

**SkyZhone 1604, 1404, 1204 Hardware
Installation Guide**

For software version 1.2.x

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Z H O N E[®]

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WARNING!

The authority to operate this equipment is conditioned by the requirement that no modifications will be made to the equipment unless the manufacturer expressly approves the changes or modifications.

The SkyZhone Model 1x04 products are AC power device conforming to UL 60950-1 standards. The AC Power cable must wired to an AC source by a licensed electrician familiar with the NEC, CEC and all applicable local codes.

Proper Safety Grounding is required to insure proper operation and protection from lightning strikes and surges. A copper ground lug is provided on the unit for this purpose. Connect a length of #10 AWG solid, bare, copper wire to the grounding lug and firmly tighten the grounding screw (see Figure 20). Connect the other end of the grounding wire to a grounded surface or another earth ground such as a metal rod. This ground must be install before applying power to the unit.

SkyZhone provides both Primary and Secondary lightning and surge protection to the SHDSL and PoE cable signals. The special POE + Console cable has both protected signals (POE) and unprotected signals (Console). This special cable is intended for unit configuration prior to installation. It is not intended for outdoor use. Use the standard POE cable for outdoor installations.

The National Electrical Code (NEC) and Canadian Electrical Code (CEC) require the use of an agency listed (UL/CSA) Building Entrance Protector for all power and data communications cables entering a building. This is to protect the building and occupants from damage caused by transient voltage and current surges.

A UL 497 (CSA C22.2 No. 226-92) approved primary protection device must be used at the building entrance if the Ethernet port is used to provide in-building access to the SkyZhone network. Also check with local wiring codes.

Serious injury can occur if the antennas come in contact with electric power lines. Carefully follow the instructions in this manual. During and after installation, the antennas must be a minimum of 24 inches from any power lines. Use caution when installing this outdoor equipment.

FCC RF Exposure Requirements (per OET-65) requires the SkyZhone platform to be mounted such that the general public does not come within 10 inches of the antennae.



Caution:

- This product requires professional installation.
- The unit is sealed at the factory and must not be opened in the field. The unit shall be returned to the factory for repairs.
- The PoE (Power over Ethernet) connector sources power to other devices. Some devices may not be compatible with this feature. In that case, do not connect the wires that supply the power. The power is 48 volts DC, at a maximum of 5 watts.



Note:

- This equipment has been tested and found to comply with the limits for a Class C digital device, pursuant to part 15, subpart C, of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the user manual, may increase the potential for harmful interference to radio communications.
- This warning applies to the Skyzhone-1404 and SkyZhone-1604 only. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are

designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which the user will be required to correct the interference at their own expense.

- The supplied cables and antennae must be used to ensure compliance with Part 15, FCC Rules. The use of any other antennas will invalidate the unit's FCC Part 15 certification.
 - The 2.4 GHz band has been designed to operate with the antennae listed below, and having a maximum gain of 5 dBi. Antennae not included in this list (Comet Part Number CFA-245W-SR) or having a gain greater than 5 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.
 - The 4.9 GHz band has been designed to operate with the antennae listed below, and having a maximum gain of 5.3 dBi. Antennae not included in this list (Comet Part Number SF-D49NW-SR) or having a gain greater than 5.3 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms
 - To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropic radiated power (e.i.r.p.) is not more than that permitted for successful communication. Operating the device with the supplied antennas will ensure that this requirement is met.
 - 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.
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ABOUT THIS GUIDE

This guide is intended for use by installation technicians, system administrators, and network administrators. It explains how to install the SkyZhone station and how to provision the physical interfaces.

Style and notation conventions

The following conventions are used in this document to alert users to information that is instructional, warns of potential damage to system equipment or data, and warns of potential injury or death. Carefully read and follow the instructions included in this document.



Caution: A caution alerts users to conditions or actions that could damage equipment or data.



Note: A note provides important supplemental or amplified information.



Tip: A tip provides additional information that enables users to more readily complete their tasks.



WARNING! A warning alerts users to conditions or actions that could lead to injury or death.

Typographical conventions

The following typographical styles are used in this guide to represent specific types of information.

<i>Bold</i>	Used for names of buttons, dialog boxes, icons, menus, profiles when placed in body text, and property pages (or sheets). Also used for commands, options, parameters in body text, and user input in body text.
Fixed	Used in code examples for computer output, file names, path names, and the contents of online files or directories.
Fixed Bold	Used in code examples for text typed by users.
<i>Fixed Bold Italic</i>	Used in code examples for variable text typed by users.
<i>Italic</i>	Used for book titles, chapter titles, file path names, notes in body text requiring special attention, section titles, emphasized terms, and variables.
PLAIN UPPER CASE	Used for environment variables.
Command Syntax	Brackets [] indicate optional syntax. Vertical bar indicates the OR symbol.

Related documentation

Refer to the following publication for additional information:

[SkyZhone CLI Reference Guide](#) explains how to use the Zhone command line interface (CLI) and describes the system commands and parameters.

[SkyZhone WEB Configuration Tool User Guide](#) explains how to configure and manage SkyZhone using the Web interface.

Refer to the release notes for software installation information and for changes in features and functionality of the product, if any.

Acronyms

The following acronyms are related to Zhone products and may appear throughout this manual:

Table 1: Acronyms and their descriptions

Acronym	Description
ADSL	Asymmetrical Digital Subscriber Line
AP	Access Point
ACS	Auto Configuration Server
DHCP	Dynamic Host Configuration Protocol
DSL	Digital Subscriber Line
EFM	Ethernet in the First Mile

MALC	Multi-Access Line Concentrator
MIB	Management Information Bases
NAT	Network Address Translation
NMS	Network Management System
RADIUS	Remote Authentication Dial In User Service
SHDSL	Symmetric High-bit-rate Digital Subscriber Line
SLMS	Single Line Multi-Service
SNMP	Simple Network Management Protocol
TFTP	Trivial File Transfer Protocol
VoIP	Voice over IP
VoWi-Fi	Voice-over-Wifi
VPN	Virtual Private Network
WEP	Wired Equivalent Privacy
Wi-Fi	Wireless Fidelity (IEEE 802.11 wireless networking)
WMM	Wi-Fi Multimedia
WPA	Wi-Fi Protected Access
ZMS	Zhone Management System

Contacting Global Service and Support

Contact Global Service and Support (GSS) if you have any questions about this or other Zhone products. Before contacting GSS, make sure you have the following information:

- Zhone product you are using
- System configuration
- Software version running on the system
- Description of the issue

Technical support

If you require assistance with the installation or operation of your product, or if you want to return a product for repair under warranty, contact GSS. The contact information is as follows:

E-mail	support@zhone.com
Telephone (North America)	877-ZHONE20 (877-946-6320)
Telephone (International)	510-777-7133
Internet	www.zhone.com/support

If you purchased the product from an authorized dealer, distributor, Value Added Reseller (VAR), or third party, contact that supplier for technical assistance and warranty support.

Service requirements

If the product malfunctions, all repairs must be performed by the manufacturer or a Zhone-authorized agent. It is the responsibility of users requiring service to report the need for service to GSS.

THE SKYZHONE ACCESS POINT

This chapter provides an overview of the SkyZhone Wi-Fi outdoor access point. It includes these sections:

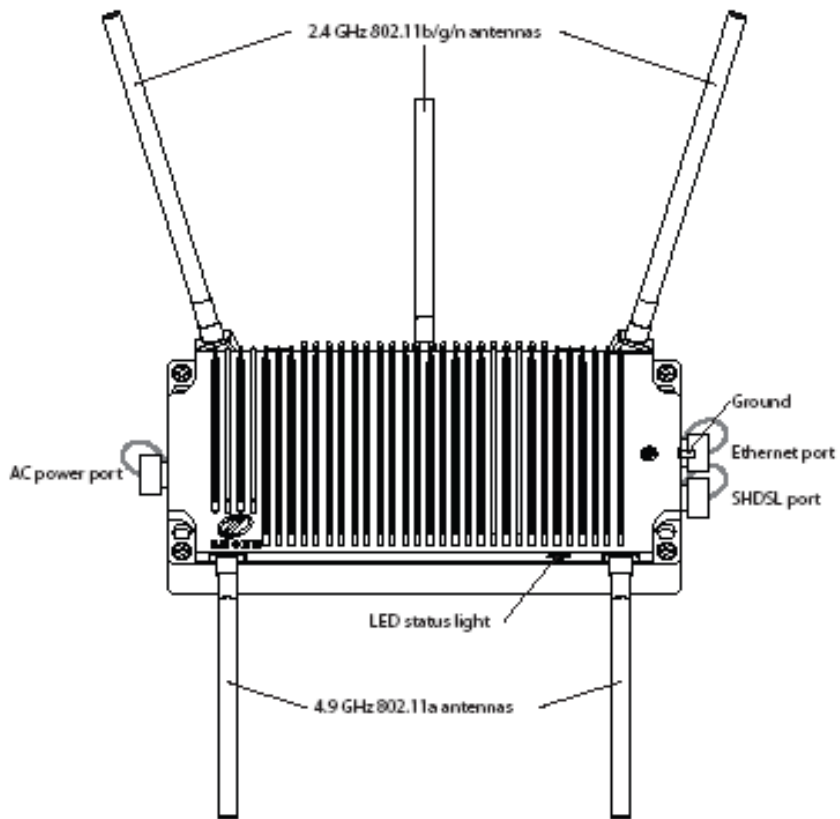
- Overview, page 11
- SkyZhone features, page 13
- SkyZhone ordering information, page 19

Overview

The SkyZhone access point (Models 1X04) are AC-powered carrier class outdoor Wi-Fi access points with 22 Mbps symmetric DSL backhaul to every unit. The SkyZhone supports a variety of applications including VoIP, internet access, mobile video, and enterprise VPNs optimized for citywide Wi-Fi deployments by telephone companies.

SkyZhone enables telephone companies to deploy a more reliable, lower latency, higher speed and lower cost network than traditional mesh Wi-Fi solutions.

Figure 1: SkyZhone with 2.4GHz 802.11b/g/n and 4.9 GHz 802.11a antennae



SkyZhone models

The SkyZhone AC-powered access point is available in the following models:

- **SkyZhone-1604** Wi-Fi Access Point

Supports wireless radio transmission of 2.4 GHz 802.11b/g, and 4.9 GHz 802.11a, using two separate radios. Four SHDSL lines with EFM Bonding are used for backhaul. 120VAC power is required.

- **SkyZhone-1404** Wi-Fi Access Point

Supports wireless radio transmission of 4.9 GHz 802.11a. Four SHDSL lines with EFM Bonding are used for backhaul. 120VAC power is required.

- **SkyZhone-1204** Wi-Fi Access Point

Supports wireless radio transmission of 2.4 GHz 802.11b/g. Four SHDSL lines with EFM Bonding are used for backhaul. 120VAC power is required.

Coverage area

With the SkyZhone access point, there is no need to use Wi-Fi links for communication between stations. This eliminates issues associated with buildings, trees, or hilly terrain that can impact node-to-node communications for mesh access points.

The SkyZhone access point uses 5dBi antennas that provide a 26-degree beam-width per antenna. Additionally, the three 2.4 GHz antennas are oriented to provide complete coverage both horizontally and vertically. SkyZhone access point's signals extend up and down, and all around to minimize dead spots.

MIMO (Multiple-In, Multiple-Out) technology maximizes the receive signal strength from typical low-power 802.11b/g client devices and enables SkyZhone to maintain a reliable link at distances more than 50% greater than non-MIMO solutions.

In Figure 1 on page 12, note that the 4.9 GHz 802.11a radio uses the bottom two antennas and the 2.4 GHz 802.11b/g radio uses the top three antennas.

The 2.4 GHz radio operates in the unlicensed ISM band and can be used for a variety of applications such as Internet Access, Voice over IP, Mobile Video, or Enterprise VPN.

The 4.9 GHz radio operates in the licensed spectrum reserved for Public Safety users including city government, police, fire and EMT.

SkyZhone features

The SkyZhone access points communicate with SkyZhone aggregators using standards-based SHDSL-EFM uplinks to transport data traffic between access points and the Central Office or remote cabinet.

After initial power up, the SkyZhone access point contacts the ACS Server, downloads the latest software, downloads the configuration file, and registers itself with the Network Management System (NMS) system.

The SkyZhone access points' dual-radio architecture provides 2.4GHz access for residential and commercial applications while simultaneously providing 4.9GHz access for public safety applications, using industry standard IEEE 802.11 client devices.

Remote configuration and troubleshooting is supported via SSH and HTTPS to SkyZhone access points through a separate management VLAN. In addition, a console port is provided for local access to the CLI.

SkyZhone also includes a Power-over-Ethernet (PoE) port which provides for connectivity from the SkyZhone access point to a video camera or other accessory.

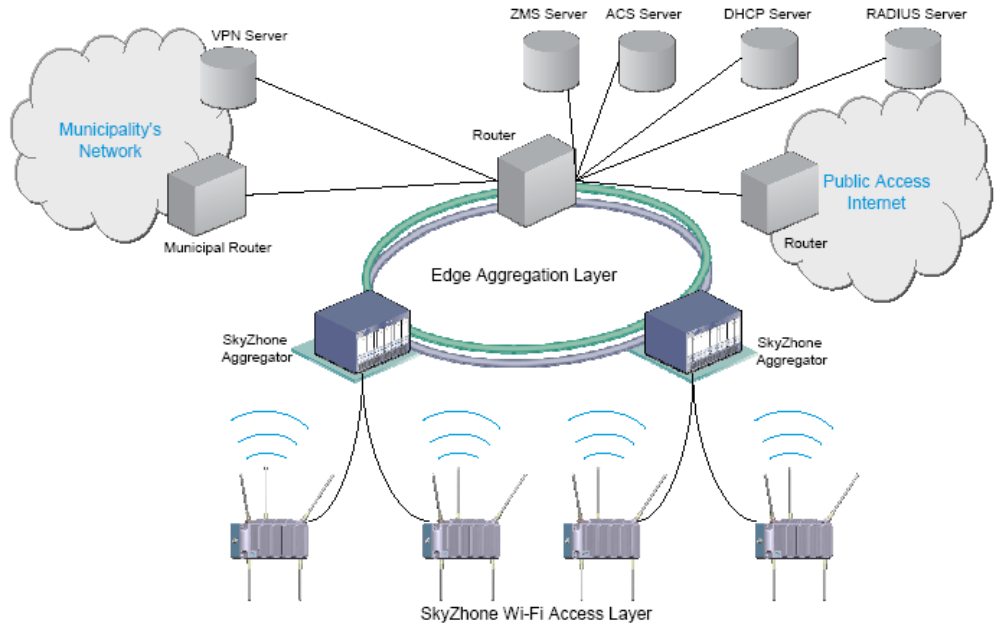
Bonding

The SkyZhone access point supports Ethernet in the First Mile (EFM) bonding on SHDSL lines. This bonding complies with the IEEE 802.3ah standard. Additional SHDSL lines can be added as your bandwidth needs increase. The

SkyZhone access point automatically performs load balancing over the SHDSL lines.

Figure 2 shows an example of a SkyZhone network configuration.

Figure 2: SkyZhone network configuration



The SkyZhone supports 4 SHDSL lines bonded as a single EFM interface and connected to a SHDSL card installed in a SkyZhone Aggregator. Each SHDSL line card in the SkyZhone Aggregator provides 24 ports and each SkyZhone access point uses up to 4 ports. The data rates for the SHDSL card are shown in Table 2.

SHDSL Data Rates

The SkyZhone Access Points support the following SHDSL data rates on 26 AWG cable.

Table 2: SHDSL Data Rates

Distance (Feet)	1 Line (Kbps)	2 Lines (Kbps)	4 Lines (Kbps)
4000	5696	11392	22784
5000	5120	10240	20480
6000	3776	7552	15104
7000	2944	5888	11776
8000	2432	4864	9728
9000	2048	4096	8192

Distance (Feet)	1 Line (Kbps)	2 Lines (Kbps)	4 Lines (Kbps)
10000	1664	3328	6656
11000	1359	2718	5436
12000	1024	2048	4096
13000	768	1536	3072
14000	640	1280	2560
15000	512	1024	2048
16000	512	1024	2048
17000	384	768	1536
18000	320	640	1280

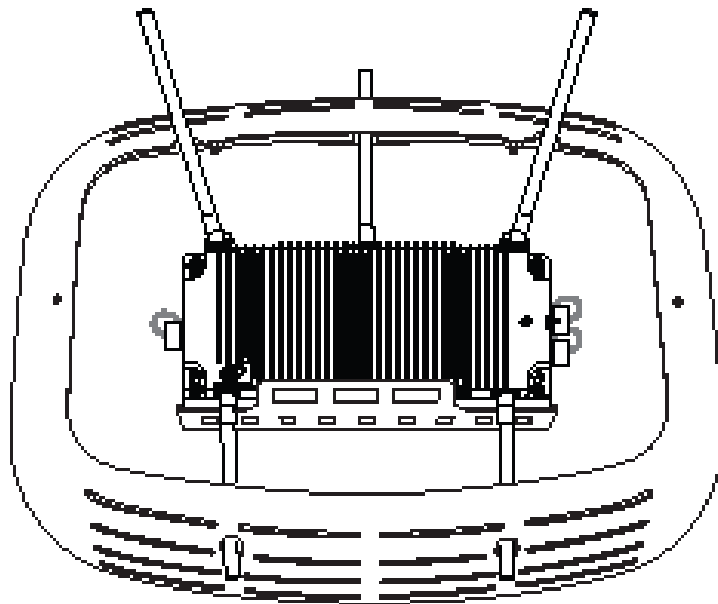
Mounting options

The SkyZhone access point can be mounted on a pole, at any angle (between vertical and horizontal), on a streetlight, loop span, or wall.

Wall-Mounting Enclosure

When wall-mounted the SkyZhone access point may be contained in an enclosed and “hidden” plastic casing that is supported on an aluminum mounting shelf. The following figure shows the SkyZhone access point with the enclosure lid removed.

Figure 3: Wall-Mount Enclosure with cover removed



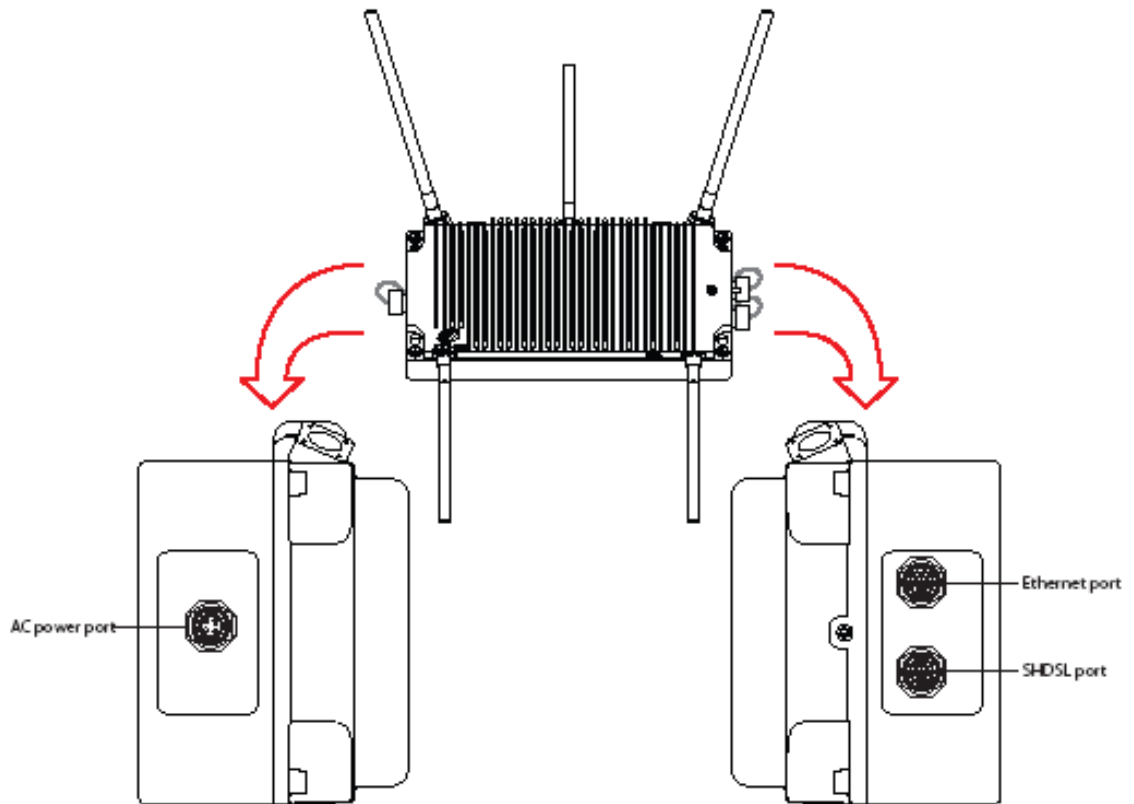
See Wall-mounting enclosure kit on page 27 for using the wall-mounted enclosure kit.

Cables

The SkyZhone Port Connectors

The port connectors are located on either side of the SkyZhone unit. Figure 4 shows the SkyZhone access point port locations.

Figure 4: SkyZhone-1x04 port connectors



SHDSL, Ethernet (PoE) + Console, and AC Power connectors

Figure 5 displays the pinouts for the SHDL PLUG connector.

Figure 5: SHDSL PLUG connector

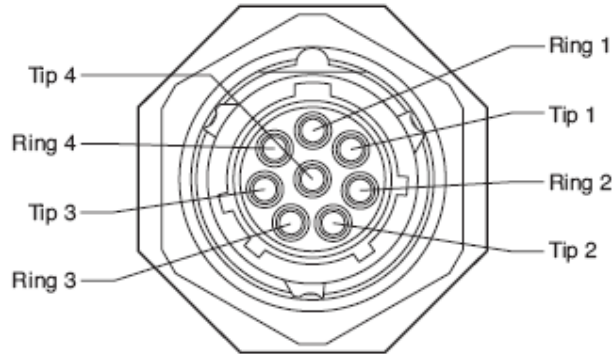


Table 3 lists the pinouts for the SHDSL cable. Each DSL line is composed of a twisted-pair of wires. These SkyZhone models (1x04) do not support line power. The four SHDSL pair are data only.



Note: The mechanical configuration (SOCKET vs. PLUG) of the SHDSL, POE + Console, and AC-Power connectors are unique to prevent attaching a cable to the wrong connector.

Table 3: SHDSL connector pinouts for data

Line	Signal	Color
1	Ring 1	Blue
	Tip 1	White/Blue
2	Ring 2	Orange
	Tip 2	White/Orange
3	Ring 3	Green
	Tip 3	White/Green
4	Ring 4	Brown
	Tip 4	White/Brown

Ethernet (PoE) + Console

Figure 6 displays the pinouts for a PoE SOCKET connector.

Figure 6: PoE + Console SOCKET connector

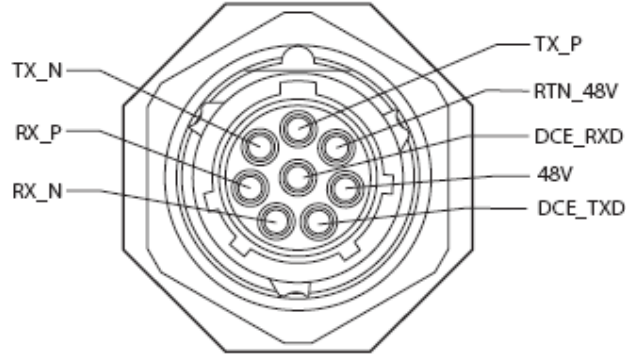


Table 4 lists the pinouts for the Ethernet (PoE) + Console cable. The Console DCE_TXD and DCE_RXD connections are only used for initial SkyZhone configuration in the lab. While these pins are available at the SkyZhone bulkhead connector mounted on the unit, they are not available with the standard external POE cable that mates with this connector. This is to avoid surges on these unprotected pins. Therefore a special cable is required to access the Console pins. Since the console pins are not provided with surge protection, this special cable is not suitable for permanent installation. If the PoE connection is used it must have a dust cap installed to maintain an IP66 rating for the unit.

Table 4: Power-over-Ethernet (PoE) connector pinouts

Pin	Signal	Color
A	TX_P	Blue
B	TX_N	White/Blue
C	RX_P	Orange
D	RX_N	White/Orange
E	DCE_TXD (special cable required)	White/Brown
F	48V	Green
G	Return_48V	White/Green
H	DCE_RXD (special cable required)	Brown

AC Power PLUG Connector

Figure 7 displays the pinouts of the 120 Volt AC Power PLUG connector.

Figure 7: AC Power PLUG connector

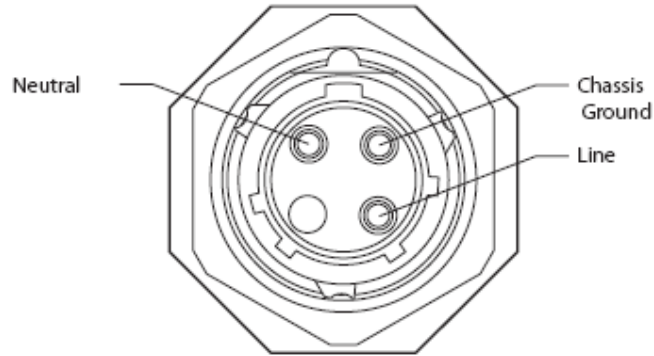


Table 5 lists the pinouts for the AC Power PLUG cable.

Table 5: AC Power PLUG connector pinouts

Pin	Signal	Color
1	Neutral	White
2	No connection	
3	Line	Black
GND	Chassis GND	Green

Grounding

Proper grounding must be complete before you connect power to the unit. See *Grounding* on page 37

SkyZhone ordering information

To order SkyZhone Wi-Fi outdoor access points by model number contact GSS, see *Contacting Global Service and Support* on page 9.

PREPARING FOR INSTALLATION

This chapter describes how to prepare your site for the installation of the SkyZhone. It includes the following sections:

- Installation precautions, page 20
- Selecting the locations, page 22
- Specifications, page 22

Installation precautions

It is advisable to be aware of the following precautions:



WARNING!

The authority to operate this equipment is conditioned by the requirement that no modifications will be made to the equipment unless the manufacturer expressly approves the changes or modifications.

The SkyZhone Model 1x04 products are AC power device conforming to UL 60950-1 standards. The AC Power cable must wired to an AC source by a licensed electrician familiar with the NEC, CEC and all applicable local codes.

Proper Safety Grounding is required to insure proper operation and protection from lightning strikes and surges. A copper ground lug is provided on the unit for this purpose. Connect a length of #10 AWG solid, bare, copper wire to the grounding lug and firmly tighten the grounding screw (see Figure 20). Connect the other end of the grounding wire to a grounded surface or another earth ground such as a metal rod. This ground must be install before applying power to the unit.

SkyZhone provides both Primary and Secondary lightning and surge protection to the SHDSL and PoE cable signals. The special POE + Console cable has both protected signals (POE) and unprotected signals (Console). This special cable is intended for unit configuration prior to installation. It is not intended for outdoor use. Use the standard POE cable for outdoor installations

The National Electrical Code (NEC) and Canadian Electrical Code (CEC) require the use of an agency listed (UL/CSA) Building Entrance Protector for all power and data communications cables entering a building. This is to protect the building and occupants from damage caused by transient voltage and current surges.

A UL 497 (CSA C22.2 No. 226-92) approved primary protection device must be used at the building entrance if the Ethernet port is used to provide in-building access to the SkyZhone network. Also check with local wiring codes.

Serious injury can occur if the antennas come in contact with electric power lines. Carefully follow the instructions in this manual. During and after installation, the antennas must be a minimum of 24 inches from any power lines. Use caution when installing this outdoor equipment.

FCC RF Exposure Requirements (per OET-65) requires the SkyZhone platform to be mounted such that the general public does not come within 10 inches of the antennae.



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- This product requires professional installation.
- The unit is sealed at the factory and must not be opened in the field. The unit shall be returned to the factory for repairs.
- The PoE (Power over Ethernet) connector sources power to other devices. Some devices may not be compatible with this feature. In that case, do not connect the wires that supply the power. The power is 48 volts DC, at a maximum of 5 watts.



Note:

- This equipment has been tested and found to comply with the limits for a Class C digital device, pursuant to part 15, subpart C, of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the user manual, may increase the potential for harmful interference to radio communications.
- This warning applies to the Skyzhone-1404 and SkyZhone-1604 only. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which the user will be required to correct the interference at their own expense.
- The supplied cables and antennae must be used to ensure compliance with Part 15, FCC Rules. The use of any other antennas will invalidate the unit's FCC Part 15 certification.
- The 2.4 GHz band has been designed to operate with the antennae listed below, and having a maximum gain of 5 dBi. Antennae not included in this list (Comet Part Number CFA-245W-SR) or having a gain greater than 5 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

- The 4.9 GHz band has been designed to operate with the antennae listed below, and having a maximum gain of 5.3 dBi. Antennae not included in this list (Comet Part Number SF-D49NW-SR) or having a gain greater than 5.3 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms
- To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropic radiated power (e.i.r.p.) is not more than that permitted for successful communication. Operating the device with the supplied antennas will ensure that this requirement is met.
- 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.

Selecting the locations

Each installation is unique due to the physical environment. Before installing each SkyZhone access point, perform a site survey to determine the optimum placement of units for maximum range, coverage, and network performance.

The SkyZhone radio is susceptible to interference that can reduce data rate and range. For best performance, follow these guidelines:

- Install the unit in an area where trees, buildings, and large steel structures do not obstruct radio signals to and from the antenna. Be sure to consider the future tree growth and construction when considering a site. Direct line-of-sight operation is always best. Antennae must be kept at least 10 inches away from contact with the general public passing by the area.
- Install the units away from other possible sources of 2.4 GHz WLAN interference. These sources include cordless phones and microwave ovens, as well as other WiFi access points.
- Install the units, when wall-mounted, onto an area that can accommodate the plastic casing and lid of 24 inches high and at least 36 inches wide.

Specifications

The following table lists SkyZhone’s technical specifications:

Table 6: SkyZhone technical specifications

Description	Specifications
PHYSICAL	
Dimensions	14” W x 6”H x 6”D

Description	Specifications
Weight	18 lbs
Operating Temperature	-31F to 131F (-35C to 55C)
Power	120VAC, 60Hz, 45W Maximum
Backhaul	22.8 Mbps symmetric backhaul using ITU G.991.2 (SHDSL) on four Tip/Ring pairs.
Regulatory Certifications	FCC Part 15, Subpart-C (15.247) FCC Part 15, Class A FCC Part 90 UL60950-1 Industry Canada RSS210 CAN/CSA-22.2 No. 60950-1-03
Enclosure/Humidity and Dust	IP66, NEMA4X, IEC 60529
MANAGEMENT	
Management Interfaces	WEB I/F, Command Line I/F, SNMPv2, TR-069
Management Access	HTTPS, SSH, TR-069
Mgmt Access Security	RADIUS password authentication
Wi-Fi Access Security	IEEE 802.1X, WPA/WPA2, WEP
Standards Compliance	EN60950 IEEE 802.11b, g (2.4 GHz Wireless) IEEE 802.11a (4.9 GHz Wireless) IEEE 802.1D Bridging K.20 Surge Immunity IEEE 802.3ah (2Base-TL) Ethernet in the first mile IEEE 802.1Q VLANS IEEE 802.1p Priority IEEE 802.3u 10/100 Base-TX (Power over Ethernet I/F) ITU 991.2 Annex A and F
Frequency Band	2.412 - 2.462 GHz (2.4 GHz Wireless) 4.900 - 4.990 GHz (4.9 GHz Wireless)

Description	Specifications
Channel Width	20 MHz (2.4 GHz Wireless) 20 MHz (4.9 GHz Wireless)
Output Power (EIRP)	1.15 W (2.4 GHz Wireless) 4.74 W (4.9 GHz Wireless)
Antenna Type	3 x 5 dBi Omni (2.4 GHz Wireless) 2 x 5.3 dBi Omni (4.9 GHz Wireless)
Modulation Technique	PSK, DQPSK, DBPSK, OFDM (2.4 GHz Wireless) OFDM (4.9 GHz Wireless)
Data Rates (Mbps)	2.4 GHz Wireless (Channels 1-11) b: 11, 5.5, 2, 1 g: 54, 48, 36, 24, 18, 12, 9, 6 4.9 GHz Wireless (4.96 GHz and 4.98 GHz center freq.) a: 54, 48, 36, 24, 18, 12, 9, 6
Operating Distance	Over 18,000 feet-AWG 26 (SHDSL I/F) Up to 300 feet (Power over Ethernet I/F) Up to 1800 feet 2.4 GHz 802.11 b/g and 4.9 GHz 802.11 a
Connector Type	8 pin circular I/O PLUG (SHDSL I/F) 8 pin circular I/O SOCKET (POE + Console I/F) 4 pin circular I/O PLUG (AC Power I/F)
WAN I/F	
Data Rate (per pair)	Up to 5.7 Mbps Full Duplex
Number of pairs	4 (up to 22.8 Mbps total)
Loop Bonding	IEEE 802.3ah (EFM)
Power over	

Description	Specifications
Ethernet I/F	
Data Rate	10Mbps/100Mbps
Number of Ports	1
Output Power	48V DC, maximum 5W
Data Path	
VLAN support	IEEE 802.1Q
Traffic Prioritization	IEEE 802.1p, 802.11e, IP TOS
Number of Priority Queues	4
Traffic Classification	Based on priority bits, protocol type, IP address
Rate Limiting	Upstream and downstream rate limiting per classified flow

INSTALLING THE SKYZHONE ACCESS POINT

This chapter describes how to mount the SkyZhone access point on a pole or on the side of a building. It includes the following topics:

- Equipment needed for installation, page 26
- Mounting the SkyZhone to a pole, page 28
- Mounting the SkyZhone to the side of a building, page 32
- Grounding, page 37
- Initial Configuration, page 38

Note that:

- The AC Mains power cable installation for this product must be done by a licensed electrician familiar with the NEC, CEC and all applicable local electrical codes. Also, no power can be connected at the SkyZhone unit until the Chassis Safety Ground is properly installed.
- The SkyZhone access point must always be mounted with the top of the unit horizontal and level.
- It is best to mount the SkyZhone access point to a metal structure. The metal mounting brackets are designed to make good contact with the pole, thereby assuring good quality connection to the grounded structure.
- The SkyZhone access point ships in a container with the antennas. The antennas are inside the protective foam, beneath the flap at the top. Do not throw away the foam.

Equipment needed for installation

Pole-mounting kit

The SkyZhone access point's pole-mounting kit (920-07821-01) contains the following items:

- One universal pole bracket that can be oriented for use on small or large diameter poles
- One SkyZhone support shelf with sun shield
- One nut to attach shelf to the center stud on the pole bracket
- Banding with screw clamps
- 4 screws to securely fasten shelf to the pole bracket
- 1 driver bit for the tamper-resistant screws

Wall-mounting enclosure kit

The SkyZhone access point wall-mounting enclosure kit (920-07811-01) contains the following items:

- One wall bracket
- One paintable decorative cover
- 4 (four) tamper-resistant mounting screws to mount the unit to the bracket
- 6 (six) mounting screws for the decorative cover
- 1 driver bit for the tamper-resistant screws
- Not included: 4 screws that will go through the metal bracket, plastic cover and into your wall's surface.

Wall-mount kit (without plastic cover)

The SkyZhone access point wall-mount kit (without plastic cover) contains the following items:

- One wall bracket
- 4 (four) tamper-resistant screws
- 1 driver bit for the tamper-resistant screws

Customer supplied equipment

For installation, you need the following items:

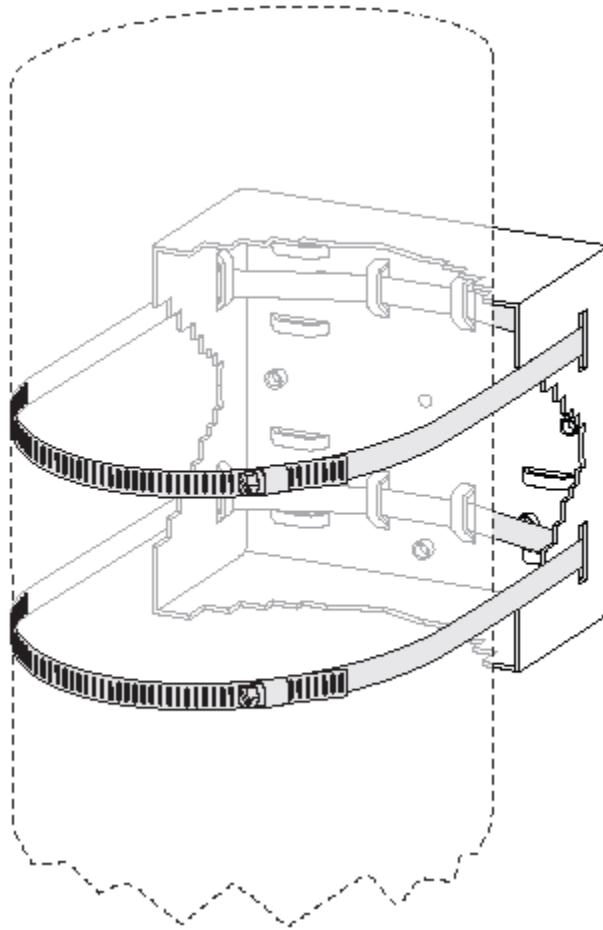
- Large slotted screw driver to secure the banding clamps
- 7/16-inch nut driver
- Cordless screwdriver with a 2 1/2 " extension to be able to secure the tamper-resistant screws, or a screwdriver that can receive a tamper-resistant screw that is at least three inches long.

Mounting the SkyZhone to a pole

This section describes the steps to mount a pole for the SkyZhone access point. First select a mounting location. You can attach the SkyZhone access point to any pipe or pole.

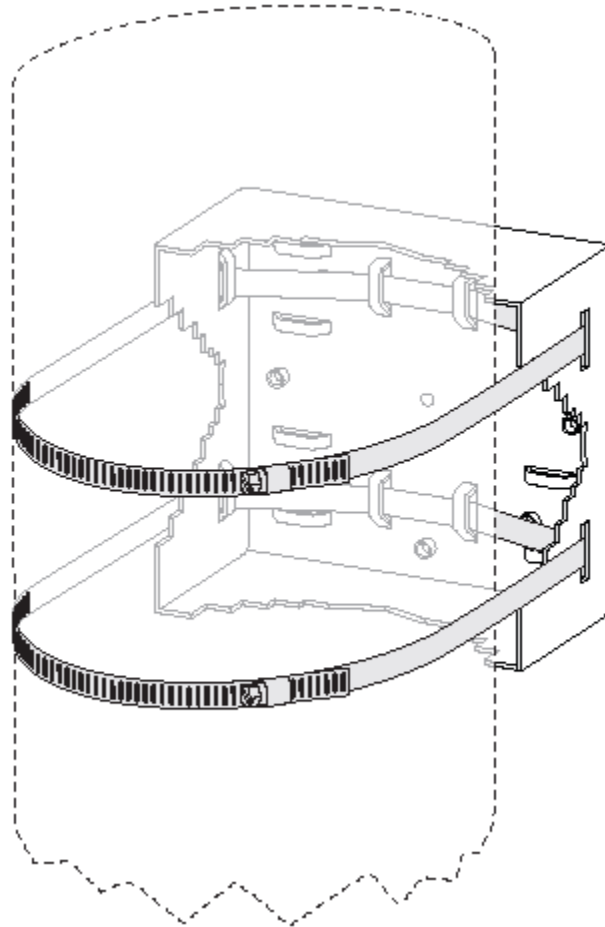
1. Attach screw clamp bands to the pole mounting plate by threading them through the slots on the mounting plate. The slots are for either horizontal or vertical mounting on large or small diameter poles. Choose the one most appropriate for this installation.

Figure 8: Threading screw clamp bands through mounting plate slots



2. Secure the screw clamp bands around the pole, using a large slotted screwdriver.

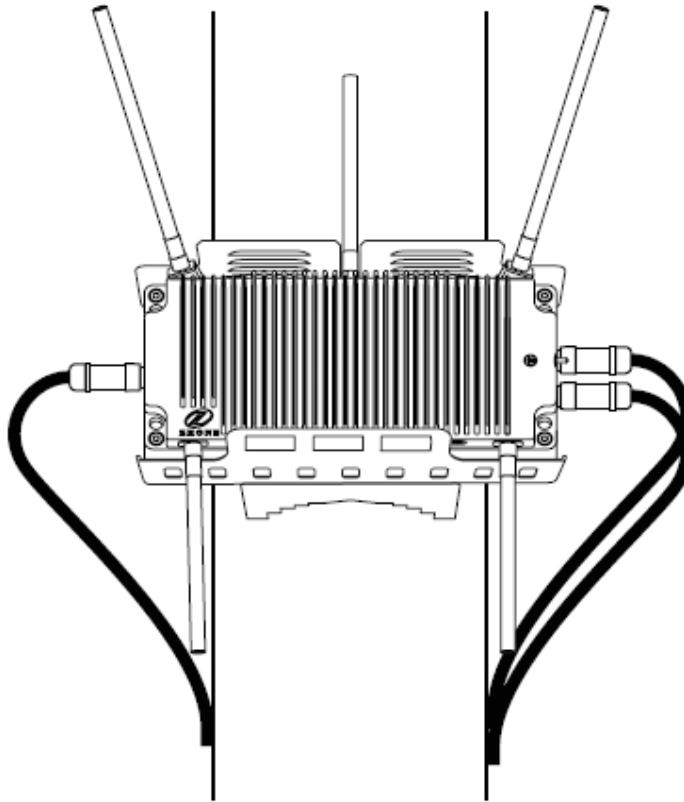
Figure 9: Mounting plate “strapped” around a pole



3. Tighten and if necessary, trim off any excess tension band.
4. Secure the mounting bracket to the pole, see Figure 11 on page 31.

The SkyZhone shelf is attached to the poll-mounting bracket. The shelf may need to be adjusted so that it is level.

Figure 10: Bracket attached to the mounting plate attached to the pole



5. Adjust the shelf until it is level by rotating the unit along the curved slot tracks.
6. Once the unit is level, securely tighten the center nut and four bolts that hold the shelf to the pole mount bracket as shown in Figure 11.
7. Attach the antennas to the unit. Note the antennas are different sizes. The three longer antennas are connected to the top of the unit. The two shorter antennas are mounted to the bottom of the unit. The antennas are not interchangeable. It is critical that the longer antennas are on the top, and the shorter ones on the bottom of the unit.
8. Slide the unit into the sun shield housing.
9. Secure with 4 (four) tamper-resistant screws, provided in the mounting kit, through the holes on the front of the unit.



WARNING! Insure that the Chassis Ground is properly connected before the next steps.

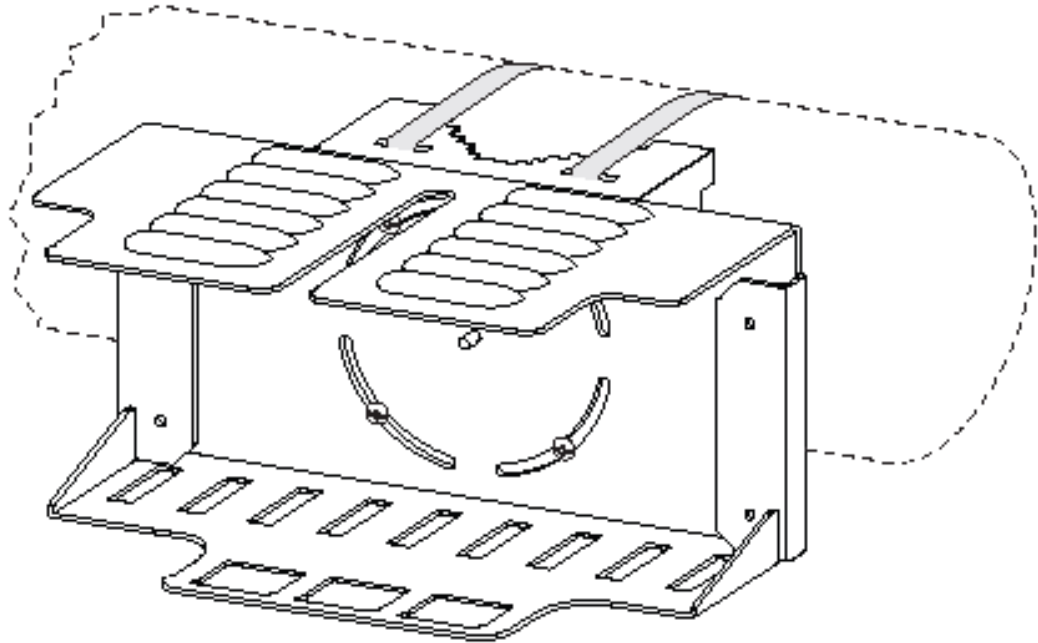
10. Attach the SHDSL cable to the SHDSL connector.

11. Attach the Ethernet cable if it is being used.
12. Attach the AC power cable
13. Secure the cable(s) to the pole with cable ties to provide strain relief, if needed.



Note: This previous procedure showed the SkyZhone station being mounted to a vertical pole. The same instructions apply to the installation on a horizontal pole or any other orientation as shown in the figure below.

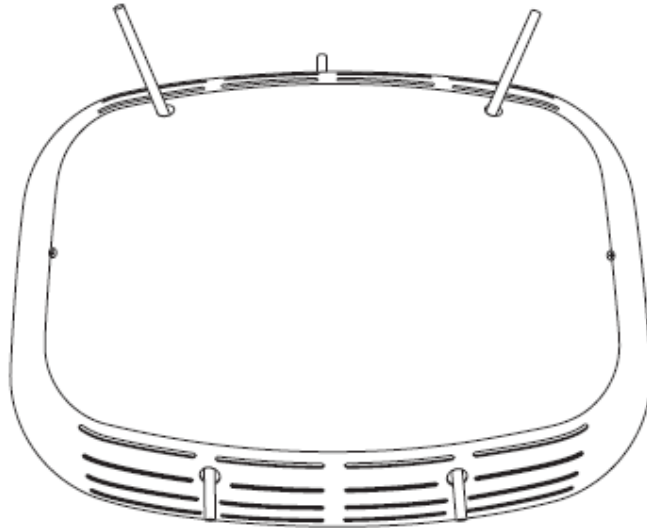
Figure 11: The bracket and sunshield mounted on a horizontal pole



Mounting the SkyZhone to the side of a building

The wall mount enclosure kit is used when the SkyZhone is mounted to a building. The cover is used to hide the unit for aesthetic purposes. This cover can be painted, which allows the unit to blend in with the building. Figure 12 displays a fully-assembled SkyZhone with its cover.

Figure 12: SkyZhone with a cover

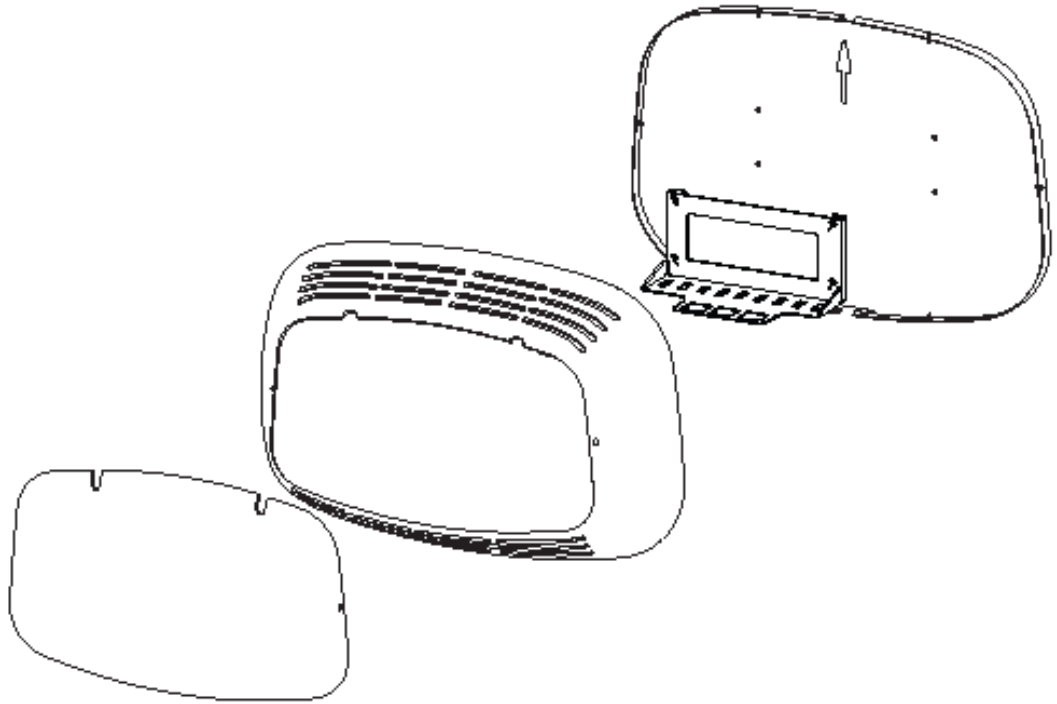


The SkyZhone wall mount enclosure kit (920-07811-01) includes the following items:

- Lid
- front cover
- bracket and base

These items are also displayed in Figure 13:

Figure 13: Contents of wall mount enclosure kit (from left: the lid, the front cover, the bracket and the base)



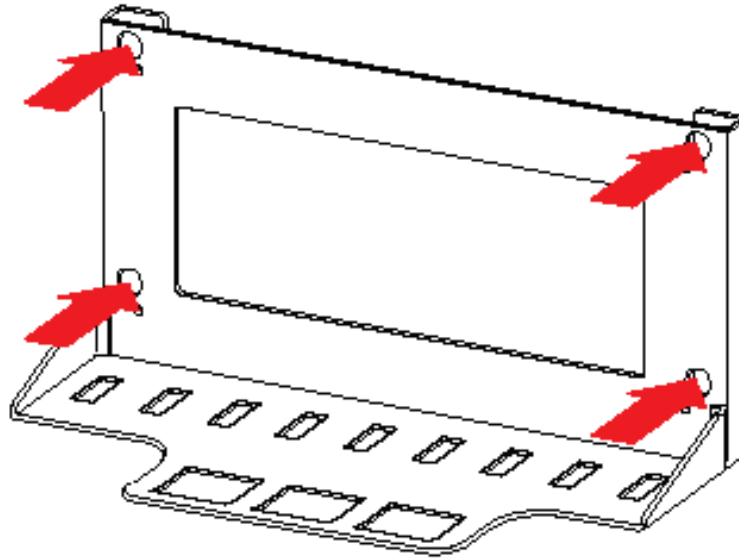
To mount the optional cover:



Note: The mounting of the SkyZhone unit should be as high as possible to ensure maximum coverage. A flat surface measuring 24 inches high and 36 inches wide will be needed to mount the unit securely.

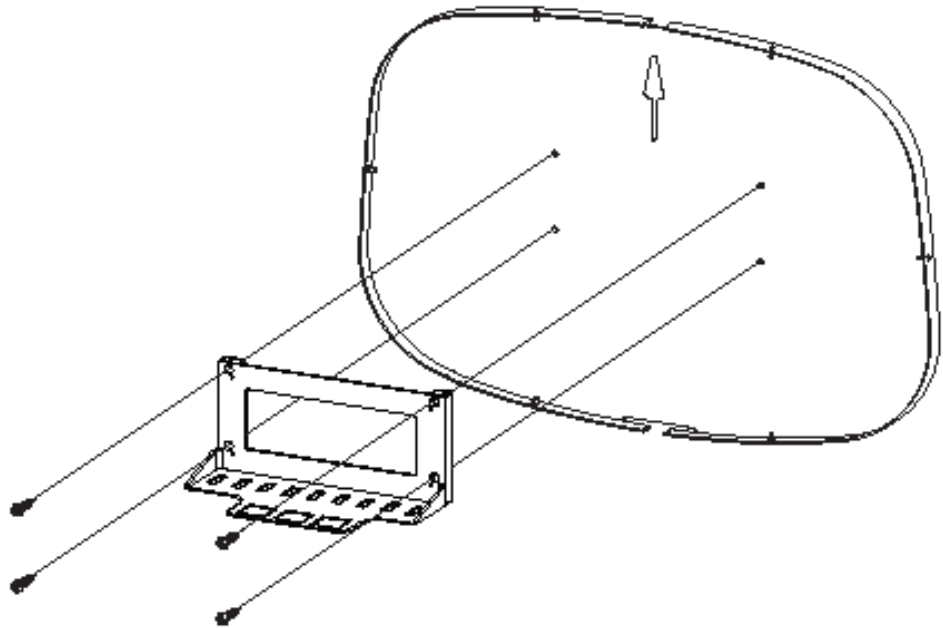
1. Find a flat surface that is at least 24 inches tall and 36 inches wide.
2. Drill the holes in the wall to align with the corresponding holes in the mounting bracket. See Figure 14.
3. Obtain the proper screws (not included) to anchor the wall mount assembly to the type of surface it is being mounted to.
4. Place the mounting bracket on the rear panel of the cover, lining up the mounting holes.
5. Fasten the mounting bracket in the desired location with the appropriate type of screw. Use the outside holes displayed in Figure 16. These should line up with the holes in the cover.

Figure 14: Mounting Bracket with screw locations



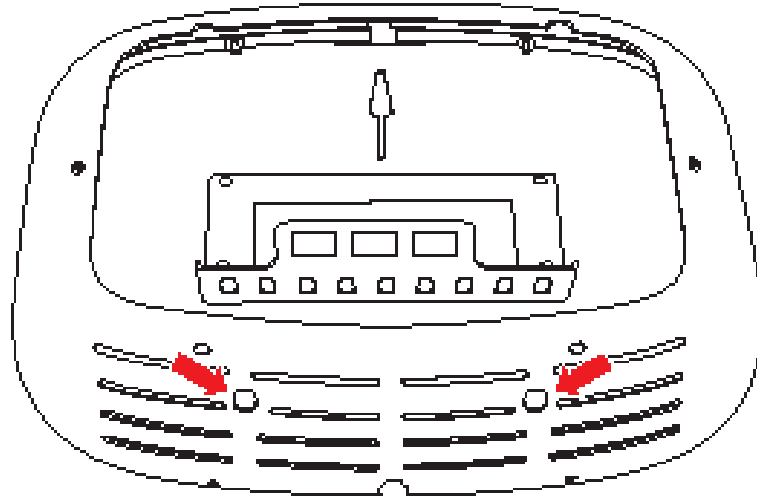
6. Attach the mounting bracket and the base to the wall (Figure 15). (The base has an UP arrow cut into the plastic casing to ensure in proper orientation.) Use a 1/4 inch drill masonry bit to install a 1 inch plastic insert to secure the cover and the aluminum frame to the concrete wall with the appropriate screws.

Figure 15: Bracket and Base



7. Attach the protective cover to the base and then attach the base to the (concrete) wall. Note that the cover should be attached so that the top contains the two cutouts for the angled antennas.

Figure 16: Base, Bracket, and Front Cover displaying two holes for antennas



8. Attach the antennas to the SkyZhone access point.

Note that the antennas are different sizes. The three longer antennas are connected to the top of the unit. The two shorter antennas are mounted to the bottom of the unit. The antennas are not interchangeable. It is critical that the longer antennas are on the top, and the shorter ones on the bottom of the unit.

9. Slide the SkyZhone station onto the wall mounting bracket.
10. Secure the SkyZhone to the wall mounting bracket with the 4 (four) tamper-resistant screws, provided in the installation kit, through the holes on the front of the unit.



WARNING! Insure that the Chassis Ground is properly connected before the next steps.

11. Attach the SHDSL cable. Also connect the optional console cable and Ethernet cables, if they are being used. In some installations, it might be easier to install the cables before mounting the unit to the bracket.
12. Attach the AC power cable
13. Attach the lid of the protective cover and secure it with the screws provided in the installation kit. The final assembly appears in Figure 17, and the final installation appears in Figure 18.

Figure 17: Wall Mount Kit - Final Assembly

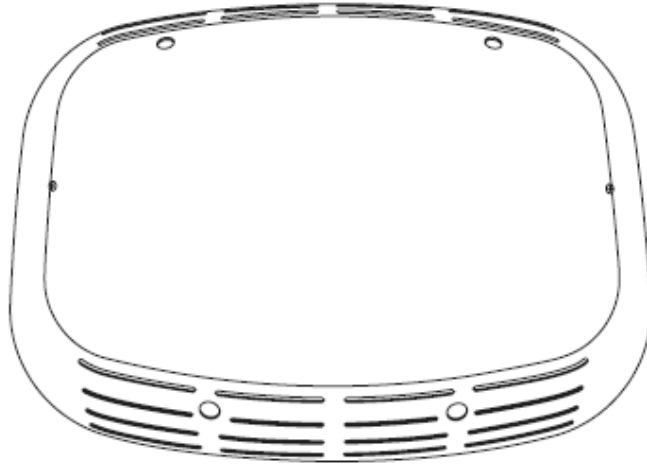
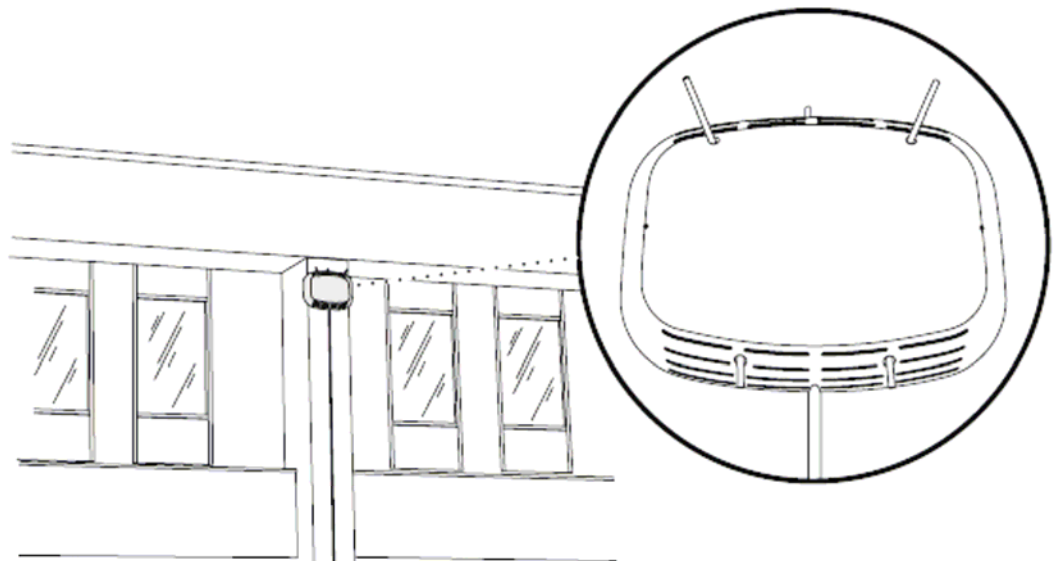


Figure 18: Example of a wall-mounted SkyZhone



Grounding

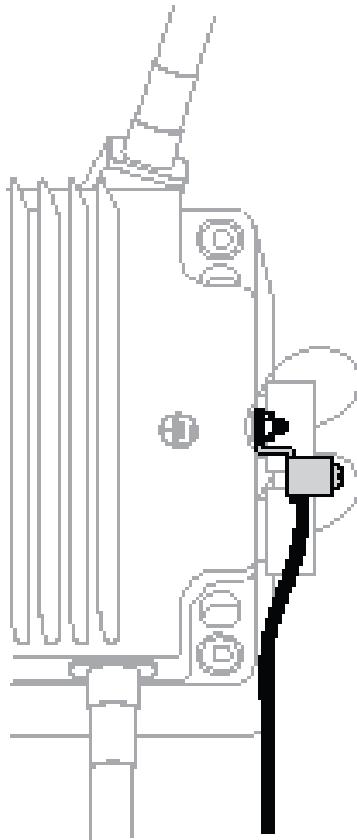
To ensure proper grounding:



WARNING! To avoid safety hazards this procedure must be completed before applying AC power to the SkyZhone unit.

- Connect a length of #10 AWG solid bare copper wire to the wire grounding lug of the unit and tighten the grounding nut. See Figure 19.
- Connect the other end of the grounding wire strap that is attached to a grounded surface or another earth ground such as a metal rod.

Figure 19: Grounding lug



Initial Configuration

Using the factory defaults

- The factory defaults for the SkyZhone Access Point includes two VLANS.
- **VLAN 1** is the default data VLAN.

Ports **eth0** (SHDSL), **eth1** (PoE), and **wlan0** are all members of this VLAN.

- **VLAN 7** is the default management VLAN.

Ports **eth0** (SHDSL) and **eth1** (PoE) are members of this VLAN.

Before using the SkyZhone Access point, use the CLI commands on the console interface to assign an IP address to the SkyZhone access point. For your network, determine the appropriate IP addresses as well as subnet mask, default gateway and broadcast address settings. The SkyZhone access point can now be configured for management.

In the following example, the values for the settings for the network are:

- IP address: 10.108.14.218
- Subnet mask: 255.255.255.0
- Broadcast Address: 10.108.14.255
- Default gateway: 10.108.14.254

Use the following three commands to configure VLAN management.

- **config if interface brvlan7 ip 10.108.14.218 mask 255.255.255.0 broadcast 10.108.14.255**
- **config if route-add destination default gateway 10.108.14.254**
- **config admin-tools save running-config**

After entering these commands, the system can be managed using SSH or HTTPS over the SHDSL interface or the PoE interface.

Refer to the *SkyZhone CLI Reference Guide* for a list of supported commands to configure advanced SkyZhone features.

Changing the factory defaults

If you are not using the factory default VLANs, you need to delete the default VLANs and configure the VLANs that are appropriate for your network. In the example below, VLAN 2 is used for management instead of the default VLAN 7. Also, VLAN 122 is the data VLAN instead of VLAN 1.

1. Delete the default VLANs. The following commands remove the default VLANs:

```
config vlan vlanconfig removeport interface eth0 vlanid 1
config vlan vlanconfig removeport interface eth1 vlanid 1
config vlan vlanconfig removeport interface wlan0 vlanid 1
config vlan vlanconfig removevlan vlanid 1
config vlan vlanconfig removeport interface eth0 vlanid 7
config vlan vlanconfig removeport interface eth1 vlanid 7
config vlan vlanconfig removevlan vlanid 7
```

2. Define the new management VLAN. In this example, VLAN 2 is the management VLAN.

```
config vlan vlanconfig addvlan vlan_name management vlanid 2
config vlan vlanconfig addport interface eth0 vlanid 2 tagged
config vlan vlanconfig addport interface eth1 vlanid 2 untagged
config vlan portdefaults default-pvid vlanport eth1 pvid 2
```

3. Configure the management address. In this example, the device address is 10.108.14.218.

```
config if interface brvlan2 ip 10.108.14.218 mask 255.255.255.0
broadcast 10.108.14.255
config if route-add destination default gw-addr 10.108.14.254
```

4. Define the data VLAN. In this example, the data VLAN is VLAN 122.

```
config vlan vlanconfig addvlan vlan_name data vlanid 122
config vlan vlanconfig addport interface wlan0 vlanid 122 tagged
config vlan vlanconfig addport interface eth0 vlanid 122 tagged
config vlan vlanconfig addport interface eth1 vlanid 122 tagged
config admin-tools save running-config
```

Using the Ethernet interface

The Ethernet port can be used to configure the SkyZhone access point using the factory default settings. The Ethernet port on the SkyZhone has a default address

of 192.168.1.1. If a static IP address is set on your PC that is on the same subnet (for example, 192.168.1.100), then use HTTPS to configure the remaining parameters. Note that the SkyZhone access point uses HTTPS and not HTTP. The default login is admin and the default password is zhone.

Note that if the IP address of the management VLAN is changed, you lose your connection to the SkyZhone unit. A new static IP address must be configured on your PC that is compatible with the new IP address that you configured in the SkyZhone unit.

Also, if any changes have been made to the VLAN definitions, the corresponding changes will have to be made in the DSLAM that the SkyZhone is connected to.

Default settings

Configuration Item	SkyZhone 1224 Single 2.4 GHz	SkyZhone 1624 2.4 GHz, 4.9 GHz	SkyZhone 1424 Single 4.9 GHz
Login	admin	admin	admin
Password	zhone	zhone	zhone
WLAN 0	2.4GHz	2.4 GHz	N/A
WLAN 1	N/A	4.9 GHz	4.9 GHz
Default VLANs	0 – internal 1 – data 7 - management	0 – internal 1 – data 7 - management	0 – internal 1 – data 7 - management
VLAN 1 port membership	Eth0 – tagged Eth1 – tagged WLAN 0 - tagged	Eth0 – tagged Eth1 – tagged WLAN 0 - tagged	Eth0 – tagged Eth1 – tagged
VLAN 7 port membership	Eth0 – tagged Eth1 – untagged	Eth0 – tagged Eth1 – untagged	Eth0 – tagged Eth1 – untagged
WLAN 0 SSID 1	SkyZhone	SkyZhone	N/A
WLAN 0 SSID 2	-	-	N/A
WLAN 0 SSID 3	-	-	N/A
WLAN 0 SSID 4	-	-	N/A
WLAN 0 SSID security	none	none	N/A
WLAN 0 Admin State	Up	Up	N/A
WLAN 0 Radio Name	2.4GHz	2.4GHz	N/A
WLAN 0 Hardware Mode	g	g	N/A
WLAN 0 Rates	auto	auto	N/A
WLAN 0 Channel Policy	Fixed	Fixed	N/A
WLAN 0 Channel	6	6	N/A
WLAN 0 Beacon Interval	200	200	N/A
WLAN 0 Broadcast SSID	Enabled	Enabled	N/A
WLAN 0 RTS Threshold	2347	2347	N/A
WLAN 0 Fragment Threshold	2346	2346	N/A
WLAN 0 DTIM period	2	2	N/A
WLAN 0 Preamble Type	Long	Long	N/A
WLAN 0 Antenna Power	0 dB	0 dB	N/A

Configuration Item	SkyZhone 1224 Single 2.4 GHz	SkyZhone 1624 2.4 GHz, 4.9 GHz	SkyZhone 1424 Single 4.9 GHz
Attenuation			
WLAN 0 Antenna Select	auto	auto	N/A
WLAN 1 SSID 1	N/A	SkyZhone	SkyZhone
WLAN 1 SSID 2	N/A	-	-
WLAN 1 SSID 3	N/A	-	-
WLAN 1 SSID 4	N/A	-	-
WLAN 1 SSID security	N/A	None	None
WLAN 1 Admin State	N/A	Down	Down
WLAN 1 Radio Name	N/A	4.9 GHz	4.9 GHz
WLAN 1 Hardware Mode	N/A	a	a
WLAN 1 Rates	N/A	auto	auto
WLAN 1 Channel Policy	N/A	Fixed	Fixed
WLAN 1 Channel	N/A	192	192
WLAN 1 Beacon Interval	N/A	200	200
WLAN 1 Broadcast SSID	N/A	Enabled	Enabled
WLAN 1 RTS Threshold	N/A	2347	2347
WLAN 1 Fragment Threshold	N/A	2346	2346
WLAN 1 DTIM period	N/A	2	2
WLAN 1 Preamble Type	N/A	Long	Long
WLAN 1 Antenna Power Attenuation	N/A	2 dB	2 dB
WLAN 1 Antenna Select	N/A	auto	Auto
System Configuration			
Host Name	SkyZhone	SkyZhone	SkyZhone
Domain Name	SkyZhoneDomain	SkyZhoneDomain	SkyZhoneDomain
Primary DNS	0.0.0.0	0.0.0.0	0.0.0.0
Secondary DNS	0.0.0.0	0.0.0.0	0.0.0.0
GPS Location			
Latitude	0	0	0
Longitude	0	0	0
Date and Time			
NTP	disable	disable	disable
NTP Server	0.0.0.0	0.0.0.0	0.0.0.0
Date	-	-	-
Time	-	-	-
Time Zhone	Eastern	Eastern	Eastern
Daylight Saving	Disable	Disable	Disable
Save			
Auto save Running Config	Disable	Disable	Disable
Bridge Management Interface			
Interface Name	br0	br0	br0
Interface Alias	Internal Bridge	Internal Bridge	Internal Bridge
LAN IP	192.168.1.1	192.168.1.1	192.168.1.1
Netmask	255.255.255.0	255.255.255.0	255.255.255.0
Broadcast Address	192.168.1.255	192.168.1.255	192.168.1.255

Configuration Item	SkyZhone 1224 Single 2.4 GHz	SkyZhone 1624 2.4 GHz, 4.9 GHz	SkyZhone 1424 Single 4.9 GHz
Interface Name	brvlan1	brvlan1	brvlan1
Interface Alias	Bridge / VLAN 1	Bridge / VLAN 1	Bridge / VLAN 1
LAN IP	0.0.0.0	0.0.0.0	0.0.0.0
Netmask	0.0.0.0	0.0.0.0	0.0.0.0
Broadcast Address	0.0.0.0	0.0.0.0	0.0.0.0
Interface Name	brvlan7	brvlan7	brvlan7
Interface Alias	Bridge / VLAN 7	Bridge / VLAN 7	Bridge / VLAN 7
LAN IP	192.168.2.1	192.168.2.1	192.168.2.1
Netmask	255.255.255.0	255.255.255.0	255.255.255.0
Broadcast Address	192.168.2.255	192.168.2.255	192.168.2.255

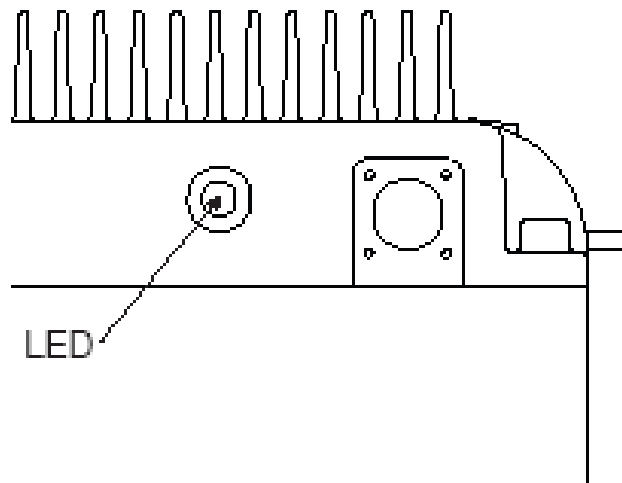
DIAGNOSTICS

This chapter describes the SkyZhone access point's LED light.

Status and LED

The SkyZhone contains one red LED located on the bottom right of the unit (Figure 20). The LED provides a quick verification as to whether it is operating correctly or if it needs to be replaced.

Figure 20: LED Location



The following table describes the possible states of the LED light.

Color	Operation	Description
Red	On solid	Power is on and the software is not in an operational state. If the LED stays in this state for more than one minute, the unit should be replaced.
Red	One blink every 5 seconds	Power is on and the unit is operational.
Off	Off	There is no power

SAFETY, REGULATIONS, AND CERTIFICATIONS

This chapter describes how to prepare your site for the installation of the SkyZhone platform. It includes the following topics:

- Safety on page 42
- Grounding and isolation on page 44
- Installation safety precautions on page 44
- Contacting Global Service and Support, page 49

Safety



WARNING!

The authority to operate this equipment is conditioned by the requirement that no modifications will be made to the equipment unless the manufacturer expressly approves the changes or modifications.

The SkyZhone Model 1x04 products are AC power device conforming to UL 60950-1 standards. The AC Power cable must wired to an AC source by a licensed electrician familiar with the NEC, CEC and all applicable local codes.

Proper Safety Grounding is required to insure proper operation and protection from lightning strikes and surges. A copper ground lug is provided on the unit for this purpose. Connect a length of #10 AWG solid, bare, copper wire to the grounding lug and firmly tighten the grounding screw (see Figure 20). Connect the other end of the grounding wire to a grounded surface or another earth ground such as a metal rod. This ground must be install before applying power to the unit.

SkyZhone provides both Primary and Secondary lightning and surge protection to the SHDSL and PoE cable signals. The special POE + Console cable has both protected signals (POE) and unprotected signals (Console). This special cable is intended for unit configuration prior to installation. It is not intended for outdoor use. Use the standard POE cable for outdoor installations.

The National Electrical Code (NEC) and Canadian Electrical Code (CEC) require the use of an agency listed (UL/CSA) Building Entrance Protector for all power and data communications cables entering a building. This is to protect the building and occupants from damage caused by transient voltage and current surges.

A UL 497 (CSA C22.2 No. 226-92) approved primary protection device must be used at the building entrance if the Ethernet port is used to provide in-building access to the SkyZhone network. Also check with local wiring codes.

Serious injury can occur if the antennas come in contact with electric power lines. Carefully follow the instructions in this manual. During and after installation, the antennas must be a minimum of 24 inches from any power lines. Use caution when installing this outdoor equipment.

FCC RF Exposure Requirements (per OET-65) requires the SkyZhone platform to be mounted such that the general public does not come within 10 inches of the antennae.



Caution:

- This product requires professional installation.
- The unit is sealed at the factory and must not be opened in the field. The unit shall be returned to the factory for repairs.
- The PoE (Power over Ethernet) connector sources power to other devices. Some devices may not be compatible with this feature. In that case, do not connect the wires that supply the power. The power is 48 volts DC, at a maximum of 5 watts.



Note:

- This equipment has been tested and found to comply with the limits for a Class C digital device, pursuant to part 15, subpart C, of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the user manual, may increase the potential for harmful interference to radio communications.
- This warning applies to the Skyzhone-1404 and SkyZhone-1604 only. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which the user will be required to correct the interference at their own expense.
- The supplied cables and antennae must be used to ensure compliance with Part 15, FCC Rules. The use of any other antennas will invalidate the unit's FCC Part 15 certification.
- The 2.4 GHz band has been designed to operate with the antennae listed below, and having a maximum gain of 5 dBi. Antennae not included in this list (Comet Part Number CFA-245W-SR) or having a gain greater than 5 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.
- The 4.9 GHz band has been designed to operate with the antennae listed below, and having a maximum gain of 5.3 dBi. Antennae not included in this list (Comet Part

Number SF-D49NW-SR) or having a gain greater than 5.3 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms

- To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropic radiated power (e.i.r.p.) is not more than that permitted for successful communication. Operating the device with the supplied antennas will ensure that this requirement is met.
 - 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.
-

Grounding and isolation

Proper grounding of the SkyZhone platform must be completed before you connect power to the unit.

- The internal subassemblies signal/Logic ground is internally bonded to the Safety Ground (chassis).
- Proper Safety Grounding is required to insure proper operation and protection from lightning strikes and surges. A copper ground lug is provided on the unit for this purpose. Connect a length of #10 AWG solid, bare, copper wire to the grounding lug and firmly tighten the grounding screw (see Figure 20). Connect the other end of the grounding wire to a grounded surface or another earth ground such as a metal rod.

Installation safety precautions

Observe the maximum recommended operating temperature as indicated here.

- Maximum ambient operating temperature should not exceed 50°C (131°F).
- Minimum ambient operating temperature should not exceed -35°C (-31°F).

Do not block system air vents; this will deprive the system of the airflow required for proper cooling. Sufficient clearance must exist on all sides of the rack to permit equipment access. Connect the system to the power supply circuit as described in this document. Do not overload the system or power supply circuit. Ensure that proper system grounding is performed and maintained.

Important Safety Instructions

Read and follow all warning notices and instructions marked on the product or included in the manual.

1. The SkyZhone Model 1x04 products are AC power device conforming to UL 60950-1 standards. The AC Power cable must be wired to an AC source by a licensed electrician familiar with the NEC, CEC and all applicable local codes.

2. Do not attempt to service this product yourself, as opening or removing covers may expose you to hazardous voltage or to other risks. Refer all servicing to qualified service personnel.
3. When installed, the product must comply with the applicable Safety Standards and regulatory requirements of the country in which it is installed. If necessary, consult with the appropriate regulatory agencies and inspection authorities to ensure compliance.
4. A rare phenomenon can create a voltage potential between the earth grounds of two or more buildings. If products installed in separate buildings are interconnected, the voltage potential may cause a hazardous condition. Consult a qualified electrical consultant to determine whether or not this phenomenon exists and, if necessary, implement corrective action prior to interconnecting the products.
5. In addition, since the equipment is to be used with telecommunications circuits, take the following precautions:
 - ✓ Never install telephone wiring during a lightning storm.
 - ✓ Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
 - ✓ Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
 - ✓ Use caution when installing or modifying telephone lines.
 - ✓ Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.
 - ✓ Do not use the telephone to report a gas leak in the vicinity of the leak.

EMI Notices

The following are EMI notices.

United States - EMI Notice

- Changes or modifications not expressly approved by Zhone Technologies, Inc. could void the user's authority to operate the equipment.
- The supplied cables and antennae must be used to ensure compliance with Part 15 and Part 90, FCC Rules.
- This device may only be used with approved antennae that are shipped with the unit and installed per installation instructions. The use of any other antennas will invalidate the unit's FCC Part 15 certification.
- The 2.4 GHz band has been designed to operate with the antennae listed below, and having a maximum gain of 5 dBi. Antennae not included in this list (Comet Part Number CFA-245W-SR) or having a gain greater than 5 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

- The 4.9 GHz band has been designed to operate with the antennae listed below, and having a maximum gain of 5.3 dBi. Antennae not included in this list (Comet Part Number SF-D49NW-SR) or having a gain greater than 5.3 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.
- To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication. Operating the device with the supplied antennas will ensure that this requirement is met.
- 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.

Canada - EMI Notice

This Class A and C digital apparatus complies with Industry Canada RSS-210.

Supplier's Declaration of Conformity

Place of Issue: Zhone Technologies
8545 126th Avenue North
Largo, FL 33773-1502
USA

Date of Issue: January 20, 2008

Zhone Technologies, located at the above address, hereby certifies that the SKYZHONE-1204/1404/1604 bearing the FCC identification numbers PJZSZ1224, PJZSZ1424, PJZSZ1624 complies with the Federal Communications Commission's ("FCC") Rules and Regulations pursuant to part 15, subpart C (14.247), part 15 Class A and part 90, as appropriate. Additionally, the Industry Canada identification numbers 3619ASZ1224, 3619ASZ1424, 3619ASZ1624 insures that the SKYZHONE-1204/1404/1604 also meet the requirements of RSS-210. The unit has network certification associated with ITU-T G.991.2.

Keith Nauman
Vice President

Notice to Users of the Canadian Telephone Network

NOTICE: This equipment has been certified to ITU-T G991.2

CE Marking

When the product is marked with the CE mark on the equipment label, a supporting Declaration of Conformity may be downloaded from the Zhone World Wide Web site at www.zhone.com.

Contacting Global Service and Support

Contact Global Service and Support (GSS) if you have any questions about this or other Zhone products. Before contacting GSS, make sure you have the following information:

- Software version running on the system
- System configuration
- Zhone product you are using
- Description of the issue

Technical Support

If you require assistance with the installation or operation of your product, or if you want to return a product for repair under warranty, contact GSS. The contact information is as follows

E-mail	support@zhone.com
Telephone (North America)	877-ZHONE20
Telephone (International)	510-777-7133
Internet	www.zhone.com/support

If you purchased the product from an authorized dealer, distributor, Value Added Reseller (VAR), or third party, contact that supplier for technical assistance and warranty support.

Service Requirements

If the product malfunctions, all repairs must be performed by the manufacturer or a Zhone-authorized agent. It is the responsibility of users requiring service to report the need for service to GSS.