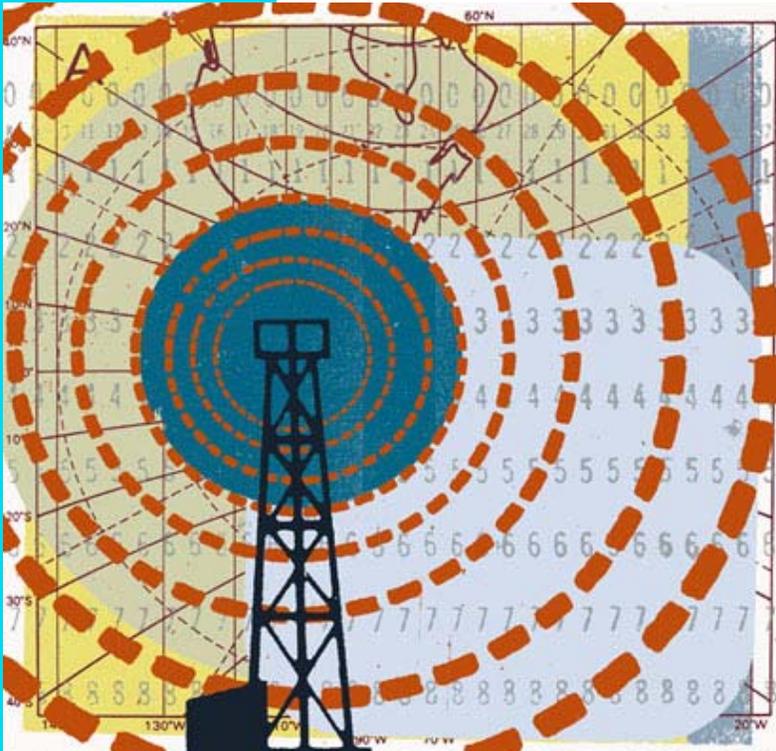


SkyPilot SkyAccess DualBand Installation



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SkyPilot Firmware 1.4
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About this Guide

This guide explains how to install and set up a SkyPilot Networks™ SkyAccess™ DualBand which provides access to a SkyPilot™ wireless mesh network and serves as an access point for users of 802.11b/g wireless (Wi-Fi).

This guide assumes administrator-level knowledge of IP networks and a familiarity with configuring wireless devices.

Overview

SkyAccess DualBand is a dual-radio solution that combines SkyPilot's long-range, high-capacity 5 GHz mesh backhaul with a high-powered 802.11b/g access point that lets service providers and municipalities offer standard Wi-Fi to subscribers.

Features and Benefits

SkyAccess DualBand provides a highly flexible wireless solution that combines scalable Wi-Fi capacity with the seamless coverage of a wireless mesh network.

Each SkyAccess DualBand can support multiple WLANs (wireless local area networks), each with its own VLAN and security policy. One SkyAccess DualBand can support several business models with a single service installation.

About Access Point Configuration

The SkyAccess DualBand access point is set up to provide Wi-Fi access right out of the box. The access point includes a preconfigured WLAN broadcasting an SSID (service set identifier) that includes the device's MAC address (for example, the SSID SkyAccess0800690201FC) and providing WPA-PSK (Wi-Fi Protected Access-Pre-Shared Key) protection. Users attempting to connect to the SkyAccessDualBand WLAN must provide a password (by default, the same as the SSID). The default configuration is provided for initial management and configuration of the SkyAccess DualBand access point via a wireless connection.

You should always create a unique access point configuration before testing the device or making it available to customers.

NOTE A wireless network protected by WPA-PSK is vulnerable. To provide a more secure level of protection, configure the WLAN for WPA authentication, in which each user is authenticated separately.

SkyPilot Network Topology

SkyPilot delivers a wireless, end-to-end broadband solution that seamlessly supports high-capacity, high-coverage mesh networks. Designed for managed-access networks and service providers, the SkyPilot network takes broadband wireless the “last mile” with a cost-effective, robust infrastructure solution.

Based on a high-performance architecture that deploys intelligent antenna arrays, the SkyPilot network delivers a dynamic broadband solution with significant advantages for business and home users.

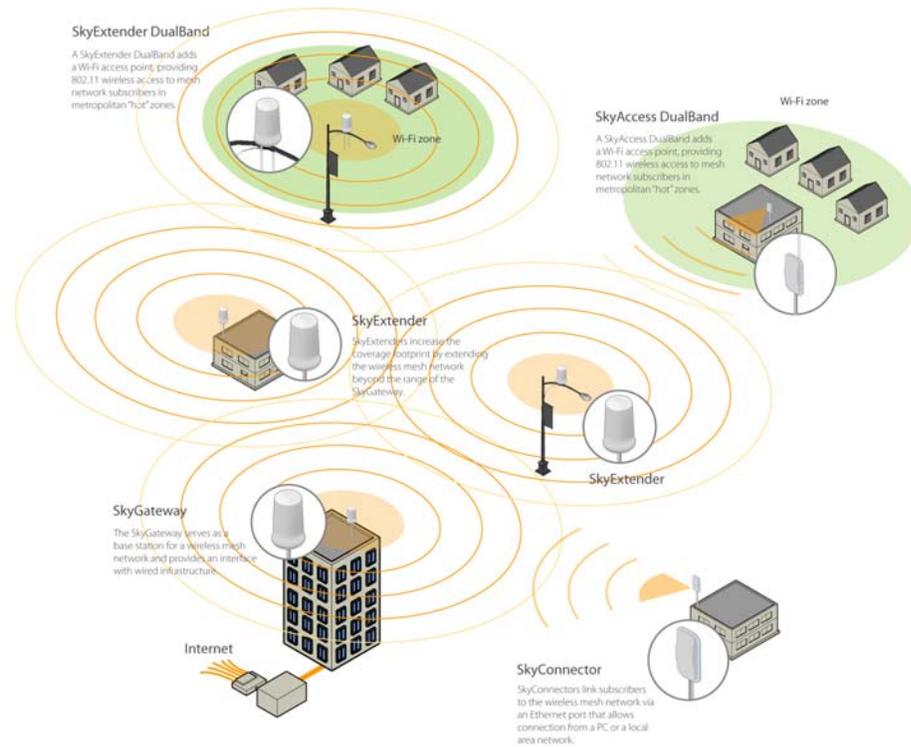
SkyPilot wireless devices are simple to install and easily fit into any type of wireless environment—metropolitan, business, or home.

The auto-discovery and rapid provisioning features of a SkyPilot wireless mesh network greatly reduce deployment and maintenance costs. Support for multiple topologies and high scalability allow attractive options for rapidly expanding a metropolitan Wi-Fi customer base.

A SkyPilot network (as illustrated in Figure 1) may include the following physical components:

- SkyGateway™ (required)
- SkyExtender™
- SkyExtender™ DualBand
- SkyConnector™
- SkyAccess™ DualBand

Figure 1. SkyPilot wireless mesh network



SkyGateway

The SkyGateway operates as a base station for a wireless mesh network. It provides an interface between wired infrastructure and a wireless network of subscribers who enjoy secure, high-speed access to the Internet or to wide area networks (WANs).

A SkyPilot wireless network requires at least one SkyGateway for normal operation. If necessary, you can add additional SkyGateways to increase network capacity or provide redundancy.

The SkyGateway typically resides at a location with easy access to wired infrastructure—usually a POP (point of presence) or data center.

For optimal performance, install the SkyGateway on an elevated site such as a cell tower or the top of a tall building.

SkyExtender and SkyExtender DualBand

- SkyExtenders and SkyExtender DualBands provide a cost-effective way to add capacity and balance network loads, by operating as “repeaters” to extend the wireless range of a SkyGateway. You can add these devices to your network to expand your coverage footprint and provide redundancy through SkyPilot’s mesh networking features. (A SkyExtender can also provide subscribers with a direct connection to the wireless network via its Ethernet port.)
- In addition, the SkyExtender DualBand serves as a Wi-Fi access point, enabling service providers and municipalities to provide standard 802.11 wireless access across great distances, for targeted hot zones, or for dense coverage patterns.
- For optimal performance, install the SkyExtender in an elevated location such as a roof, tower, or utility pole.

SkyConnector and SkyAccess DualBand

SkyConnectors link your subscribers to the SkyPilot wireless network. An Ethernet port on the device allows a connection to a subscriber’s computer, or to a local area network (LAN) via a data switch or router. Designed for installation by the service provider, the SkyConnector attaches to an external structure such as an eave, roof, or pole.

The SkyAccess DualBand offers the same features as a SkyConnector, plus a Wi-Fi access point that enables service providers and municipalities to provide standard 802.11 wireless access over great distances, for targeted hot zones, or for dense coverage patterns.

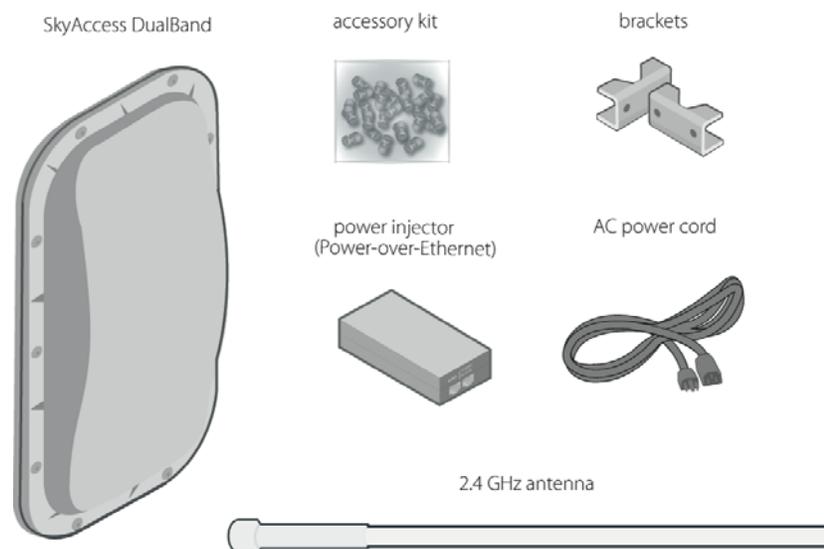
The SkyAccess DualBand Install Kit

The SkyPilot SkyAccess DualBand installation kit provides everything you need to install the device and configure it as both a connector to your wireless mesh network and an 802.11b/g Wi-Fi access point.

This chapter reviews that equipment and tells you what else you need to have on hand before starting installation.

What the Kit Provides

Figure 2. Contents of SkyAccess DualBand installation kit



SkyPilot also offers accessories, including a tilt mount for optimizing your SkyAccess DualBand installation. For more information, contact a SkyPilot sales representative.

What Else You Need

Before starting installation, you also need the following:

- For basic mounting: a Phillips screwdriver
- For pole mounting:
 - A magnetic level (optional)
 - A secured steel pole between 1.13" (2.87 cm) and 1.37" (3.48 cm) in diameter
- For network cabling:
 - A spool of CAT5 network cable (shielded cable is recommended)

NOTE Ethernet cabling must comply with the requirements of NEC/CEC codes for outdoor CAT5 cables. The outer jacket of the cabling must be clearly marked as CAT5e per ANSI/TIA/EIA-568-B.2.

- Ethernet crossover cable (for connecting to data switch or router)
- RJ-45 connectors (connectors without a protective “boot” are required)
- RJ-45 crimping tool
- For wireless mesh network configuration: a laptop with a Telnet client application and a 10/100bT Ethernet network interface card
- Setup information for the access point:
 - A (case-sensitive) wireless SSID for each virtual WLAN Wi-Fi network
 - A unique IP address for the management of the access point if it’s not connected to a DHCP server
 - A default gateway and subnet mask for the management network if the access point is not on the same subnet as your PC

NOTE Plan on configuring the SkyAccess DualBand before mounting it. Some steps are easier if the access point is more accessible.

Getting Help

For technical assistance, contact SkyPilot customer support at

www.skypilot.com/support/.

Installing a SkyAccess DualBand

This chapter provides instructions for planning and performing the physical installation of a SkyAccess DualBand.

Planning Your Installation

In a typical wide area wireless mesh network, you'll install a SkyAccess DualBand on a utility pole or the roof of a building. The effective range of the SkyAccess DualBand is usually proportional to the height of the installation.

When choosing a site for the device, consider the radio frequency (RF) environment and physical characteristics of the site. Trees, buildings, and hills can block a wireless signal. Also keep in mind that the RF environment is dynamic and can deteriorate over time as obstacles appear or are relocated.

Plan on testing potential sites to determine the suitability of the link topology for target applications. Once you've identified a potential site, use a topographic map or path profile software to ensure that terrain or obstacles will not interfere with the links.

Your site survey should include an RF scan to identify available frequencies. You should also check your preferred frequency at all locations; a frequency that's clear in one location may be crowded in another. Frequency planning is a critical factor in planning and implementing a wireless mesh network.

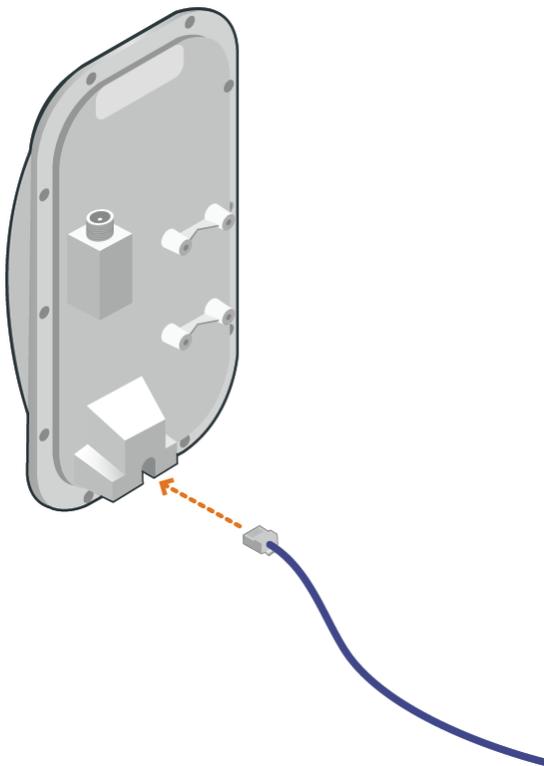
The site survey process should be ongoing. To verify that a site is relatively free of interference, make site audits every 6 to 12 months, scheduling regular maintenance visits to coincide with the site audits.

Cabling the SkyAccess DualBand

Ethernet cabling provides both power and data connectivity for the SkyAccess DualBand. This section provides instructions for attaching CAT5 cable to the device.

- 1 Terminate the appropriate grade and length of CAT5 cable with an RJ-45 connector and plug it into the RJ-45 port on the back of the SkyAccess DualBand.

Figure 3. Connecting CAT5 cable to the SkyAccess DualBand



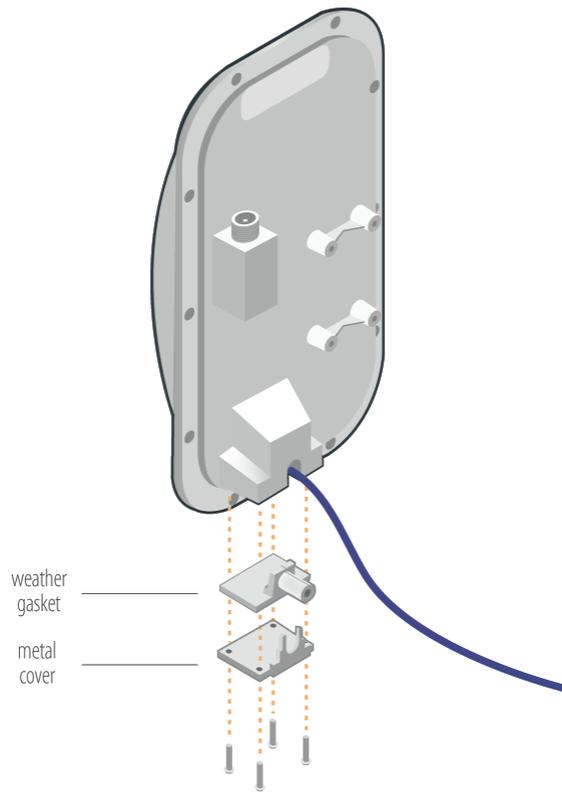
Make sure the fit is snug so that the cable does not interfere with the weather gasket.

- 2 Insert the weather gasket and secure the metal cover.

Press the CAT5 cable into the gasket and insert the gasket into the housing, taking care not to twist or place unnecessary force on the RJ-45 connector.

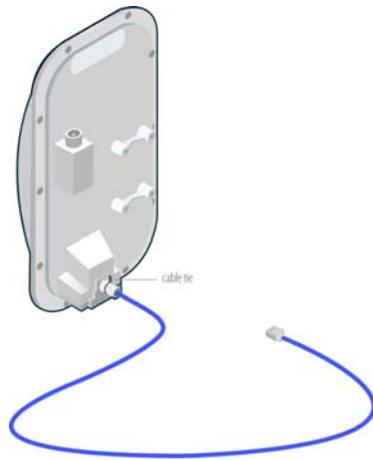
Fit the metal cover over the weather gasket and secure it with the four machine screws supplied in the accessory kit.

Figure 4. Attaching weather gasket and metal cover



- 3** Attach a tie wrap to the neck of the weather gasket and tighten it so that it slightly depresses the neck.

Figure 5. Attaching tie wrap to the gasket neck



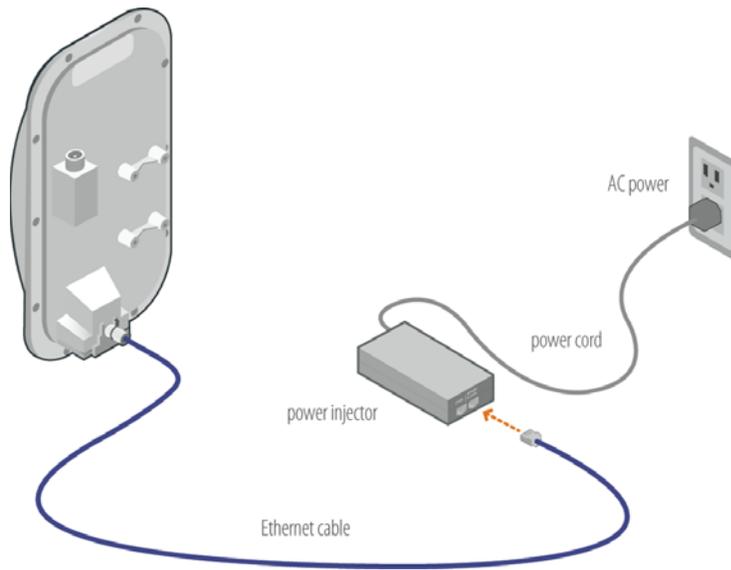
The tie wrap provides relief from cable strain.

Powering On the SkyAccess DualBand

Before mounting the SkyAccess DualBand, first power on the unit so that you can use the onboard LEDs to determine optimal placement.

- 1** Connect the SkyAccess DualBand to the power supply, as follows:
 - a** Plug the AC adapter into an AC outlet. (The SkyAccess DualBand requires a Class 2 or listed-LPS power supply, 24VDC/750 mA minimum.)
 - b** Connect the Ethernet cable to the port labeled “POWER” on the power injector.
 - c** Plug the AC adapter into the power injector.

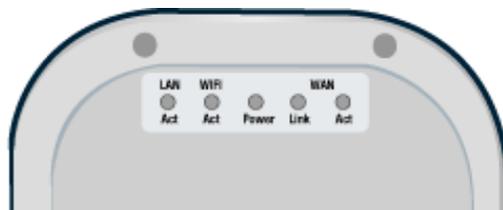
Figure 6. Providing power to the SkyAccess DualBand



- 2 Check the LEDs on the SkyAccess DualBand.

If the connections are correct, the power LED (labeled “Power”) and the WAN activity LED (labeled “Act” under “WAN”) on the SkyAccess DualBand will illuminate. The WAN Act LED should blink and turn off, but the Power LED should remain lit.

Figure 7. The SkyAccess DualBand LEDs



Optimizing Location

After powering on the SkyAccess DualBand, use the device’s LEDs to identify the optimal location for mounting—a location where it can easily acquire a signal from the wireless mesh network and quickly create links.

Confirm Signal Acquisition

- Position the SkyAccess DualBand near the intended mounting location and watch the WAN Act LED for activity.

The LED starts to blink when it has acquired a signal from the network and is attempting to set up a connection.

If the WAN Act LED does not start blinking within 30 seconds, try changing the orientation of the SkyAccess DualBand or walk to a new location; then repeat the process until the LED begins blinking.

When the LED starts blinking, make minor adjustments to find the location where the signal is strongest. (The faster the LED blinks, the stronger the signal.)

When the WAN Act LED blinks steadily and at a high rate, you have an optimal signal. Go to the next section to verify the network connection.

Verify Network Connection

- Watch the WAN Link LED for activity.

Within approximately 90 seconds of locating a signal, the WAN Link LED should start to blink—first slowly, and then more quickly.

When the WAN Link LED is solid and the WAN Act LED is blinking, the SkyAccess DualBand has established an authorized connection to the network, indicating that the current location is suitable for mounting

If both the WAN Act LED and the WAN Link LED continue blinking, a signal is available but is not strong enough for reliable service. Keep trying different locations until you can confirm a network connection.

NOTE To optimize your SkyAccess DualBand installation, ask your network administrator (at the network operations center) to measure signal strength on the node to which the SkyAccess DualBand has established a link.

Verify Wi-Fi Connections

- Watch the Wi-Fi Act LED for activity.

The Wi-Fi Act LED starts to blink when a client device on the Wi-Fi network is attempting to connect to the SkyAccess DualBand.

When the Wi-Fi Act LED blinks steadily and at a high rate, there is an optimal connection with devices on the Wi-Fi network.

For more information on LED states, see Table 1.

Table 1. LED States

LED	LED state	Device state
LAN Act	Blinking	Device is transmitting or receiving data via its Ethernet port.
LAN Act	Steady illumination	SkyAccess DualBand is connected to another device via its Ethernet port.
Wi-Fi Act	Blinking	Device is transmitting or receiving data via its Wi-Fi access point.
Power	Steady illumination	Device is powered on.
WAN Link	Blinking (fast blink when device is in standby mode)	Device is attempting to establish an authorized connection on the wireless network. If both WAN Link and WAN Act continue to blink, the signal is not strong enough to support reliable service or there is a provisioning problem that's preventing the device from coming online. Contact your network administrator.
	Steady illumination	Device is connected to the wireless network.
WAN Act	None	Device cannot detect a wireless network.
	Blinking	Device is within the coverage area of a wireless network. Blink rate communicates signal strength: <ul style="list-style-type: none"> • Fast (8x per second) = excellent • Medium (4x per second) = good • Slow (<1x per second) = poor • None = no reception

Mounting the SkyAccess DualBand

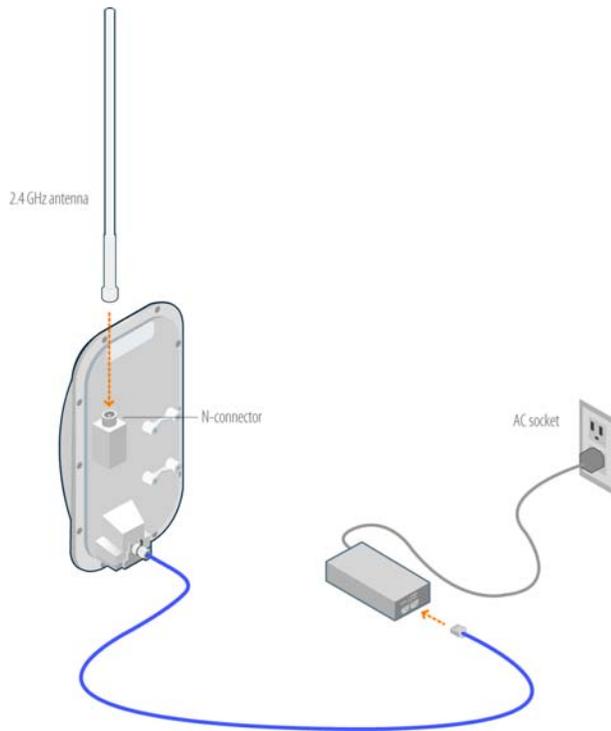
After determining an optimal location for your SkyAccess DualBand, you can mount the device and run the appropriate cables.

Before mounting the device, disconnect the CAT5 cable from the power injector to power down the device.

- 1** Connect the 2.4 GHz antenna.

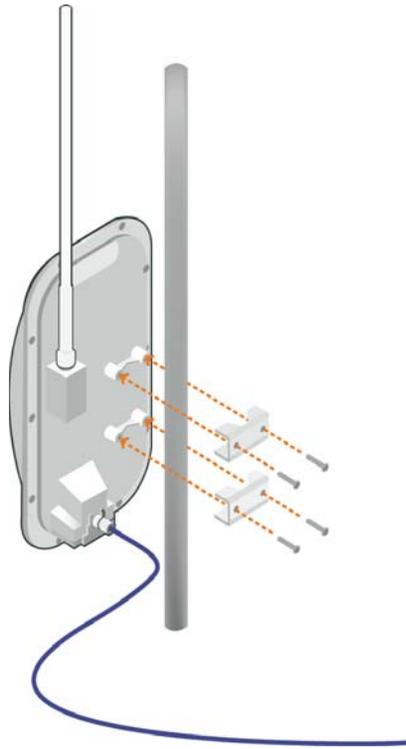
To provide Wi-Fi connectivity, the SkyAccess DualBand requires attachment of the 2.4 GHz antenna included with the device. Screw the antenna onto the standard N-connector on the back of the SkyAccess DualBand. (Tighten by hand only.)

Figure 8. Attaching the 2.4 GHz antenna



- 2** Use the supplied clamps to secure the SkyAccess DualBand to the pole; then loop the Ethernet cable around the mounting pole and secure it with tie wraps.

Figure 9. Securing the SkyAccess DualBand



Tighten the bolts securely on the mounting hardware.

- 3 Connect the CAT5 cable to the port on the power injector to restore power to the SkyAccess DualBand.

Connecting to the Wireless Network

After mounting the SkyAccess DualBand, you can set up a connection to the wireless network via a local computer or LAN. Once connected, a subscriber can use the wireless network to gain access to Internet services and applications.

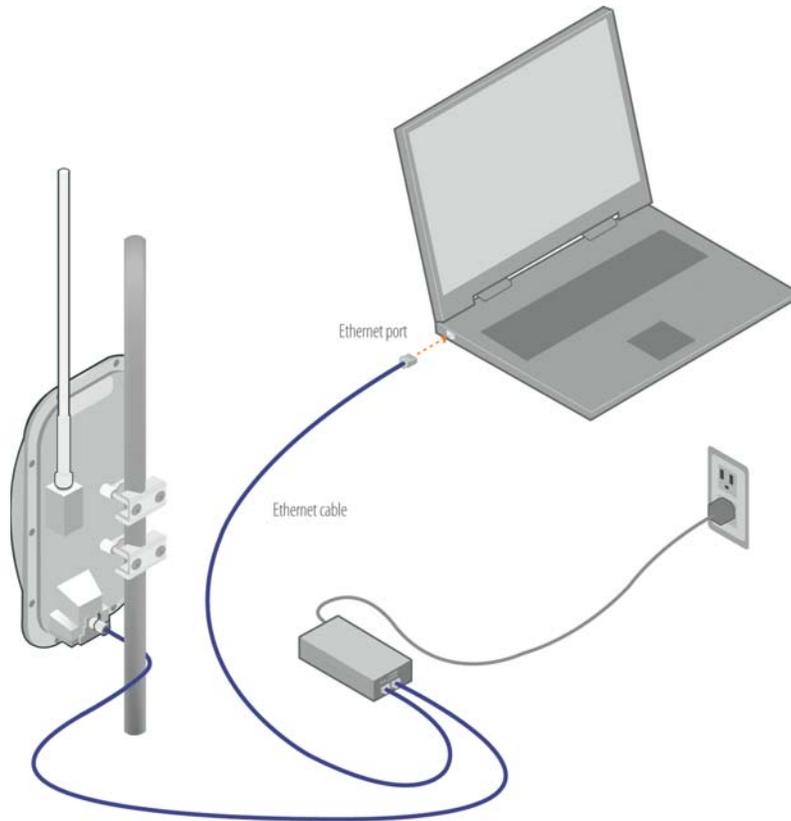
You can either connect to the SkyAccess DualBand with Ethernet or use the onboard access point to establish a wireless connection.

Connect to the Wireless Network with Ethernet

- Connect the device to a computer or LAN (for a SkyAccess DualBand that's providing Internet/WAN access to the mesh network).

Connect a second Ethernet cable from the power injector port labeled “DATA” to a personal computer or router/data switch providing a connection to a LAN.

Figure 10. Connecting a SkyAccess DualBand to a computer



Connect to the Wireless Network via a Wi-Fi Connection

- 1 From a Wi-Fi/WPA-PSK-capable computer within operating range of the access point, open the network settings panel and set up a wireless connection with the IP address 192.168.0.2 and the netmask 255.255.255.0.
- 2 From the Network Connection control panel, choose the default SSID provided with the SkyAccess DualBand—for example, SkyAccess0800690201FC.
- 3 At the password prompt, enter the default SSID.

Configuring the SkyAccess DualBand

After installing the SkyAccess DualBand, you need to provide the device components with configuration information required for network operations.

This chapter explains how to use SkyPilot EMS software to configure the SkyAccess DualBand for both mesh networking and Wi-Fi operation.

Before You Begin

Before starting configuration, make sure the SkyAccess DualBand is powered up and capable of receiving a signal from a SkyGateway or SkyExtender. Additionally, make sure that the EMS software is installed on a central server and that you have client access from PC-based client software or a Web browser. (Detailed procedures for using EMS software are provided in *SkyPilot Network Administration*, available from SkyPilot customer support at www.skypilot.com/support/.

Choosing a WLAN Configuration

You also must decide on the type of Wi-Fi network you want to configure at the access point location. Most WLAN deployments use one of two common types of WLAN configuration:

- **Open**—Allows anyone with Wi-Fi capability to connect to the wireless network via the SkyAccess DualBand access point. An open WLAN does not authenticate users at the network layer, nor does it depend on authentication by a backend system.

An open configuration raises obvious security concerns. The lack of encryption other than SSL/TLS (which is available only during login) makes the network

vulnerable to unauthorized access and malicious actions (including denial-of-service attacks).

You can provide backend authentication at the application layer through a captive portal mechanism operating outside your wireless mesh network. A captive portal forces all HTTP traffic from an unauthenticated user to a login Web page and blocks the traffic until the user successfully logs in. (For more information about captive portal mechanisms, refer to the Web page http://en.wikipedia.org/wiki/Captive_portal.)

An additional disadvantage of open configurations is that users must begin each session from a Web browser before they can use other Internet applications, such as `email`, `ssh`, `ftp`, and `chat` clients.

- **Protected**—A Wi-Fi Protected Access (WPA) network that uses standards-based client authentication and encryption. Users are authenticated via a Radius server (which you'll need to implement using a third-party solution).

WPA uses the IEEE 802.11b/g and IETF EAP protocols to give users a secure connection with both the access point and the Radius server, allowing the exchange of credentials (`user-name@domain` and `password`) and keys for encrypting all traffic between the client and the access point—even after authentication.

WPA encryption is by WEP, with the addition of keys that are unique to each session and client. This additional keying mechanism eliminates the security problems of the original WEP. You can use AES encryption with the SkyAccess DualBand for even stronger encryption capabilities.

For more information about WPA, refer to the following Web page: http://en.wikipedia.org/wiki/Wi-Fi_Protected_Access.

As you follow the procedure for configuring the SkyAccess DualBand, it will refer you to the appropriate steps depending on the WLAN configuration you've chosen.

Setting Up a Radius Server for Authenticating Users

If you plan to configure your SkyAccess DualBand access point for WPA, you must first configure a Radius server with the following:

- The IP address and shared secret of the SkyAccess DualBand access point.
- EAP-PEAP/MSCHAPv2 and EAP-TTLS/PAP, or MSCHAPv2 (not EAP-TLS) suitable for WPA. (Your Radius supplier can provide instructions.)
- A Users database with user names and passwords. (You may also need to identify a proxy Radius server if you're delegating some domains to other service providers.)

Automatic vs. Manual Provisioning

To operate on the wireless mesh network, the SkyAccess DualBand and its contained access point require network configurations to operate on the wireless mesh network. SkyPilot gives you a choice of two modes for provisioning devices with configurations:

- **Automatic provisioning**—Requires the use of SkyPilot EMS software to create configurations that an unattended central server can distribute to devices on the wireless mesh network. Although automatic provisioning requires more setup time than manual provisioning, it greatly simplifies the administration of a growing network.

After getting a configuration from the provisioning server, the SkyAccess DualBand will establish a link to the SkyGateway (or to a SkyExtender or another SkyAccess DualBand) and use DHCP to retrieve an IP address and instructions for downloading configuration information stored on the server.

- **Manual provisioning**—Usually performed in the field, manual provisioning permits the configuration of only a single device at a time, creating the minimum settings required for a wireless link and storing them in the device's flash memory.

For more about provisioning modes, see *Getting Started with the SkyPilot Network*, available from the SkyPilot customer support at www.skypilot.com/support/.

Preparing Software Images

EMS Software

Before you use the SkyPilot EMS software to set up the automatic configuration of the SkyAccess DualBand, make sure the most current software images are available to the EMS program.

To provide the EMS program with access to software images, copy the images to the folder `/var/ftp/pub/images` on the provisioning server.

Access Point Firmware

You can update the firmware in a SkyAccess DualBand access point either before or after DualBand configuration. All you need is FTP installed on the host computer that contains the desired firmware image. For detailed procedures, refer to the section on updating access point firmware in **SkyPilot Network Administration**.

Manual Provisioning Procedure

To configure a SkyAccess DualBand that's in manual provisioning mode, you first configure its SkyAccess portion (following the same procedure as for SkyConnectors), and then you configure its access point.

To manually provision a SkyAccess DualBand:

- 1** Log in to the SkyAccess portion of the DualBand.
You can connect to a SkyAccess DualBand and access its command-line interface via a Telnet session from a console connected to the SkyAccess DualBand's Ethernet port. After logging in (by supplying a password), you can enter commands at the command prompt. For access instructions for the command-line interface, see Appendix A.
- 2** Configure the SkyAccess DualBand by using the `set prov batch` command.

3 Enter the `set prov manual` command so that the SkyAccess DualBand uses manual provisioning mode when it next starts.

4 Log in to the SkyAccess DualBand's access point.

You can connect to an access point and access its Web-based interface via a network connection to the SkyAccess DualBand or by a direct Wi-Fi connection to the access point. After logging in (by supplying a password), you can configure the access point through its Web-based interface. For detailed network setting requirements and access instructions for the Web-based interface, refer to the *SkyPilot Web Interface Reference*.

5 Using the Access Point Configuration page, configure the access point's global configuration parameters.

6 Using the WLANs Settings page, configure the SSIDs.

7 Optionally, configure any additional access point settings that you want.

Accessing the SkyAccess DualBand Command-Line Interface

This appendix describes how to access the command-line interface that SkyPilot SkyAccess DualBand provides for provisioning and troubleshooting.

Connect to the SkyAccess Interface

You can connect to a SkyAccess DualBand and access the command-line interface through Telnet over an Ethernet connection. After logging in (by supplying a password), you can enter commands at the command prompt.

- 1** Cable and mount the SkyAccess DualBand according to the instructions in Chapter 3.
- 2** Prepare a PC or laptop.
Open the network settings panel and assign the computer the IP address 192.168.0.3 with a subnet mask of 255.255.255.0.
- 3** Connect the computer to the SkyAccess DualBand according to the instructions in the section “Mounting the SkyAccess DualBand,” in Chapter 3.
- 4** Start a Telnet session.
Telnet to the default IP address of the SkyAccess DualBand (192.168.0.2).
- 5** Log in by entering the password at the command prompt. (The default is `public`.)

Figure 11. Example Telnet login

```
Welcome to SkyPilot Networks, Inc.  
Copyright (C) 2006 SkyPilot Networks, Inc. All Rights Reserved.  
  
Password: *****  
Login successful  
  
>
```

After making an Ethernet connection to the SkyAccess DualBand, you can manage and troubleshoot the device using a wide range of commands available through the command-line interface. For detailed descriptions of the commands, as well as sample output for many of them, see *SkyPilot Network Administration*.

For comprehensive guidelines to troubleshooting devices on your SkyPilot wireless mesh network, see *Getting Started with the SkyPilot Network*.

Grounding Guidelines

This appendix provides some guidelines for properly grounding the SkyAccess DualBand.

Proper grounding protects both your SkyPilot device and equipment connected to it. For the surge protection circuitry built into the SkyPilot equipment to be effective, proper grounding of the unit is necessary. This is especially true if you're installing devices on tall structures, or in areas subject to lightning.

NOTE The techniques described in this appendix are intended as general guidelines only and do not constitute a comprehensive guide covering all installation scenarios. For maximum protection, contact a qualified installation specialist who is familiar with your operating environments. If lightning is a threat in your area, consider a consultation with a lightning and transient protection specialist.

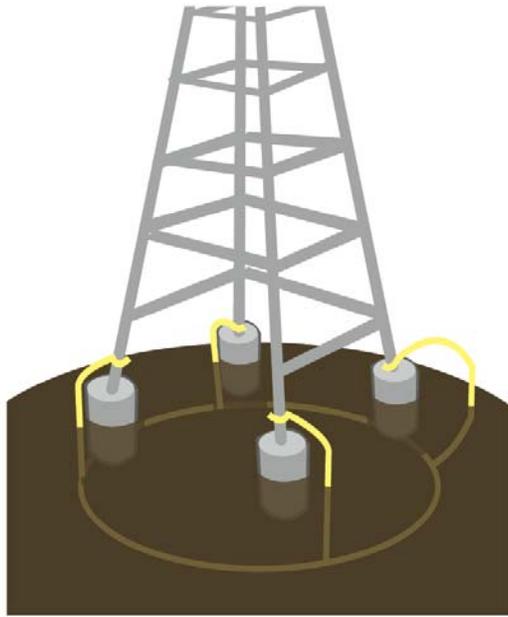
General Grounding Strategy

To ensure optimal reliability, properly ground the metal base of the SkyPilot device. The most efficient way to ground the device is to use an 8 GA or larger wire to connect it to a ground point on the structure or tower.

The three most common ground points are:

- A cold-water pipe. Make sure it is well connected to earth.
- The primary grounding point of the AC electrical system of the building.
- A 10-foot or longer copper-clad ground rod driven into the earth. For a tower with multiple legs, you need one ground rod per leg and a ground wire loop connecting each of the rods; see Figure 12.

Figure 12. Ground wire loop



Making Connections “Gas-Tight”

Regardless of the grounding point you use, make sure the connections are “gas-tight”—capable of retaining low resistance and integrity over time and with exposure to the elements.

Use of an antioxidant compound and proper sealing is essential. For protection against corrosion, wrap all connections with Scotch® 130C tape.

Checking Cold-Water Pipe Integrity

If you’re using a cold-water pipe for grounding, verify the integrity of the ground. In some cases, sections of metal cold-water pipes may have been repaired or extended with PVC material. PVC material or a dielectric union will render a cold-water pipe ground unacceptable for grounding.

Measuring Resistance

Verify that there is no more than 5 ohms of resistance between any two ground points in the entire system. Also make sure that all ground points on a structure are tied together. For example, if you use a ground rod and a cold-water pipe as grounding points at different locations on the same structure, you must tie them together.

Adding Surge Protection

If you're installing a SkyPilot device in an area that's subject to lightning storms, SkyPilot recommends installing a surge protection device (SPD) at both ends of the Ethernet cable—one at the SkyPilot device and one at the point of entry to a building or enclosure.

SkyPilot offers SPDs with bracket and cabling designed for use with SkyPilot equipment. For more information, visit SkyPilot customer support at www.skypilot.com/support/ to view accessory guides for SkyPilot-branded surge protection solution. (You may also purchase SPDs from third-party vendors.)

Grounding Checklist

When grounding a SkyPilot device, use the following checklist to confirm that your installation is adequately protected from power surges and lightning.

- Connect a ground wire from the SkyPilot device to a ground system on the building or tower.
- Use shielded CAT5 cabling and connect the drain wire of the shield to ground at the SkyPilot device. (Leave the other end of the drain wire unconnected.)
- Use the proper size down lead to connect a SkyPilot device on a roof or tower to the ground system of indoor equipment.
- Verify that all points of the ground system are tied together with less than 5 ohms resistance between any two points.

- Run the CAT5 cable inside the tower structure, tying the cable to the tower leg at every 4 feet of length. For increased protection, run the CAT5 cable through metallic conduit installed on the tower.
- Bleed off any static charge by installing a streamer-delaying, static-dissipation array above the SkyPilot device.
- Install all lightning and surge protection devices in accordance with UL 96A installation requirements for lightning protection systems and the NFPA 780 standard for lightning protection.

Specifications

This appendix provides technical specifications for the SkyPilot SkyAccess DualBand.

Wireless Specifications

Frequency band	4.940–5.150, 5.150–5.450, 5.450–5.725, or 5.725–5.850 GHz
EIRP	<p>Wi-Fi access: 2.400–2.491 GHz</p> <p>42.5 dBm/17.8 W peak, 36 dBm/4 W average, 33 dBm/2 W average, 30 dBm/1 W average, or 36 dBm/4 W peak (EIRP selected for country-specific regulations)</p>
Media access	Wi-Fi access: -33.0 dBm/3.2 W
Modulation technique	Time Division Duplex (TDD)
Modulation rates	OFDM with adaptive modulation
Throughput	Wi-Fi access: DSSS and OFDM
Latency	6–54 Mbps
Antennas	Up to 20 Mbps UDP, up to 10 Mbps TCP
Channel width	8–10 ms roundtrip per hop
Channel resolution	28° horizontal x 9° vertical panel, 17 dBi
Receive sensitivity	Wi-Fi access: omnidirectional 7.5 dBi antenna
Connectivity	20 MHz
Authentication	5 MHz frequency control
Encryption	-90 dBm at 6 Mbps modulation
	SkyAccess DualBand connects with SkyGateways, SkyExtenders, and SkyExtender DualBands
	MD5-based certificates
	128-bit AES on all wireless links

Product Specifications

Connectors	RJ-45: Ethernet connection (10/100bT) and power (Power-over-Ethernet)
Mounting	Eave, roof, or chimney; outside pole diameter up to 1.35"
Range	7.5 miles (12 km) Wi-Fi access: Up to 1,200 feet
LEDs	LAN activity; Wi-Fi activity; WAN link and activity; and power
Dimensions	12.6" (32 cm) H x 6.6" (16.8 cm) W x 4.2" (10.7 cm) D
Weight	3.8 pounds (1.7 kg)
Operating temperature	-40° to 131° F (-40° to 55° C)
Wind loading	Up to 150 mph (240 km/h)
Enclosure/humidity	NEMA-4X
Power	110–230 VAC, 50–60 Hz input; 8 W
Certifications	FCC Part 15, FCC 47 CFR Part 15, Class B USA; compliance with UL safety standards, CE, C-Tick, IC RSS210 Issue 5
EMI and susceptibility	FCC Part 15.107 and 15.109
Warranty	One-year limited warranty on hardware and software

Security

Authentication	MD5-based certificates
Encryption	AES
Filtering	Based on protocol type, IP port ID, and configurable IP address list
VLAN	Supports 802.1q VLAN tagging; also supports a management VLAN for managing traffic and a data VLAN for subscriber traffic

Network Management

Command-line interface	Console via Telnet
NMS integration	SNMP v2c
GUI configuration	SkyProvision™ software and Web interface
GUI EMS	SkyControl™ software
IP address	DHCP or static
Firmware	Multiple versions of firmware stored in nonvolatile memory; updated via FTP
Configuration file	XML over HTTP

Quality of Service

Prioritization	802.1p-based; based on protocol type, IP address, port ID, and configurable IP address list
Traffic shaping	Per-device rate limits upstream and downstream
Monitoring and MIB Support	
Supported MIBs	MIB-II (RFC 1213); EtherLike (RFC 2665); Bridge (RFC 1493); SkyPilot private MIB
Local management	RS-232 Serial Console Port
Remote management	Command-line interface via Telnet, SNMP v2c, Web interface
Topology	
Configurations	Mesh, point-to-multipoint, point-to-point

