AeroScout®
Enterprise Visibility Solutions

AeroScout
Location Receiver

User Guide

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Disclaimer

Trademark Acknowledgements

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Introduction

The AeroScout Location Receiver is a component of the AeroScout Wireless LAN Location Platform. AeroScout's expertise in wireless signal measurement has lead to the development of a range of patent-pending algorithms and techniques embedded in the Location Receiver. These measure the time of arrival (TOA) of standard 802.11b messages to the nanosecond. The AeroScout Positioning Server processes the TOA data to produce accurate location information suitable for mission-critical applications. Each Location Receiver can process over 300 location measurements per second, enough to satisfy even the most demanding applications. In addition to TDOA positioning, the Location Receivers can also supply signal strength information required for RSSI based location calculation.

AeroScout Location Receivers are capable of locating:

- AeroScout Tags - small, battery-powered Wi-Fi based tags that can be used to track people and a variety of assets.
- Standard Wi-Fi clients - laptops, PDAs, barcode scanners and other wireless devices without the need for any hardware or software modifications.

Location Receivers communicate with the AeroScout Engine via standard Ethernet or wirelessly, over a Wi-Fi™ network. No dedicated location network cabling is required. Location Receivers also support Power over Ethernet, eliminating costly electrical installation.

The Location Receiver units do not interfere with the wireless local area network. Even when set up with a bridge to provide location-measurement data wirelessly, the volume of traffic the Location Receivers generates is insignificant.

Location Receiver Hardware

The AeroScout Location Receiver includes a Wi-Fi radio module, a powerful TOA processor and a Low Frequency transmitter module. Approximately the size of a small access point, Location Receivers include two external antenna connectors, a DC input power connector and an Ethernet + Power over Ethernet adaptor.

The Location Receiver can also be connected to a wireless LAN bridge. Such a configuration is suitable for locations where a wired LAN connection is not available.

Figure 1. AeroScout Location Receiver

Figure 2. AeroScout Location Receiver – Ruggedized Unit

Figure 1 describes the AeroScout Location Receiver panels and indication LEDs.

Figure 1. AeroScout Location Receiver front and back panels

1 **Power** – Green LED indicates that the unit is ON and connected to a power source.

2 **Status** – Green LED indicates the unit's operational status.

   a. Blinking fast (several times per second) – Location Receiver is associated to the AeroScout Engine and sending location data to it.

   b. Blinking slow (once per second) - Location Receiver is not associated to the AeroScout Engine.

   c. Off - Fault

3 **Link** – Orange LED indicates active Ethernet communication.

4 **Antenna SMA connector** – 2.4GHz antenna connectors. A pair of dipole antennas is included with the unit, but other compatible antennas may also be used to enhance performance.

   Note that those are reverse polarity connectors. The left antenna next to the RJ-45 interface is the main antenna, to be used when diversity is not selected.

5 **Local Area Network (LAN)** – 10/100 base-T Ethernet (RJ-45) connector. The same connector is used for powering the Location Receiver when using Power over Ethernet (802.3af compatible).

6 **Power** – The power jack provides connection to an external power supply. The adapter rating is 5V/1.5A and positive center pole. The 110/220VAC power adapter is supplied with the Location Receiver and available in US/Japan or Europe models.

Note
Use only AeroScout-supplied power supplies.

Antennas

This section shows the supported antennas by the AeroScout Location Receivers.

Note

Antennas are selected according to specific site and system requirements. Before changing antennas, please consult with your vendor.

5.5dBi Omni-directional Antenna - Max Rad MMO24005PT

- Vertical polarization
- Horizontal beam width – 360 degrees
- Vertical beam width – 32 degrees
- Length – 11.3” (287mm)

8dBi Omni-directional Antenna - High-Gain HG2409U

- Vertical polarization
- Horizontal beam width – 360 degrees
- Vertical beam width – 15 degrees
- Length – 16” (406mm)

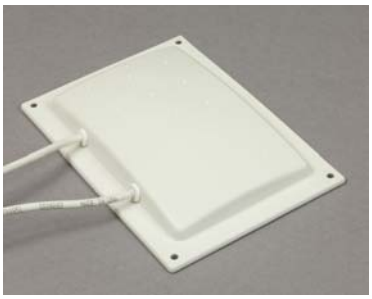
8dBi Directional Flat Patch Antenna - High Gain HG2409P

- Horizontal beam width – 75 degrees
- Vertical beam width – 65 degrees
- Dimensions – 4.5” X 4.5” X .9” (114mm X 114mm X 23mm)
- Horizontal or vertical polarization

5dBi Directional Antenna - Cushcraft SR2405135D

- Wide H-plane antenna
- 135 degrees
- Dimensions - 3" X 6" X 2" (76mm X 152mm X 51mm)

6.5dBi Directional Diversity Patch Antenna - S2406DSP12NF Cushcraft



- Spatial diversity directional antenna
- Linear polarization
- Two 6.5 dBi patch antennas in one package
- Dimensions 6.5"X 4.75"X .8" (165mm X 120mm X 20mm)

2dBi Omnidirectional Diversity Antenna - Cushcraft S2402DS

- 2dBi integrated Omnidirectional diversity antennas in one package
- Dimensions 5.25" X 2.75" X .75" (133mm X 70mm X 19.05mm)

2 dBi Omni-directional Dipole Rubber Antenna - Hankook TB2400S

- Vertical polarization
- Antenna length: 6.7" (170mm)

Note

Indoor cables for antennas are of type RF Coaxial Cable RG316 SMA(RP)-NT. These are available in the following lengths: ½ m, 1m, 2m, and 3m.

Location Receiver Installation

Connecting to the Power Source

The Location Receivers can be powered externally or over the Ethernet network using a standard 802.3af power injector.

To power a Location Receiver using Power over Ethernet:

1. Plug the CAT5 cable to the Location Receiver.
2. Plug the cable into the power supply device (e.g. PoE switch).
3. Check that the green power LED is on.

To power the Location Receiver from an external power supply:

1. Connect the CAT5 cable to the Location Receiver.
2. Connect the CAT5 cable to the hub or switch.
3. Connect the power cable to the Location Receiver.
4. Plug in the power supply cable to a standard 110-240V AC outlet.
5. Check that the green power LED is on.

Mounting the Location Receiver

The Location Receiver shall be mounted vertically with the LEDs panel pointing to the bottom. The unit (and antennas) shall be stable during normal operation.

The unit should be installed in a ventilated area not exposed to direct sun. Do not to install the unit near heat sources and/or other RF antennas.

The Location Receiver should be firmly mounted on a fixed surface using two screws. You can either mount the Location Receiver directly with the mounting holes at the back of the unit or use the mounting plate that is supplied with the unit.

Figure 4 shows the Location Receiver mounting plate and the Location Receiver back panel mounted on it.

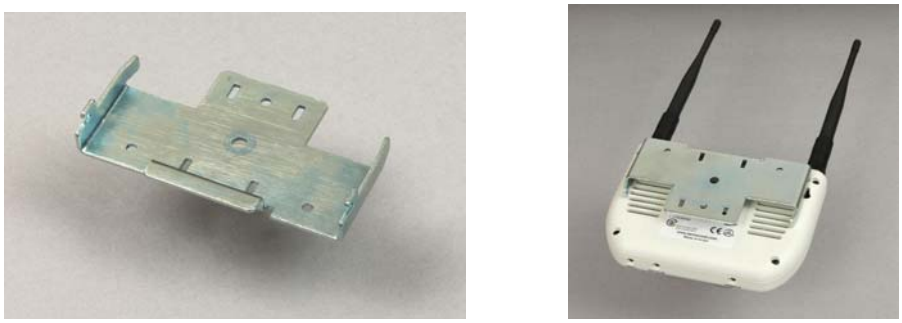


Figure 4. Location Receiver Mounting Plate

Positioning the Antenna

When connecting the dipole antennas included with the Location Receiver, ensure that they are positioned vertically, up or down.

When connecting any other antenna, ensure that it is compatible with the SMA connector or use a suitable RF cable.

Location Receiver and Accessories Model Numbers

AeroScout Location Receiver	Comments	Model Number
AeroScout Location Receiver	Includes 2 Omni-directional dipole rubber antennas, 802.3af Power over Ethernet and power adapter.	BWH1000-02
AeroScout Location Receiver – Ruggedized Unit	Location Receiver unit in a metal housing.	BWH1000-02-R
AeroScout Tag Activator	Includes 2 Omni-directional dipole rubber antennas, Low Frequency antenna, 802.3af Power over Ethernet and power adapter.	BWH1000-02-TA
Antennas		
Omni-directional dipole rubber antenna - 2dBi	Hankook TB2400S	ANT-101
Omni-directional Antenna - 5.5dBi	Max Rad MMO24005PT	ANT-102
Omni-directional Antenna - 8dBi	HyperGain HG2409U, mounting accessory included	ANT-103
Directional Antenna - 8dBi	HyperGain HG2409P, mounting accessory included	ANT-201
Directional Antenna - 5dBi	CushCraft SR2405135D, mounting accessory included	ANT-202
Directional Diversity Antenna - 6.5dBi	CushCraft S2406DSP, mounting kit included	ANT-301
Omnidirectional Diversity Antenna - 2dBi	CushCraft S2402DS	ANT-302
Power Adapters		
AC/DC power adapter 110/220VAC US/Japan		ADP-010
AC/DC power adapter 110/220VAC Europe		ADP-020

Location Receiver Specifications

Performance

- Outdoor range: up to 200m (600 feet)
- Indoor range: up to 60m (180 feet)
- Over 300 measurements processed per second (system capacity depends on the server's processing power as well)
- Patent-pending signal-processing algorithms
- Supports standard Wi-Fi (802.11b) clients and AeroScout tags

Physical and Environmental Specifications

- Dimensions: 5.51" x 4.33" x .1.38" (140mm x 110mm x 35mm)
- Weight: 120g (4.2oz.)
- Temperature: -20°C to 50°C (-4°F to 122°F)
- Humidity: 0% to 95% Non-Condensing

Interfaces

- Ethernet: 10/100 base-T Ethernet (RJ-45)
- External antenna: SMA connectors
- Compatible with standard wireless bridges

Radio Specifications

- 2.4GHz direct sequence spread spectrum 802.11b radio
- Supports all worldwide Wi-Fi channels 1-14 (subject to local regulations)
- 125kHz low frequency transmitter and antenna
- Transmission power: 15dBm

Power

- Power: 5VDC 1.5A wall unit adapter, auto-sensing 100/240 VAC
- Power-over-Ethernet: 802.3af compliant

Certifications

- Radio:

  FCC Part 15, sub-part C class B, sub-part B

  EN 300-328, EN 301-489, EN 300-330

  RSS 210 (Canada)

  ARIB STD-T66 (Japan), ARIB STD-33 (Japan)

- Safety:

  CE, cTUVus (EN60950)

Safety and Warnings

FCC STATEMENT

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

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

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:
a) This device may not cause harmful interference
b) This device must accept any interference received, including interference that may cause undesired operation.

FCC Warning

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

Instructions concerning human exposure to radio frequency electromagnetic fields.
To comply with FCC Section1.307 (b)(1) for human exposure to radio frequency electromagnetic fields, implement the following instruction: A distance of at least 20 cm between the equipment and all persons should be maintained during operation of the equipment.

Warranty

Hardware. AeroScout Inc. ("AeroScout"), warrants that commencing from the date of delivery to Customer, and continuing for a period of one year the Hardware will be free from defects in material and workmanship under normal use. The date of shipment of a Product by AeroScout is set forth on the packaging material in which the Product is shipped. This limited warranty extends only to the original user of the Product. Customer's sole and exclusive remedy and the entire liability of AeroScout and its suppliers under this limited warranty will be, at AeroScout's or its service center's option, shipment of a replacement within the period or a refund of the purchase price if the Hardware is returned to the party supplying it to Customer, if different than AeroScout, freight and insurance prepaid. AeroScout replacement parts used in Hardware repair may be new or equivalent to new. AeroScout's obligations hereunder are conditioned upon the returned of affected articles in accordance with AeroScout's then-current Return Material Authorization (RMA) procedures.

Restrictions. This warranty does not apply if the Product (a) has been altered, except by AeroScout, (b) has not been installed, operated, repaired, or maintained in accordance with instructions supplied by AeroScout, (c) has been subjected to abnormal physical or electrical stress, misuse, negligence, or accident; or (d) is sold for beta, evaluation, testing, or demonstration purposes for which AeroScout does not receive a payment of purchase price or license fee.

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This disclaimer and exclusion shall apply even if the express warranty set forth above fails of its essential purpose.