
Link Labs

130 Holiday Court
Annapolis, MD 21401
+1 (202) 524-1390



AirFinder Hardware Quick Start Guide

11 September 2019



OVERVIEW

This document is a Quick Start Guide for AirFinder Access Point and Location Beacon Hardware and related accessories. The Guide provides information about proper installation and verification of functioning. The Guide also provides relevant information for ETL and FCC purposes.

TABLE OF CONTENTS

OVERVIEW	1
TABLE OF CONTENTS	2
Revision History	2
Table of Figures	2
1. AirFinder System Overview	4
2. AirFinder Power Cradle AC Power (WF-402C)	6
3. AirFinder Location Beacon AC Power (WF-402CB)	10
4. AirFinder Access Point (WF-402AP)	13
5. AirFinder Location Beacon (WF-402B)	16
6. AirFinder Power Cradle DC Power (WF-402D)	18
7. ETL Warnings (English and French)	20
8. FCC Warning	21

Revision History

Date	Revision Number	Changed By	Description
08.28.19	v.0.1	D. Marcellino	Initial Draft
09.11.19	v.1.0.	D. Marcellino	Completed Document

Table of Figures

Figure 1: Front view of Power Cradle AC Power	6
Figure 2: Rear view of Power Cradle AC Power	6
Figure 3: Front view of Power Cradle AC Power	7
Figure 4: Side view of Power Cradle AC Power	7
Figure 5: Location Beacon AC Power with external power cable inserted	7
Figure 6. Top view of Power Cradle AC Power	8
Figure 7: Front view of Location Beacon AC Power	9
Figure 8: Rear view of Location Beacon AC Power	9
Figure 9: Front view of Location Beacon AC Power	10
Figure 10: Side view of Location Beacon AC Power	10
Figure 11: Location Beacon AC Power with external power cable inserted	10
Figure 12: Top view of Location Beacon AC Power	11
Figure 13: Front view of Access Point	12
Figure 14: Rear view of Access Point	12
Figure 15: Front view of Access Point	13
Figure 16: Side view of Access Point	13
Figure 17: Top view of Access Point	14
Figure 18: Front view of Location Beacon fits into Power Cradle DC Power	15
Figure 19: Front view of Power Cradle DC Power	15
Figure 20: Top view of Location Beacon AC Power	17
Figure 21: Front view of Power Cradle DC Power with Access Point attached	18
Figure 22: Rear view of Power Cradle DC Power with Access Point attached	18

1. AirFinder System Overview

AirFinder Staff Alert Devices work with the AirFinder Precise Location Service, resulting in the AirFinder Staff Alert System.

The AirFinder Precise Location Service consists of the following hardware components:

- AirFinder Location Beacon (LB) or Location Beacons (LBs)
- AirFinder Access Point (AP) or Access Points (APs) (also referred to as Aggregators)
- AirFinder Gateway (GW) or Gateways (GWs)

Location Beacons (LBs) provide the input data for the AirFinder Precise Location Service.

Location Beacons rapidly broadcast short Bluetooth Low Energy (BLE) data packets on the three Bluetooth Advertising channels (2.402 GHz, 2.426 GHz, and 2.480 GHz); these broadcast packets are called beacon messages. These BLE beacon messages are transmitted multiple times per second, and the on-air time of each beacon is very short - measured in milliseconds.

AirFinder Staff Alert Devices, when in Active Alert Mode, scan for Location Beacon advertisement messages, calculate their location, connect to an Access Point, and transmit that location. See Staff Alert Event - BLE Only below for more details.

AirFinder Access Points (or, in Marriott parlance, BLE Aggregators) propagate the local BLE network for AirFinder Devices. AirFinder Access Points (APs) are installed at hotels or other facilities in a configuration to provide complete and redundant BLE network coverage for Devices. APs, like Location Beacons, broadcast a frequent and periodic beacon message; however, the AP beacon message is different than the Location Beacon message. These AP beacons are also heard by AirFinder Devices, but not used by Devices in the standard location algorithm. The AP beacon message indicates to a Device that A. it is an Access Point, and B. whether the AP is available for connection, so the Device can transmit its location, or whether the AP is currently busy with traffic from other Devices, and, instead, the Device should connect to another AP. A Device will default to connecting to the AP whose beacon RSSI is highest, unless that AP is busy; in that case, the Device will connect to the AP with the next highest beacon RSSI and so forth. As installed in the AirFinder Staff Alert System, in almost all cases, Devices will receive beacon messages from multiple APs in any location within a hotel.

When an AP receives an Alert Location from a Staff Alert Device, the AP prioritizes these messages over any other and immediately transmits this message to an AirFinder Gateway. APs use an FCC-certified over-the-air-protocol called Symphony Link™, which operates in the 902-928 MHz frequency band, to communicate with Gateways. Link Labs is the

creator of the Symphony Link Protocol and the AirFinder Gateways.

Like APs, Gateways are installed at a hotel or other site to provide comprehensive and redundant Symphony Link coverage. This Symphony Link Network is an Internet of Things (IoT) network service layer for all Access Points. Access Points communicate Alert messages to Gateways. When a Gateway receives an Alert message from an Access Point, it acknowledges to the Access Point that the message was received.

Access Points have several other functions, in addition to aggregating location messages from Staff Alert Devices. Location Beacons also periodically connect to Access Points to send a heartbeat (i.e. "still alive") message. This short heartbeat message contains the LB MAC ID and also the current voltage of the batteries of the LB. Access Points also regularly send their own heartbeat message to Gateways, indicating that the Access Point is connected and functioning properly. Staff Alert Devices also transmit a heartbeat message periodically.

If, or when, the configuration of Location Beacons or Staff Alert Devices need to be changed, the configuration change will be transmitted from the AirFinder Precise Location Service Platform through a Gateway down to the Access Points. In non-Alert, normal functioning, when Location Beacons and Staff Alert Devices connect to Access Points when transmitting their heartbeat message, they also check a mailbox to determine if there are new configuration settings to download. If there are, then the LB or Device, updates its settings.

AirFinder Gateways aggregate and transmit all Staff Alert messages, as well as any other traffic from Devices, Location Beacons, and Access Points to the AirFinder Precise Location Service cloud platform. These messages are also directed to the AT&T backend. Gateways are connected to the Internet via an AT&T IoT (LTE) network connection. In some rare cases, the Gateway may have an Internet connection via a LAN or other backhaul method.

Any messages to Staff Alert Devices or other infrastructure coming from either the AT&T Platform or the AirFinder Platform are transmitted via that cloud to the on-site Gateways. Gateways then pass on the messages, as required by each message type, to individual hardware or categories of hardware.

Staff Alert Event

In the event that an individual holding an AirFinder Staff Alert Device presses and holds both of the Device's buttons, then the Device goes into Active Alert Mode.

The Device will emit a tone (65 dB) when placed into Active Alert Mode.

When the Device is in Active Alert Mode, the Device immediately, and then every five seconds until it the Active Alert Mode is deactivated,

scans the BLE advertising channels for BLE advertisement messages from Location Beacons.

0. The Devices record the MAC ID and Received Signal Strength Indicator (RSSI) of all received (or "heard") Location Beacon advertisement messages during the scan interval.
1. These RSSI values are processed by the Device's location algorithm. The algorithm also uses any historical location determinations to determine the current location.
2. The output of the algorithm is the LB in closest proximity to the Device.

Note: AirFinder device locations are based on highest probability of proximity to a specific location beacon - not exact/precise location. The precision of this proximity determination is a function of the number of location beacons, their placement, and any other data going into the calculation. For example, future versions of the AirFinder Precise Location Service will also use ultrasound.

3. When the Device has determined the LB it is in closest proximity to, it will attempt to initiate a connection to the AP on its list that has the highest RSSI beacon message value and is available. In the event of a successful connection, the Device will receive an acknowledgement message from the Access Point.
 1. If the Device does not receive an acknowledgement, it will resend the message, either to the first AP or another AP.
4. At the next scan interval, the Device will repeat Steps 1-3. If the Device determines that it is in the same location as the previous message, it will go back to sleep until the next scan interval.
5. If the Device, on repeating Steps 1-3. determines that it is in closest proximity to a different Location Beacon from the previous scan window, then the Device will proceed to Step 4.

Note: a condition that could cause a Device to determine a new location would be when a person holding a Staff Alert Device is moving between rooms or down a hallway.

2. AirFinder Power Cradle AC Power (WF-402C)

a. Hardware Verification

- o Remove AirFinder Power Cradle AC Power (WF-402CB) from packaging.
- o Visibly inspect front and back of unit (see Figures 1 and 2 below)
 - If not damaged, proceed to the next step.
 - If the unit has visible damage, do not install.
Instead, immediately put unit aside and RMA.

Figure 1: Front view of Power Cradle AC Power (right) with Access Point attached (left)



Figure 2: Rear view of Power Cradle AC Power (left) with Access Point attached (right)



- Locate power outlet for powering Power Cradle AC Power.
- If there are any power cables occupying one or both outlets to be covered by the Power Cradle AC Power, then remove any power cables first.
 - Recall the outlet location of each power cable.
 - Where applicable remove center screw of outlet. For single duplex outlets only.
- Insert Power Cradle AC Power into power outlet. (See Figures 3 and 4 for verification of proper installation)
 - Where applicable, if center screw was removed from single duplex outlet, then secure the Power Cradle AC Power by inserting the provided "long" screw through the penetration between the outlets of the Power Cradle AC Power.
 - Using an approved drill or screwdriver, screw "long" screw through the Power Cradle AC Power and into the screw opening in the duplex outlet.
 - Apply torque until "long" screw is sits snug in the Power Cradle AC Power penetration.
- Verify proper functioning of Power Cradle AC Power by observing proper LED behavior of unit according to the Power and Reset Conditions described below in b.
- After verification of the proper functioning of Power Cradle AC Power, then, if required, reinsert any other power cables. (See Figure 5 for an example.)
- Power Cradle AC Power has been successfully installed.

Figure 3: Front view of Power Cradle AC Power (right) with Access Point attached (left)



Figure 4: Side view of Power Cradle AC Power (right) with Access Point attached (left)



Figure 5: Location Beacon AC Power with external power cable inserted.



b. Power and Reset Conditions on Power Cradle AC Power

- o LED Behavior when unit is powered
 - LED to the left of "POWER" on the top of the device (see Figure 6 to the right) lights solid for 5 minutes when power is applied (or after a reset) to the unit.
 - After 5 minutes, LED shuts off.
- o Reset
 - There are two means of resetting the Power Cradle AC Power. This can be accomplished by unplugging and plugging the device in again, or by activating the Reset pin.

- The preferred method of resetting the Power Cradle AC Power is to take a small implement (i.e. the end of a paperclip) and inserting it gently into the hole next to the word Reset on the top of the Power Cradle AC Power. Press the implement into the hole, until resistance is met.
- If the Power Cradle AC power is not secured into the outlet with a screw, then unplugging/plugging is an acceptable means of resetting.
- When successfully reset, the device will return to the initial LED Behavior laid out above ("LED Behavior when unit is powered")

Image 6: Top view of Power Cradle AC Power



3. AirFinder Location Beacon AC Power (WF-402CB-XLE)

c. Hardware Verification

- o Remove AirFinder Location Beacon AC Power (WF-402CB-XLE) from packaging.
- o Visibly inspect front and back of unit (see Figures 7 and 8 below)
 - If not damaged, proceed to the next step.
 - If the unit has visible damage, do not install.
Instead, immediately put unit aside and RMA.

Figure 7: Front view of Location Beacon AC Power (right) with Access Point attached (left)



Figure 8: Rear view of Location Beacon AC Power (left) with Access Point attached (right)



- o Locate power outlet for powering Location Beacon AC Power
- o If there are any power cables occupying one or both outlets to be covered by the Location Beacon AC Power, then remove any power cables.
 - Recall the outlet location of each power cable.
 - Where applicable remove center screw of outlet. For single duplex outlets only.
- o Insert Location Beacon AC Power into power outlet. (See Figures 9 and 10 for verification of proper installation)
 - Where applicable, if center screw was removed from single duplex outlet, then secure the Location Beacon AC Power by inserting the provided "long" screw through the penetration between the outlets of the Location Beacon AC Power.

- Using an approved drill or screwdriver, screw “long” screw through the Location Beacon AC Power and into the screw opening in the duplex outlet.
- Apply torque until “long” screw is sits snug in the Location Beacon AC Power penetration.



Figure 9: Front view of Location Beacon AC Power (right) with Access Point attached (left)



Figure 10: Side view of Location Beacon AC Power (right) with Access Point attached (left)

- o Verify proper functioning of Location Beacon AC Power by observing proper LED behavior of unit according to the Power and Reset Conditions described below in b.
- o After verification of the proper functioning of Location Beacon AC Power, then, if required, reinsert any other power cables. (See Figure 11 for an example.)
- o Location Beacon AC Power has been successfully installed.

Figure 11: Location Beacon AC Power with external power cable inserted.



d. Power and Reset on Location Beacon AC Power

o LED on Location Beacon AC Power

- LED starts blinking when power is applied (or after a reset).
- The LED is to the left of the word POWER on the top of the Location Beacon AC Power device. (See Figure 12.)
- LED lights solid for 5 minutes when BLE connection to Access Point is successfully acquired (i.e. registration completed).
 1. After 5 minutes, LED shuts off.
- If no AirFinder Access Point is found after full scan process, LED transition to a slow blink for up to 5 minutes
 1. After 5 minutes in slow blink mode, LED shuts off.
- When Location Beacon attempts another scan / registration process, start blinking again at faster rate.

o Reset

- There are two means of resetting the Location Beacon AC Power. This can be accomplished by unplugging and plugging the device in again, or by activating the Reset pin.
- The preferred method of resetting the Location Beacon AC Power is to take a small implement (i.e. the end of a paperclip) and inserting it gently into the hole next to the word Reset on the top of the Location Beacon AC Power. Press the implement into the hole, until resistance is met.
- If the Location Beacon AC power is not secured into the outlet with a screw, then unplugging/plugging is an acceptable means of resetting.
- When successfully reset, the device will return to the initial LED Behavior laid out above ("LED Behavior when unit is powered")

Image 12: Top view of Location Beacon AC Power



4. AirFinder Access Point (WF-402AP-WP)

a. Hardware Verification

- i. Remove AirFinder Access Point (WF-402AP-WP) from packaging.
- ii. Visibly inspect front and back of unit (see Figures 13 and 14 below)
 1. If not damaged, proceed to the next step.
- iii. If the unit has visible damage, do not install.
Instead, immediately put unit aside and RMA.

Figure 13: Front view of Access Point (left) attached to Power Cradle AC Power (right)



Figure 14: Rear view of Access Point (right) attached to Power Cradle AC Power (left)



- iv. Locate power outlet that already has installed a functioning Power Cradle AC Power or a Location Beach AC Power.
- v. Slide attaching pegs of Access Point into slots of Power Cradle AC Power or a Location Beach AC Power.
- vi. See Figures 15 and 16 for verification of proper installation of Access Point.
- vii. Verify proper functioning of Access Point by observing proper LED behavior of unit according to the Power and Reset Conditions described below in b.
- viii. After verification of the proper functioning of Access Point, then the Access Point has been properly installed.

Figure 15: Front view of Access Point (left) attached to Power Cradle AC Power (right)



Figure 16: Side view of Access Point (left) attached Power Cradle AC Power (right)



b. Power and Reset Conditions on Access Point

- o LED Behavior when Access Point is powered
 - See Image 17 for view of the Access Point LEDs.
 - LED Labeled "SL" Success
 - LED starts blinking when power is applied (or after a reset).
 - Lights solid for 5 minutes when SL backhaul is successfully acquired (i.e. registration through completed; ready to flow data).
 - After 5 minutes, LED shuts off.
 - LED Labeled "SL" Failure
 - If no SL Gateway is found after full scan process, transition to slow blink for up to 5 minutes
 - o After 5 minutes, LED shuts off.
 - Access Point will periodically attempt to find a gateway. When AP attempts another scan / registration process, the LED starts blinking again (as above)
- o LED Labeled "AF"
 - LED blinks when AirFinder messages over BLE are being received / transmitted. This function is enabled as long as LED is active.
 - When LED "SL" is shut off, LED "AF" will also be shut off.
 -
- o Reset
 - To reset the Access Point, simply remove the device from the Power Cradle AC Power or the Location Beacon AC Power and then reconnect to power.
 - To remove the Access Point from the Power Cradle AC Power or the Location Beacon AC Power, access the underside of the combined unit to release the attaching clip.
 - Acquire a ballpoint pen or paperclip.
 - Find the slot underneath the Access Point. Insert the pen or paperclip into the circular opening.

Image 17: Top view of Access Point



- While keeping the pen or paperclip inserted, pull the paperclip or pen gently away from the Power Cradle AC Power or the Location Beacon AC Power. This releases the attaching clip without breaking the Access Point or attachment.
- After detaching the Access Point, reattach it.
- When successfully reset, the device will return to the initial LED Behavior laid out above ("LED Behavior when unit is powered")

5. AirFinder Location Beacon (WF-402B)

a. Hardware Verification

- o Remove AirFinder Location Beacon (WF-402B) from packaging.
- o Visibly inspect front and back of unit (see Images 18 and 19 below)
 - If not damaged, proceed to the next step.
 - If the unit has visible damage, do not install. Instead, immediately put unit aside and RMA.



Image 18: Front view of Location Beacon fits into Power Cradle DC Power



Image 19: Front view of Power Cradle DC Power

- o Identify location for installing Location Beacon.
 - Verify that Power Cradle DC Power can be installed in the designated position. See 6. below for Power Cradle DC Power installation instructions.
- o If using battery power for Power Cradle DC Power Verify that batteries are installed in the Location Beacon.
- o Screw bracket into wall or other surface.
- o Insert Location Beacon into bracket.

- o Verify proper functioning of Location Beacon by observing proper LED behavior of unit according to the Power and Reset Conditions described below in b.
- o Location Beacon has been successfully installed.

b. Power and Reset on Location Beacon AC Power

o LED on Location Beacon

- LED starts blinking when power is applied (or after a reset).
- See Image 22 to the right. The

LED is to the left of the word POWER on the top of the Location Beacon AC Power device.

- LED lights solid for 5 minutes when BLE connection to Access Point is successfully acquired (i.e. registration completed).

1. After 5

minutes, LED shuts off.

- If no AirFinder Access Point is found after full scan process, transition to slow blink for up to 5 minutes

1. After 5 minutes in slow

blink mode, LED shuts off.

- When Location Beacon attempts another scan / registration process, start blinking again at faster rate

o Reset

- There are two means of resetting the Location Beacon. This can be accomplished by detaching the unit, removing its batteries, and replacing them, and reattaching the device; or by activating the Reset pin.
- The preferred method of resetting the Location Beacon is to take a small implement (i.e. the end of a paperclip) and inserting it gently into the hole next to the word Reset on the top of the Location Beacon AC Power. Press the implement into the hole, until resistance is met.

Image 22: Top view of Location Beacon AC Power



When successfully reset, the device will return to the initial LED Behavior laid out above ("LED Behavior when unit is powered")

6. AirFinder Power Cradle DC Power (WF-402D)

a. Hardware Verification

- o Remove AirFinder Power Cradle DC Power (WF-402B) from

packaging.

- o Visibly inspect front and back of unit (see Images 23 and 24 below)
 - If not damaged, proceed to the next step.
 - If the unit has visible damage, do not install.
Instead, immediately put unit aside and RMA.



Image 23: Front view of Power Cradle DC Power with Access Point attached



Image 24: Rear view of Power Cradle DC Power with Access Point attached

- o Identify location for installing Power Cradle DC Power.
 - Verify that Power Cradle DC Power can be installed in the location.
- o Screw Power Cradle DC Power into wall or other surface.
- o Attach power supply to Power Cradle DC Power.
- o Attached Location Beacon or Access Point to Power Cradle DC Power.
 - If Location Beacon or Access Point powers normally, see above, then the Power Cradle DC Power has been successfully installed.

b. Power and Reset on Power Cradle DC Power

- o Power
 - When power is connected to Power Cradle DC Power, LED lights solid for 5 minutes.
 - After 5 minutes, the LED turns off.
- o Reset
 - If the Power Cradle DC Power needs to be reset, then remove external power from the unit.
 - Wait 1 minute.
 - Reattached power supply.
 - Validate power conditions above.

7.ETL Warnings (English and French)

1. For connection to a supply not in the U.S.A., use an attachment plug adapter of the proper configuration for the power outlet, if needed.

Pour la connexion à une alimentation pas aux Etats-Unis, utilisez un adaptateur de fixation de la configuration correcte pour la prise d'alimentation, si nécessaire.

2. Caution: Risk of Electric Shock. Grounding continuity must be maintained.

Attention: RISQUE DE CHOC ÉLECTRIQUE. La continuité de la mise à la terre doit être maintenue.

3. For indoor use only.

POUR UNE UTILISATION EN INTÉRIEUR.

4. Please check prior use, if output voltage and current of the power supply is suitable for the product.

Se il vous plaît vérifier avant l'utilisation, si la tension de sortie et le courant de l'alimentation est adapté au produit.

5. For information technology equipment use only.

Pour l'utilisation des équipements de technologie d'information seulement.

6. The plug is used as disconnect device. The socket-outlet shall be installed near the equipment and shall be easily accessible.

La prise est utilisée comme dispositif de déconnexion. La prise de courant doit être installée près de l'équipement et doit être facilement accessible.

7. The cover may under no circumstances be opened. If the cover is damaged, then the power supply may no longer be used.

Le couvercle peut en aucun cas être ouvert. Si le couvercle est endommagé, l'alimentation ne peut plus être utilisé.

8. Children should be supervised to ensure that they do not play with the appliance.

Les enfants doivent être surveillés pour s'assurer qu'ils ne jouent pas avec l'appareil.

8.FCC Warning

Federal Communications Commission (FCC) Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generate, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

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

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

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

RF exposure warning

This equipment complies with FCC radiation exposure limits set forth

for an uncontrolled environment.

ISED

CAN ICES-003 (B)/NMB-003(B)

Canadian Compliance Statement This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

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

IMPORTANT NOTE:

Radiation Exposure Statement:

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

Déclaration d'exposition aux radiations:

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé.

Cet équipement doit être installé et utilisé avec un minimum de 20cm de distance entre la source de rayonnement et votre corps.