

# NETGEAR®

## Hardware Installation Guide

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### Insight Instant AirBridge WBC502

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# 1

## Introduction

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This hardware installation guide is for the NETGEAR Insight Instant Wireless AirBridge WBC502.

The AirBridge can provide an outdoor, long-distance, WiFi connection in a master-satellite configuration that lets you extend your main network to a detached site. You can also use the AirBridge as a long-range, outdoor access point or client bridge.

This hardware installation guide complements the installation guide that came with your AirBridge. This chapter serves as an introduction to the AirBridge and includes the following sections:

- [Overview](#)
- [Features](#)
- [Safety instructions and warnings](#)

**Note:** This device must be professionally installed. It is the installer's responsibility to follow local country regulations, including operations within legal frequency channels, output power, and DFS requirements. The vendor, reseller, or distributor is not responsible for illegal wireless operations. For more details, see the device's terms and conditions.

**Note:** For more information about the topics that are covered in this manual, visit the support website at [netgear.com/support/](http://netgear.com/support/).

**Note:** For technical specifications, see the data sheet at [netgear.com/business/products/wireless/premium-wireless](http://netgear.com/business/products/wireless/premium-wireless). For AirBridge documentation, visit [netgear.com/support/download/](http://netgear.com/support/download/).

# Overview

The AirBridge is intended for environments where you need to extend your network to another building or across a large outdoor campus or field when no wired network infrastructure is available.

The AirBridge can provide a long distance, high performance, IEEE 802.11ac WiFi connection in the following setups:

- **Single master to single satellite.** Point-to-point setup between two AirBridges in a configuration with a single master and single satellite with a long-distance reach of 1.8 miles (3 km) or more. This setup requires a line of sight between the main and detached sites.
- **Single master to multiple satellites.** Point-to-multipoint setup between multiple AirBridges in a configuration with a single master and up to four satellites with a long-distance reach of 1.8 miles (3 km) or more. This setup requires a line of sight between the main and detached sites.
- **Outdoor access point.** A setup that allows for a long-range WiFi reach in which an AirBridge functions as an access point that provides connections to WiFi clients, client bridges, or both.
- **Outdoor client bridge.** A setup in which an AirBridge functions as a client bridge, providing a network connection to a wired device, such as an IP surveillance camera. The client bridge connects to the main network through a backhaul WiFi connection to a WiFi access point.

**Note:** For information about application samples, see [Applications](#) on page 19.

You can mount the AirBridge outside to a wall or pole and provide power to the AirBridge through an Ethernet cable that is connected to the provided power adapter, which must be installed indoors. The AirBridge integrates a high-gain directional antenna for a line of sight connection to other AirBridges or WiFi clients.

The AirBridge provides two 10/100/1000BASE-T RJ-45 LAN ports for network connections (see [Bottom panel with Ethernet ports](#) on page 15). One LAN port must be connected to the provided power adapter (see [Power adapter](#) on page 16). Use Category 5e (Cat 5e) or higher-rated Ethernet cables terminated with RJ-45 connectors to make Gigabit connections.

The AirBridge provides administrative management options that let you configure, monitor, and control the AirBridge and the WiFi network:

- Using the local browser user interface (UI) you can configure the AirBridge and set up a WiFi connection between two or more units in any of the supported operation modes.

For more information, see the user manual, which you can download from [netgear.com/support/download/](http://netgear.com/support/download/).

- Using NETGEAR Insight, you can set up a pair or a group of AirBridges, with one AirBridge functioning as the master and one or more other AirBridges functioning as satellites.

**Note:** At this time, NETGEAR Insight does not support the access point and client bridge operation modes. To configure and manage the AirBridge as an access point or client bridge, you first must change the management mode to Standalone Mode, and then use the local browser UI. For more information, see the user manual.

For more information about NETGEAR Insight, visit [netgear.com/insight](http://netgear.com/insight) and see the NETGEAR knowledge base articles at [netgear.com/support](http://netgear.com/support).

## Features

The AirBridge supports the following key features:

- 2.4 GHz dedicated radio for the management SSID
- 5 GHz radio with 2x2 MU-MIMO for the support of 802.11ac/a/n WiFi clients
- WPA-PSK and WPA2-Enterprise WiFi security
- Advanced features such as WiFi output power level control, traffic shaping, and realtime RSSI indication
- Automatic site survey to detect BSSIDs and SSIDs
- 2 Gigabit Ethernet ports for network connections  
(For more information, see [Bottom panel with Ethernet ports](#) on page 15 and [Power adapter](#) on page 16.)
- Includes the following mounting hardware:
  - Wall mounting screws and anchors
  - Pole mounting strap

(For more information, see [Step 5: Mount the AirBridge](#) on page 40.)

- Full compatibility with IEEE switching standards:
  - IEEE 802.3 Ethernet
  - IEEE 802.3u 100BASE-T
  - IEEE 802.3ab 1000BASE-T
  - IEEE 802.1Q VLAN tagging

- IEEE 802.3x Full-duplex flow control
- IEEE 802.1p Class of Service (QoS)
- IEEE 802.1D Spanning Tree Protocol (STP)
- IEEE 802.1x RADIUS network access control

- AutoSensing, autonegotiating capabilities, and Auto Uplink technology for the LAN2 Ethernet port.  
(For more information, see [Bottom panel with Ethernet ports on page 15](#) and [RJ-45 ports for 10/100/1000M BASE-T Ethernet connectivity on page 17](#).)

## Safety instructions and warnings

**Note:** This device must be professionally installed. It is the installer's responsibility to follow local country regulations, including operations within legal frequency channels, output power, and DFS requirements. The vendor, reseller, or distributor is not responsible for illegal wireless operations. For more details, see the device's terms and conditions.

Use the following safety guidelines to ensure your own personal safety and to help protect your system from potential damage.

To reduce the risk of bodily injury, electrical shock, fire, and damage to the equipment, observe the following precautions:

- This product is designed for outdoor use but can be used indoors too. However, the power adapter must be installed indoors. For more information, see the environmental specifications in the user manual or the data sheet.
- Power the product only with an Ethernet cable that is connected from the LAN1 port to the PoE port on the supplied power adapter. Do not use any other power source such as a PoE switch. The LAN1 port is not a standard PoE port. Using any other power source could damage the device.
- Do not service the product except as explained in your system documentation. Some devices should never be opened.
- If any of the following conditions occur, unplug the product from the electrical outlet and replace the part or contact your trained service provider:
  - Depending on your device, the power adapter, power adapter cable, power cable, extension cable, or plug is damaged.
  - An object fell into the product.

- The product was dropped or damaged.
- The product does not operate correctly when you follow the operating instructions.
- Do not push any objects into the openings of your system. Doing so can cause fire or electric shock by shorting out interior components.
- Use the product only with approved equipment.
- If applicable to your device, allow the product to cool before removing covers or touching internal components.
- Operate the product only from the type of external power source indicated on the electrical ratings label. If you are not sure of the type of power source required, consult your service provider or local power company.
- To avoid damaging your system, if your device uses a power supply with a voltage selector, be sure that the selector is set to match the power at your location:
  - 115V, 60 Hz in most of North and South America and some Far Eastern countries such as South Korea and Taiwan
  - 100V, 50 Hz in eastern Japan and 100V, 60 Hz in western Japan
  - 230V, 50 Hz in most of Europe, the Middle East, and the Far East
- Be sure that attached devices are electrically rated to operate with the power available in your location.
- Depending on your device, use only a supplied power adapter or approved power cable:  
*If your device uses a power adapter:*
  - If you were not provided with a power adapter, contact your local NETGEAR reseller.
  - The power adapter must be rated for the product and for the voltage and current marked on the product electrical ratings label.  
*If your device uses a power cable:*
  - If you were not provided with a power cable for your system or for any AC-powered option intended for your system, purchase a power cable approved for your country.
  - The power cable must be rated for the product and for the voltage and current marked on the product electrical ratings label. The voltage and current rating of the cable must be greater than the ratings marked on the product.
- To help prevent electric shock, plug the system and peripheral power cables into properly grounded electrical outlets.

- If applicable to your device, the peripheral power cables are equipped with three-prong plugs to help ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable. If you must use an extension cable, use a three-wire cable with properly grounded plugs.
- Observe extension cable and power strip ratings. Make sure that the total ampere rating of all products plugged into the extension cable or power strip does not exceed 80 percent of the ampere ratings limit for the extension cable or power strip.
- To help protect your system from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply (UPS).
- Position system cables, power adapter cables, or power cables carefully. Route cables so that they cannot be stepped on or tripped over. Be sure that nothing rests on any cables.
- Do not modify power adapters, power adapter cables, power cables or plugs. Consult a licensed electrician or your power company for site modifications.
- Always follow your local and national wiring rules.

Failure to follow these guidelines can result in damage to your NETGEAR product, which might not be covered by NETGEAR's warranty, to the extent permissible by applicable law.

# 2

## Hardware Overview

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This chapter describes the AirBridge hardware features.

The chapter includes the following sections:

- Front panel
- Back panel with status LEDs
- Bottom panel with Ethernet ports
- Power adapter
- RJ-45 ports for 10/100/1000M BASE-T Ethernet connectivity
- Reset button

## Front panel

The Airbridge enclosure is IP55-rated for outdoor use. The following figure shows the front panel of the AirBridge.



Figure 1. Front panel

The only component on the front panel is the latch that lets you open the cover so that you can access the ports and **Reset** button on the bottom panel.

- **Open the cover.** To open the cover, carefully pull the latch toward you and pull the cover downward so that it slides out of the enclosure.
- **Close the cover.** To close the cover, slide the cover into the enclosure and push the cover upward until the latch locks into the enclosure.

## Back panel with status LEDs

The back panel of the AirBridge shows the status LEDs.

The following figure shows the back panel of the AirBridge.

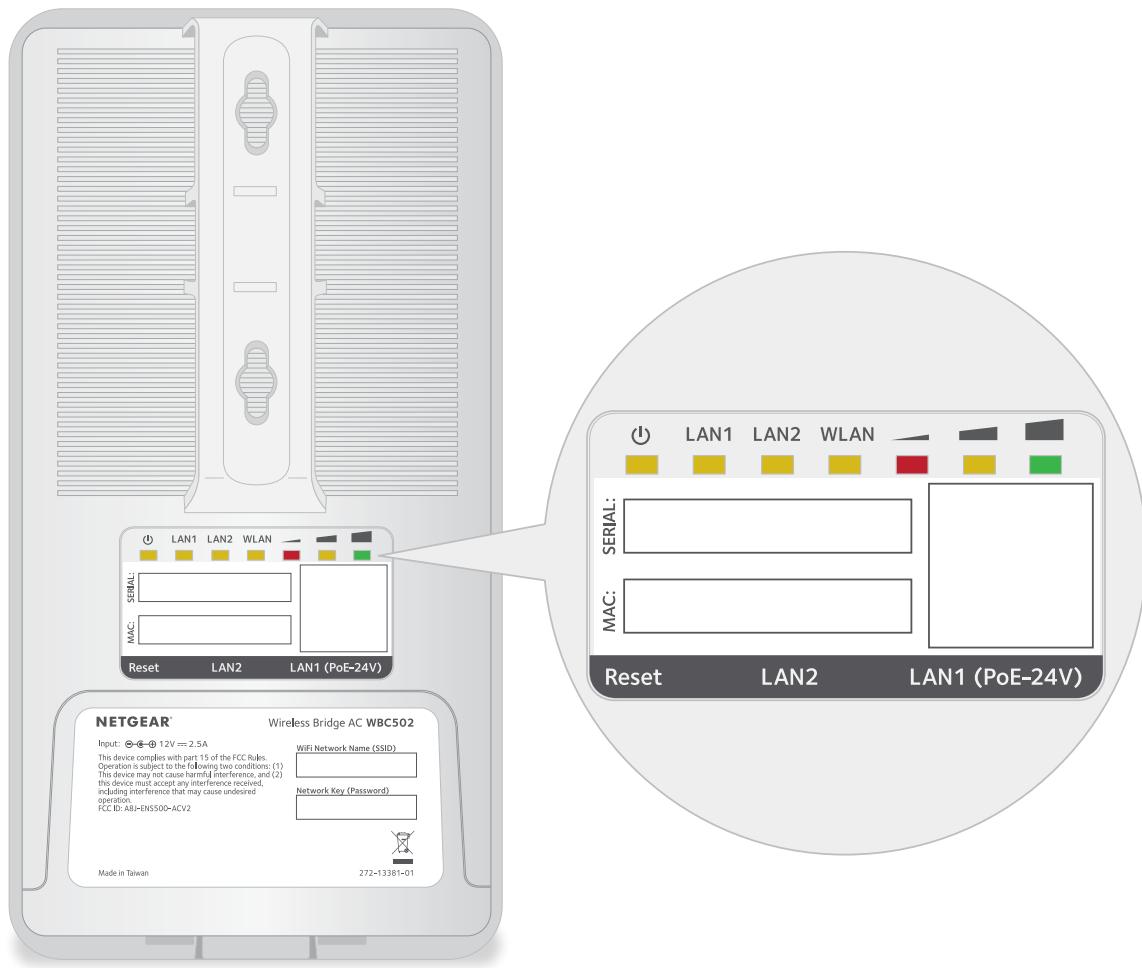


Figure 2. Back panel

The following table describes the status LEDs on the back panel.

Table 1. Status LEDs

LED	Description								
Power LED	<p><b>Solid amber.</b> The AirBridge is powered on.</p> <p><b>Blinking amber.</b> The <i>physical</i> <b>Reset</b> button was pressed and the AirBridge is resetting to factory default settings or user default settings.</p> <p><b>Off.</b> Power is not supplied to the AirBridge.</p>								
LAN1 LED	<p><b>Solid amber.</b> The port is connected to the supplied power adapter, and the LAN port on the power adapter is connected to an Ethernet device.</p> <p><b>Off.</b> No port link is established.</p>								
LAN2 LED	<p><b>Solid amber.</b> The port is directly connected to another Ethernet device.</p> <p><b>Off.</b> No port link is established.</p>								
WLAN LED	<table> <tr> <td>AirBridge Master operation mode</td><td> <p><b>Solid amber.</b> One or more 5 GHz SSIDs are enabled.</p> <p><b>Off.</b> All 5 GHz SSIDs are disabled.</p> <p><b>Note:</b> If the AirBridge mode is enabled, a single 5 GHz SSID only is supported. You cannot disable that SSID.</p> <p><b>Note:</b> If the management mode is NETGEAR Insight, a single 5 GHz SSID only is supported.</p> </td></tr> <tr> <td>AirBridge Satellite operation mode</td><td> <p><b>Solid amber.</b> The satellite is connected to the master.</p> <p><b>Off.</b> The satellite is not connected to the master.</p> </td></tr> <tr> <td>Access Point operation mode</td><td> <p><b>Solid amber.</b> One or more 5 GHz SSIDs are enabled.</p> <p><b>Off.</b> All 5 GHz SSIDs are disabled.</p> </td></tr> <tr> <td>Client Bridge operation mode</td><td> <p><b>Solid amber.</b> The client bridge is connected to the access point.</p> <p><b>Off.</b> The client bridge is not connected to the access point.</p> </td></tr> </table>	AirBridge Master operation mode	<p><b>Solid amber.</b> One or more 5 GHz SSIDs are enabled.</p> <p><b>Off.</b> All 5 GHz SSIDs are disabled.</p> <p><b>Note:</b> If the AirBridge mode is enabled, a single 5 GHz SSID only is supported. You cannot disable that SSID.</p> <p><b>Note:</b> If the management mode is NETGEAR Insight, a single 5 GHz SSID only is supported.</p>	AirBridge Satellite operation mode	<p><b>Solid amber.</b> The satellite is connected to the master.</p> <p><b>Off.</b> The satellite is not connected to the master.</p>	Access Point operation mode	<p><b>Solid amber.</b> One or more 5 GHz SSIDs are enabled.</p> <p><b>Off.</b> All 5 GHz SSIDs are disabled.</p>	Client Bridge operation mode	<p><b>Solid amber.</b> The client bridge is connected to the access point.</p> <p><b>Off.</b> The client bridge is not connected to the access point.</p>
AirBridge Master operation mode	<p><b>Solid amber.</b> One or more 5 GHz SSIDs are enabled.</p> <p><b>Off.</b> All 5 GHz SSIDs are disabled.</p> <p><b>Note:</b> If the AirBridge mode is enabled, a single 5 GHz SSID only is supported. You cannot disable that SSID.</p> <p><b>Note:</b> If the management mode is NETGEAR Insight, a single 5 GHz SSID only is supported.</p>								
AirBridge Satellite operation mode	<p><b>Solid amber.</b> The satellite is connected to the master.</p> <p><b>Off.</b> The satellite is not connected to the master.</p>								
Access Point operation mode	<p><b>Solid amber.</b> One or more 5 GHz SSIDs are enabled.</p> <p><b>Off.</b> All 5 GHz SSIDs are disabled.</p>								
Client Bridge operation mode	<p><b>Solid amber.</b> The client bridge is connected to the access point.</p> <p><b>Off.</b> The client bridge is not connected to the access point.</p>								
Signal strength indicator (SSI) LEDs (AirBridge Satellite or Client Bridge operation mode)	<p>On an AirBridge that functions either as a satellite or a client bridge, a single SSI LED lights to indicate the strength of the signal for the WiFi connection, either between the satellite and the master or between the client bridge and the access point.</p> <table> <tr> <td></td><td><b>Right SSI LED solid green.</b> The signal for the WiFi connection is strong. (The RSSI is better than -70 dBm.) The left and middle SSI LEDs are off.</td></tr> <tr> <td></td><td><b>Middle SSI LED solid amber.</b> The signal for the WiFi connection is moderately good. (The RSSI is between -70 dBm and -85 dBm.) The left and right SSI LEDs are off.</td></tr> <tr> <td></td><td><b>Left SSI LED solid red.</b> The signal for the WiFi connection is weak. (The RSSI is weaker than -85 dBm.) The middle and right SSI LEDs are off.</td></tr> <tr> <td></td><td><b>All SSI LEDs off.</b> No WiFi connection is established or the signal strength cannot be determined.</td></tr> </table>		<b>Right SSI LED solid green.</b> The signal for the WiFi connection is strong. (The RSSI is better than -70 dBm.) The left and middle SSI LEDs are off.		<b>Middle SSI LED solid amber.</b> The signal for the WiFi connection is moderately good. (The RSSI is between -70 dBm and -85 dBm.) The left and right SSI LEDs are off.		<b>Left SSI LED solid red.</b> The signal for the WiFi connection is weak. (The RSSI is weaker than -85 dBm.) The middle and right SSI LEDs are off.		<b>All SSI LEDs off.</b> No WiFi connection is established or the signal strength cannot be determined.
	<b>Right SSI LED solid green.</b> The signal for the WiFi connection is strong. (The RSSI is better than -70 dBm.) The left and middle SSI LEDs are off.								
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	<b>Left SSI LED solid red.</b> The signal for the WiFi connection is weak. (The RSSI is weaker than -85 dBm.) The middle and right SSI LEDs are off.								
	<b>All SSI LEDs off.</b> No WiFi connection is established or the signal strength cannot be determined.								

## Bottom panel with Ethernet ports

The following figure shows the bottom panel with the cover removed.

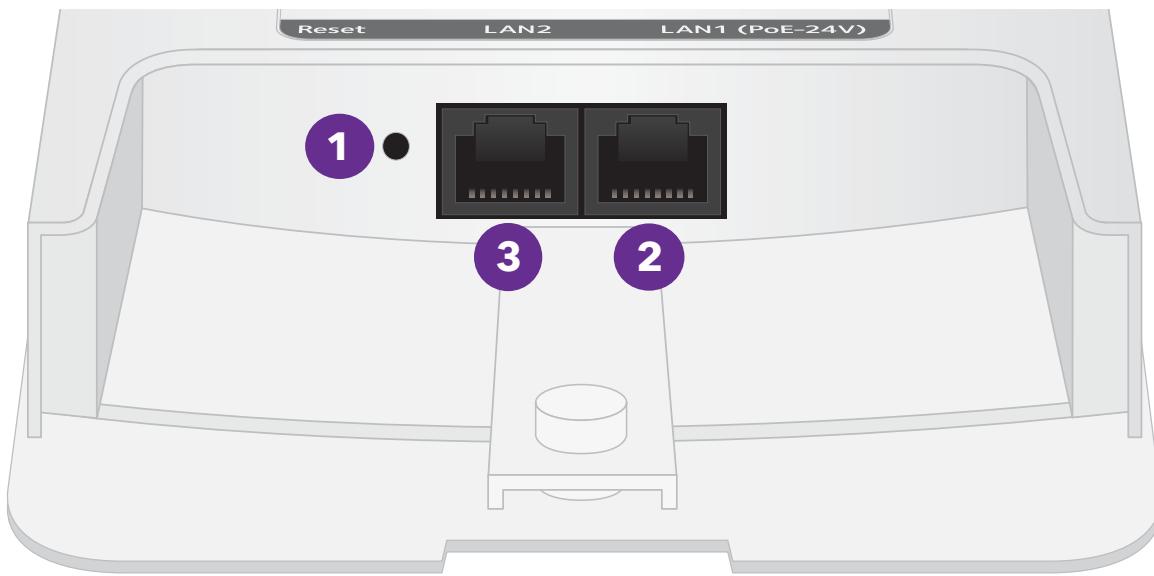


Figure 3. Bottom panel with the cover removed

The bottom panel of the AirBridge is covered. When you remove the cover (see [Front panel](#) on page 12), the following components display:

1. **Reset button.** Recessed **Reset** button (see [Reset button](#) on page 18).
2. **LAN1 (PoE-24V) port.** One 10/100/1000BASE-T RJ-45 PoE port that provides both PoE power and network connectivity to the AirBridge.  
Using an Ethernet cable, connect the LAN1 port on the AirBridge to the PoE port on the supplied power adapter (see [Power adapter](#) on page 16) that is supplied in the package. For an AirBridge that functions as a master in a master-to-satellite setup or as an access point (either in an access point-to-client bridge setup or as standalone access point) at a main site, the network can include wired Internet access.

**WARNING:** Power the AirBridge only with an Ethernet cable that is connected from the LAN1 port to the PoE port on the supplied power adapter. Do not use any other power source such as a PoE switch. The LAN1 port is not a standard PoE port. Using any other power source could damage the device.

3. **LAN2 port.** One 10/100/1000BASE-T RJ-45 port that allows you to connect an optional *single* device (such as an IP camera) directly to an AirBridge that functions as a client bridge at a detached site.

Do not use the LAN2 port to connect the AirBridge to a network. Instead, connect the LAN1 port on the AirBridge to the PoE port on the supplied power adapter and connect the LAN port on the power adapter to the network (see [Power adapter](#) on page 16).

## Power adapter

The following figure shows the power adapter and power cord.

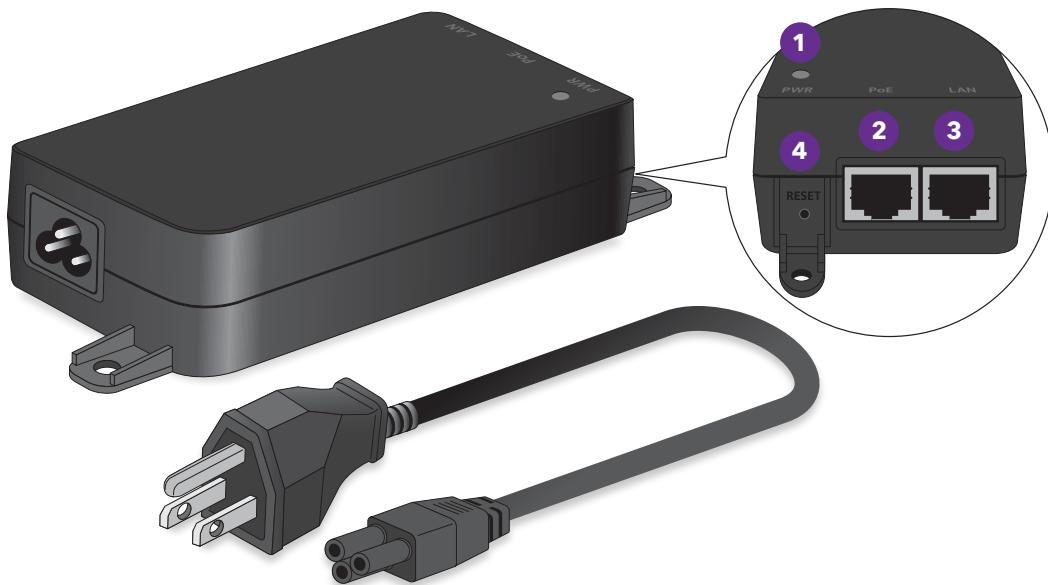


Figure 4. Power adapter

In addition to a receptacle for the power cable, the power adapter provides the following LED, ports, and button:

1. **PWR LED.** The power LED lights green when you insert the three-prong plug of the power cable into the receptacle on the power adapter and the other side into an AC outlet.
2. **PoE port.** One 10/100/1000BASE-T RJ-45 PoE port that you must connect to the LAN1 port on the AirBridge.  
The Ethernet cable between the PoE port on the power adapter and the LAN1 port on the AirBridge provides PoE power to the AirBridge and serves as the network connection for the AirBridge.
3. **LAN port.** One 10/100/1000BASE-T RJ-45 port that you must connect to a network device that provides network connectivity. For an AirBridge that functions as a master

or access point (either in an access point-to-client bridge setup or as standalone access point) at a main site, the network can include wired Internet access.

4. **Reset button.** A **Reset** button that lets you reset the power adapter to factory default settings by inserting a device such as a straightened paper clip into the opening and pressing for at least 10 seconds.

**WARNING:** Although the AirBridge is designed for outside installation, the power adapter is not. You can use an Ethernet cable up to 328 ft (100 m) to connect the power adapter from an inside location to the AirBridge at either an inside or outside location.

## RJ-45 ports for 10/100/1000M BASE-T Ethernet connectivity

Both RJ-45 Ethernet ports on the AirBridge and both RJ-45 ports on the power adapter support autosensing. When you insert a cable into an RJ-45 port, the AirBridge or power adapter automatically ascertains the maximum speed (10 Mbps, 100 Mbps, or 1 Gbps) and duplex mode (half-duplex or full-duplex) of the attached device. The Ethernet ports support a Cat 5e cable (or higher-rated Ethernet cable) terminated with an 8-pin RJ-45 connector.

To simplify the procedure for attaching devices, all RJ-45 ports support Auto Uplink technology. This technology allows attaching devices to the RJ-45 ports with either straight-through or crossover cables.

When you insert an Ethernet cable into an RJ-45 port, the AirBridge or power adapter automatically performs the following actions:

- Senses whether the cable is a straight-through or crossover cable.
- Determines whether the link to the attached device requires a normal connection (such as when you are connecting the port to a computer) or an uplink connection (such as when you are connecting the port to a router, switch, or hub).
- Automatically configures the RJ-45 port to enable communications with the attached device. The Auto Uplink technology compensates for setting uplink connections while eliminating concern about whether to use crossover or straight-through cables when you attach devices.

## Reset button

The AirBridge provides a recessed **Reset** button on the bottom panel so that you can return the AirBridge to its factory default settings, causing all custom settings to be erased.

**Note:** To return the AirBridge to factory default settings, you can also access the local browser UI and use the *software* **Reset** button. For more information, see the user manual, which you can download by visiting [netgear.com/support/download/](http://netgear.com/support/download/).

### **To return the AirBridge to its factory default settings:**

1. Remove the cover from the bottom panel to access the **Reset** button.
2. Insert a device such as a straightened paper clip into the opening of the **Reset** button.
3. Press the **Reset** button for at least 10 seconds, or until the Power LED starts to blink. The AirBridge restarts and returns to factory default settings.

**WARNING:** To avoid the risk of corrupting the firmware, do not interrupt the reset. Do not turn off the AirBridge. Wait until the AirBridge finishes restarting.

# 3

## Applications

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The AirBridge is designed to provide a WiFi connection over a distance of 1.8 miles (3 km) or more, depending on the network situation, physical conditions, and configured WiFi options. The AirBridge can function in various operation modes, each one suited for a particular application.

This chapter includes the following sections:

- Applications overview
- Extend your network to a detached site
- Provide a WiFi Internet connection to a detached, independent network
- Centrally manage video surveillance networks located at different sites
- Provide long-range WiFi service to outdoor clients
- Provide a WiFi connection to an outdoor device that is not WiFi-capable

# Applications overview

The AirBridge can function as a master, satellite, access point, or client bridge in various applications:

- **Extend your network to a detached site.**

Set up one AirBridge that functions as a master at the main site to connect to another AirBridge that functions as a satellite at a detached site. The network at the detached site is an extension of the network at the main site. For more information, see [Extend your network to a detached site](#) on page 21.

- **Provide a WiFi Internet connection to a detached, independent network.**

Set up one AirBridge that functions as a master at the main site to connect to another AirBridge that functions as a satellite at a detached site. By connecting a router to the satellite, the network at the detached site is independent from the network at the main site. For more information, see [Provide a WiFi Internet connection to a detached, independent network](#) on page 23.

- **Centrally manage video surveillance networks located at different sites.**

Set up one AirBridge that functions as a master at the main site to connect to two, three, or four AirBridges that function as satellites at detached sites. Connect video surveillance equipment to the satellite at each detached site. For more information, see [Centrally manage video surveillance networks located at different sites](#) on page 25.

- **Provide long-range WiFi service to outdoor clients.** Set up an AirBridge that functions as an access point to serve multiple outdoor WiFi clients at a long range. For more information, see [Provide long-range WiFi service to outdoor clients](#) on page 27.

- **Provide a WiFi connection to an outdoor device that is not WiFi-capable.** Set up an AirBridge that functions as a client bridge to connect to any WiFi access point. Provide a WiFi connection to an outdoor device such as a pan-tilt-zoom (PTZ) camera by connecting it directly to the client bridge. For more information, see [Provide a WiFi connection to an outdoor device that is not WiFi-capable](#) on page 29.

# Extend your network to a detached site

This application lets you extend your network to a detached site by using two AirBridges in a master-to-satellite, point-to-point setup.

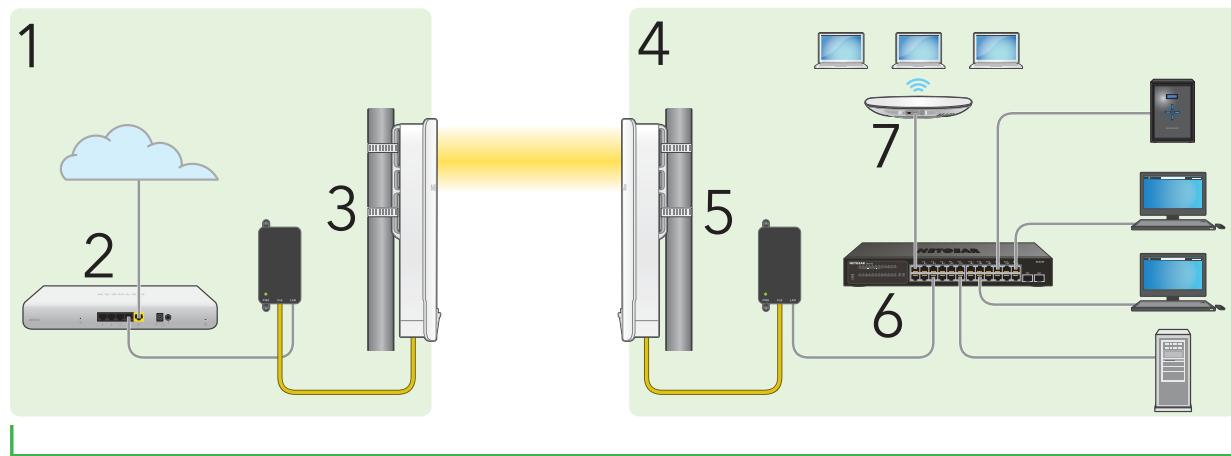


Figure 5. Extend your network to a detached site

Number	Device at Main Site	Number	Device at Detached Site
1	Main site	4	Detached site
2	Router with wired Internet connection	5	AirBridge satellite
3	AirBridge master	6	Switch, allowing for multiple wired connections at the detached site
		7	WiFi access point, allowing for WiFi clients at the detached site

In the previous figure, the master at the main site can be connected to the Internet through a router. The satellite at the detached site is connected to a switch, which allows you to connect multiple wired devices. If you connect a WiFi access point to the switch, you can also provide a WiFi connection to multiple WiFi clients at the detached site.

Each device at the detached site communicates over the WiFi connection with the main site and functions on the same LAN. That is, the main site and detached site function as a single network.

To extend your network to a detached site, complete the following high-level steps:

1. At the main site, configure one AirBridge as a master and enable the AirBridge mode. The master can be connected to the Internet over a wired connection, for example, through a router.
2. Configure another AirBridge as a satellite, enable the AirBridge mode, and establish the WiFi connection.
3. At the detached site, reestablish the WiFi connection between the satellite and the master.

The master provides the network connection to the satellite over a long-distance WiFi connection.

You can connect multiple wired devices to the satellite, for example, using a switch. The network at the detached site is an extension of the network at the main site, with all devices functioning on the same LAN.

# Provide a WiFi Internet connection to a detached, independent network

This application lets you provide an Internet connection to an independent network at a detached site by using two AirBridges in a master-to-satellite, point-to-point setup. Basically, the main site provides a WiFi ISP (WISP) connection to the detached site.

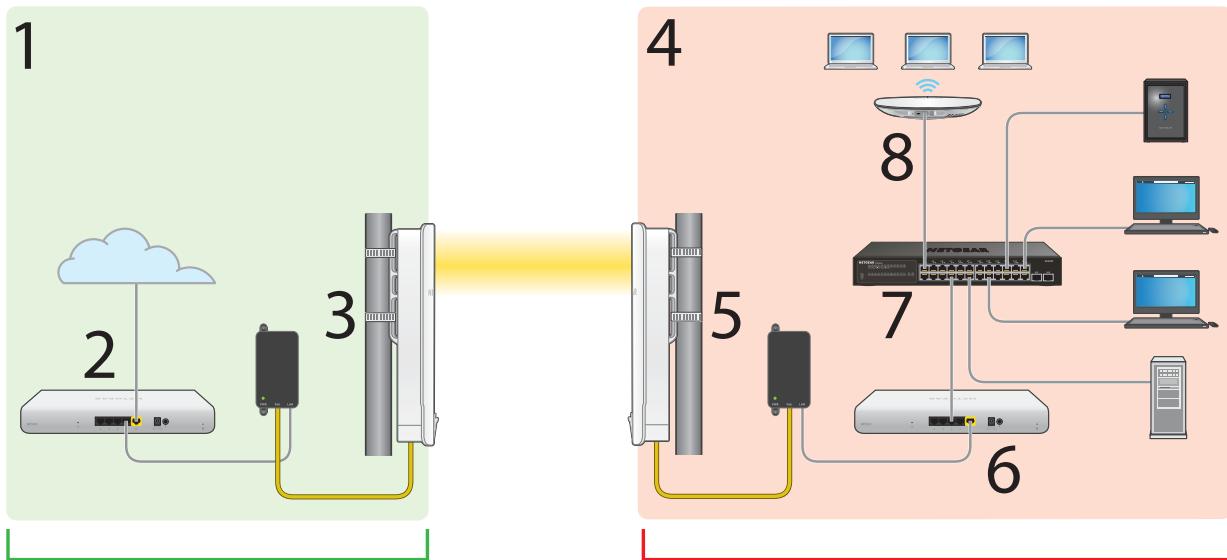


Figure 6. Provide a WiFi Internet connection to a detached, independent network

Number	Device at Main Site	Number	Device at Detached Site
1	Main site	4	Detached site
2	Router with wired Internet connection	5	AirBridge satellite
3	AirBridge master	6	Router that receives its Internet connection from the satellite
		7	Switch, allowing for multiple wired connections at the detached site
		8	WiFi access point, allowing for WiFi clients at the detached site

In the previous figure, the master at the main site is connected to the Internet through a router. The WiFi connection between the master and the satellite at the detached site provides an Internet connection *only* to the detached site. The satellite at the detached site is connected to a router. A switch is connected to the router, which allows you to

connect multiple wired devices. If you connect a WiFi access point to the switch, you can also provide a WiFi connection to multiple WiFi clients at the detached site.

Each device at the detached site is connected to the Internet over the WiFi connection to the main site, but each device functions on a different LAN from the devices at the main site. That is, the main site and detached site are entirely separate networks.

To provide a WiFi Internet connection to a detached, independent network, complete the following high-level steps:

1. At the main site, configure one AirBridge as a master and enable the AirBridge mode. The master must be connected to the Internet over a wired connection, for example, through a router.
2. Configure another AirBridge as a satellite, enable the AirBridge mode, and establish the WiFi connection.
3. At the detached site, reestablish the WiFi connection between the satellite and the master.  
The master provides the Internet connection to the satellite over a long-distance WiFi connection.
4. Connect the satellite to the Internet port on a router.  
The wired Internet connection to the router must come exclusively from the satellite. You can connect one or multiple wired devices to the router, for example, using a switch. The network at the detached site is an independent network so that the devices function in a different LAN from the devices on the network at the main site.

# Centrally manage video surveillance networks located at different sites

This application lets you centrally manage video surveillance networks that are located at different sites. You do this by using three or more AirBridges in a master-to-satellite, point-to-multipoint setup. Basically, you can extend your network to up to four detached sites.

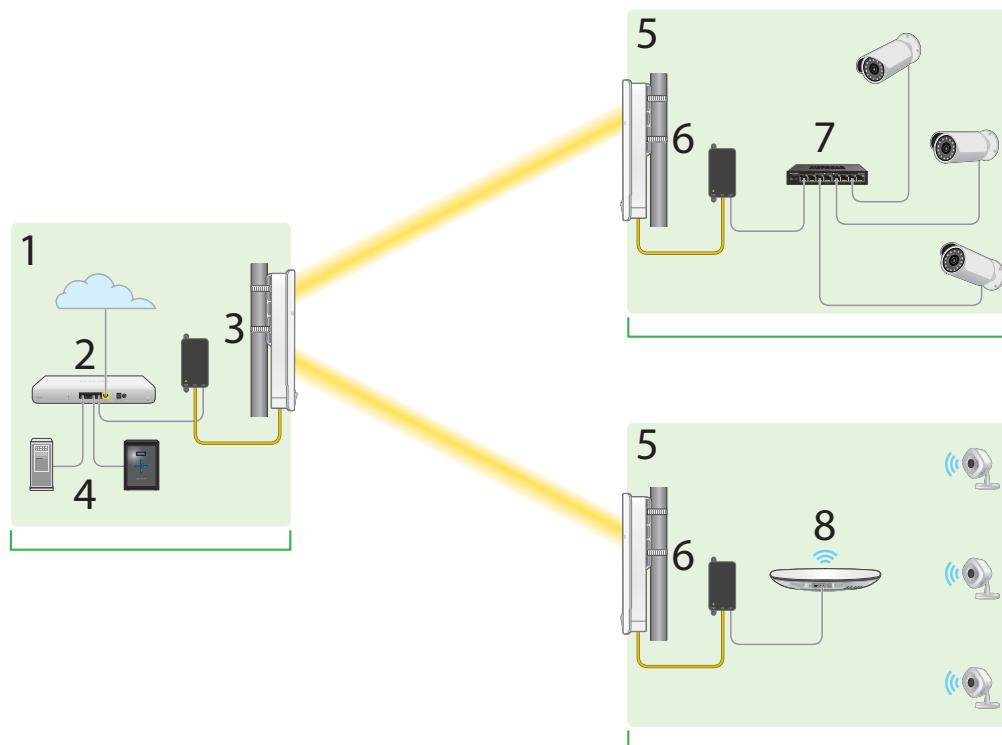


Figure 7. Centrally manage video surveillance networks located at different sites

Number	Device at Main Site	Number	Device at Detached Site
1	Main site	5	Detached site
2	Router with wired Internet connection	6	AirBridge satellite
3	AirBridge master	7	Switch, allowing for multiple wired PTZ camera connections at the detached site
4	Surveillance video and management server and database	8	WiFi access point, allowing for multiple WiFi cameras at the detached site

In the previous figure, the master at the main site can be connected to the Internet through a router and to a surveillance video and management server and database.

At one detached site, a switch is connected to the satellite, allowing you to connect multiple wired security devices such as pan-tilt-zoom (PTZ) cameras. At the other detached site, a WiFi access point is connected to the satellite, allowing you to extend the area of surveillance through WiFi cameras. (When the AirBridge mode is disabled on the satellite, the satellite cannot support individual WiFi clients.)

At each detached site, all cameras are connected over the WiFi connection to the main site, are on the same LAN, and are therefore discoverable and manageable by the surveillance video and management server at the main site.

To centrally manage video surveillance networks located at different sites, complete the following high-level steps:

1. At the main site, configure one AirBridge as a master and enable the AirBridge mode. The master can be connected to the Internet over a wired connection, for example, through a router.
2. Configure up to four other AirBridges as satellites, enable the AirBridge mode on each of them, and establish the WiFi connection for each of them.
3. At each detached site, reestablish the WiFi connection between the satellite and the master.  
The master provides the network connection to each satellite over a long-distance WiFi connection, using the same 5 GHz SSID for each satellite.
4. At each detached site, connect a single or multiple wired devices to the satellite, for example, using a switch.  
The network at each detached site is an extension of the network at the main site, with all devices functioning on the same LAN.

# Provide long-range WiFi service to outdoor clients

This application lets you provide WiFi coverage to WiFi clients at a long range. Because of the powerful antenna of the AirBridge, WiFi clients can connect from a longer range than when they connect to a regular access point.

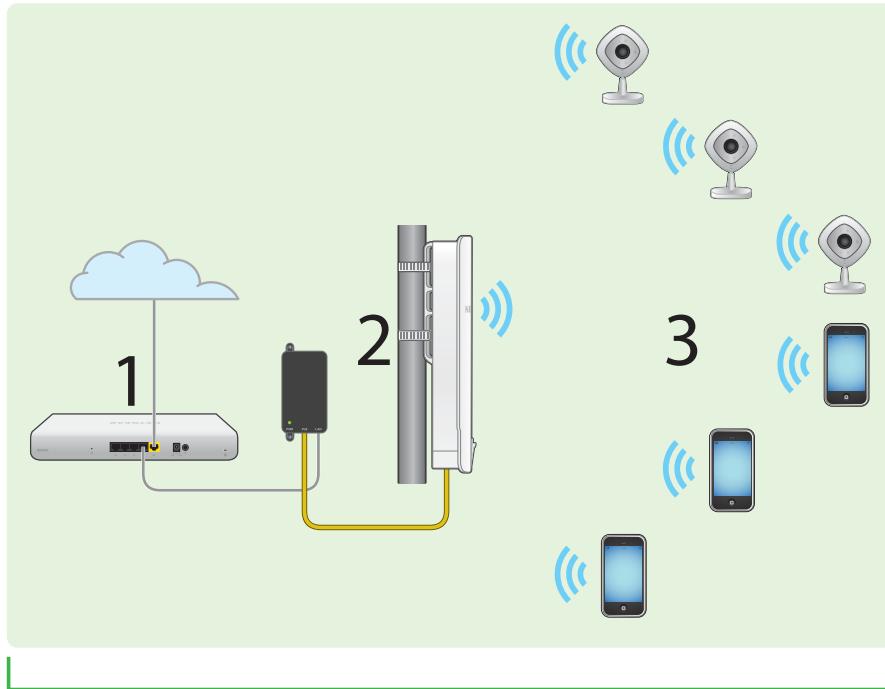


Figure 8. Provide long-range WiFi service to outdoor clients

Number	Device at Main Site	Number	Device at Long Range
1	Router with wired Internet connection	3	WiFi clients at a long range
2	AirBridge access point		

In the previous figure, the access point at the main site is connected to the Internet through a router. The access point broadcasts its WiFi signal over a large area, allowing WiFi clients such as IP cameras and mobile devices to connect to the network and Internet.

An access point configuration is suitable for a facility with an outdoor campus or field where users require network connectivity. You can also use the AirBridge inside as an access point, for example, in a very large conference or exhibition hall.

To provide long-range WiFi service to outdoor clients, complete the following high-level steps:

1. Configure an AirBridge as an access point.
2. Configure up to eight 5 GHz SSIDs to allow different types of WiFi users to connect from a long range.

# Provide a WiFi connection to an outdoor device that is not WiFi-capable

This application lets you extend the network connectivity of any access point (that is, it does not need to be an AirBridge) to an outdoor wired device that is not WiFi-capable. For example, you can connect a security surveillance camera at an entrance or gate to your network by placing an AirBridge configured as a client bridge between the camera and the access point. Because of the powerful antenna of the AirBridge, the camera can connect from a long range.

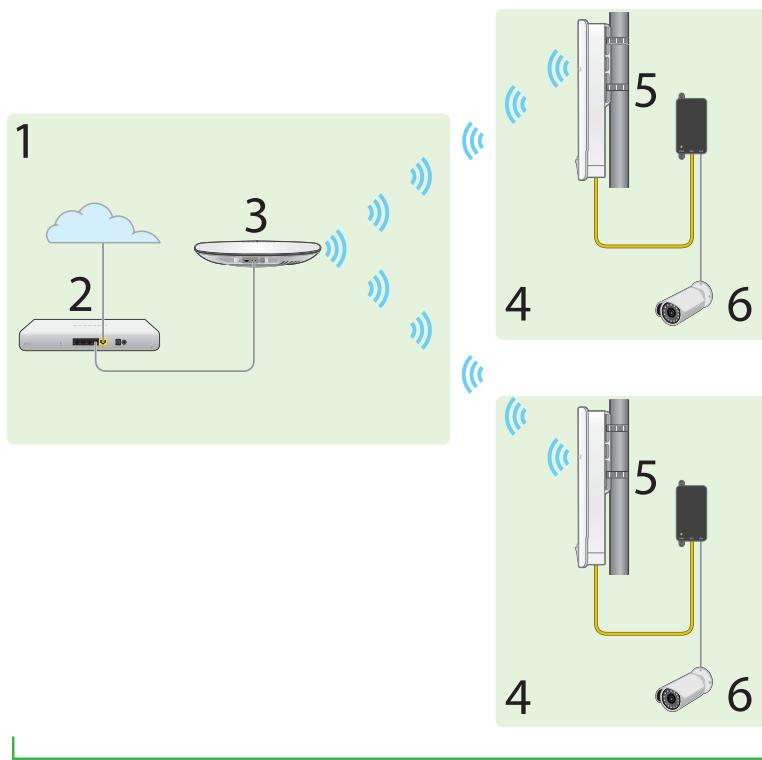


Figure 9. Provide a WiFi connection to an outdoor device that is not WiFi-capable

Number	Device at Main Site	Number	Device at Detached Site
1	Main site	4	Detached site
2	Router with wired Internet connection	5	AirBridge client bridge
3	Any WiFi access point	6	PTZ camera connected to the AirBridge power adapter

In the previous figure, the access point at the main site can be connected to the Internet through a router.

The access point can be an AirBridge that functions as an access point, but can also be any other model access point, including a third-party access point. The access point broadcasts its WiFi signal to detached sites, each one with an AirBridge that functions as a client bridge operation. At each detached site, a single pan-tilt-zoom (PTZ) camera is connected to the AirBridge, so no switch is required at the detached site. You can view the life stream and manage the camera from the main site.

To provide a WiFi connection to an outdoor device that is not WiFi-capable, complete the following high-level steps:

1. Configure an AirBridge as a client bridge.
2. On the AirBridge, configure the same 5 GHz SSID and passphrase that is being broadcast by the access point to which the AirBridge must connect.
3. Place the AirBridge at the detached site and attach a wired device such as a PTZ camera by connecting it directly to the LAN port of the AirBridge power adapter. The camera at the detached site functions on the same LAN as the devices at the main site.

# 4

## Installation

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This chapter describes the installation procedures for the AirBridge. The installation involves the steps described in the following sections:

- Step 1: Determine the site-to-site distance or required coverage area
- Step 2: Prepare the site
- Step 3: Unpack the AirBridge
- Step 4: Set up the WiFi connection between a master and a satellite
- Step 5: Mount the AirBridge
- Step 6: Manage the AirBridge and WiFi network

# Step 1: Determine the site-to-site distance or required coverage area

Before you install an AirBridge as a master at a main site and another AirBridge as a satellite at a detached site, determine the distance between the main site and the detached site. If you plan to use the AirBridge as an access point, determine the coverage area and the number of WiFi clients.

If the master and satellite are placed face to face with a direct line of sight, the antenna coverage area from the master is 40 degrees vertical and 40 degrees horizontal. Place the satellite in this coverage area.

The following figure illustrates the placement and direct line of sight. (The AirBridges and poles are shown oversized.)

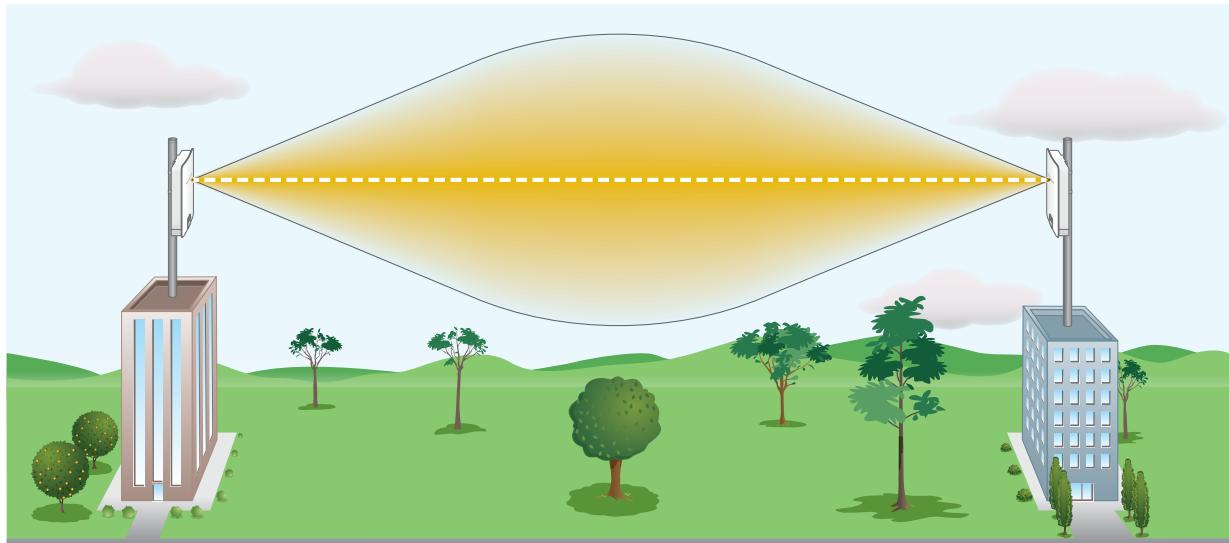


Figure 10. Antenna coverage area with a direct line of sight

In a master-to-satellite setup, you can place the satellite at a distance of 3,000 m (3 km or about 1.8 miles) or more from the master. The supported distance depends on the physical environment, absence of WiFi interference, and other factors.

The horizontal distance from an AirBridge and the vertical coverage area are related, as illustrated in the following figure and table.

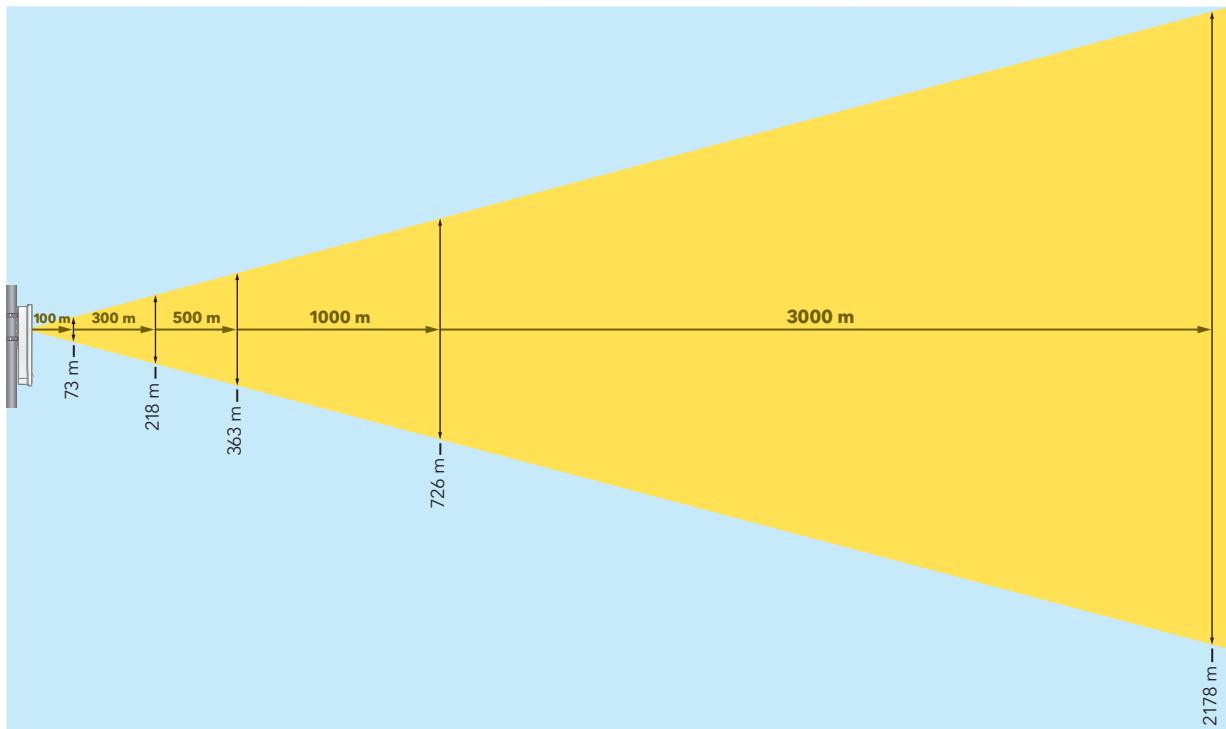


Figure 11. Horizontal distance and vertical coverage area

Horizontal distance from an AirBridge	Vertical coverage area
100 m (328 ft)	73 m (240 ft)
300 m (984 ft)	218 m (715 ft)
500 m (1,640 ft)	363 m (1,257 ft)
1,000 m (3,281 ft)	726 m (2,382 ft)
3,000 m (1.86 mi)	2,178 m (1.35 mi)

After you determine the distance and coverage area, calculate the approximate bandwidth requirements for the satellite, or in a point-to-multipoint setup, for each satellite. Base the physical location of a satellite on those calculations so that the throughput and coverage area are realistic.

You can use the local browser UI to configure the distance, transmit power, and channel mode to achieve optimum coverage and throughput. For more information, see the user manual, which you can download by visiting [netgear.com/support/download/](http://netgear.com/support/download/).

## Step 2: Prepare the site

Before you install the AirBridge, make sure that the installation site or sites meet the requirements.

Table 2. Site requirements

Characteristics	Requirements
Mounting	<p><b>Wall installations.</b> Use the wall mounting screws, anchors, and paper screw placement guide that are provided in the package to mount the AirBridge onto a flat wall.</p> <p><b>Pole installations.</b> Use the pole mounting strap that is provided in the package to mount the AirBridge onto a pole with a diameter of up to 4 inches.</p>
Power source	<p>Use only the power adapter and power cord that are supplied with the AirBridge. Make sure that the AC outlet is not controlled by a wall switch, which can accidentally turn off power to the outlet and the AirBridge.</p> <p>You must provide an Ethernet cable of up to 328 ft (100 m) to connect the power adapter from an inside location to the AirBridge, which you can install either at an inside or outside location.</p>
Cabling	Route cables to avoid sources of electrical noise such as radio transmitters, broadcast amplifiers, power lines, and fluorescent lighting fixtures.
Environmental	<p><b>Temperature AirBridge.</b> Install the AirBridge at a site where the ambient temperature is between -4°F and 140°F (-20°C and 60°C). Keep the AirBridge away from heat sources such as direct sunlight, warm-air exhausts, and hot-air vents.</p> <p><b>Temperature power adapter.</b> The power adapter must be installed inside, <i>not</i> outside. For the power adapter, the ambient temperature must be between 32°F and 104°F (0°C and 40°C).</p> <p><b>Operating humidity AirBridge and power adapter.</b> The maximum relative humidity of the installation locations must not exceed 90 percent, noncondensing.</p>

## Step 3: Unpack the AirBridge



Figure 12. Package contents

Check the contents of the box to make sure that all items are present before testing and installing the AirBridge.

### **To check the package contents:**

1. Place the container on a clean flat surface, and cut all straps securing the container.
2. Unpack the hardware from the boxes by carefully removing the hardware and placing it on a secure and clean surface.
3. Remove all packing material.
4. Verify that the package contains the following items:
  - Insight Instant Wireless AirBridge (model WBC502)
  - Power adapter and power cord (varies by region)
  - Pole mounting strap

- Installation guide
- Wall mounting screws (2), anchors (2), and paper screw placement guide (not shown in the previous figure)

5. If any item is missing or damaged, contact your local NETGEAR reseller for replacement.

## Step 4: Set up the WiFi connection between a master and a satellite

This step refers to a configuration with two AirBridges that function in a master-to-satellite setup.

We recommend that you complete the initial pairing of the AirBridges at a staging area with easy access to the network that is to supply connectivity to the master.

This hardware installation manual describes the hardware setup, *not* the software configuration, which you must perform using one of the following management methods:

- **Local browser UI.** See the user manual, which you can download from [netgear.com/support/download/](http://netgear.com/support/download/).
- **NETGEAR Insight.** Visit [netgear.com/insight](http://netgear.com/insight) and see the NETGEAR knowledge base articles at [netgear.com/support](http://netgear.com/support).

Perform the setup of the WiFi connection in the following order:

- Step 4a: Set up the WiFi connection on the master at the main site
- Step 4b: Set up and establish the WiFi connection on the satellite at the main site
- Step 4c: Reestablish the WiFi connection on the satellite at the detached site

**Note:** You must provide the Ethernet cables that are required for the setup.

### Step 4a: Set up the WiFi connection on the master at the main site

Perform this task on the AirBridge that must function as the master.

#### **To set up the WiFi connection locally on the AirBridge that must function as the master:**

1. Connect an Ethernet cable to the LAN1 (PoE-24V) port on the AirBridge.
2. Connect the other end of the Ethernet cable to the PoE port on the power adapter.

**WARNING:** Power the AirBridge only with an Ethernet cable that is connected from the LAN1 port on the AirBridge to the PoE port on the supplied power adapter. Do not use any other power source such as a PoE switch. The LAN1 port on the AirBridge is not a standard PoE port. Using any other power source could damage the device.

3. Use another Ethernet cable to connect the LAN port on the power adapter to a switch that is connected to your network or directly to your network router.

Your network can provide Internet access to the AirBridge. The master provides a network connection *over the WiFi connection* to the satellite.

4. Insert the plug of the power cable into an outlet.

On the power adapter, the PWR LED lights solid green. On the AirBridge, all the LEDs light and then go off. The Power LED remains solid amber.

5. Connect your computer or mobile device to the same network as the AirBridge.

6. Configure the operation mode of the AirBridge as master and specify the WiFi settings.

For configuration information, see the user manual, which you can download from [netgear.com/support/download/](http://netgear.com/support/download/). To configure a master-to-satellite setup, you can also use NETGEAR Insight. For configuration information, visit [netgear.com/insight](http://netgear.com/insight) and see the NETGEAR knowledge base articles at [netgear.com/support](http://netgear.com/support).

7. When you complete the configuration, disconnect the AirBridge from the network, but leave it powered on.

To prevent a network loop, do not keep the master connected to the network while you locally set up and configure the satellite.

## Step 4b: Set up and establish the WiFi connection on the satellite at the main site

Perform this task on the AirBridge that must function as the satellite.

### **To set up the WiFi connection locally on the AirBridge that must function as the satellite:**

1. Place the AirBridge that must function as the satellite in the same room as the AirBridge that you configured as the master (see [Step 4a: Set up the WiFi connection on the master at the main site](#) on page 36).
2. Connect an Ethernet cable to the LAN1 (PoE-24V) port on the AirBridge that must function as the satellite.
3. Connect the other end of the Ethernet cable to the PoE port on the power adapter.

**WARNING:** Power the AirBridge only with an Ethernet cable that is connected from the LAN1 port on the AirBridge to the PoE port on the supplied power adapter. Do not use any other power source such as a PoE switch. The LAN1 port on the AirBridge is not a standard PoE port. Using any other power source could damage the device.

4. Use another Ethernet cable to connect the LAN port on the power adapter to a switch that is connected to your network.

5. Insert the plug of the power cable into an outlet.

On the power adapter, the PWR LED lights solid green. On the AirBridge, all the LEDs light and then go off. The Power LED remains solid amber.

6. Connect your computer or mobile device to the same network as the AirBridge.

7. Configure the AirBridge:

- a. Configure the operation mode of the AirBridge as satellite.

- b. Configure the same AirBridge mode as on the master.

- c. Specify the WiFi settings.

For configuration information, see the user manual, which you can download from [netgear.com/support/download/](http://netgear.com/support/download/). To configure a master-to-satellite setup, you can also use NETGEAR Insight. For configuration information, visit [netgear.com/insight](http://netgear.com/insight) and see the NETGEAR knowledge base articles at [netgear.com/support](http://netgear.com/support).

8. When you complete the configuration, disconnect the AirBridge that is now configured as the satellite from the network, but leave it powered on.

9. Reconnect the AirBridge that you configured as the master to the network.

Depending on the setup that you configured, the WiFi connection automatically establishes itself between the master and the satellite.

On the satellite, a single signal strength indicator (SSI) LED lights to indicate the quality of the signal for the WiFi connection. Because all AirBridges are in the same room, the right SSI LED lights solid green, indicating a strong WiFi signal.

10. Disconnect the satellite from the network and power it down.

You are now ready to reestablish the WiFi connection at the detached site where you intend to place the satellite.

## Step 4c: Reestablish the WiFi connection on the satellite at the detached site

After you successfully set up a WiFi connection at the main site, perform this task at the detached site on the AirBridge that you configured as the satellite

Before you mount the AirBridge at its permanent location, we recommend that you first test the WiFi connection so that you can determine the location with the strongest signal for the WiFi connection.

### **To reestablish the WiFi connection between the master and satellite:**

1. At the detached site, place the satellite near the location where you intend to mount it permanently.
2. Connect an Ethernet cable to the LAN1 (PoE-24V) port on the satellite.
3. Connect the other end of the Ethernet cable to the PoE port on the power adapter.

**WARNING:** Power the AirBridge only with an Ethernet cable that is connected from the LAN1 port on the AirBridge to the PoE port on the supplied power adapter. Do not use any other power source such as a PoE switch. The LAN1 port on the AirBridge is not a standard PoE port. Using any other power source could damage the device.

4. Insert the plug of the power cable into an outlet.

On the power adapter, the PWR LED lights solid green. On the AirBridge, all the LEDs light and then go off. The Power LED remains solid amber.

The WiFi connection automatically reestablishes itself. The satellite at the detached site is now connected over the WiFi connection to the master at the main site.

On the satellite, a single signal strength indicator (SSI) LED lights to indicate the quality of the signal for the WiFi connection:

- **Right LED solid green.** The signal for the WiFi connection is strong. The left and middle SSI LEDs are off.
- **Middle LED solid amber.** The signal for the WiFi connection is moderately good. The left and right SSI LEDs are off.
- **Left LED solid red.** The signal for the WiFi connection is weak. The middle and right SSI LEDs are off.
- **All SSI LEDs off.** No WiFi connection is established or the signal strength cannot be determined.

5. If the signal strength is weak or moderately good, make sure that you place the AirBridge according to the following guidelines:
  - Place the AirBridge at a higher location.
  - Place the AirBridge in a direct, or near line of sight with the AirBridge at the main site.
  - Align the front panel of the AirBridge with the AirBridge at the main site. The AirBridges at both sites must face each other.
6. Test the network connectivity by doing one of the following:
  - Connect a WiFi client to the satellite.
  - Connect a computer to the LAN2 port on the satellite.

At the detached site, if you can access the network at the main site and the Internet, the WiFi connection functions.

## Step 5: Mount the AirBridge

Before you mount the AirBridge at a permanent location outside, configure your setup at your main test site and test your setup by establishing a WiFi connection at the permanent location (see [Step 4: Set up the WiFi connection between a master and a satellite on page 36](#)).

You can mount the AirBridge on a flat wall or on a pole with a diameter of up to 4 inches (10 cm). It is helpful if the location enables easy access to the AirBridge.

Select the optimal location for the equipment using the following guidelines:

- The higher you place the AirBridge, the better the WiFi link quality.
- For AirBridges, that are installed at different sites, do the following:
  - Provide a direct, or near line of sight between the AirBridges.
  - Align the front panels of the AirBridges so that they face each other.

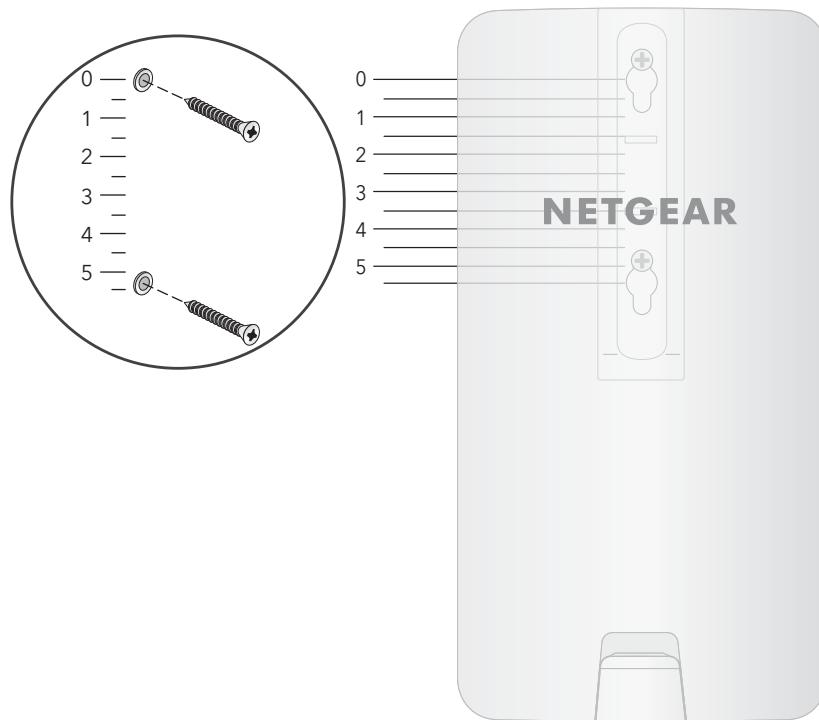
### Mount the AirBridge to a wall

The back panel of the AirBridge provides two holes for wall mounting. The AirBridge package includes two screws, two washers, and a paper screw placement guide.

Make sure that the wall that you select allows the front panel of the AirBridge to face the front panel of the AirBridge at the main site.

**To mount the AirBridge to a wall:**

1. Using screw placement guide, mark the location for the holes on the wall where you want to mount the AirBridge.  
The holes must be 2.13 in. (54 mm) apart, center to center.
2. Drill holes into the wall for the two anchors in which you will insert the M3 x L16 mm screws.  
The screws and anchors are in a plastic bag in the package.



3. Insert the anchors into the wall and tighten the screws with a No. 2 Phillips screwdriver. Leave about  $\frac{1}{4}$  inch (6 mm) of each screw protruding from the wall so that you can insert the screws into the holes on the back panel of the AirBridge.
4. Line up the holes on the back panel of the AirBridge with the screws in the wall and mount the AirBridge to the wall.

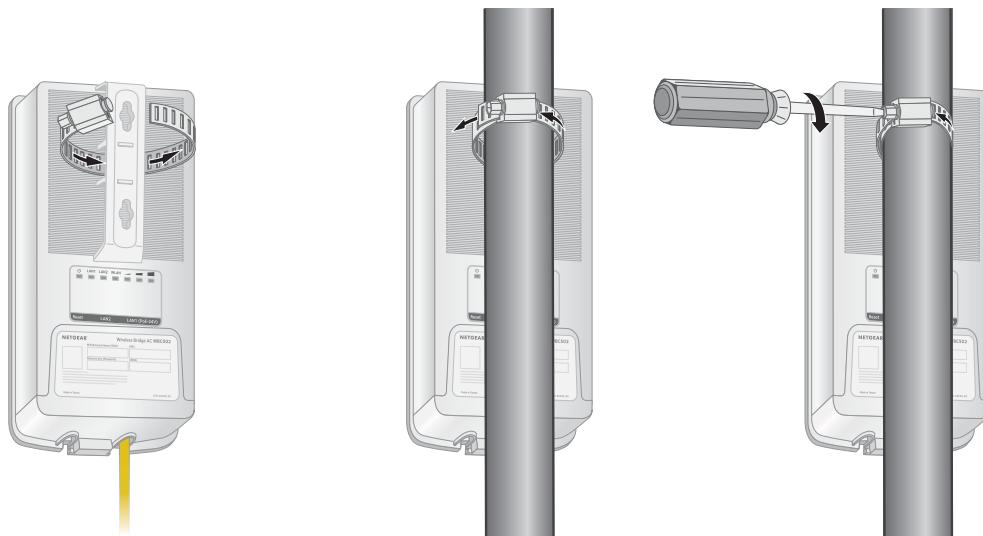
## Mount the AirBridge to a pole

The back panel of the AirBridge provides an opening for the strap for pole mounting. The AirBridge package includes a pole-mounting strap.

**To mount the AirBridge to a pole:**

1. Using a screwdriver, open the supplied pole-mounting strap.

2. Insert the strap through the opening on the back of the AirBridge. The opening is located between the holes on the back panel of the AirBridge.
3. With the strap still open, wrap the strap with the attached AirBridge around the pole.
4. Close the strap but do not tighten it.
5. Move the strap with the AirBridge attached to its permanent position. Make sure that the front panel of the AirBridge faces the front panel of the AirBridge at the main site.
6. Using the screwdriver, tighten the screw to secure the strap and AirBridge to the pole.



## Step 6: Manage the AirBridge and WiFi network

After you complete the initial log-in procedure, you can configure the AirBridge using the local browser UI. After you complete the initial log-in procedure, you can also change the management mode so that you configure the AirBridge in a master-satellite setup using the Insight app, or if you are an Insight Premium or Insight Pro subscriber, the Insight Cloud portal.

For more information about managing the AirBridge using the local browser UI, see the user manual, which you can download from [netgear.com/support/download/](http://netgear.com/support/download/).

For more information about NETGEAR Insight, visit [netgear.com/insight](http://netgear.com/insight) and see the NETGEAR knowledge base articles at [netgear.com/support](http://netgear.com/support).

# 5

## Hardware troubleshooting

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This chapter provides information about hardware troubleshooting the AirBridge.

The chapter includes the following sections:

- Hardware troubleshooting chart
- The satellite at a detached site does not reestablish a WiFi connection with the master

# Hardware troubleshooting chart

The following table lists symptoms, possible causes, and possible solutions for problems that might occur.

Table 3. Troubleshooting chart

Symptom	Possible Cause	Possible Solution
The Power LED and LAN1 LED on the AirBridge are off	Power is not supplied to the AirBridge	<ul style="list-style-type: none"> <li>Check the Ethernet cable connection at the LAN1 port on the AirBridge and the PoE port on the power adapter.</li> <li>Check the cable connection from the power adapter to the electrical outlet and make sure that the outlet is providing power.</li> </ul>
The LAN2 LED on the AirBridge is off although the port is connected to a powered-on device.	The port connection is not working.	<ul style="list-style-type: none"> <li>Check the crimp on the connectors and make sure that the plug is properly inserted and locked into the port at both the AirBridge and the connecting device.</li> <li>Make sure that all cables are used correctly and comply with the Ethernet specifications.</li> <li>Check for a defective port, cable, or module by testing them in an alternate environment where all products are functioning.</li> </ul>
A file transfer is slow or performance is degraded.	One possible cause is that a network loop (redundant path) was created and that a broadcast storm occurred.	Break the loop by making sure that only one path exists from any networked device to any other networked device. After you connect to the AirBridge local browser UI, you can configure the Spanning Tree Protocol (STP) to prevent network loops.
A segment or device at a detached site is not recognized as part of the network.	One or more devices are not properly connected, or cabling does not meet Ethernet guidelines.	<ul style="list-style-type: none"> <li>Verify that the cabling is correct.</li> <li>Make sure that all connectors are securely positioned in the required ports. It is possible that equipment was accidentally disconnected.</li> </ul>
The network is disabled. On a switch that is connected to an AirBridge, the port LEDs for all connected ports might be blinking continuously.	A network loop (redundant path) was created.	Break the loop by making sure that only one path exists from any networked device to any other networked device. After you connect to the AirBridge local browser UI, you can configure the Spanning Tree Protocol (STP) to prevent network loops.

# The satellite at a detached site does not reestablish a WiFi connection with the master

These troubleshooting steps refer to a setup with one AirBridge functioning as master and another as a satellite.

If you successfully establish a WiFi connection between the master and satellite at the main site, then move the satellite to the detached site, but the satellite does not reestablish the WiFi connection with the master, check the following items:

- Does the satellite's front panel face the master's front panel at the main site? If the master and satellite are placed face to face, the antenna coverage area from the master is 40 degrees vertical and 40 degrees horizontal. If necessary, adjust the position of the satellite so that it is in the coverage area of the master.
- Are the satellite and the master placed in a direct line of sight or near line of sight? Tall trees, buildings, walls, and similar objects can interfere with the WiFi connection. If necessary, move the satellite to a higher location so that the satellite and master are in a direct line of sight or near line of sight.
- Is the distance between the satellite and the master too great? For information about distances, see [Step 1: Determine the site-to-site distance or required coverage area on page 32](#).
- Is the satellite connected to a wired network with an Internet connection? If the satellite is connected to a wired network with an Internet connection while the satellite attempts to reestablish a WiFi connection with the master, a network loop can occur. Make sure that the only Internet connection is the one provided through the WiFi connection with the master.

You can use the local browser UI to configure the distance, transmit power, and channel mode to achieve optimum coverage and throughput. For more information, and for software troubleshooting information, see the user manual, which you can download by visiting [netgear.com/support/download/](http://netgear.com/support/download/).