NOTIFIER®

by Honeywell

PRELIMINARY

Notifier Wireless Sensor Network
LS10036-000NF-E
User Manual

Fire Alarm & Emergency Communication System Limitations

While a life safety system may lower insurance rates, it is not a substitute for life and property insurance!

An automatic fire alarm system—typically made up of smoke detectors, heat detectors, manual pull stations, audible warning devices, and a fire alarm control panel (FACP) with remote notification capability—can provide early warning of a developing fire. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire.

An emergency communication system—typically made up of an automatic fire alarm system (as described above) and a life safety communication system that may include an autonomous control unit (ACU), local operating console (LOC), voice communication, and other various interoperable communication methods—can broadcast a mass notification message. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire or life safety event.

The Manufacturer recommends that smoke and/or heat detectors be located throughout a protected premises following the recommendations of the current edition of the National Fire Protection Association Standard 72 (NFPA 72), manufacturer's recommendations, State and local codes, and the recommendations contained in the Guide for Proper Use of System Smoke Detectors, which is made available at no charge to all installing dealers. This document can be found at http://www.systemsensor.com/appguides/. A study by the Federal Emergency Management Agency (an agency of the United States government) indicated that smoke detectors may not go off in as many as 35% of all fires. While fire alarm systems are designed to provide early warning against fire, they do not guarantee warning or protection against fire. A fire alarm system may not provide timely or adequate warning, or simply may not function, for a variety of reasons:

Smoke detectors may not sense fire where smoke cannot reach the detectors such as in chimneys, in or behind walls, on roofs, or on the other side of closed doors. Smoke detectors also may not sense a fire on another level or floor of a building. A second-floor detector, for example, may not sense a first-floor or basement fire.

Particles of combustion or "smoke" from a developing fire may not reach the sensing chambers of smoke detectors because:

- Barriers such as closed or partially closed doors, walls, chimneys, even wet or humid areas may inhibit particle or smoke flow.
- Smoke particles may become "cold," stratify, and not reach the ceiling or upper walls where detectors are located.
- Smoke particles may be blown away from detectors by air outlets, such as air conditioning vents.
- Smoke particles may be drawn into air returns before reaching the detector.

The amount of "smoke" present may be insufficient to alarm smoke detectors. Smoke detectors are designed to alarm at various levels of smoke density. If such density levels are not created by a developing fire at the location of detectors, the detectors will not go into alarm.

Smoke detectors, even when working properly, have sensing limitations. Detectors that have photoelectronic sensing chambers tend to detect smoldering fires better than flaming fires, which have little visible smoke. Detectors that have ionizing-type sensing chambers tend to detect fast-flaming fires better than smoldering fires. Because fires develop in different ways and are often unpredictable in their growth, neither type of detector is necessarily best and a given type of detector may not provide adequate warning of a fire.

Smoke detectors cannot be expected to provide adequate warning of fires caused by arson, children playing with matches (especially in bedrooms), smoking in bed, and violent explosions (caused by escaping gas, improper storage of flammable materials, etc.).

Heat detectors do not sense particles of combustion and alarm only when heat on their sensors increases at a predetermined rate or reaches a predetermined level. Rate-of-rise heat detectors may be subject to reduced sensitivity over time. For this reason, the rate-of-rise feature of each detector should be tested at least once per year by a qualified fire protection specialist. Heat detectors are designed to protect property, not life.

IMPORTANT! Smoke detectors must be installed in the same room as the control panel and in rooms used by the system for the connection of alarm transmission wiring, communications, signaling, and/or power. If detectors are not so located, a developing fire may damage the alarm system, compromising its ability to report a fire.

Audible warning devices such as bells, horns, strobes, speakers and displays may not alert people if these devices are located on the other side of closed or partly open doors or are located on another floor of a building. Any warning device may fail to alert people with a disability or those who have recently consumed drugs, alcohol, or medication. Please note that:

- An emergency communication system may take priority over a fire alarm system in the event of a life safety emergency.
- Voice messaging systems must be designed to meet intelligibility requirements as defined by NFPA, local codes, and Authorities Having Jurisdiction (AHJ).
- Language and instructional requirements must be clearly disseminated on any local displays.
- Strobes can, under certain circumstances, cause seizures in people with conditions such as epilepsy.
- Studies have shown that certain people, even when they hear a fire alarm signal, do not respond to or comprehend the meaning of the signal. Audible devices, such as horns and bells, can have different tonal patterns and frequencies. It is the property owner's responsibility to conduct fire drills and other training exercises to make people aware of fire alarm signals and instruct them on the proper reaction to alarm signals.
- In rare instances, the sounding of a warning device can cause temporary or permanent hearing loss.

A life safety system will not operate without any electrical power. If AC power fails, the system will operate from standby batteries only for a specified time and only if the batteries have been properly maintained and replaced regularly.

Equipment used in the system may not be technically compatible with the control panel. It is essential to use only equipment listed for service with your control panel.

Telephone lines needed to transmit alarm signals from a premises to a central monitoring station may be out of service or temporarily disabled. For added protection against telephone line failure, backup radio transmission systems are recommended.

The most common cause of life safety system malfunction is inadequate maintenance. To keep the entire life safety system in excellent working order, ongoing maintenance is required per the manufacturer's recommendations, and UL and NFPA standards. At a minimum, the requirements of NFPA 72 shall be followed. Environments with large amounts of dust, dirt, or high air velocity require more frequent maintenance. A maintenance agreement should be arranged through the local manufacturer's representative. Maintenance should be scheduled monthly or as required by National and/or local fire codes and should be performed by authorized professional life saftety system installers only. Adequate written records of all inspections should be kept.

Installation Precautions

Adherence to the following will aid in problem-free installation with long-term reliability:

WARNING - Several different sources of power can be connected to the fire alarm control panel. Disconnect all sources of power before servicing. Control unit and associated equipment may be damaged by removing and/or inserting cards, modules, or interconnecting cables while the unit is energized. Do not attempt to install, service, or operate this unit until manuals are read and understood.

CAUTION - System Re-acceptance Test after Software Changes: To ensure proper system operation, this product must be tested in accordance with NFPA 72 after any programming operation or change in site-specific software. Re-acceptance testing is required after any change, addition or deletion of system components, or after any modification, repair or adjustment to system hardware or wiring. All components, circuits, system operations, or software functions known to be affected by a change must be 100% tested. In addition, to ensure that other operations are not inadvertently affected, at least 10% of initiating devices that are not directly affected by the change, up to a maximum of 50 devices, must also be tested and proper system operation verified.

This system meets NFPA requirements for operation at 0-49º C/32-120º F and at a relative humidity 93% ± 2% RH (non-condensing) at 32°C ± 2°C (90°F ± 3°F). However, the useful life of the system's standby batteries and the electronic components may be adversely affected by extreme temperature ranges and humidity. Therefore, it is recommended that this system and its peripherals be installed in an environment with a normal room temperature of 15-27º C/60-80º F.

Verify that wire sizes are adequate for all initiating and indicating device loops. Most devices cannot tolerate more than a 10% I.R. drop from the specified device voltage.

Like all solid state electronic devices, this system may operate erratically or can be damaged when subjected to lightning induced transients. Although no system is completely immune from lightning transients and interference, proper grounding will reduce susceptibility. Overhead or outside aerial wiring is not recommended, due to an increased susceptibility to nearby lightning strikes. Consult with the Technical Services Department if any problems are anticipated or encountered.

Disconnect AC power and batteries prior to removing or inserting circuit boards. Failure to do so can damage circuits.

Remove all electronic assemblies prior to any drilling, filing, reaming, or punching of the enclosure. When possible, make all cable entries from the sides or rear. Before making modifications, verify that they will not interfere with battery, transformer, or printed circuit board location.

Do not tighten screw terminals more than 9 in-lbs. Over-tightening may damage threads, resulting in reduced terminal contact pressure and difficulty with screw terminal removal.

This system contains static-sensitive components. Always ground yourself with a proper wrist strap before handling any circuits so that static charges are removed from the body. Use static suppressive packaging to protect electronic assemblies removed from the unit.

Follow the instructions in the installation, operating, and programming manuals. These instructions must be followed to avoid damage to the control panel and associated equipment. FACP operation and reliability depend upon proper installation.

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Software Downloads

In order to supply the latest features and functionality in fire alarm and life safety technology to our customers, we make frequent upgrades to the embedded software in our products. To ensure that you are installing and programming the latest features, we strongly recommend that you download the most current version of software for each product prior to commissioning any system. Contact Technical Support with any questions about software and the appropriate version for a specific application.

Documentation Feedback

Your feedback helps us keep our documentation up-to-date and accurate. If you have any comments or suggestions about our online Help or printed manuals, you can email us.

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Send email messages to:

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Table of Contents

Section 1: About This Guide

1.1 Purpose

The Notifier Wireless Sensor Network user's manual provides an overview of the following:

- Wireless fire alarm system.
- Instructions for installing and configuring the wireless devices.
- Information on monitoring the status of the wireless devices.
- Removal and replacement procedures of the FWSG.
- Testing, maintenance, and firmware upgrade information of the FWSG.

1.2 Assumed Knowledge

The document is created with the assumption that all users are familiar with working on a PC and laptop for configuration purposes. Installers should be familiar with Fire Alarm and Related Service Standards.

The terminology and level of details of this document reflect this assumption.

1.3 Site Survey

A site survey is recommended to assess and qualify the site prior to installing the Wireless Fire Alarm system. The site survey utility allows you to perform the Link quality test and radio frequency (RF) assessment of the site. This information is used for site qualification, maximum device spacing identification, and configuring the network. This helps to optimize the reliability and performance of the wireless network in the wireless fire alarm system. Conduct a site survey, and ensure there are no obstructions for using RF communications. For more information on a site survey, refer to Appendix A:, "Site Survey".

1.4 Abbreviations and Meanings

The following table lists the abbreviations and their definitions used in this manual.

Abbreviation	Definition
AHJ	Authority Having Jurisdiction
ANSI	American National Standards Institute
dBm	Milli Decibel
FACP	Fire Alarm control Panel
FCC	Federal Communications Commission
FWSG	Fire Wireless System Gateway
ISM Band	Industrial, Scientific and Medical Radio Bands.
LCD	Liquid Crystal Display
LED	Light Emitting Diode
mA	Milliampere
MHz	Megahertz
NFPA	National Fire Protection Association
PC	Personal Computer
RF	Radio Frequency
SLC	Signaling Line Circuit
UI	User Interface
UL	Underwriters Laboratories
USB	Universal Serial Bus

Section 2: FWSG

2.1 Description

The FWSG is a device in a wireless fire system th at acts as a bridge between fire alarm control panels and wireless fire devices. All wireless fire devices communicate with the FWSG over the wireless network formed by the devices and the FWSG.

The FWSG is powered by either the SLC loop or from any external 24VDC UL listed power supply. It uses FlashScan protocol on the SLC to communicate with the panel and a proprietary wireless protocol to communicate with wireless fire devices. The following graphic is an illustration of the components of the Firelite Wireless Sensor Network.

Figure 2.1   Wireless Fire Alarm System

2.2 Agency Approvals

2.2.1 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 interferences that may cause undesired operation.

FCC ID PV3WFSGW

WARNING: CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE MANUFACTURER COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

2.3 Specifications

Following are the specifications of an FWSG.

Specifications	Data
External Supply Electrical Ratings	18V-30V
SLC Electrical Ratings	15V-30V
Maximum current when using the external supply	40mA
Maximum current when using the SLC power supply	24mA
Maximum SLC Resistance	50 Ohms
Minimum signal strength level needed at the receiver for a primary path with weak link trouble reporting enabled.	-50dBm
Minimum signal strength level needed at the receiver for a secondary path or primary path with weak link trouble reporting disabled.	Must be 15 dBm higher than the noise floor down to a minimum of -87dBm*
Maximum ambient noise level	-90dBm
Maximum RF Power Output	+17dBm (Tx power level without antenna)
Radio Frequency	Lower ISM Band (915 MHz).

NOTE: Devices that do not meet the minimum signal strength or have an ambient noise level that exceeds the limit are not allowed to join the mesh network.

2.3.1 Environmental Specification

System	Operating Temperature	Storage Temperature	Humidity
FWSG	0°C-49°C/32°F-120°F	-10°C-60°C/14°F-140°F	10 to 93% RH Non condensing

2.4 Installing FWSG

2.4.1 Before Installing

Choose a location for the FWSG that is clean, dry, and vibration-free. The area should be readily accessible with sufficient room to easily install and maintain the FWSG. Metal obstructions that impede the radio frequency communication and should be avoided. Carefully unpack the system and inspect for shipping damage if any. All wiring must comply with the national and local codes for fire alarm systems.

2.5 Mounting & Wiring

2.5.1 Mounting

The FWSG has two major pieces, the cover and the mounting plate. The mounting plate is mounted to the wall or ceiling and field wiring is connected to it. The cover contains the PC board and is fastened to the mounting plate once the wiring is connected.

Mount the mounting plate directly to an electrical box on the ceiling or wall. The plate mounts directly to 4″ square (with and without plaster ring), 4″ octagon, 3 1/2″octagon, single gang or double gang junction boxes. If an electrical box is not available, the mounting plate can be mounted to any flat surface and the wiring can be connected via the knockout points in the mounting plate.

To mount the FWSG, do the following:

1. Pull the wiring through the opening in the mounting plate.
2. Mount the mounting plate to the junction box, wall or ceiling. See Figure 2.2, "Mounting Plate".
3. Connect field wiring to the terminals, as described in 2.5.2 "Wiring".
4. Connect necessary jumpers where applicable, as described in 2.5.3 "FWSG Powered from SLC".
5. To mount the cover, align the locating pins on the cover to the corresponding slots in the mounting plate. See Figure 2.3, "Cover Attaching to Mounting Plate".
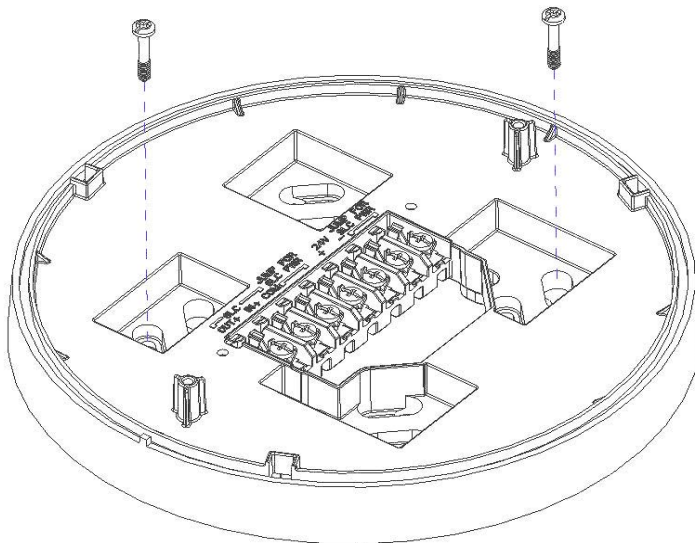6. Secure the cover by tightening the mounting screws.
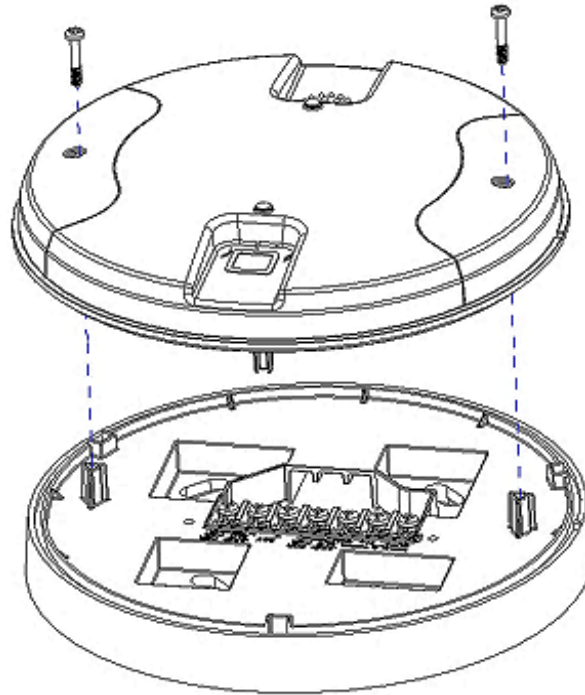

Figure 2.2 Mounting Plate

Figure 2.3 Cover Attaching to Mounting Plate

2.5.2 Wiring

- All wiring must be installed in compliance with the National Electrical Code and the local codes having jurisdiction.
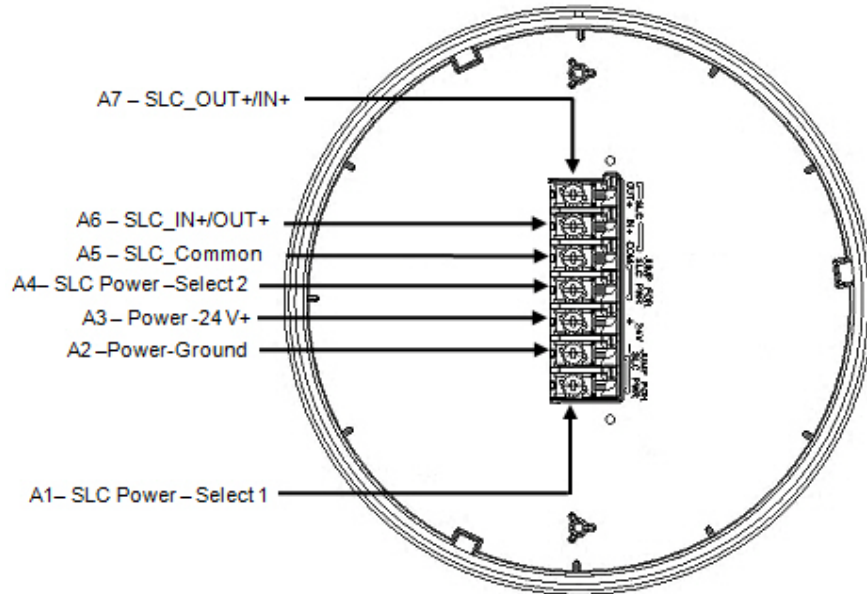- 12-18 AWG is recommended.

Figure 2.4 Wiring Diagram with Terminal Descriptions

For wiring connections, follow this procedure:

- Strip about 3/8" of insulation from the end of the wire.
- Then, to make the wire connection, slide the bare end of the wire under the appropriate clamping plate, and tighten the clamping plate screw.

NOTE: Do not loop the wire under the clamping plate.

2.5.3 FWSG Powered from SLC

To power the FWSG using the signal line circuit, connect it as described in table 2.1 below:

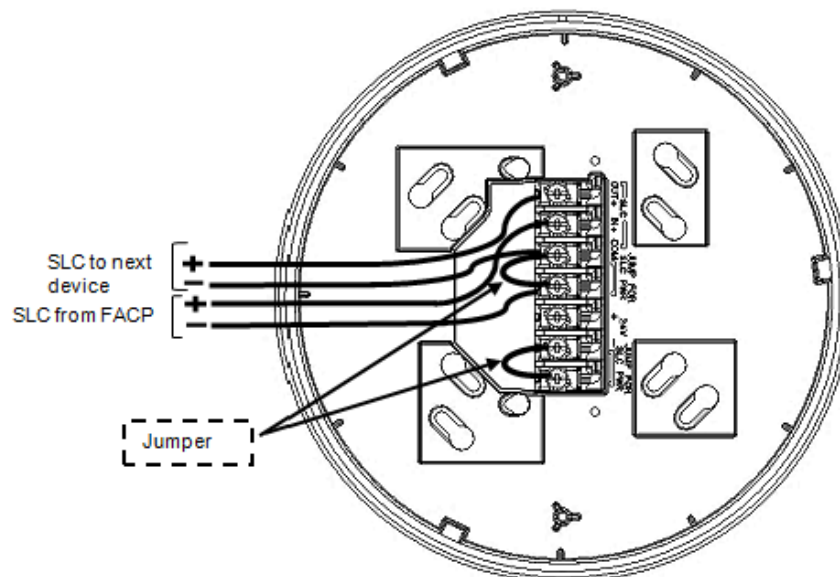| Terminal Pins	Description
A5 & A7	SLC Common & SLC Output/Input
A5 & A6	SLC Common & SLC Input/Output
A4 & A5	Jumper selection to enable power from the SLC supply (Insert jumper when using SLC power)
A3	Unused
A1 & A2	Jumper selection to disable power from the external supply. (Insert jumper when using SLC power)

Table 2.1

Figure 2.5 Wiring Connections (FWSG powered from SLC)

NOTE: It is recommended to use the same wire gauge if there are multiple connections to the same terminal.

The FWSG provides isolation of short circuits on the SLC in Class A installations, that use the A6 and A7 connections as an in and out connection. A5 is common for SLC wiring that enters and leaves. Class B wiring that terminates at the FWSG can use either the A6 or A7 connection for the SLC positive. SLC connections are power limited by the panel. An interruption in the SLC that causes a loss of power at the FWSG for more than 100ms may result in a trouble condition and loss of fire protection provided by the wireless devices for up to 15 minutes. Using an external 24V power source (not SLC power) is recommended for installations that require fire protection in the presence of short circuits, including class A applications and applications that utilize isolator modules.

2.5.4 FWSG Powered from an External +24VDC Source

To power the FWSG using a +24VDC source, connect the FWSG as described in table 2.2 below.

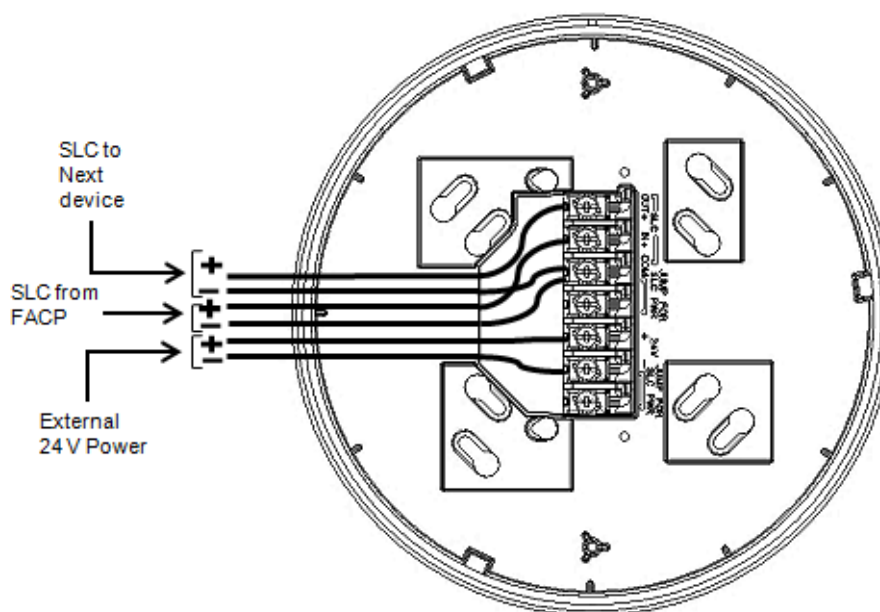| Terminal Pins	Devices Powered
A5 & A7	SLC Input/output
A5 & A6	SLC Input/output
A4	Unused
A2 & A3	+24VDC input. Voltage range from 18VDC to 30VDC. Use only power limited circuits
A1	Unused

Table 2.2

Figure 2.6 Wiring Connections -FWSG powered from an external +24VDC source

NOTE: Terminal A5 is referenced more than once in the above connections. It is recommended to use wire of the same gauge for all connections to A5 and use the same wire gauge if there are multiple connections to the same terminal.

The FWSG provides isolation of short circuits of the SLC in class A installations that use the A6and A7 as an in and out connection. A5 is common for in and out SLC wiring. Class B SLC wiring that terminates at the FWSG can use either the A6 or A7 connection for the SLC positive. SLC connections are power limited by the panel. 24VDC must be power limited by the source.

2.6 Configuration and Programming

The goal of configuring and/or programming the FWSG is to:

1. Create a profile - A profile isa set of parameters that binds together the FWSG and the devices in a mesh network.
2. Distribute the profile to every device that will be a part of the mesh.
3. Form the mesh - The mesh cannot be formed until the profile is assigned to the FWSG. The profile contains a mesh ID and, if required, a password, that are used when forming the associations. Creating and distributing the profile will enable all the devices that have that profile to form associative links when the mesh is formed. All devices, including the FWSG, require a common profile.

This section shows how to configure/program an FWSG with a profile, how to distribute that profile to other devices, and how to form all these devices into a mesh. These processes may be performed with or without using PC-based configuration tool.

2.6.1 Without a PC-based Configuration Tool

This section shows the configuration of the FWSG using only a magnet and a screw driver. For configuration instructions using the PC-based configuration tool, refer to 2.6.2 "With a PC-based Configuration Tool".

There are two ways to provide an FWSG with a profile without using a configuration tool.

*   Create a new profile using the FWSG
*   Assign a previously created profile to the FWSG using a distributor.

Create a New Profile

To create a unique profile in the FWSG without using the PC-based configuration tool, perform the following steps.

1. Start with the device powered off. The process is performed during the start-up.
2. Power on the FWSG using SLC power or external +24V. This can be done either by attaching the FWSG to its mounting plate with the terminals already energized, or by connecting the SLC or external source wiring to a FWSG that is already installed in its mounting plate.
3. Verify if the FWSG is in the factory default state; if it is in the factory default state, both the LEDs on the FWSG flash red (double blink) every second for ten seconds. If the LEDs are yellow, refer to the topic below on "Removing a Profile".
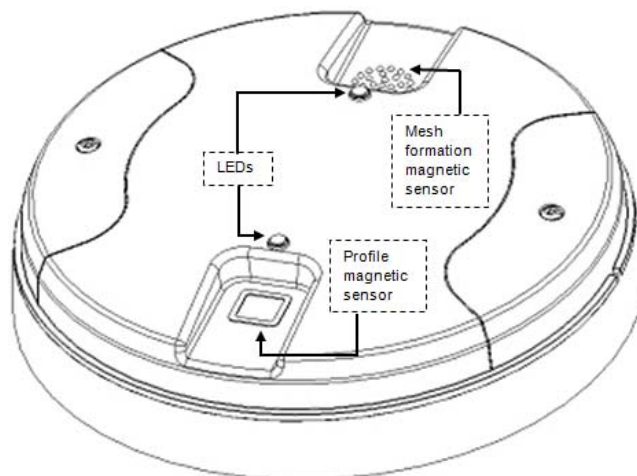

Figure 2.7 FWSG with LEDs and Magnetic Sensors

4. Activate either magnetic sensor with a magnet within ten seconds of starting up the FWSG while the double red blink is active on the FWSG. (If you miss this ten-second window, power down the FWSG and repeat step 1). The LED next to the magnetic sensor emits a red light for one second when it is activated.

When the profile is successfully created, the LEDs on the FWSG emit green light for five seconds (Refer to 2.7.2 "Magnet Sensor Activations" for further information on activating magnetic sensors). A default profile has been created, containing a mesh ID, and a password. The default password is '12345' and is needed if the FWSG is locked by the FACP and later accessed by the PC-based configuration tool.

Next, the FWSG starts the profile distribution mode. Refer to 2.6.3 "Profile Distribution" for further information on profile distribution mode.

Assign a Previously Created Profile Using a Distributor

To assign an existing profile to the FWSG (as you would do during a replacement), use the FWSG that has the profile, or a device in the mesh that contains the profile, to distribute that profile to the FWSG that requires it. Perform the following steps:

1. Ensure that the FWSG or other mesh device with the profile is set for distribution (Refer to 2.6.3 "Profile Distribution" or 3.6.2 "Distributor Mode").
2. Start with the device powered off. The process is performed during the start-up.
3. Power on the FWSG and ensure it is in the factory default state (Refer to steps 1 and 2 in the above topic "Create a New Profile").
4. Bring the profile distributor within 20 feet of the FWSG.
5. Wait until the FWSG blinks only a single red blink (ten seconds after startup).
6. Use a magnet to activate either of the magnetic sensors. The LED blinks a single red every half-second indicating that it is searching for a profile.

When the profile is successfully received from the distributor, the LEDs on the FWSG emit green light for five seconds. If the profile is rejected, the FWSG LEDs emit red light for five seconds.

Removing a Profile

To remove the profile from an FWSG, perform the following steps:

1. Start with the device powered off. The process is performed during the start-up.
2. Power on the FWSG using SLC power or external +24V. This can be done either by attaching the FWSG to its mounting plate with the terminals already energized, or by connecting the SLC or external source wiring to a FWSG that is already installed in its mounting plate.
3. Verify the FWSG is in the profile modification state; if it is in the profile modification state, both the LEDs on the FWSG flash yellow (double blink) every second for ten seconds.
4. Activate both using magnetic sensors within ten seconds of starting up the FWSG (while the double yellow blink is active on the FWSG) or repeat step 1 (If you miss the ten second window, power down the FWSG and repeat steps 1 and 2).

The FWSG LEDs blink green every second for five seconds indicating that the profile is removed.

Create Mesh Network

Mesh formation forms a wireless communication mesh around the FWSG. The FWSG communicates with all devices in range that have a common profile and establishes communication links with all the devices. Once a device joins the mesh, it acts as a repeater for devices out of the range of the FWSG. All devices must be in their final mounting locations prior to initiating the mesh formation. The mesh formation is initiated and terminated by the FWSG.

To form a mesh network, ensure that the FWSG is powered on and contains a profile (Refer to 2.7.3 "LED Indications" for information on how the FWSG indicates its status). Activate the mesh formation magnet sensor on the FWSG with a magnet.
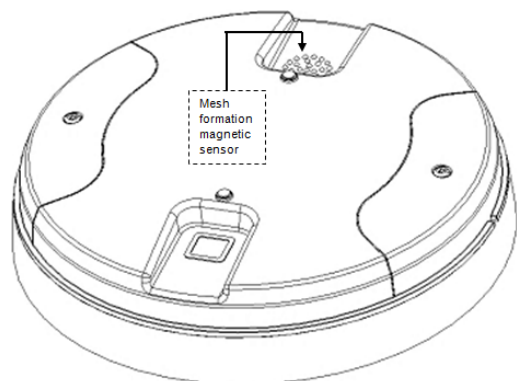
Figure 2.8 Mesh Formation Magnetic Sensor on a FWSG

The FWSG transitions to the mesh formation mode and establishes communication with all the devices containing a common profile. The blink pattern on the FWSG indicates that it is in mesh formation mode.

•At this stage, both the LEDs on the FWSG blink twice every 3.4 seconds.

•The first blink is green and the second blink is red when the FWSG is acting as a profile distributor and forming the mesh.

•   The first blink is green and the second blink is yellow when the FWSG is only forming the mesh.

Mesh formation typically takes one minute for each device in the mesh. Mesh formation automatically terminates 10 minutes after the last device joins the mesh. The mesh formation can be terminated manually by the user by activating the mesh formation magnetic sensor again.

Once the mesh formation is complete, the network transitions to optimize the mesh. For further operating instructions, refer to 2.7 "Operations".

2.6.2 With a PC-based Configuration Tool

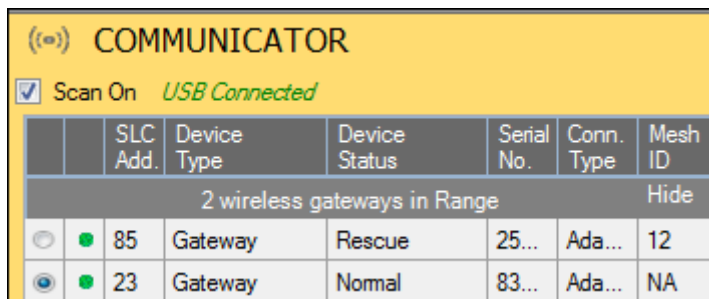### Assigning Profile with PC Tools

To assign a profile to the FWSG using the PC Tools application, do the following:

1.   Connect the W-USB dongle device to your computer. For more information on USB dongle, refer to Section 4: "USB Adapter".

2.   Launch the PC Tools application. Refer Appendix B: "PC Tools" to know about launching the PC Tools application.

3.   Go to the **Create Mesh Network** step.

4.   Create a new profile or import an existing profile as required.

5.   Select and open the profile to be assigned to the FWSG from the **Name** drop-down list in the left panel.
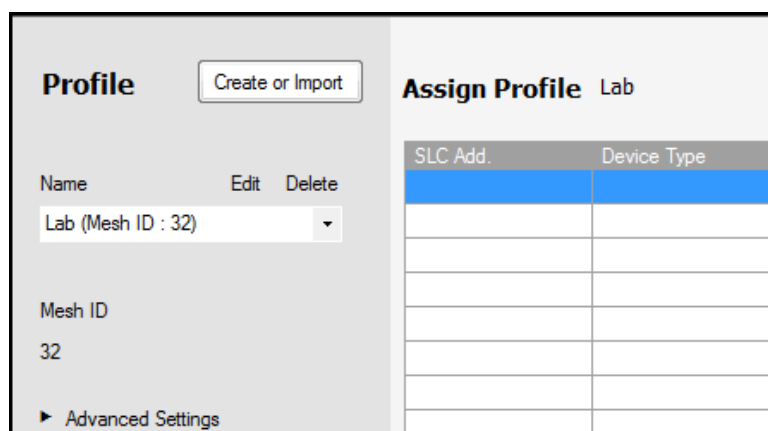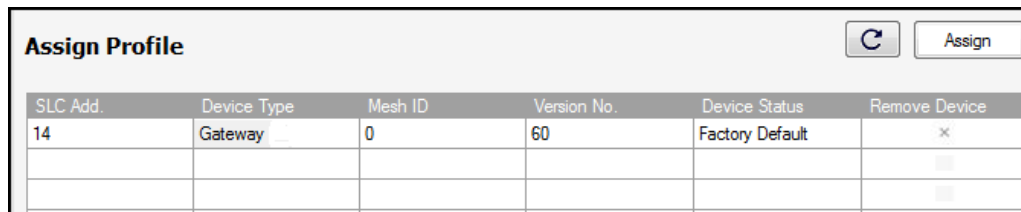

6.   Power on the FWSG in range of the PC Tools.

7. Select the FWSG from the **Communicator** panel.


8. Click **Assign**.

The FWSG is now included in the list of devices with a profile assigned.

Removing Profile with PC Tools

To remove a profile in a FWSG using the PC Tools application, do the following:

1. Connect the W-USB dongle device to your computer. For more information on the USB dongle, refer to Section 4: "USB Adapter".

2. Launch the PC Tools application. Refer Appendix B: "PC Tools" to know about launching the PC Tools application.

3. Go to the **Site Survey**, **Create Mesh Network,** or **Diagnostics** step.

4. Click **Extras** and select **Reset Devices**. The **Reset Devices** screen appears, displaying the FWSG and other devices that have a profile assigned.
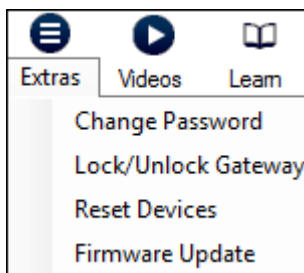
5. Click to select the FWSG and click **Reset Device** to remove the profile.
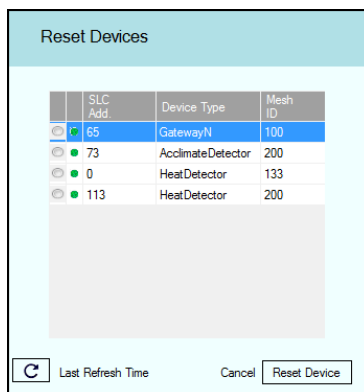
The profile is removed and the FWSG is reset to factory default state.

Mesh Formation with PC Tools

To create a mesh network using the PC Tools, perform the following steps.

1. Connect the W-USB dongle device to your computer. For more information on the USB dongle, refer to Section 4: "USB Adapter"

2. Launch the PC tools application. Refer Appendix B: "PC Tools" to know about launching the PC Tools application.

3. Go to the **Create Mesh Network** step.

4. Navigate to the second step of **Create Mesh Network** by clicking on top of the screen.

Steps 1/2
Assign Profile → Next

5. Click to select the FWSG displayed in the **Gateways in Range** table, and click '**Start Mesh Formation**'.

Gateways in Range

	Profile Name	Mesh ID	Gateway State	No. of Devices Joined	Total Device Count Expected	Progress Status
○		103	Normal		2	
○		255	Normal		0	

When the mesh is formed, the tool helps you to track the number of devices that have joined the mesh, and view the progress. The mesh formation terminates in 10 minutes after the last device joins the mesh. In addition, it can be terminated by the user by clicking **Stop Mesh Formation**.

Once mesh formation is complete, the network transitions to optimize the mesh. For further operating instructions, refer to 2.7 "Operations".

2.6.3 Profile Distribution

There are two ways to initiate profile distribution from an FWSG.

• Automatically after creating a profile,
• Activating the profile creating magnetic sensor when it has a profile.

After Creating a Profile

Profile distribution is automatically enabled from an FWSG after creating a profile. The profile distribution automatically terminates after 10 minutes.

Activating the Profile Magnetic Sensor when it has a Profile
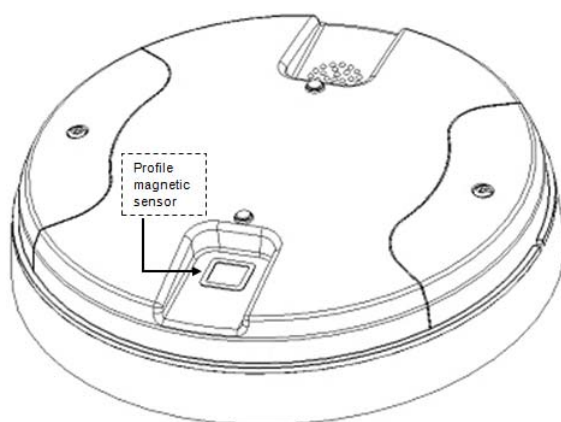
Activating the profile magnetic sensor while it has a profile will put an FWSG in a mode of distributing the profile to any device that requests a profile. The FWSG's LED pattern will be altered when it is distributing a profile for easy identification. Profile distribution will automatically terminate after 10 minutes. For more information on FWSG LED patterns, refer to the table in 2.7.3 "LED Indications".

Figure 2.9 Profile Magnetic Sensor on FWSG

2.6.4 SLC Configuration

The FWSG,

- •   Communicates with the control panel via the SLC circuit.
- •   Is a FlashScan only device.
- •   CLIP mode is not supported.
- •   Is only compatible with Fire Alarm Control Panels version 21 or higher.
- •   Occupies one module SLC address. Set the address using the rotary dials on the FWSG prior to installation.

The point uses the following configuration parameters:

- •   Module Type: Monitor
- •   Type Code Label: RF GATEWAY
- •   Flash Scan Type: RF GATEWAY

An FWSG does not initiate alarms but the point is used for event reporting.
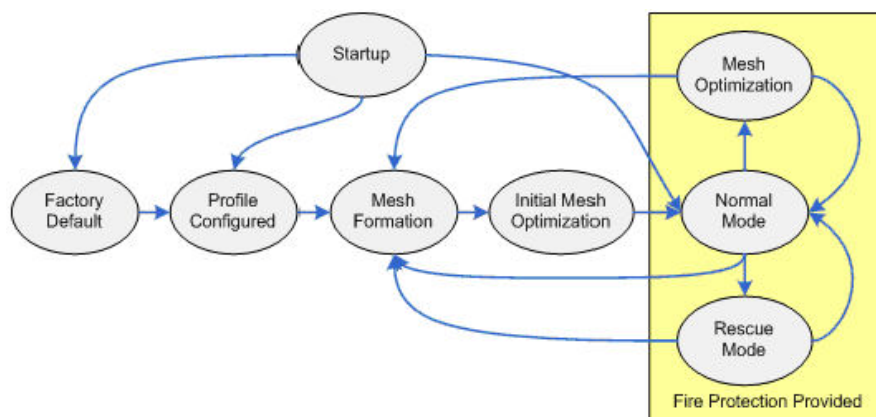
2.7 Operations

2.7.1 FWSG Modes Of Operation

Figure 2.10 FWSG Modes Of Operation

Start Up

Startup is a temporary mode of operation. It is during the startup mode, a profile can be created or removed. The startup period lasts for 10 seconds. If a particular unit contains a profile, the LEDs blink yellow twice every second. If the unit does not contain a profile, the LEDs blink red twice every second.

During startup, the FWSG does not provide fire protection.

After startup, the FWSG proceeds to the **factory default** state if a profile was removed or missing. In the presence of a profile, the FWSG will proceed to **mesh formation** if it was previously part of a mesh network or **normal mode** if it was not previously part of a mesh network. The FWSG does not respond to the FACP during startup mode.

Factory Default

Factory default is the initial mode of the FWSG. The FWSG and peripheral devices do not provide any fire protection when they are in factory default mode. The FWSG does not communicate with wireless devices. The only wireless communication is with the configuration tool. The configuration tool needs to be within 20 feet of the FWSG for communication. The FWSG needs to be assigned a profile before continuing the installation.

The FWSG reports a 'PROFILE MISSING' or 'PR MIS' trouble to the FACP. The FWSG reports "Factory Default" to the communicator display of the PC Tools application.

Profile Configured

The FWSG enters the profile configured mode after getting assigned a profile from the tool or a distributor or creating a profile. Profile configured mode is a temporary mode before the FWSG transitions to mesh formation or normal mode.

The FWSG does not provide fire protection in the profile configured mode. While in the profile configured mode, the FWSG reports a "MESH NOT FORMED" or "NO MSH" trouble to the FACP. The FWSG reports "Profile Assigned" to the communicator display of the PC Tools application.

Mesh Formation

The FWSG must have a profile before entering mesh formation. The FWSG and the peripheral devices do not provide any fire protection in mesh formation. The FWSG automatically enters mesh formation mode in the following ways:

- After creating a profile using the mesh formation sensor.
- After activating the mesh formation sensor with a magnet when the FWSG contains a profile.
- Automatically after startup when the FWSG previously was part of a mesh.
- By command from the PC Tools application.
- By command from the FACP.

A FWSG in mesh formation mode instructs all devices in the mesh to also transition to mesh formation. The FWSG and all communicating devices search for new or lost devices with the same profile to join the network.

If the FWSG automatically entered mesh formation mode after startup, then mesh formation terminates after all existing devices are recovered. If new devices are found or if mesh formation was initiated by the user, then mesh formation terminates after a period of 10 minutes without any new devices joining the mesh. At any point, mesh formation can be terminated by user interaction by activating the magnet sensor again, by using the PC Tools application, or by using FACP.

The FWSG reports a "NO WIRELESS DEVS" or "NO DEV" trouble when it is in Mesh Formation mode without any attached devices. The FWSG reports a "MESH IS FORMING" or "MS FRM" trouble when it is mesh formation mode with additional devices in the mesh. The FWSG reports "Mesh Formation" to the communicator display of the PC Tools application.

Initial Mesh Optimization

The initial mesh optimization mode automatically runs after each **mesh formation**. The FWSG and peripheral devices do not provide fire protection during the initial mesh optimization. Mesh optimization mode analyzes the signal strengths between devices. The FWSG designates the primary and secondary communication paths between devices that provide a redundant path for all transmissions. Mesh optimization terminates automatically once all devices have a redundant communication path and signal strengths that meet the requirements of primary and secondary transmission paths. Any device that does not have a redundant path or meet the requirements for signal strength will report a fault.

The FWSG reports an 'OPTIMIZING MESH' or 'OPT MS' trouble to the FACP. The FWSG reports "Optimization" to the communicator display of the PC Tools application.

Normal Mode

Normal mode can be described as a standard operating state. The mesh network is formed, providing fire protection. The mesh network continuously searches for additional devices with a matching profile to join the mesh. To avoid interference, the mesh network periodically checks for adjacent mesh networks created by Honeywell. The FWSG reports "Normal" to the communicator display of the PC Tools application.

Rescue Mode

During **normal mode**, when a device loses communication to the network, the FWSG triggers the rescue mode in all communicating devices. All devices in communication continue to provide fire protection during rescue mode; but also search for a lost or added device. The rescue mode terminates automatically 6 minutes after the last device is rescued and returns to the **normal mode**. The FWSG does not report trouble during rescue mode. The FWSG reports "Rescue" to the communicator display of the PC Tools application.

Mesh Optimization

In addition to the **initial mesh optimization**, the routine executes after any large change to the network configuration or to recover from a link failure (class A fault). Mesh optimization that occurs during the normal mode does not generate a trouble and provides fire protection from all devices that are participating in the mesh communication. The FWSG reports "Optimization" to the communicator display of the PC Tools application.

Bootloader

The FWSG enters the bootloader mode when it is being updated using the PC Tools application. The FWSG does not communicate with the FACP during bootloader mode. The FWSG reports "Bootloader" to the communicator display of the PC Tools application.

2.7.2 Magnet Sensor Activations

Profile Magnetic Sensor

The profile magnetic sensor (Figure 2.9, "Profile Magnetic Sensor on FWSG") is used to create a unique profile on startup. It can also be used to start profile distribution for a FWSG that contains a profile. The LED next to the profile magnetic sensor emits solid red light for ½ a second when the sensor is activated.

Mesh Formation Magnetic Sensor

The mesh formation magnetic sensor (Figure 2.8, "Mesh Formation Magnetic Sensor on a FWSG") toggles the FWSG, in and out of mesh formation mode. The initial activation of the sensor puts the FWSG in mesh formation mode (as long as it contains a profile). A subsequent activation of the magnetic sensor toggles the FWSG out of mesh formation and into the initial mesh optimization and normal mode. The FWSG can be placed back into mesh formation by activating the magnet sensor once again. The Mesh formation magnetic sensor can also be used to create a profile on startup for a FWSG that does not already contain a profile.

The LED next to the mesh formation magnetic sensor emits solid red light for ½ a second when the sensor is activated.

2.7.3 LED Indications

The two LEDs on the FWSG blink in the same pattern to allow the LED to be viewed from any angle. The LED indications are provided in the table below.

LED Pattern	Condition	Action Required
Bootloader	Device is ready to update	Use PC based configuration tool to initiate the download
App loading App erase	New application code is being downloaded	
Mesh formation	Gateway is forming the mesh & looking for devices that are not in the mesh	Wait until all devices join the mesh, and then terminate mesh formation
Mesh formation with profile distribution	Gateway is forming the mesh & looking for devices that are not in the mesh. The gateway is also distributing a profile to any device that requests a profile	Wait until all devices join the mesh, and then terminate mesh formation
Profile removed	Gateway has returned to the factory default state	
Profile accepted	Gateway is now profile assigned	
Normal Mode / Background mesh optimization	Normal operation of the gateway	
Normal Mode/Background mesh optimization with profile distribution	Normal operation of the gateway. The gateway is also distributing a profile to any device that requests a profile	
Rescue Mode	Gateway and the mesh network are searching for any device that is not in the mesh network with the same profile	

Legend

No. of blinks
LED color
Interval between blink patterns
Duration of LED state
Approximate duration

Example:

Two blinks in this pattern
First blink is green. Second is yellow
7 sec between blink patterns
Will transition to next state after 30 min (approx)

All units are in seconds. Minute is indicated by M.

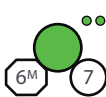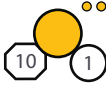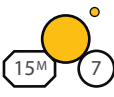| LED Pattern	Condition	Action Required
Rescue Mode with profile distribution (6M, 7)	Gateway and the mesh network are searching for any device that is not in the mesh network with the same profile. The gateway is also distributing a profile to any device that requests a profile	
Profile assigned; pending hall sensor activations (10, 1)	starting up with a profile	Activate both hall sensors simultaneously within 10 seconds to remove a profile
1st mesh optimization (15M, 7)	Mesh is formed and initializing	Ensure all devices in the mesh have a valid address.
1st mesh optimization with profile distribution (15M, 7)	Mesh is formed and initializing. The gateway is also distributing a profile to any device that requests a profile	
Generic Trouble (14)	The gateway has a trouble condition.	Refer to the panel to identify the trouble and possible resolution
Generic Trouble with profile distribution (14)	The gateway has a trouble condition. The gateway is also distributing a profile to any device that requests a profile.	Refer to the panel to identify the trouble and possible resolution
Address Trouble (4)	The gateway is in a dual address condition with another wireless module in the mesh or there is a device in the mesh set to address 0.	Ensure all devices in the mesh have a valid address.
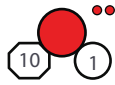
Legend

- No. of blinks
- LED color
- Interval between blink patterns
- Duration of LED state
- Approximate duration

Example:

- Two blinks in this pattern
- First blink is green. Second is yellow
- (30M, 7) 7 sec between blink patterns
- Will transition to next state after 30 min (approx)

All units are in seconds. Minute is indicated by M.

LED Pattern	Condition	Action Required
Address Trouble with profile distribution	The gateway is in a dual address condition with another wireless module in the mesh or there is a device in the mesh set to address 0. The gateway is also distributing a profile to any device that requests a profile.	Ensure all devices in the mesh have a valid address.
Factory default; pending hall sensor activation	Starting up without a profile	Activate either hall sensors within 10 seconds to create a default profile
Waiting for profile	Gateway is factory default	Use PC tool to assign profile or activate switch to search for profile
Searching for profile	Gateway is factory default and requesting a profile from a distributor or another gateway	
Profile rejected; incompatible device	There is a mismatch between the profile and the gateway.	Recreate the profile or update the gateway
Create profile	Gateway is creating a default profile	

Legend

No. of blinks
LED color
Interval between blink patterns
Duration of LED state
Approximate duration

Example:

Two blinks in this pattern
First blink is green. Second is yellow
7 sec between blink patterns
Will transition to next state after 30 min (approx)

All units are in seconds. Minute is indicated by M.

2.7.4 Lock/Unlock FWSG

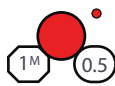The FWSG can be locked to prevent access to the magnetic sensors, and to password-protect all wireless interactions. The lock function can be performed by the PC Tool or by the FACP. When the PC Tool is used to lock the FWSG, a password must be provided for all future interactions, including unlocking the FWSG. When the FWSG is locked by the FACP for the first time, a default password of "12345" is applied. If the FWSG was previously locked with a password from the PC tools, the previous password will be applied. Use this password for all future interactions from the PC Tools application.

Lock/Unlock FWSG through FACP

The lock/unlock function for the NFS2-3030 is accessible using the point programming menu. For more information refer to the NFS2-3030 manual, part number LS10006-051NF-E.

Lock/Unlock FWSG through PC tools

To lock/unlock FWSG through PC tools, perform the following steps:

1. Connect the W-USB dongle device to your computer. For more information on USB dongle, refer to Section 4: "USB Adapter".

2. Launch the PC Tools application. Refer to Appendix B: "PC Tools" to know about launching the PC Tools application.

3. Go to **Site Survey**, **Create Mesh Network,** or **Diagnostics** step.

4. Click **Extras.** The following screen is displayed.
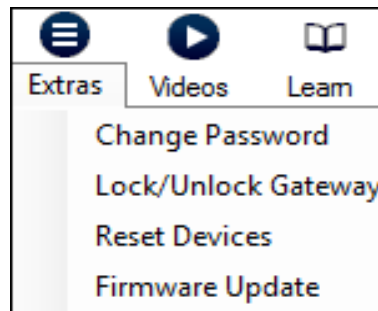
5. Select **Lock/Unlock Gateway**. The **Lock/Unlock gateway** screen appears, displaying the FWSG that is locked.
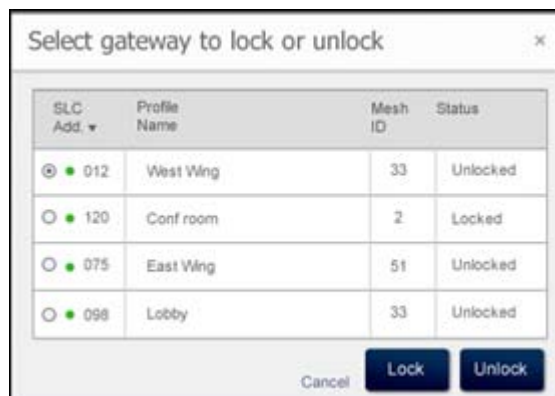
6. To lock or unlock the gateway, click **Lock or Unlock** as required.

    • **Lock -** The **Lock Gateway** screen is displayed. Create a password and click **Lock**. The gateway is locked.

    • **Unlock** - The **Enter password for Gateway** screen is displayed. Enter the password and click **Unlock**. The FWSG is unlocked.

Password Reset

To reset the password, contact technical support.
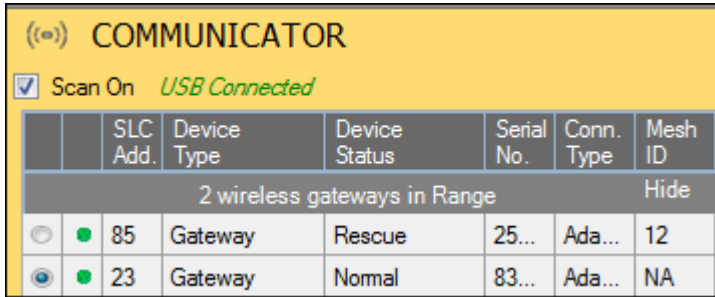
2.7.5 Weak Link Trouble Reporting

The Notifier Wireless Sensor Network uses two paths of communication for each device. To establish the link between devices as a viable communication path, the signal strengths must meet the limits provided in Section 2.3, "Specifications". The Wireless Sensor Network implements a higher threshold for primary connections to provide an extra layer of robustness and immunity from interference. A weak link trouble condition is initiated for any device that does not have at least one connection at the primary threshold. This is an optional setting that can be disabled to ignore the weak link trouble condition. The trouble can be disabled at the FWSG or at the FACP (NFS2-3030 only). Disabling the trouble reporting at the panel will prevent the event from registering as a trouble but still enters into history as a background event. Disabling the trouble reporting at the FWSG prevents the event from being reported to the FACP as a trouble or a non-trouble event. To have trouble reporting enabled, turn the settings on at both locations.

Disabling Trouble Reporting at the FWSG Using PC Tools

To disable trouble reporting at the FWSG through PC tools, perform the following steps:

1. Connect the W-USB dongle device to your computer. For more information on USB dongle, refer to Section 4: "USB Adapter".
2. Launch the PC Tools application. Refer to Appendix B: "PC Tools" to know about launching the PC Tools application.
3. Go to **Diagnostics** step.
4. Choose the FWSG from the communicator pane.

5. Click **View Mesh.**
6. Click **Advanced Functions**. A drop-down list is displayed.

7. Click **Weak links troubles.** The **Report weak links troubles** screen is displayed.
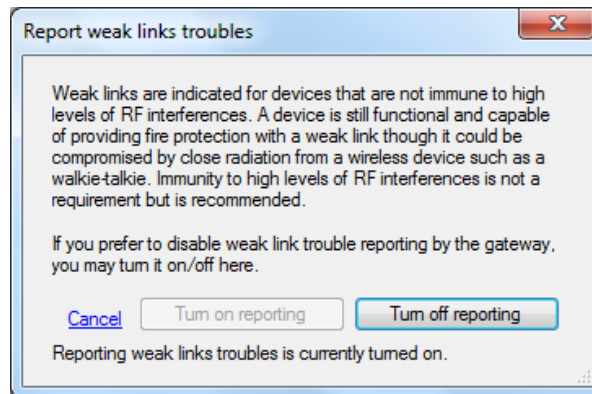
8. Click **Turn off reporting.**

The trouble reporting is disabled.

Disabling Trouble Reporting in the Panel

To disable trouble reporting at the panel, refer to the manual for the NFS2-3030, part number LS10006-051NF-E.

2.7.6 Collapse Network Command
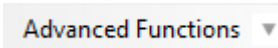
The collapse command is a diagnostic function to break the mesh network. All devices will retain the profile information but will be removed from the mesh. The mesh can be immediately reformed by activating mesh formation.

CAUTION: FIRE PROTECTION FROM WIRELESS DEVICES WILL BE LOST WHEN A COLLAPSE COMMAND IS ISSUED.

The mesh network can be collapsed using the PC-based configuration tool or through the NFS2-3030 panel.

Collapsing Mesh Network Using PC Tools

To collapse the mesh network using the PC based configuration tool, perform the following steps:

1. Connect the W-USB dongle device to your computer. For more information on USB dongle, refer to Section 4: "USB Adapter".
2. Launch the PC Tools application. Refer to Appendix B: "PC Tools" to know about launching the PC Tools application.
3. Go to **Diagnostics** step.
4. Select a Gateway from the **Communicator** pane.
5. Click **View Mesh**. The mesh is displayed.
6. Click Advanced Functions on top of the mesh display. A drop-down list is displayed.
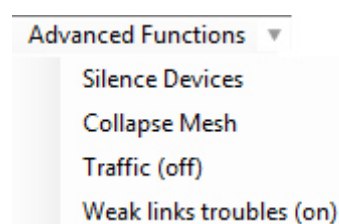
7. Click **Collapse Mesh**. The **Collapse mesh network** screen is displayed.

8. Click **Yes.**

The network is collapsed and a confirmation is displayed as shown below:
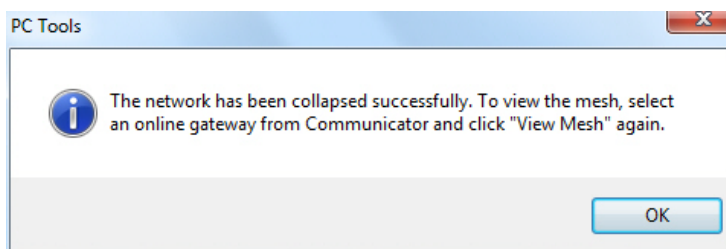
Collapsing Mesh Network in the Panel

To collapse the mesh network using the NFS2-3030, refer to the "shutdown wireless" entry in the NFS2-3030 operations manual, part number LS10006-051NF-E.

2.7.7 Silence Network Command

The silence network command is a diagnostic function to turn off all radio communication from the wireless devices for the set amount of time. All devices will retain the profile information but will be removed from the mesh. The devices will not send or receive any wireless communication until the set time expires or the device is rebooted. The mesh network can be reformed at the end of the silence period or after the device is restarted.
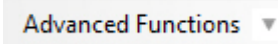
CAUTION: FIRE PROTECTION FROM WIRELESS DEVICES WILL BE LOST WHEN A SILENCE COMMAND IS ISSUED.

The mesh network can be silenced using the PC-based configuration tool or through the NFS2-3030 panel.

Silencing Mesh Network Using PC Tools

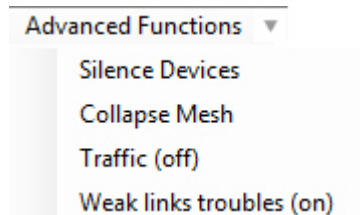To silence the mesh network using the PC-based configuration tool, perform the following steps:

1. Connect the W-USB dongle device to your computer. For more information on USB dongle, refer to Section 4: "USB Adapter".

2. Launch the PC Tools application. Refer to Appendix B: "PC Tools" to know about launching the PC Tools application.

3. Go to **Diagnostics** step.

4. Select a Gateway from the **Communicator** pane.

5. Click **View Mesh**. The mesh is displayed.

6. Click Advanced Functions ![Advanced Functions ▼] on top of the mesh display. A drop-down list is displayed.

> Advanced Functions ▼
> Silence Devices
> Collapse Mesh
> Traffic (off)
> Weak links troubles (on)
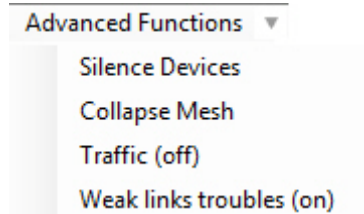
7. Click **Silence Devices**. The **Silence mesh network** screen is displayed.
8. Select the time interval to silence the wireless devices from the dropdown list and click **Yes**.

> **Silence mesh network**
>
> This command will disable all radio transmissions from all devices in the mesh. Fire protection will be disabled and all devices will be non-functional until the time expires or the device is restarted. The mesh will need to be re-informed at the end of the silence period to restore the mesh network and fire protection.
>
> **Silence wireless devices for** 30 Mins ▼
> 30 Mins
> 1 Hr
> Do you wish to silence the mesh ne 2 Hrs
>   4 Hrs
>   [Yes]   [No]   8 Hrs
>   16 Hrs
>   24 Hrs

9. Enter the **Verfication Password** in the **Gateway Password** screen.

The network is silenced and a confirmation is displayed as shown below:

> **PC Tools**
>
> ⓘ The network has been silenced successfully. To view the mesh, select an online gateway from Communicator and click "View Mesh" again.
>
>   [OK]
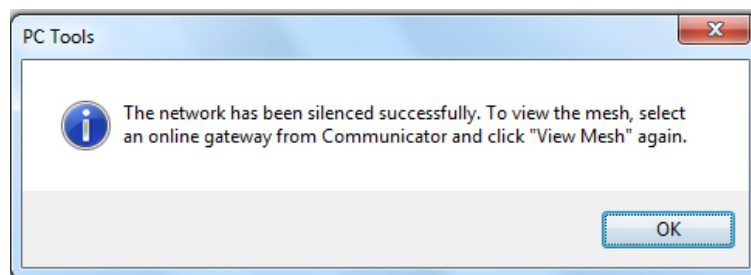
Silencing Mesh Network in the Panel

To silence the mesh network using the NFS2-3030, refer to the "shutdown wireless" entry in the NFS2-3030 operations manual, part number LS10006-051NF-E.

2.7.8 Multiple Wireless Sensor Network Installation Restrictions

Notifier's Wireless Sensor Network technology shares the RF spectrum with other Honeywell Wireless Sensor Network systems. Honeywell has established a limit of 4 overlapping networks to avoid congestion in the RF spectrum. If the limit of overlapping systems is exceeded, a system trouble will be generated for the system that detects 4 or more adjacent networks. To resolve this situation, the instances of overlap need to be removed. Refer to Appendix C: "Troubleshooting and Testing" for suggestions on removing overlap between wireless networks. The trouble will be self restoring up to 36 hours after the condition is resolved. To expedite the trouble resolution, toggle the network that is reporting the trouble in and out of mesh formation mode.

2.7.9 Avoiding RF Interference

The Notifier wireless mesh network uses radio frequency hopping spread spectrum technology to communicate in the 900 MHz ISM band (902MHz to 928MHz). Other commercial and industrial products also operate in this band. If two-way radios or other wireless communication devices are used during the installation process it is recommended that they be kept at least 4 feet away from the Notifier wireless devices or that they operate on a different frequency band to ensure rapid mesh formation.

A properly installed Notifier wireless mesh network with primary link reporting enabled will be highly immune to RF interference from other wireless products even when they are nearby. The use of the primary link reporting feature is highly recommended. If the system is installed in a controlled environment where other 900 MHz ISM band devices will not be present, the primary link reporting feature may be disabled to permit greater distances between installed devices if required.

The Notifier wireless mesh network will be able to automatically detect and avoid certain types of in-band channel interference (often caused by two-way radios) by using an alternate channel set. The system will log detection and avoidance of this kind interference in the FWSG history as "Walkie Talkie Mode" Entry or Exit and in the NFS2-3030 history as Alternate Channel Set or Normal Channel Set.

2.7.10 Trouble States

NFS2-3030 NCA-2 Onyxworks	NFS2-640 NFS-320		Description	Course of Action
RADIO JAMMING	JAM	Non-latching	The FWSG is being overloaded with RF energy and is unable to receive messages from other devices.	Identify any RF emitters in close proximity of the FWSG and remove them, or relocate the FWSG.
INCOMPAT SOFT	IN SFT	Non-latching	Software mismatch between the application code for the RF processor and the SLC processor.	Use PC Tools to identify the mismatch, and update the processors as necessary for compatibility.
MESH IS FORMING	MS FRM	Non-latching	The FWSG and attached devices are searching for additional devices to join the mesh. The wireless system is not able to provide fire protection during this time.	Wait until all desired wireless devices are communicating and members of the mesh network. Once all desired devices are in the mesh network, the mesh forming mode can be terminated by the user by activating the Mesh formation magnetic sensor or by using the PC Tools. If no action is taken, this mode will automatically exit 10 minutes after the last device joins.
MESH NOT FORMED	NO MESH	Non-latching	The FWSG contains a profile but has not formed a mesh.	To form a mesh, refer to "Create Mesh Network".
OPTIMIZING MESH	OPT MS	Non-latching	The FWSG is performing the initial identification and assignment of optimal communication paths for the mesh network. The wireless system is not able to provide fire protection during this time.	No action needed. The duration of this event correlates to the number of devices in the mesh. A fully loaded mesh may take up to 5 minutes to optimize.
PROFILE MISSING	PR MIS	Non-latching	The FWSG is in the factory default state and is not providing fire protection.	A profile needs to be created or assigned to the FWSG before a mesh can be formed.
NO WIRELESS DEVS	NO DEV	Non-latching	The FWSG is functional, but is not in communication with any wireless devices.	Verify the desired wireless devices are in range, have matching profiles assigned, have batteries, and are not in the tampered condition. Initiate "Mesh Formation mode" to actively search for devices.

NFS2-3030 NCA-2 Onyxworks	NFS2-640 NFS-320		Description	Course of Action
ADDRESS FAULT	AD FLT	Non-latching	There is either a device in the mesh set to address 0, or there is a duplicate address used for another wireless module at the address of the FWSG.	The offending device (detector or module set at address 0 or module at the same address as the FWSG) will be indicating the LED pattern for address fault. Find and resolve that device.
MAX GATEWAYS	MAX GW	Non-latching	Wireless communication reliability is compromised due to the installation limits of Honeywell wireless systems being exceeded.	Investigate for overlapping or adjacent wireless systems produced by Honeywell. Reduce the instances of overlap by removing systems, or devices in the overlapping region. Refer to 2.7.8 "Multiple Wireless Sensor Network Installation Restrictions" on the installation limits for the Honeywell wireless system.
RF DEV NO ANSWER	RF DEV	Latching trouble; remains active for the first 180 seconds before it can be cleared with a system reset.	A wireless device that was part of the mesh has dropped from the mesh.	Initiate a system reset at the FACP at least 3 minutes after the trouble was initiated to clear. If the device was intentionally removed, no further action is needed. If the device was not intentionally removed; refer to panel history or active panel troubles to investigate the cause of the disturbance.

2.7.11 History Events

FWSG History Entries

NFS2-3030	Description
PR	The profile has been received; assigned from either the PC Tools or a distributor device.
PC	The profile has been created.
B	The system is currently operating in the alternate channel set due to the presences of an interference source such as a walkie-talkie.
SLOT REALIGNMENT (TEMP CHAN SET)	The slot assignments are being re-assigned to avoid empty slots; the system is currently operating in the alternate channel set due to the presences of an interference source such as a walkie-talkie.
SLOT REALIGNMENT	The slot assignments are being re-assigned to avoid empty slots.
OPTIMIZING MESH (TEMP CHAN SET)	The FWSG is performing a routine identification and assignment of optimal communication paths for the mesh network. The system is currently operating in the alternate channel set due to the presences of an interference source such as a walkie-talkie.
OPTIMIZING MESH	The FWSG is performing a routine identification and assignment of optimal communication paths for the mesh network.
RESCUE MODE (TEMP CHAN SET)	A device has been removed or dropped from the mesh. The mesh network is currently scanning for the return of the device or others with a matching profile. The system is currently operating in the alternate channel set due to the presences of an interference source such as a walkie-talkie.
RESCUE MODE	A device has been removed or dropped from the mesh. The mesh network is currently scanning for the return of the device or others with a matching profile.
TEMP CHANNEL SET	The system is currently operating in the alternate channel set due to the presence of an interference source such as a walkie-talkie.
NORMAL CHANNEL SET	The system is normal.
PROFILE DISTRIBUTION DISABLED	The FWSG has terminated the distribution of its profile.
PROFILE DISTRIBUTION ENABLED	The FWSG has started the distribution of its profile.
SWITCH ACCESS ENABLED	The FWSG is unlocked and the magnetic sensors on the front of the FWSG are enabled.
SWITCH ACCESS DISABLED	The FWSG is locked and the magnetic sensors on the front of the FWSG are disabled. Attempts to active the sensors will not be recognized.
MAXIMUM DEVICE COUNT EXCEEDED	More than 50 devices are attempting to join the mesh network. This is beyond the capacity of the mesh network.

Section 3: Devices

3.1 Description

Subsystem Overview

The Wireless Sensor Network consists of the following devices:

■ FWD-200P- Wireless Photoelectric Smoke Detector (FCC ID AUBWFSSD)

The wireless photoelectric smoke detector is powered by four CR123A batteries. It has a sensor head to detect smoke and LEDs to indicate the activation & trouble status. For further details, refer to the table in 3.7.2, "LED Indications".

■ FWD-200ACCLIMATE- Wireless Acclimate (FCC ID AUBWFSSD)

The wireless acclimate is powered by four CR123A batteries. It has a sensor head to detect smoke and LEDs to indicate activation & trouble status. For further details, refer to the table in 3.7.2, "LED Indications".

■ FWH-200ROR135- Wireless Rate of Rise Heat Detector (FCC ID AUBWFSSD)

The rate of rise heat detectors are powered by four CR123A batteries. The detectors have LEDs, to indicate the activation & trouble status. For further details, refer to the table in 3.7.2, "LED Indications".

■ FWH-200FIX135- Wireless Fixed Heat Detector (FCC ID AUBWFSSD)

The fixed heat detectors are powered by four CR123A batteries. The detectors have LEDs, to indicate the activation & trouble status. For further details, refer to the table in 3.7.2, "LED Indications".

■ FW-MM- Wireless Monitor Module (FCC ID AUBWFSMM)

The wireless monitor module is powered by four CR123A batteries. It can be connected to a switch within three feet of its location or wired directly to the pull station. The module has LEDs, to indicate the activation & trouble status. For further details, refer to table in 3.7.2, "LED Indications".

3.2 Agency Approvals

3.2.1 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 interferences that may cause undesired operation.

WARNING: CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE MANUFACTURER COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

3.3 Specifications

Following are the specifications for the devices.

Specifications	Data
Radio Frequency	Lower ISM Band (915 MHz)
Maximum power output	+17dBm
Minimum signal strength level needed at the receiver for a primary path with weak link trouble reporting enabled.	-50dBm
Minimum signal strength level needed at the receiver for a secondary path or primary path with weak link trouble reporting disabled.	Must be 15 dBm higher than the noise floor down to -87dBm
Maximum ambient noise level	-90dBm
Minimum battery life	1 year

Table 3.1 Device Specifications

The below table provides details on the device references.

Model	Description	Manual
FWD-200P	Photo	FWD-200Pand FWD-200ACCLIMATE Intelligent wireless Photoelectric Smoke Sensors. Manual part number for the above devices - I56-4065-000.
FWD-200ACCLIMATE	Acclimate	
FWH-200ROR135	Wireless Rate of Rise Heat	Rate of Rise Heat FWH-200ROR135 and FWH-200FIX135 Intelligent Wireless Temperature Sensors. Manual part number for the above devices - I56-4066-000
FWH-200FIX135	Wireless fixed heat	
FW-MM	Wireless monitor module	FW-MM Wireless Monitor Module. Manual part number - I56-4067-000

Table 3.2 Device References

3.4 Installing Devices

For information on installing the devices, refer to the manuals mentioned in the above table.

3.5 Mounting & Wiring

For information on mounting and wiring, refer to the manuals mentioned in the table 3.2.

3.6 Configuration and Programming

The configuration of a device starts with assigning a profile. Refer to the instructions below for assigning a profile.

- Assign profiles using PC Tools.
- Assigning profile to a detector with an FWSG or distributor.
- Assigning profile to a module with an FWSG or distributor.

3.6.1 Assigning Profiles

NOTE: To assign a profile, the device must be in a factory default state. A single red light flashes on the LED confirming that the device is in the default state. To restore the device to factory default state, refer to 3.6.4, "Restoring a Device to Factory Default".

Assigning Profile Using PC Tools

To assign a profile to the device using the PC Tools application, do the following:

1. Connect the W-USB dongle device to your computer. For more information on USB dongle, refer to Section 4:, "USB Adapter".

2. Launch the PC Tools application. Refer Appendix B:, "PC Tools" to know about launching the PC Tools application.

3. Go to the **Create Mesh Network** step.

4. Create a new profile or import an existing profile as required.

5. Select and open the profile to be assigned to the device from the **Name** drop down list in the left panel.
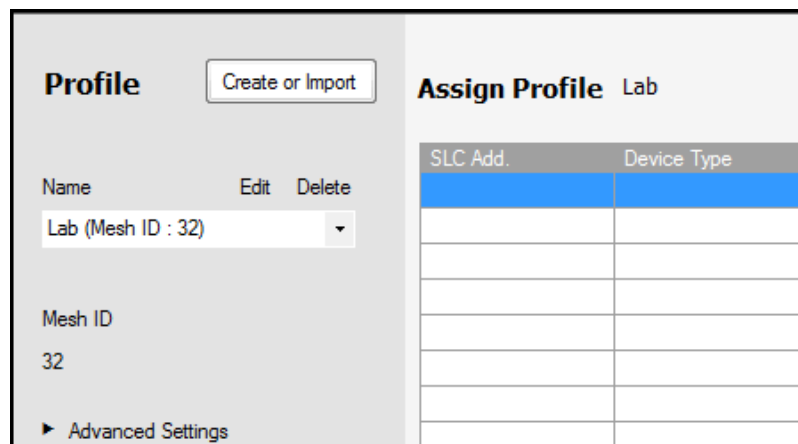
6. Switch on the device in range of the USB adapter, which is connected to the laptop or PC where PC tool is installed.

7. Select the device from the **Communicator** panel.
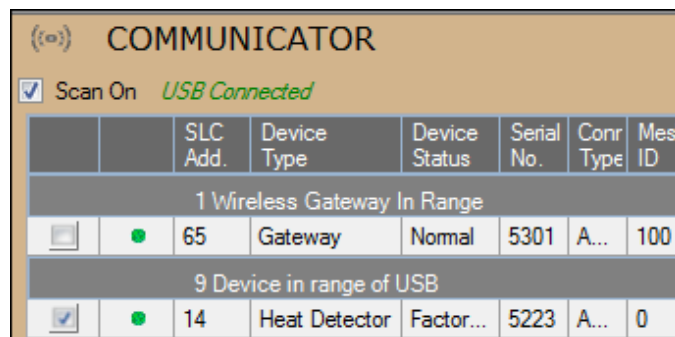
8. Click **Assign**.
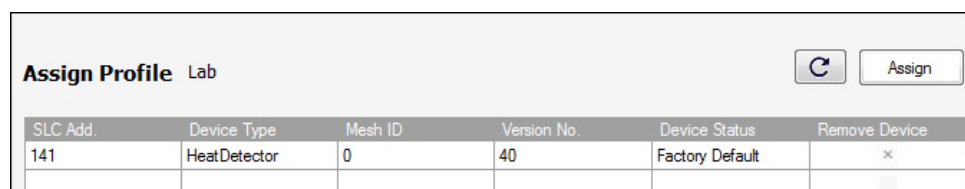
The device is now included in the list of devices with a profile assigned. When the profile gets assigned, the LEDs emit a solid green light for 10 seconds.

Assigning Profile to a Device with an FWSG or Distributor

An FWSG that has a profile can be used to distribute the profile to other devices. The FWSG must be in a state where it can distribute a profile. For more information on converting an FWSG to a distributor, refer to 2.6.3, "Profile Distribution". A device with a profile can be used to distribute the profile. To put a device into distributor mode, refer to the topic, "Converting a Device into a Distributor".

■ Transfer Profile from an FWSG/Distributor to Detector

To transfer profile from the FWSG/distributor to the detector, do the following:

1. Bring the detector within the range of the FWSG.

2. Power on the detector. Ensure the detector is in factory default state. A single or double red light flashing on the detector confirms that the detector is in the default state.

3. To make the detector request the profile on the FWSG, activate the test marker shown in the figure below using a magnet.
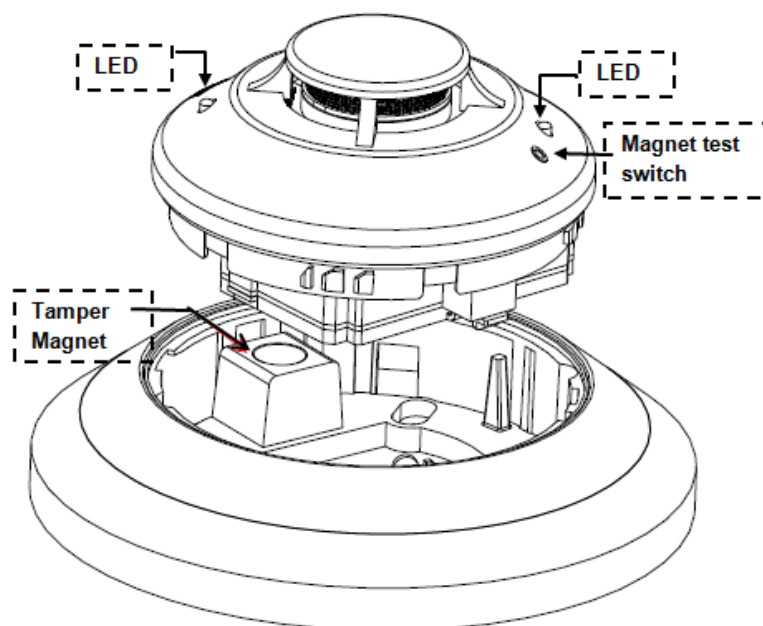

Figure 3.1 Magnet in a Detector

Once the magnet sensor is activated, the LED flashes red light every half second indicating that it is requesting a profile. If the profile is successfully received, the LED emits a solid green light for 10 seconds. If the profile is not received within a minute, the LED flashes a red light every ten seconds indicating that it has stopped requesting for a profile.

■ Transfer Profile from an FWSG/Distributor to Module

To assign a profile to a module, perform the following steps:

1. Bring the module in range of the FWSG or the distributor.

2. Power on the module. Ensure the module is in factory default state. If the module is in factory default state, the LED blinks red once.

3. To make the module request the profile, toggle the state of the tamper condition. To toggle the state tamper condition, start with the faceplate removed.

4. Place the faceplate over the module temporarily, and remove the faceplate again in less than 1 second. Do not attach the mounting screws for the faceplate during this step. The LED flashes red light every half a second indicating that it is requesting a profile. The LEDs blink solid green for ten seconds indicating that the profile is assigned.
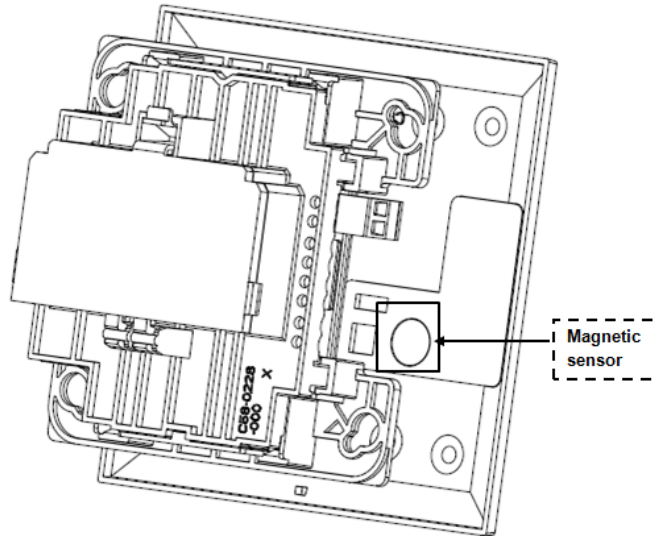

Figure 3.2 Magnetic Sensor in a Module

3.6.2 Distributor Mode

Converting a Device into a Distributor

NOTE: Only a device with a profile can be made as a distributor.

To turn a device into a distributor, do the following:

1. Power up the device with one battery.

NOTE: Ensure that the device is in the profile modification mode. This is indicated by a single yellow blink every 5 seconds. The profile modification mode times out if it has not received a command in one minute.

---

2. Toggle the SLC code wheel address to pattern of 0-1-0-1. To toggle the SLC code wheel address,

- Set the address to 0
- Change the address to 1
- Change the address back to 0
- Change the address back to 1.

NOTE: The LED flashes a single green every half a second when the device is functioning as a distributor.

Converting a Distributor Back into a Device

To turn a distributor device back to a network device, replace the battery and provide a proper code wheel address. A normal device requires four batteries for trouble-free operation. It is recommended to use fresh batteries after the distributor mode.

3.6.3 Mesh Formation

To add a device to a mesh, refer to the topic, "Mesh Formation with PC Tools" or, to form a mesh network, ensure that the FWSG is powered on and contains a profile. Activate the mesh formation magnet sensor (Figure 2.8, "Mesh Formation Magnetic Sensor on a FWSG") on the FWSG.

Repeater

The Notifier's Wireless Sensor Network does not require the use of a dedicated repeater; all wireless devices act as repeaters. When the repeater function is needed in a location where there is no specific fire function is required, a wireless monitor module or another device can be installed to fulfill the function as a repeater.

3.6.4 Restoring a Device to Factory Default

Removing Profiles without PC-based Configuration Tool

A device can be restored to factory default state by following the below steps.

1. Start with the device powered off. The process is performed during the start-up.
2. Power on the device by inserting a single battery into any slot in the device. The LEDs blink yellow twice every five seconds for one minute continuously after inserting the battery.
3. Toggle the code wheel address pattern to 0-159-0. To toggle the SLC code wheel address,

- Set the address to 0
- Change the address to 159
- Change the address back to 0.
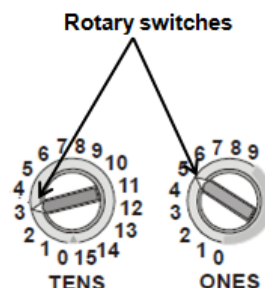
NOTE: The above illustration depicts the rotary switches being set at address 35 (rotary switch on 'TENS' set at 3 and rotary switch on 'ONES' set at 5. Ensure that the code wheel address pattern is toggled within 1 minute of inserting the battery.

After the code wheel pattern is set, the LEDs in the device blink green five times followed by a single or double red blink confirming that the device has reverted back to factory default condition.

Removing Profile with PC Tools

To remove a profile in a device using the PC Tools application, do the following:

1. Connect the W-USB dongle device to your computer. For more information on USB dongle, refer to Section 4:, "USB Adapter".
2. Launch the PC Tools application. Refer Appendix B:, "PC Tools" to know about launching the PC Tools application.
3. Go to **Site Survey**, **Create Mesh Network** or **Diagnostics** step.

4. Click **Extras** and select **Reset Devices**. The **Reset Devices** screen appears, displaying the FWSG and other devices that have the profile assigned.
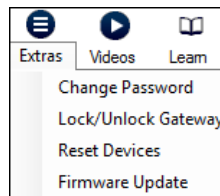
5. Click to select the required device and click **Reset Device** to remove the profile.
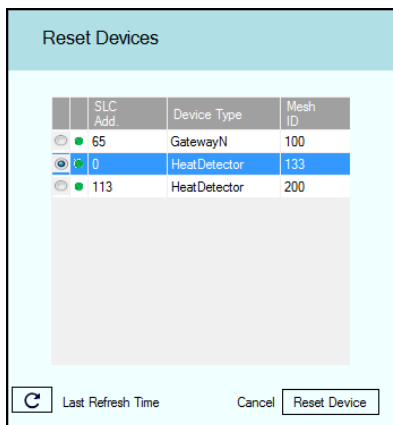
The profile is removed and the device is reset to factory default state.

3.7 Device Operations

3.7.1 Modes of Operation

Factory Default

In this mode, the devices are not associated with the FWSG. A profile must be assigned to associate the device with the FWSG. For further information on assigning a profile, refer to the topic, "Assigning Profile to a Device with an FWSG or Distributor". A device in factory default can be used for site survey. Refer to Appendix A:, "Site Survey".

The device cannot perform any fire protection in the factory default state.

In this mode, the devices will be viewable in the communicator window of the PC tool with the state displayed as "Factory Default".

Profile Assigned

In this mode, the devices are associated with the FWSG but are not an active participant in the mesh network. A device that is not in the tampered state can join the mesh network in formation or in the rescue mode. For further information on mesh formation, refer to the topic "Mesh Formation Mode" and for further information on rescue mode, refer to the topic "Rescue Mode". A device in the profile configured state can also be used to distribute profiles. For further information on distributing a profile, refer to 3.6.2 "Distributor Mode". To remove a profile from a device, refer to 3.6.4 "Removing Profiles without PC-based Configuration Tool".

A device cannot perform any fire protection until it becomes a part of the mesh network. The device will be an invalid reply or no answer at the FACP.

In this mode, the devices will be viewable in the communicator window of the PC tool and indicates a status of "Profile assigned".

Bootloader

In this mode, the device cannot participate in a mesh and cannot provide fire protection. The device will be available in the communicator window of the PC Tool with a status "Bootloader".

To get a device out of bootloader, refer to the Appendix C:, "Troubleshooting and Testing".

Distributor

In this mode the device is functioning as a profile distributor. The device cannot participate in a mesh and cannot provide fire protection. It can be used to share the profile with any device that requests a profile. The device will be available in the communicator window of the PC Tool with a status "Distributor".

Mesh Participant

Devices that are in the mesh network, no longer communicates directly with the PC Tools application. The PC Tools application must communicate with the FWSG for status information from the device. The FWSG will respond to the FACP for the device at the address set with the code wheels. The following states are applicable for a device in a mesh network.

■ Mesh Formation Mode

In this mode, the devices are active participants in a mesh that is forming. The LED flashes in the following pattern. First blink green, second blink yellow every 6.8 seconds. The device cannot perform any fire protection in this state. The device responds to its SLC address with a "DEVICE INIT" or "INIT" trouble.

For further information on mesh formation mode, refer to the topic "Mesh Formation".

■ Initial Mesh Optimization Mode

In this mode, the mesh network is formed and is in the process of establishing stronger communication paths. The LED pattern flashes in the following pattern. Single yellow blink every 6.8 seconds. The device cannot perform any fire protection in this state. The device responds to its SLC address with a "DEVICE INIT" or "INIT" trouble.

For further information on initial mesh optimization mode, refer to the topic, "Initial Mesh Optimization Mode".

■ Normal Mode
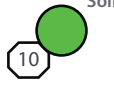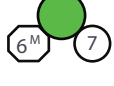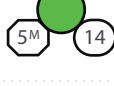
In the normal mode, the mesh network is formed and provides fire protection. The LED pattern is single green blink every 13.6 seconds. The LED flash can be disabled by panel configuration. If a device is in trouble, it will be indicated by the trouble states. For information on trouble states, refer to the topic "Trouble States with Fire Protection".

■ Rescue Mode

In the rescue mode, devices that are active participant in the mesh search and retrieve the devices that have lost the communication link. The rescue mode is indicated by the LED pattern of 1 green blink every 6.8 seconds. For more information on rescue mode, refer to the topic, "Rescue Mode".

3.7.2 LED Indications

The two LEDs on the devices blink in the same pattern to allow the LED to be viewed from any angle. The LED indications are provided in the table below:

LED Pattern	Condition	Action Required
Bootloader — 5	Device is ready to update	Use PC based configuration tool to initiate the download
Slot request rejected — 7	Device not permitted into the mesh	Confirm device count and software version
Mesh Forming — 30M / 7	Device is in the mesh & looking for devices that are not in the mesh	
App erase / App loading — 2	New application code is being downloaded	
Profile removed — 5 / 1	Device has returned to factory default state	
Profile received — Solid 10	Device is now profile assigned.	
Battery Check - All batteries are fresh — Solid 2.5	Minimum of 2.5 years battery life remaining	
Distributor mode — 0.5	Device is distributing its profile to other devices which requested profile	
Rescue mode — 6 M / 7	Device is functioning as normal and searching for lost devices	
Background mesh optimization — 5M / 14	Device is functioning as normal and optimizing parent-child connectivity	
Normal mode — 14	Device is functioning as normal	
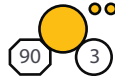
Legend
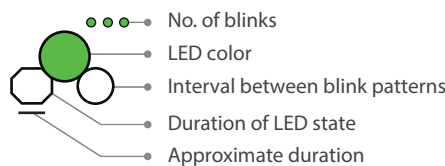
Example:

- No. of blinks
- LED color
- Interval between blink patterns
- Duration of LED state
- Approximate duration

- Two blinks in this pattern
- First blink is green. Second is yellow
- 7 sec between blink patterns
- Will transition to next state after 30 min (approx)
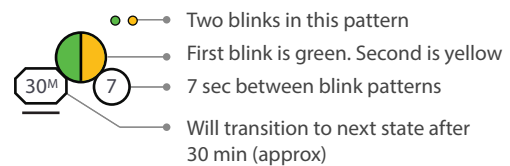
All units are in seconds. Minute is indicated by M.

LED Pattern	Condition	Action Required
Waiting for profile (red, 10)	Device is factory default	Use PC tool to assign profile or activate switch to search for profile
Searching for profile (red, 1M 0.5)	Device is factory default and requesting a profile from a distributor or gateway	
Pending site survey (red, 1M 5)	Device is factory default and is ready to enter site survey	Clear the tamper condition within 1 minute to enter site survey
Self test fail (Solid yellow)	Device has failed internal self diagnostics	Restart the device. If problem persists. Contact customer support
Factory Command (yellow, 1)	Device is in a configuration state.	Restart the device. If problem persists. Contact customer support
Profile modification (yellow, 1 5)	Device has a profile and can be set as distributor or have profile removed	Set code wheel pattern to enter the desired mode
Battery Check - All batteries are present (Solid yellow, 2.5)	Minimum of 6 months battery life remaining	
Searching for mesh (in rescue mode) (yellow, 90 3)	Profile is assigned and device is searching for the mesh	Ensure the mesh is in rescue mode or wait for timeout to search mesh in formation mode
Searching for mesh (in formation mode) (yellow, 20)	Profile is assigned and device is searching for the mesh	Ensure the mesh is in formation mode
1st Mesh optimization (yellow, 2.5 7)	Mesh is formed and initializing	

Legend

Example:

No. of blinks
LED color
Interval between blink patterns
Duration of LED state
Approximate duration

Two blinks in this pattern
First blink is green. Second is yellow
7 sec between blink patterns
Will transition to next state after 30 min (approx)

(green, 30M 7)

All units are in seconds. Minute is indicated by M.

LED Pattern		Condition	Action Required
● 14	Device generic trouble (Eg: Low battery, Partial link condition)	Device is in the mesh and in trouble condition.	Refer to the panel to identify the trouble and possible resolution
● 3	Device address trouble (Eg: Dual address, Zero address)	Device is in the mesh but has a incorrect SLC address	Verify the address is non duplicate and non zero
● 12	Sustained tamper	Device is tampered	Ensure detector is in the base and module has the face-plate on
Solid 4	Tamper entry	Device has just been tampered	Ensure detector is in the base and module has the face-plate on
Solid 2.5	Battery Check - Weak	Less than 6 months or not all 4 batteries present	Ensure all 4 batteries are present or replace the batteries.
● 3	Alarm state	Device is functioning as normal and has been activated	

Legend

No. of blinks
LED color
Interval between blink patterns
Duration of LED state
Approximate duration

Example:

Two blinks in this pattern
First blink is green. Second is yellow
7 sec between blink patterns
Will transition to next state after 30 min (approx)

All units are in seconds. Minute is indicated by M.

3.7.3 Trouble States

The following trouble states are unique to the battery powered RF devices. Multiple troubles states may be active for a single device, but only the highest priority trouble event will be displayed.

Trouble States with Fire Protection

The devices indicate the following trouble states with a single yellow LED blink every 13.6 seconds. The wireless device will still perform fire protection during the following trouble states.

■ Class A Fault

The Class A fault denotes a single connection path from the device. The wireless system is a Class A system requiring two communication paths for normal operations. To remedy the Class A fault, ensure adequate device spaci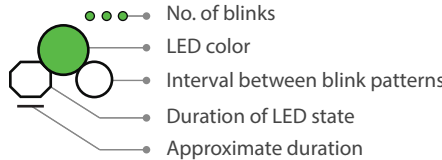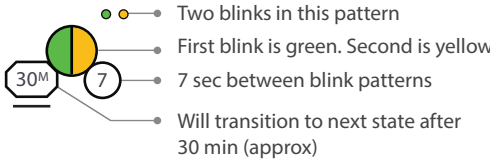ng or the use of a repeater may be required. The wireless mesh is a self healing network. If the trouble is not cleared within 5 minutes, additional actions may be required. Refer to the troubleshooting section for tips on resolving Class A fault conditions.

The panel will display "CLASS A FAULT" or "CL A" during a Class A fault condition.

■ Weak Link

The weak link trouble denotes a connection of insufficient primary signal strength. If you come across such a trouble, ensure adequate device spacing, or the use of a repeater may be required. Tamper the device when moving it to a new location. When the tamper condition is cleared, the FWSG will re-evaluate the signal strength connectivity with the neighboring devices and select the suitable signal paths. Weak link trouble reporting can be disabled at the FACP or at the FWSG for installations not requiring primary link connectivity. Refer to section 2.7.5 for more information on disabling weak link trouble reporting. Refer to the troubleshooting section for more instructions on resolving a weak link condition.

The panel displays "WEAK LINK FAULT" or "WEAK" for a device that is in the weak link condition.

■ Low Battery

The low battery event denotes that:

- The device has less than one month power left to perform the required operations.
   Or
- Presence of less than four viable batteries.

The low battery event is a latching condition. To clear the low battery event, tamper the device and replace all the four batteries. When a device is tampered, it drops out of the mesh network and attempts to rejoin as soon as the batteries are replaced and the tamper event is cleared. If the device has dropped from the mesh prior to the tamper event, a system reset has to be issued to clear the low battery trouble. The panel displays "BATTERY LOW " or "BAT LOW" during a low battery condition.

Trouble States without Fire Protection

■ Tamper

A tamper trouble indicates that a detector is not firmly attached to the base or, in a module, the cover plate is not properly attached. The tamper condition is annunciated in the following ways:

Device Indication The LED on the device emits yellow light for 4 seconds followed by a yellow blink once every 12 seconds immediately after the tamper condition.

Panel Indication Devices that are in the tampered condition reports a latching trouble event. The event is active for 180 seconds before it can be removed with a system reset. Once the event is removed, the device reports a "NO ANSWER' or "INVALID REPLY" until the device is restored or the point is removed from the database.

Clearing the Tamper To clear the tamper,

- If it is a detector, ensure that the detector is locked together with its base.
- If it is a module, ensure that there is a magnet in the cover plate, and is securely fastened to the device in the right orientation.

Once the tamper event is cleared, the LEDs in the device emit solid light for 2.5 seconds, in the following color patterns that denote the battery status.

- **Green** - All the four batteries are installed and fresh. The device has a minimum one year of normal operation.
- **Yellow** - All the four batteries are installed, and one or more is no longer fresh. This device has- between a minimum of 1 month and 1 year of operation.
- **Red** - One or more of the batteries are low in power and the device has less than a month of operation.

After the device displays the current battery condition, it attempts to join the mesh network in the rescue mode or normal mode. This is indicated by a double yellow blink every 3.4 seconds. If a device does not find its mesh in the rescue mode, it searches for its mesh under formation. This is indicated by a double yellow blink every 20 seconds.

■ Duplicate Address

Two wireless devices on the same mesh network that are set to the same address reports a duplicate address trouble. The device(s) blink the address fault condition of a single yellow blink every 3.4 seconds. The FWSG will respond to the panel with the device type of the first device to join.

The panel displays "DUAL ADDR" or "DUALAD" during a duplicate address condition.

■ No Answer

A device that is not in the mesh, displays a "NO ANSWER" or "INVREP" message at the FACP. Follow the steps in topic, "Mesh Formation Mode" to get a device in the mesh.

■ Jamming

Jamming occurs when a device is overloaded with an interfering RF signal; but is able to send the messages out. A jamming event is detected after 20 seconds of exposure to the jamming signal. In the event of jamming, the LED emits a single yellow blink every 13.6 seconds. Prolonged durations of jamming results in the jammed device dropping from the mesh network. The panel displays "RADIO JAMMING" or "JAM" during a jamming condition.

■ Device Initialization

A device reports a device initialization trouble when it is part of a mesh network but is not capable of performing fire protection. This is the case for mesh networks that are still forming and optimizing.

The panel displays "INIT MODE" or "INIT" during a device initialization condition.

3.7.4 Background Events

The following conditions are not considered a trouble, supervisory, or alarm condition. These events are stored in history of the FACP.

Pre-Class A Fault

A device will report a pre-Class A event when it first identifies a single connection path condition. If the connection path is not restored or replaced with another viable connection path within 180 seconds a Class A fault condition will be reported. The history event reports this condition as "PRE-CLASS A FAULT".

Device Drop

A device will report a device drop if it has lost complete communication with the mesh network. If the device does not recover in 180 seconds or less, a "NO ANSWER" or "INVREP" trouble is reported for the address. The history event will report as a "DEVICE DROPPED".

Weak Link

When weak link reporting is enabled by the FWSG and disabled in the FACP, then all weak link conditions will be entered as background events in history. The history event is reported as a "WEAK LINK FAULT" or "WEAK" for a device that is in the weak link condition.

Section 4: USB Adapter

4.1 Introduction

The W-USB is an interface that can be connected to a PC through USB. It communicates with the RF devices using the same frequencies as the mesh protocol. This device is powered directly by the USB port.

The LED gives an indication of power and initialization status.

The W-USB has an adjustable USB connector to facilitate the connection by reducing the size when connected to a PC/laptop.
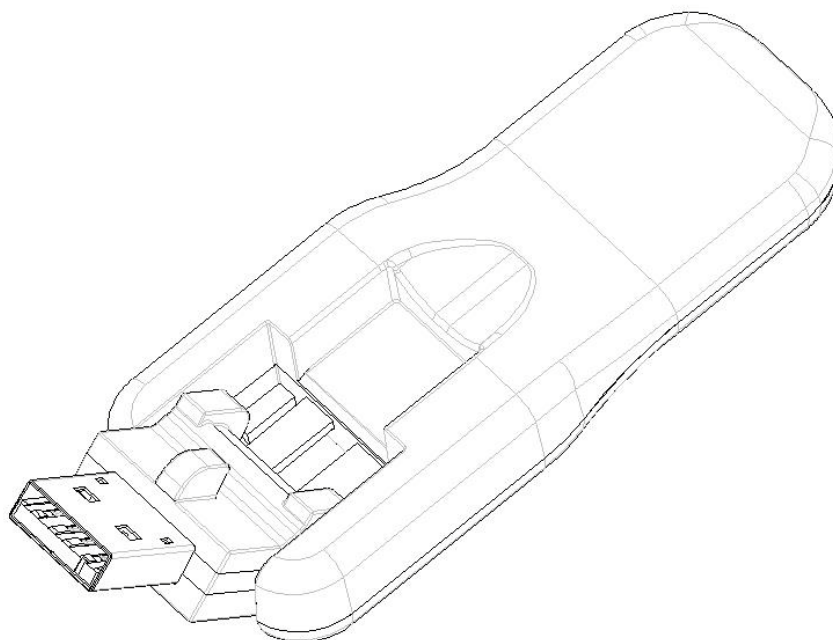
Figure 4.1 W-USB Adapter

4.2 Agency Approvals

4.2.1 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 interferences that may cause undesired operation.

FCC ID PV3WFSADPT

WARNING: CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE MANUFACTURER COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

4.3 Specifications

4.3.1 Electrical Specifications

ITEM	TYP	MIN	MAX	UNITS	Comments
Operating Voltage	5	4.3	5.5	VDC	
Supply Current	33	25	85	mA	

4.3.2 Serial Communication Specification

ITEM	Comments
USB Standard	USB 2.0 full speed

4.3.3 Mechanical Specifications

ITEM	TYP	UNITS	Comments
USB connector type	A		
Length	76.2	mm	Connector closed
Length	96.2	mm	Connector open
Thickness	13	mm	Connector side
Thickness	8.4	mm	Antenna side
Width	31.2	mm	
Weight	19.5	g	

4.3.4 Environmental Specifications

Specification	MIN	MAX	UNITS	Comments
Humidity	10	93	%RH	Non Condensing
Temperature	0°	50°	Celsius	Maximum Operating temperature range
Storage Temperature	-10°	60°	Celsius	

4.4 Driver Installation

NOTE: Install the PC Tools application before attempting to install the driver.

To install a driver, perform the following steps:

1. Insert the adapter into the PC. The adapter is detected and is displayed in the Computer Management screen as a **Wireless Fire System Dongle**.
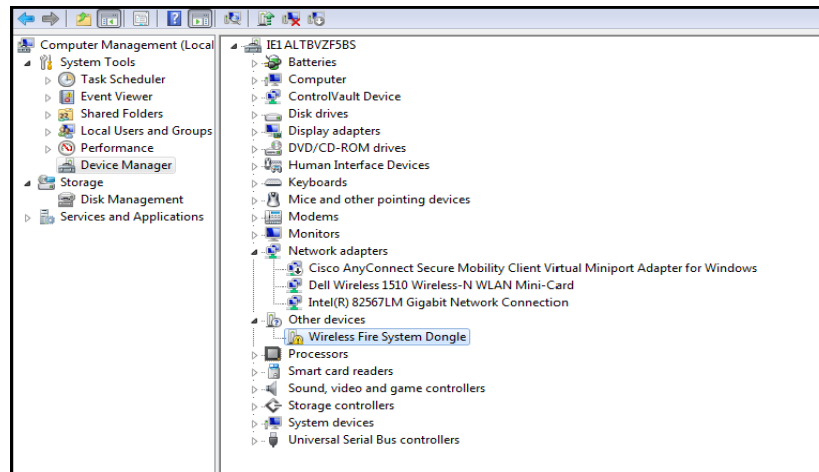
2. Right click on **Wireless Fire System Dongle** and select **Update Driver Software**.

PRELIMINARY: *Notifier Wireless Sensor Network* — P/N LS10036-000NF-E:N0 10/10/2013
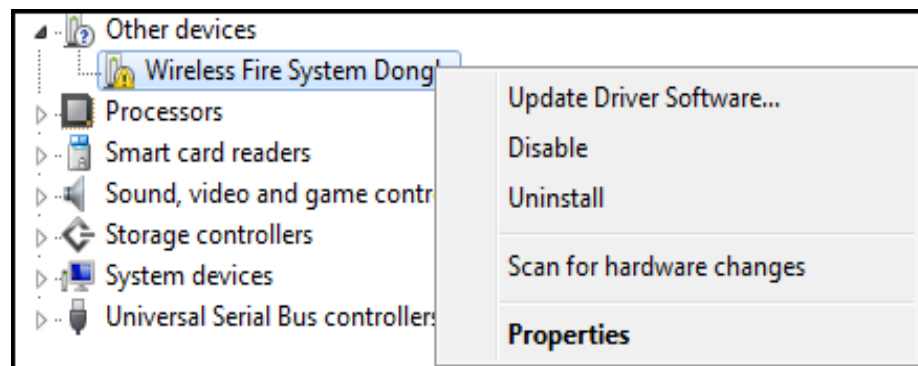
3.   Select **Browse my computer for driver software** the option.
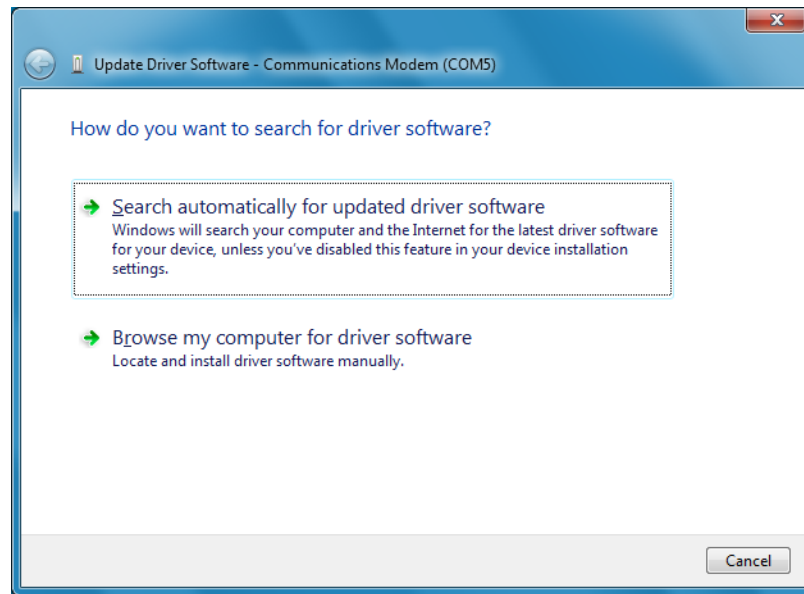
4.   Browse to the location of the driver software by clicking **Browse**. Select the file and click **Next**. To locate the driver software, go to c:\Program Files\Honeywell\Device Driver. The file resides inside the Device Driver folder.
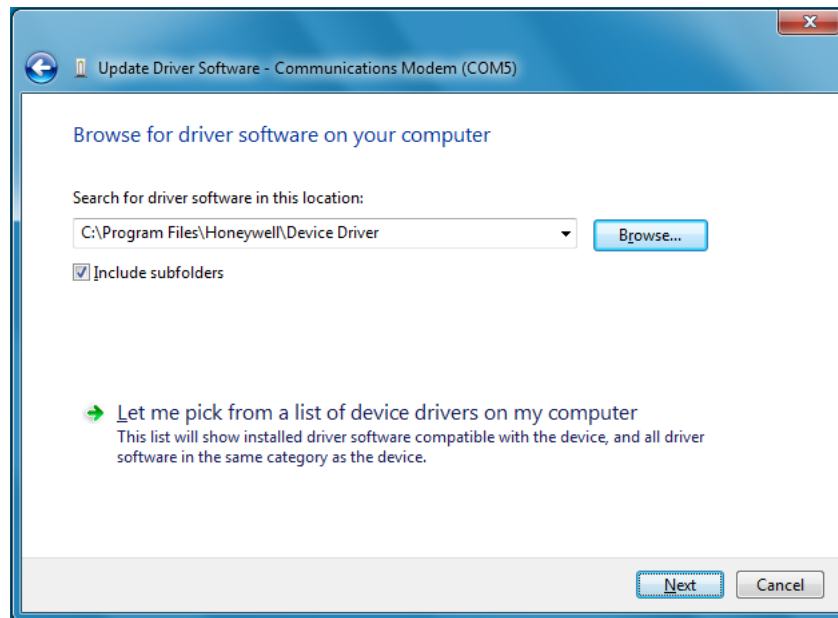
5. The confirmation message is displayed that the driver software is updated.
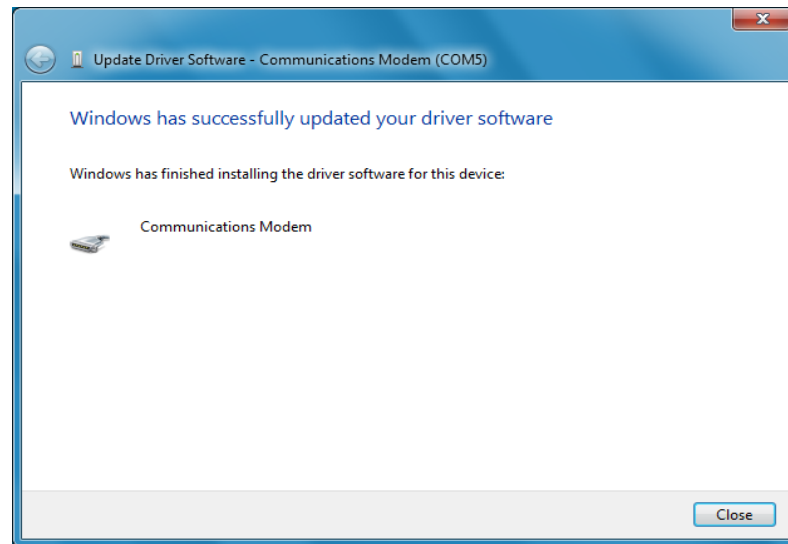
6. The device is displayed under ports.
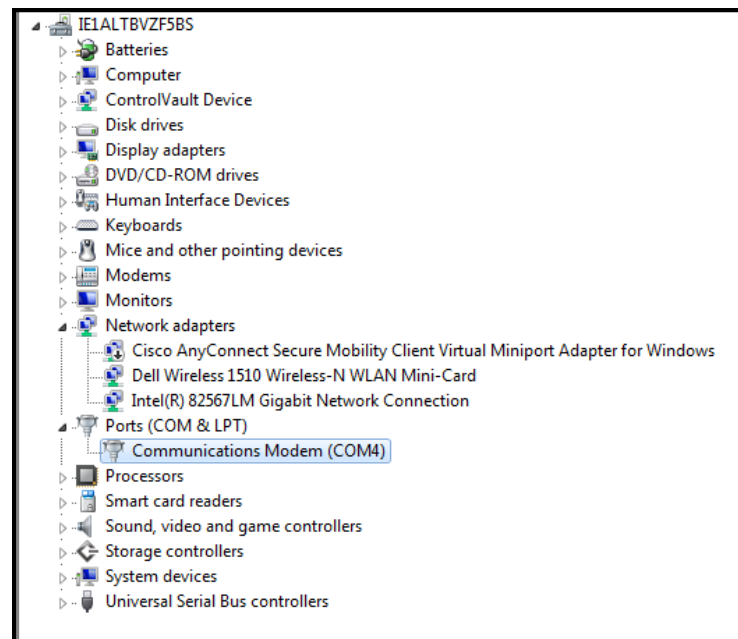
The driver is installed.

Appendix A: Site Survey

A.1 Description

The site survey allows you to assess and qualify the site for installing the wireless fire alarm system. The site survey view in the PC tool allows you to view the Radio Frequency (RF) assessment of the site. The tool reports the suggested device spacing based on the data collected during the site survey. This helps to optimize the reliability and performance of the wireless network in the wireless fire alarm system.

A.1.1 Conducting Site Survey at the Job Site

The site survey includes two tests:

- Link quality test
- RF Scan Test

The link test can be conducted individually or it can be done followed by the RF Scan test. This section explains the steps for link quality test and a link quality test followed by RF Scan test.

Link Quality Test

A link quality test is a quick and repeatable test that provides immediate feedback on the device connectivity. It is conducted primarily to check if there is an event of pocket loss during data transmission between devices. In a link test, the device addresses are set in the range of 001 to 100.

■ Basic Requirements

To conduct a link test, ensure that

- You possess two or more devices.
- The devices are in factory default condition.

NOTE: The LEDs in the device blink red (single or double blink) upon starting the device if it is in a factory default condition. Refer to 3.6.4, "Restoring a Device to Factory Default" for more information on setting the device to factory default state.

■ Conduct a Link Test

NOTE: The below procedure lists the steps for conducting only a link test. Hence, examples on the setting the address on devices is explained considering only the link test.

To conduct a link test, perform the following steps.

1. Remove the batteries if any present from the devices and set the address of the first device as 001.

NOTE: For each subsequent device, use the next highest SLC address. For example, set the first device address as 001, second device as 002 and third device as 003. The upper address limit for a device address is 100 while doing a link test.

---

2. Bring the first device to the required location to conduct the test.
3. Insert one battery into the factory fresh device.   After inserting the battery, the LEDs in the device blink red twice every five seconds if the device is ready for site survey.

NOTE: You could insert the battery into any available slot. Inserting more than one battery deters the device from entering the site survey mode.

---

4. Clear the tamper condition within one minute of the device startup, to enter the site survey mode. To clear the tamper condition, position the decorative ring around the base of the detector and rotate it in either direction until the ring snaps to its place (Refer to the below image). When you clear the tamper, the device starts the transmission that is denoted by LEDs. Refer to the Table A.1, "Link Test Results-LED Pattern" for results.

NOTE: Due to the absence of the second device that is yet to be introduced, the transmission fails. Hence, the LEDs in the first device emits solid red.

---

5. Bring the second device to the required location and repeat the steps 3 and 4. The LEDs in the second device emit yellow light while the test is being conducted.

Results of Link Test

Once you have introduced the two devices, the devices start communicating and the link quality test is started. The blinking pattern of the LEDs in the device 002 communicates the results of the link test.   To repeat the test, follow the steps 1 to 4.

The following table explains the LED patterns during a link test.

State	Pattern	LED	Results & Description
LInk Test in progress	Single blink every 0.5 seconds.	Yellow	Transmission of data packets to another device.
	Solid	Red	Failure - No Packets received
	Single blink every 5 seconds.	Red	Poor -Received only half of the total transmission of data packets or poor signal strength
	2 blinks every 5 seconds.	Red	Marginal - Packets partially received or marginal signal strength.
	3 blinks every 5 seconds.	Green	Good - All packets received and good signal strength
	4 blinks every 5 seconds.	Green	Excellent - All packets received and excellent signal strength

Table A.1 Link Test Results-LED Pattern

■ **Tasks After Link Test**

- Reboot the devices of the link test. To do this, remove and insert the batteries.

- After rebooting, do not push the detector back in the base.

- The devices can be moved around different locations in the site to optimize the results.

- The LED indications will exist until the battery lasts in the devices.

- Upon completion of the link test using the devices numbered 001 and 002, you can test the link quality using different set of devices in other required locations. To do so, follow the steps 1 to 5.

- Retrieve the site survey results. To retrieve the site survey results, refer to the topic , "Retrieving Site Survey Results"at the end of this section.

Link Quality Test and RF Scan Test

An RF Scan test can be conducted following a link test. A Radio Frequency scan test is conducted to assess and measure the background noise and interference, from other wireless systems if any, in the site. The RF Scan test is conducted following the link test. While doing a RF Scan test, the device addresses are set starting from 100 till 159.

The below procedure lists the steps for conducting a link test followed by a RF Scan test. Hence, examples on the setting the address on devices is explained considering both the tests.

Conduct a Link Test

To understand the basic requirements of a link test, refer to the topic, "Basic Requirements".

To conduct a link test, perform the following steps.

1. Remove the batteries if any present from the devices and set the address of the first device as 101. For each subsequent device, use the next highest SLC address. For example, set the first device address as 101, second device as 102 and third device as 103. The upper address limit for a device address is 100 while doing a link test.

2. Bring the first device to the required location to conduct the test.

3. Insert one battery into the factory fresh device in any available slot. Inserting more than one battery deters the device from entering the site survey mode. If the device is ready for site survey, after inserting the battery, the LEDs in the device blink red twice every five seconds.

4. Clear the tamper condition within one minute of the device startup to enter the site survey mode. To clear the tamper condition, position the decorative ring around the base of the detector and rotate it in either direction until the ring snaps to its place. Refer to the below image. At this stage, the device starts the transmission. Due to the absence of the second device that is yet to be introduced, the transmission fails. Hence, the LEDs in the first device emits solid red. For more information, Refer to Table A.2, "RF Scan Test Results - LED Pattern"

5. Bring the second device to the required location and repeat the steps 3 and 4. The LEDs in the second device emit yellow light while the test is being conducted.

Results of Link Test

Once you have introduced the two devices, the devices start communicating and the link quality test is started. The blinking pattern of the LEDs in the device 102 communicates the results of the link test. To repeat the test, follow the steps 1 to 4. The link test results stay for 5 minutes and then the RF test begins. You can repeat the test any number of times; the only condition being that the next test should be conducted within five minutes of the last concluded test. Refer to Table A.1, "Link Test Results-LED Pattern" for LED patterns that convey the link quality results.

This concludes the link test and the RF Scan test starts. The devices addressed 101 or higher, transition to RF Scan test. On devices addressed below 100, the link test results stay until the battery last. If you are conducting the link test with several devices started in various time frames, it is possible that the devices that start and complete the link test first can transition to RF Scan test, when the devices that began later are still in the link test mode. The RF Scan test may take up to 70 minutes and you have to check the LED patterns for results. The LED patterns are given below.

Results of RF Scan Test

State	Pattern	LED	Result
In Progress- 70 minutes remaining	7 short blinks (Solid) every 30 seconds.	Red	Bad
In Progress- 70 minutes remaining	7 short blinks (Solid) every 30 seconds.	Yellow	Marginal
In progress- 70 minutes remaining	7 short blinks (Solid) every 30 second.	Green	Good

Table A.2 RF Scan Test Results - LED Pattern

Retrieving Site Survey Results

To retrieve the site survey results, do the following:

1. Reboot the devices by removing and inserting the battery back into the device.
2. Plug in the USB adapter into the laptop/PC where you have installed the PC tool.
3. Bring the devices within a range of 20ft from the USB adapter.
4. Log into PC Tools application and retrieve the data.

Appendix B: PC Tools

B.1 Description

The PC Tools is a standalone desktop windows application. It is a configuration and maintenance tool for an FWSG and devices of the Wireless Sensor Network. It allows you to survey the site, configure the devices and diagnose the wireless network of the Wireless Sensor Network. This tool can be installed on a PC or a laptop. The tool communicates with an FWSG and wireless devices through USB based user interface. You have to connect the USB adapter to the computer to invoke the PC tools application. At any point of time, only one instance of PC Tools application can run on a laptop or PC.

The tool has the following utilities.

• Site Survey

• Creating Mesh Network

• Diagnostics

The PC tool works in a wireless environment with an FWSG and devices within the range of 20 feet.
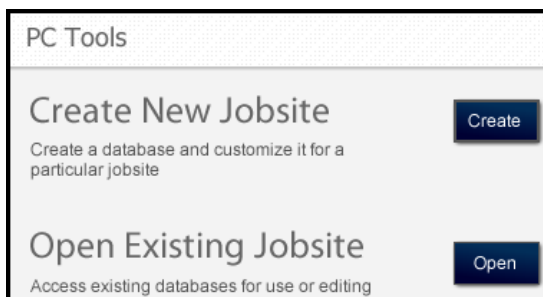
B.2 Launching PC Tools

To launch PC Tools application,

1. Click **Start**, point to **All Programs**, click **Wireless Tool**, and then **Wireless Tool.**   The following screen is displayed. Alternatively, you can double click the Wireless Tool shortcut in your desktop.

2. Click Start **Using**. The **PC Tools** screen is displayed.
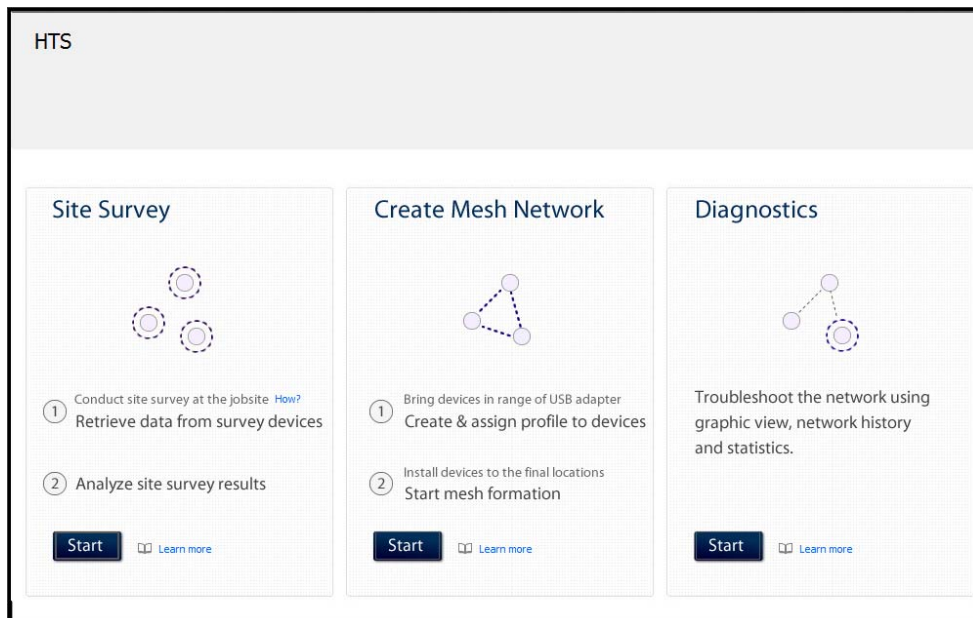
B.2.1 Creating Jobsite

You can create a new jobsite or open an existing one.

 To create a new jobsite,

1. Perform the steps listed to launch the PC Tools application.

2. Click **Create** from **PC Tools screen**.

3. Enter the name of the new jobsite in the **Jobsite Name** field.

4. Enter the **Location/Description** if any, and click **Create**.

5. The **Create Project** window opens and displays the name of the jobsite that you created.

6. Click **Save**.

The jobsite is created, and the following screen is displayed. You can go to the required function that you want to perform by clicking the **Start** button in the respective function.

B.2.2 Opening Jobsite

If you have a jobsite already created, you can open the existing jobsite.

 To open an existing jobsite,

1. Perform the steps listed to launch the PC Tools application.

2. Click **Open** from the **PC tools** screen.

3. Choose the required file from your local drive and click **Open** against **Open Existing Jobsite** option. Enter the name of the new jobsite in the **Jobsite Name** field.

The following screen is displayed. You can go to the required function that you want to perform by clicking the **Start** button in the respective function.
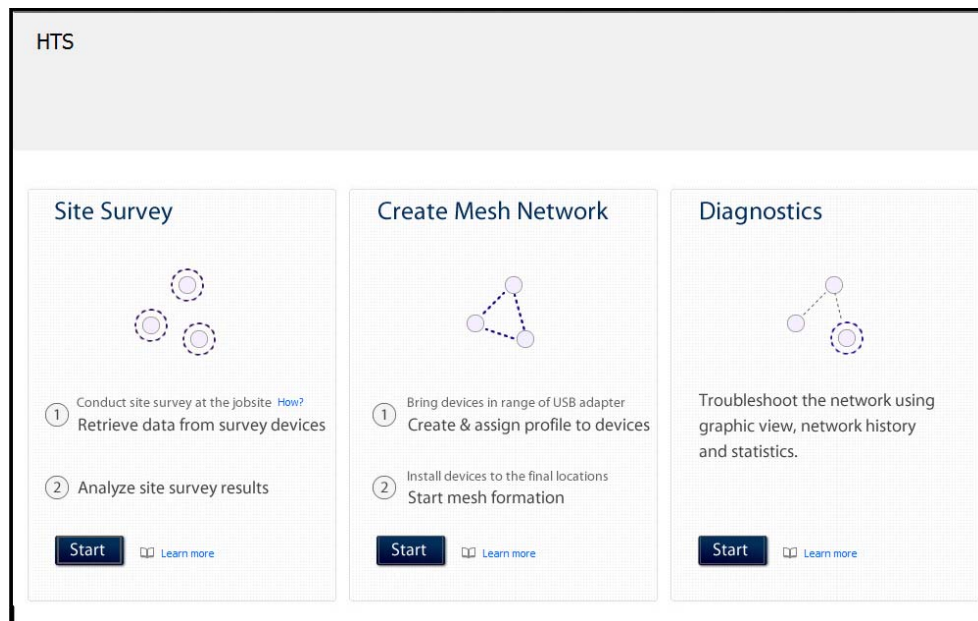
Appendix C: Troubleshooting and Testing

C.1 Troubleshooting

Trouble Type	Trouble Description	Action
Weak link condition	The weak link trouble denotes a connection of insufficient primary signal strength.	Ensure spacing between devices, or use repeaters.
Class A fault condition	Device loses the connection with any of the parent devices.	Ensure spacing between devices, or use repeaters.
Jamming	Jamming occurs when a device is overloaded with an interfering RF signal; but is able to send the messages out.	If any jammers are installed in the vicinity of the devices, remove them.
Low battery	The low battery event denotes that the device has less than one month power left to perform the required operations. Or presence of less than four viable batteries.	To clear the low battery event, tamper the device and replace all the four batteries. When a device is tampered, it drops out of the mesh network and attempts to rejoin as soon as the batteries are replaced and the tamper event is cleared.
Duplicate address	Two wireless devices on the same mesh network that are set to the same address reports a duplicate address trouble.	Change the address of a device to avoid duplication.

C.2 Testing FWSG and Devices

The FWSG must be tested after installation and as an integral part of a periodic maintenance program. The testing methods must satisfy the Authority Having Jurisdiction (AHJ). The FWSG provides optimum performance when tested and maintained in compliance with NFPA 72 ordinances.

NOTE: The FWSG used with this base must be tested and maintained regularly following the NFPA 72 ordinances. The FWSG should be cleaned at least once a year.

C.2.1 Testing LED Indications

For testing LED indications, and for more information on LED indications, refer to the respective chapters and the table provided for LED indications.

C.3 Testing Wireless Network

The PC Tools application allows you to:

• Diagnose and troubleshoot the wireless network and connectivity of the devices.

• Monitor the wireless network topology, quality of the communication links between the devices, live and historical event reports for the troubleshooting purpose.

- View the parent-child relationship and the signal strength between the two devices, and identifies the device that has lost the communication link with the wireless network.

In addition to the above, PC Tools application communicates with the FWSG to retrieve the live information about the connectivity and status of the devices. The tool stores the wireless network data such as network map, parent-child information, device information, history events, and network statistics.

The PC Tools application allows you to retrieve the following information for diagnosing and troubleshooting purpose.

- Network Topology
- History Events
- Network Snapshots
- Network Statistics
- Device Attributes

C.3.1 Network Topology

Parent-Child Devices

The parent child relationship between the devices in the wireless network is displayed using the directional arrows.

Orphan Devices

The device that is not linked with any other device in the wireless topology is an orphan device. The device is represented as an orphan device due to one of the following reasons:

- The device was originally a part of the wireless network and due to a 'Device Connected' live event, the device sets out of wireless network range.
- The device was system configured with the same network ID and hence it was a part of the same wireless network. When the network topology was retrieved, the device detail was not retrieved.
- The network connections are saturated and hence parent-child connection with the device is not established.

Class A Compliance

Each device must comply with Class A guidelines. The guidelines provide instructions on the required number of parent device for each device to be compliant with the guideline. Following are the compliance requirements.

- Class A guideline requirement:

  Every device must have two parent devices.

NOTE: The device image is changed to depict that it does not meet the required guidelines.

NOTE: The Class A guidelines are not applicable for the FWSG.

Selecting a device from the graphical representation and clicking either left or right allows you to view the following details. The Network Topology window allows you to click either left or right on any connected or orphan device.

C.3.2 History Events

The PC Tools application allows you to retrieve and view the history events of the wireless network for troubleshooting purpose. This report provides information on when the device gets connected with the wireless network, mode change, and the slot change details.

C.3.3 Network Snapshots

The PC Tools application allows you to retrieve and view the network snapshot for troubleshooting purpose. The network snapshot helps you to analyze on how the wireless network is functioning over a period of time.

C.3.4 Network Statistics

The PC Tools application allows you to retrieve and view the network statistics for troubleshooting purpose. The network statistics provides information on the attributes and RSSI of a device. The attributes provide information on the retransmission count and device re-join events. The retransmission count is a value equal to the number of times a device retransmits the wireless signal. The device re-join events is a value equal to the number of times the devices gets disconnected from the wireless network and gets connected with the wireless network. The RSSI of a device displays the parent-child relationship between the devices.

C.3.5 Device Attributes

The PC Tools application allows you to retrieve and view the attributes of a device for troubleshooting purpose. The attributes of a device such as low indication, removal indication, level, tamper fault and others are retrieved.

Index

Changes & Comments LS10036-000NF-E:N0

Revise to:	UL change?	Brief description:

Manufacturer Warranties and Limitation of Liability

Manufacturer Warranties. Subject to the limitations set forth herein, Manufacturer warrants that the Products manufactured by it in its Northford, Connecticut facility and sold by it to its authorized Distributors shall be free, under normal use and service, from defects in material and workmanship for a period of thirty six months (36) months from the date of manufacture (effective Jan. 1, 2009). The Products manufactured and sold by Manufacturer are date stamped at the time of production. Manufacturer does not warrant Products that are not manufactured by it in its Northford, Connecticut facility but assigns to its Distributor, to the extent possible, any warranty offered by the manufacturer of such product. This warranty shall be void if a Product is altered, serviced or repaired by anyone other than Manufacturer or its authorized Distributors. This warranty shall also be void if there is a failure to maintain the Products and the systems in which they operate in proper working conditions.

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