Nortel WLAN Access Point 2332 Series Installation Guide

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Legal information

This section includes the following legal information:

Limited product warranty

The following sections describe the Nortel standard Product Warranty for End Users.

Products

WLAN—Security Switch 2300 Series

WLAN—Access Points 2332 Series

Nortel WLAN Location Engine 2340

Limited warranty

Nortel standard warranty for hardware is one (1) year. Nortel warrants software materials to be defect free for 90 Days from time of purchase. Nortel requires purchasing the software subscription if a customer would like to receive new WLAN—Security Switch 2300 Series, Nortel WLAN — Management System software. This limited warranty extends only to you the original purchaser of the Product.

Exclusive remedy

Your sole remedy under the limited warranty described above is, at Nortel's sole option and expense, the repair or replacement of the non-conforming Product or refund of the purchase price of the non-conforming Products. Nortel's obligation under this limited warranty is subject to compliance with Nortel's then-current Return Material Authorization ("RMA") procedures. All replaced Products will become the property of Nortel. Exchange Products not returned to Nortel will be invoiced at full Product list prices. Replacement Products may be new, reconditioned or contain refurbished materials. In connection with any warranty services hereunder, Nortel may in its sole discretion modify the Product at no cost to you to improve its reliability or performance.

Warranty claim procedures

Should a Product fail to conform to the limited warranty during the applicable warranty period as described above, Nortel must be notified during the applicable warranty period in order to have any obligation under the limited warranty.

The End Customer or their designated reseller must obtain a Return Material Authorization number (RMA number) from Nortel for the non-conforming Product and the non-conforming Product must be returned to Nortel according to the then-current RMA procedures. The End Customer or their designated reseller is responsible to ensure that the shipments are insured, with the transportation charges prepaid and that the RMA number is clearly marked on the outside of the package. Nortel will not accept collect shipments or those returned without an RMA number clearly visible on the outside of the package.

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Nortel shall not be responsible for any software, firmware, information or memory data contained in, stored on or integrated with any Product returned to Nortel pursuant to any warranty or repair.

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Regulatory Compliance Statements for WLAN Access Point 2332 Series

Federal Communications Commission (FCC) Compliance Notices

This section includes the following FCC statements for the WLAN Access Point 2332 Series:

- Class B Interference Statement
- RF Radiation Exposure & Hazard Warning
- Non-Modification Statement
- Deployment Statement

Class B Interference Statement

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

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

FCC Caution:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

RF Radiation Exposure & Hazard Statement

To ensure compliance with FCC RF exposure requirements, this device must be installed in a location such that the antenna of the device will be greater than 20 cm (8 in.) away from all persons. Using higher gain antennas and types of antennas not covered under the FCC certification of this product is not allowed. Installers of the radio and end users of the product must adhere to the installation instructions provided in this manual.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Non-Modification Statement

Use only the supplied internal antenna, or external antennas supplied by the manufacturer. Unauthorized antennas, modifications, or attachments could damage the WLAN Access Point 2332 Series and violate FCC regulations. Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. Contact Nortel for a list of approved 2.4 GHz and 5.0 GHz external antennas.

This device must be operated with the CAT-5 Ethernet cable installed on each activated AP 2332 Series Ethernet Port to ensure compliance with the Class B emissions standards. Failure to comply with this installation requirement may cause the device to operate in excess of the allowable emissions limits.

Deployment Statement

This product is certified for indoor deployment only. **Do not** install or use this product outdoors.

Dynamic Frequency Selection (DFS) in the 5.0 GHz UNII bands

The 2332 Series access point has been prohibited, via software, from operating in the 5250 to 5350 MHz and 5470 to 5725 MHz frequency bands for the US and Canada because it cannot meet the DFS requirements as outlined in the rules of the FCC for Part 15, Subpart E that come into force on July 20, 2007.

The 2332 Series and 2332 Series access points will not be marketed or sold in the US and Canada after July 20, 2007 because they are not compliant with the FCC Part 15, Subpart E rules.

Canadian IC Statement

Operation is subject to the following two conditions in Canada:

> 1) this device may not cause interference, and

> 2) this device must accept any interference, including interference that may cause undesired operation of the device

To prevent radio interference to the licensed service (i.e. co-channel Mobile Satellite systems) this device is intended to be operated indoors and away from windows to provide maximum shielding. Equipment (or its transmit antenna) that is installed outdoors is subject to licensing and not supported by the WLAN Access Point 2332 Series.

Because high power radars are allocated as primary users (meaning they have priority) in the 5250-5350 MHz band, these radars could cause interference and/or damage to license exempt WLAN devices.

European Union and European Free Trade Association (EFTA) Regulatory Compliance

This equipment may be operated in the countries that comprise the member countries of the European Union and the European Free Trade Association. These countries, listed in the following paragraph, are referred to as The European Community throughout this document:

AUSTRIA, BELGIUM, BULGARIA, CYPRUS, CZECH REPUBLIC, DENMARK, ESTONIA, FINLAND, FRANCE, GERMANY, GREECE, HUNGARY, IRELAND, ITALY, LATVIA, LITHUANIA, LUXEMBOURG, MALTA, NETHERLANDS, POLAND, PORTUGAL, ROMANIA, SLOVAKIA, SLOVENIA, SPAIN, SWEDEN, UNITED KINGDOM, ICELAND, LICHTENSTEIN, NORWAY, SWITZERLAND

The WLAN Access Point 2332 Series communicates with a Nortel Networks WLAN - Security Switch using a standard CAT-5 (Category 5) or higher 10/100 Mbps twisted pair Ethernet cable to provide wireless local area networking (WLAN) capabilities. The WLAN Access Point 2332 Series includes one 802.11a and one 802.11b/g radio and two 802.11a and two 802.11b/g omnidirectional internal antennas. In addition, the 2332 Series access point can use optional factory-supplied external omnidirectional and/or directional high-gain antennas, one per the 802.11b/g and one per the 802.11a radios, as described in the external antenna section of the WLAN Access Point 2332 Series Installation Guide. When using the external antennas, connect them to the reverse-polarity R-SMA connectors located on the side of the WLAN Access Point 2332 Series.

Declaration of Conformity

Marking by this symbol

indicates compliance with the Essential Requirements of the R&TTE Directive of the European Union (1999/5/EC). This equipment meets the following conformance standards:

Safety: EN 60950-1:2001 + A11:2004

EMC: EN 55022:1998 + A1:2000, EN 55024:1998 + A1:2001 + A2:2003, EN301489-1 V.1.4.1, EN 301489-17 v1.2.1, CISPR22:1997, CISPR24

> Including: EN 61000-3-2, -3-3, -4-2, -4-3, -4-4, -4-5, -4-6 and -4-11. The product is also licensed as required for additional country specific standards as required for the International Marketplace.

Radio: EN 300-328 v.1.6.1 (2004-11) & EN 301-893 v.1.2.3 (2003-08)

> Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques and Broadband Radio Access Networks (BRAN); 5 GHz high performance RLAN. Certifications are harmonized to the EN standards covering essential requirements under article 3.2 of the R&TTE Directive. Compliance includes testing with antennas as specified in attached table.

SAR: EN 50385:2002

European Community Declaration of Conformity

Bulgaria	български С това, nortel обявява, че този модел на радио на WLAN на 2332 Series, е със съгласие с съществените изисквания и други важни условия на директива 1999/5 на европейски съюз
Czech Republic	Èesky Norteltímto prohlašuje, že tento WLAN Radio Model 2332 Series, je ve shodì se základními požadavky a dalšími pøíslušnými ustanoveními smìrnice 1999/5/ES.
Denmark	Dansk Undertegnede Nortelerklærer herved, at følgende udstyr WLAN Radio Model 2332 Series, overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.
English	English Hereby, Nortel declares that this WLAN Radio Model 2332 Series, is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
Estonia	Eesti Käesolevaga kinnitab Nortelseadme WLAN Radio Model 2332 Series, vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
Finland	Suomi Nortelvakuuttaa täten että WLAN Radio Model 2332 Series, tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.

France	Français
	Par la présente Norteldéclare que l'appareil WLAN Radio Model 2332 Series, est conforme aux exigencies essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.
Germany	Deutsch
	Hiermit erklärt Nortel., dass sich das Gerät WLAN Radio Model 2332 Series, in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 1999/5/EG befindet.
Greece	ΕΛΛΗΝΙΚΗ
	ÌÅ ÔÇÍ ÐÁÑÏÕÓÁ Nortel. ÇË.ÍÅÉ ÏÔÉ WLAN Radio Model 2332 Series, ÓÕÌÌÏÑÖÏ.ÍÅÔÁÉ ÐÑÏÓ ÔÉÓ ÏÕÓÉ..ÅÉÓ ÁÐÁÉÔÇÓÅÉÓ ÊÁÉ ÔÉÓ ËÏÉÐÅÓ Ó×ÅÔÉÊÅÓ .ÉÁÔÁÎÅÉÓ ÔÇÓ Ï.ÇÃÉÁÓ 1999/5/ÅÊ.
Hungary	Magyar
	Alulírott, Nortelnyilatkozom, hogy a WLAN Radio Model 2332 Series, megfelel a vonatkozó alapvetõ követelményeknek és az 1999/5/EC irányelv egyéb elõírásainak.
Italy	Italiano
	Con la presente Norteldichiara che questo WLAN Radio Model 2332 Series, è conforme ai requisiti essenziali ed alle alter disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.
Latvia	Latviski
	Ar šo Norteldeklarç, ka WLAN Radio Model 2332 Series, atbilst Direktîvas 1999/5/EK bûtiskajâm prasîbâm un citiem ar to saistîtajiem noteikumiem.
Lithuania	Lietuviø
	Šiuo Norteldeklaruoja, kad šis WLAN Radio Model 2332 Series, atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.
Malta	Malti
	Hawnhekk, Nortel., jiddikjara li dan WLAN Radio Model 2332 Series, jikkonforma mal-tiijiet essenzjali u ma provvedimenti orajn relevanti li hemm fid-Dirrettiva 1999/5/EC.
Netherlands	Netherlands
	Hierbij verklaart Norteldat het toestel WLAN Radio Model 2332 Series, in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.

Poland	Polski
	Niniejszym Nortelooewiadcza, ¿e WLAN Radio Model 2332 Series, jest zgodny z zasadniczymi wymogami oraz pozosta³ymi stosownymi postanowieniami Dyrektywy 1999/5/EC.
Portugal	Português
	Norteldeclara que este WLAN Radio Model 2332 Series, está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.
Romania	Român
	Astfel, Nortel declarã acel acest WLAN Radio Model 2332 Series, este în conformitate cu cerinþele necesare ºi proviziile alte semnificative de Directive 1999 5 EC.
Slovakia	Slovensky
	Norteltýmto vyhlasuje, že WLAN Radio Model 2332 Series spåòa základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.
Slovenia	Slovensko
	Nortelizjavlja, da je ta WLAN Radio Model 2332 Series, v skladu z bistvenimi zahtevami in ostalimi relevantnimi doloèili directive 1999/5/ES.
Spain	Español
	Por medio de la presente Norteldeclara que el WLAN Radio Model 2332 Series, cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.
Sweden	Svenska
	Härmed intygar Nortelatt denna WLAN Radio Model 2332 Series, står I överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

Countries of Operation & Restrictions of Use in the European Community

Operation Using the 2.400 to 2.4835 GHz Channels in the European Community

The professional installer should use the configuration utility provided with this product to verify the current channel of operation, the expected transmit power level, and to confirm that the device is operating in conformance with the spectrum usage rules for the selected European Community country. **If operation is occurring outside of the allowable channels as indicated in this guide, then operation of the product must cease immediately** and the installer must consult with the local technical support staff responsible for the wireless network.

This device is intended to be operated in all countries of the European Community. Additional restrictions of use for the 2332 Series access point within the European Community countries in the 2.400 to 2.4835 GHz band are listed below.

- The frequencies associated with channels 1 to 13 in the 2.400 to 2.4835 GHz band are allowed to be used either indoors or outdoors in all countries of the European Community, except where noted below:

- In **Greece**, **Italy**, **Latvia**, and **Spain** the end-user must apply for a license from the national spectrum authority to operate this device outdoors. Please consult the Nortel WLAN 2300 Series Outdoor Solutions Guide for further information regarding restrictions and operating conditions for outdoor configurations.

- In **France**, the following operation is permitted:

  — Outdoor operation is **only** permitted using the 2.400 - 2.454 GHz band, which includes channels 1 to 7, at a maximum EIRP of 100 mW (20 dBm).

  — Outdoor operation is permitted in the 2.400 to 2.4835 GHz band on channels 1 to 13 at a maximum EIRP of 10 mW (10 dBm).

  — Indoor operation is permitted in the 2.400 to 2.4835 GHz band on channels 1 to 13 at a maximum EIRP of 100 mW (20 dBm).

  The 2332 Series, whether using the internal or approved external antennas, is guaranteed to meet this limit by automatically adjusting the transmit power level through the operating software depending upon the gain of the selected antenna.

Operation Using the 5.15 to 5.25 GHz, 5.25 to 5.35 GHz, and 5.470 to 5.725 GHz Channels in the European Community

To remain in conformance with European National spectrum usage laws, follow the channel limitations associated with the 5 GHz bands as specified in this document. The professional installer should verify the current channel of operation and the expected transmit power level of the WLAN Access Point 2332 Series to confirm that the device is operating in conformance with the spectrum usage rules for the European Community country where the unit is being installed. **If operation is occurring outside of the allowable frequencies or above the power levels, as indicated in this guide, then operation of the product must cease immediately** and the installer must consult with the local technical support staff responsible for the wireless network.

This device is intended to be operated in all countries of the European Community. Additional restrictions of use for the 2332 Series access point within the European Community countries in the 5.15 to 5.25 GHz, 5.25 to 5.35 GHz, and 5.470 to 5.725 GHz bands are listed below.

- This device is restricted to **indoor** use only when operated in the European Community using the 5.15-5.25 GHz and 5.25-5.35 GHz bands, which includes channels 36, 40, 44, 48, 52, 56, 60 & 64.

- The **5 GHz Turbo Mode** feature is not allowed for operation in any European Community country.

- In **France**, operation is restricted to the 5.15 to 5.25 GHz band. No operation is permitted in either the 5.25 to 5.35 GHz or 5.470 to 5.725 GHz bands because the device is noncompliant with the DFS requirements stated in EN 301-893 v1.3.1.

- In **Italy** and **Latvia** the end-user must apply for a license from the national spectrum authority to operate this device outdoors. Please consult the Nortel WLAN 2300 Series Outdoor Solutions Guide for further information regarding restrictions and operating conditions for outdoor configurations.

Dynamic Frequency Selection (DFS)

This device implements a DFS feature in accordance with the limits in EN 301-893v1.2.3, Section 4.6 and Annex D, Tables D.1, D.2 & D.4 for a device operating in the mode defined as "Master". Section 4.6, Tables 6 and 7 of this document define the requirements prior to using a channel and during normal operation for a Master device (i.e., Interference Detection Threshold, Channel Availability Check Time, Uniform Spreading, Channel Closing Transmission Time and Channel Move Time). This product qualifies for this category since the maximum achievable transmit power is greater than 23 dBm per the requirements of Table D.2 in Annex D of the standard.

IEEE 802.11a operation in the 5250 to 5350 MHz and 5470 to 5725 MHz frequency bands is governed by ETSI EN 301-893v1.2.3 and the R&TTE Directive 1999/5/EC. Effective March 31, 2008, EN 301-893 v1.2.3 will be replaced by EN 301-893v1.3.1. The 2332 Series access point will meet compliance with EN 301-893v1.3.1 by disabling operation, via software, in the 5250 to 5350 MHz and 5470 to 5725 MHz frequency bands because it cannot meet the DFS requirements as outlined in EN 301-893v1.3.1.

Transmit Power Control (TPC)

European Regulatory requirements specify that wireless devices must employ Transmit Power Control (TPC) to reduce the potential for interference to other communication systems operating in the 5 GHz frequency bands. This device includes a provision for adjustment of Transmit Power in accordance with the limits in EN 301-893v1.2.3, Sections 4.3.1 and 4.3.2.

Korea MIC Compliance Statement.

당해 무선설비는 운영 중 전파혼신 가능성이 있음

Possible radio wave interference during operation of concerned radio equipment.

Taiwan Compliance Statement

低功率電波輻射性電機管理辦法
第 十 二 條
經型式認證合格之低功率射頻電機，非經許可，公司、商號或
使用者均不得擅自變更頻率、加大功率或變更原設計之特性及
功能。
第 十 四 條
低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經
發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續
使用。
前項合法通信，指依電信法規定作業之無線電通信。
低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻
射性電機設備之干擾。

Administrative Rules for Low-power Radio-Frequency Devices

Article 12

For those low-power radio-frequency devices that have already received a type-approval, companies, business units or users should not change its frequencies, increase its power or change its original features and functions.

Article 14

The operation of the low-power radio-frequency devices is subject to the conditions that no harmful interference is caused to aviation safety and authorized radio station; and if interference is caused, the user must stop operating the device immediately and can't re-operate it until the harmful interference is clear.

The authorized radio station means a radio-communication service operating in accordance with COMMUNICATION ACT.

The operation of the low-power radio-frequency devices is subject to the interference caused by the operation of an authorized radio station, by another intentional or unintentional radiator, by industrial, scientific and medical (ISM) equipment, or by an incidental radiator.

5GHz warning statement

本設備限於室內使用

This equipment is limited to indoor use.

External Antenna Statement

Intentional radiators, such as the Nortel WLAN Access Point 2332 Series are not intended to be operated with any antenna(s) other than those furnished by Nortel. An intentional radiator may only be operated with the antenna(s) with which it is authorized. For a complete listing of the authorized antennas for use with this product, visit

http://www.nortel.com/support

In order to ensure continued compliance, use of an antenna not on the Nortel approved antenna list is not allowed without specific authorization from Nortel. For additional questions or inquiries regarding specific antennas, contact Nortel at 1-800-4NORTEL (1-800-466-7835), and use express routing code (ERC) 1572.

Use of an antenna not specifically authorized by Nortel may not comply with local regulatory requirements with respect to radiated emission limits and may result in illegal operation of the product. The installer of the wireless system and associated antenna is required to ensure that only those antennas on the Nortel approved antenna list or those antennas specifically approved by Nortel on a case by case basis are deployed with the intentional radiator.

Be sure to associate the appropriate antenna model number and localized regulatory region when selecting the Nortel authorized antenna(s).

Country Specific External Antenna Restrictions

The following list of countries cannot use the Nortel approved antennas listed in the table. Use of these antennas would violate the local regulatory rules and approved certifications for that country or operation is not allowed in the specified frequency bands.

Country	2.4 GHz	5.0 GHz
Costa Rica		ALL antenna models
Indonesia		ALL antenna models
Japan	S2403BHN36RSM S2403BPXN36RSM	S51514WPN36RSM
	S2406PN36RSM	
	S241290PN36RSM	
	SR24120DN36RSM	
Korea	S2406PN36RSM	S51514WPN36RSM
	S2409PN36RSM	
	PC2415NA36RSM	
	S241290PN36RSM	
	SR24120DN36RSM	
Nigeria		ALL antenna models
Russian Federation		ALL antenna models
Thailand		ALL antenna models

Contents

How to get help

This section explains how to get help for Nortel products and services.

Getting help from the Nortel web site

The best way to get technical support for Nortel products is from the Nortel Technical Support Web site:

http://www.nortel.com/support

This site provides quick access to software, documentation, bulletins, and tools to address issues with Nortel products. More specifically, the site enables you to:

- download software, documentation, and product bulletins
- search the Technical Support Web site and the Nortel Knowledge Base for answers to technical issues
- sign up for automatic notification of new software and documentation for Nortel equipment
- open and manage technical support cases

Getting help over the phone from a Nortel solutions center

If you don't find the information you require on the Nortel Technical Support Web site, and have a Nortel support contract, you can also get help over the phone from a Nortel Solutions Center.

In North America, call 1-800-4NORTEL (1-800-466-7835).

Outside North America, go to the following Web site to obtain the phone number for your region:

http://www.nortel.com/callus

Getting help from a specialist by using an express routing code

To access some Nortel Technical Solutions Centers, you can use an Express Routing Code (ERC) to quickly route your call to a specialist in your Nortel product or service. To locate the ERC for your product or service, go to:

http://www.nortel.com/erc

Getting help through a Nortel distributor or reseller

If you purchased a service contract for your Nortel product from a distributor or authorized reseller, contact the technical support staff for that distributor or reseller.

Introducing the Nortel WLAN 2332 Series System

This guide shows you how to install a Nortel Access Point (AP) in a Nortel WLAN 2332 Series System.

Read this guide if you are a network administrator or other person installing an AP in a network.

> **Note.** The 2332-A1 is for use in the US & Canada and the 2332-E1 is for use in the EU countries.

Nortel WLAN 2332 Series system

The Nortel WLAN 2332 Series System is an enterprise-class WLAN solution that seamlessly integrates with an existing wired enterprise network. The Nortel system provides secure connectivity to both wireless and wired users in large environments such as office buildings, hospitals, and university campuses.

The Nortel WLAN 2332 Series System fulfills the three fundamental requirements of an enterprise WLAN: It eliminates the distinction between wired and wireless networks, allows users to work safely from anywhere (*secure mobility*), and provides a comprehensive suite of intuitive tools for planning and managing the network before and after deployment, greatly easing the operational burden on IT resources.

The Nortel WLAN 2332 Series System consists of the following components:

* **WLAN Management Software tool suite**—A full-featured graphical user interface (GUI) client application used to plan, configure, and deploy a WLAN and manage the users. It also provides a centralized service application for the WLAN to allow for user monitoring, reporting, and diagnostics

* **One or more WLAN—Security Switches (WSSs)** —Distributed, intelligent machines for managing user connectivity, connecting and powering Access Points (APs), and connecting the WLAN to the wired network backbone

* **Multiple Access Point (AP)** —Wireless access points that transmit and receive radio frequency (RF) signals to and from wireless users and connect them to a WSS

* **WLAN 2300 System Software (WSS Software)**—The operating system that controls all WSSs and APs in a WLAN. It is accessible through a command-line interface (CLI), or the WLAN Management Software GUI

Documentation

Consult the following documents to plan, install, configure, and manage a Nortel WLAN 2332 Series System.

Planning, configuration, and deployment

Nortel WLAN Management Software 2332 Series User Guide: This document provides instructions for planning, configuring, deploying, and managing the entire WLAN with the WLAN Management Software tool suite. Read this guide to learn how to plan wireless services, how to configure and deploy Nortel equipment to provide those services, and how to optimize and manage your WLAN.

Nortel WLAN Management Software 2300 Series Reference Guide: Detailed instructions and information for all WLAN Management Software planning, configuration, and management features.

Installation

- *Nortel WLAN Security Switch 2300 Series Quick Start Guide:* Instructions for performing basic setup of secure (802.1X) and guest (Web AAA) access, for configuring a Mobility Domain for roaming, and for accessing a sample network plan in the WLAN Management Software for advanced configuration and management

- *Nortel WLAN—Security Switch 2300 Series Installation and Basic Configuration Guide*: Instructions and specifications for installing a WSS in a Nortel WLAN 2332 Series System, and basic instructions for deploying a secure IEEE 802.11 wireless service

- *Nortel WLAN—Access Point 2332 Installation Guide*: Instructions and specifications for installing an AP and connecting it to a WSS

Configuration and management

- *Nortel WLAN Management System 2300 Series Reference Guide*: Instructions for planning, configuring, deploying, and managing the entire WLAN with the WLAN Management Software tool suite

- *Nortel WLAN—Security Switch 2332 Series Configuration Guide*: Instructions for configuring and managing the system through the WSS Software CLI

- *Nortel WLAN—Security Switch 2300 Series Command Line Reference:* Functional and alphabetical reference to all WSS Software commands supported on WSSs and APs

Safety and advisory notices

The following kinds of safety and advisory notices appear in this manual. (For translations of the warning conventions and of all warnings in this manual, see Appendix , "Translated caution statement, warning conventions and warning messages," on page 113.)

Caution! This situation or condition can lead to data loss or damage to the product or other property.

Warning! This situation or condition can cause injury.

Warning! High voltage. This situation or condition can cause injury due to electric shock.

Note. This information is of special interest.

Text and syntax conventions

Nortel manuals use the following text and syntax conventions:

Convention	Use
Monospace text	Sets off command syntax or sample commands and system responses.
Bold text	Highlights commands that you enter or items you select.
Italic text	Designates command variables that you replace with appropriate values, or highlights publication titles or words requiring special emphasis.
Menu Name > Command	Indicates a menu item that you select. For example, **File > New** indicates that you select **New** from the File menu.
[ ] (square brackets)	Enclose optional parameters in command syntax.
{ } (curly brackets)	Enclose mandatory parameters in command syntax.
| (vertical bar)	Separates mutually exclusive options in command syntax.

AP overview

A Nortel Access Point (AP) provides IEEE 802.11 wireless access to the network. APs are designed for use with a Nortel WLAN—Security Switch (WSS). APs require hardware installation only. All configuration for an AP takes place on the WSS.

The WLAN Access Point 2332 Series (2332-E1 and 2332-A1) communicate with a Nortel Networks WLAN - Security Switch using a standard CAT-5 (Category 5) or higher 10/100 Mbps twisted pair Ethernet cable to provide wireless local area networking capabilities. The WLAN Access Point 2332 Series includes one 802.11a and one 802.11b/g radio and two 802.11a and two 802.11b/g omnidirectional internal antennas. In addition, the 2332 Series access points can use optional factory-supplied external omnidirectional and/or directional high-gain antennas, one per the 802.11b/g and one per the 802.11a radios, as described in the external antenna section of this document.

When using the external antennas, connect them to the reverse-polarity R-SMA connectors located on the side of the WLAN Access Point 2332 Series model.

⚠ **Warning!** Installation must be performed by qualified service personnel only. Read and follow all warning notices and instructions marked on the product or included in the documentation. (For translations of this warning, see "Qualified service personnel warning" on page 115.)

External hardware features

Figure 1 and Figure 2 show the external hardware features of the 2332.
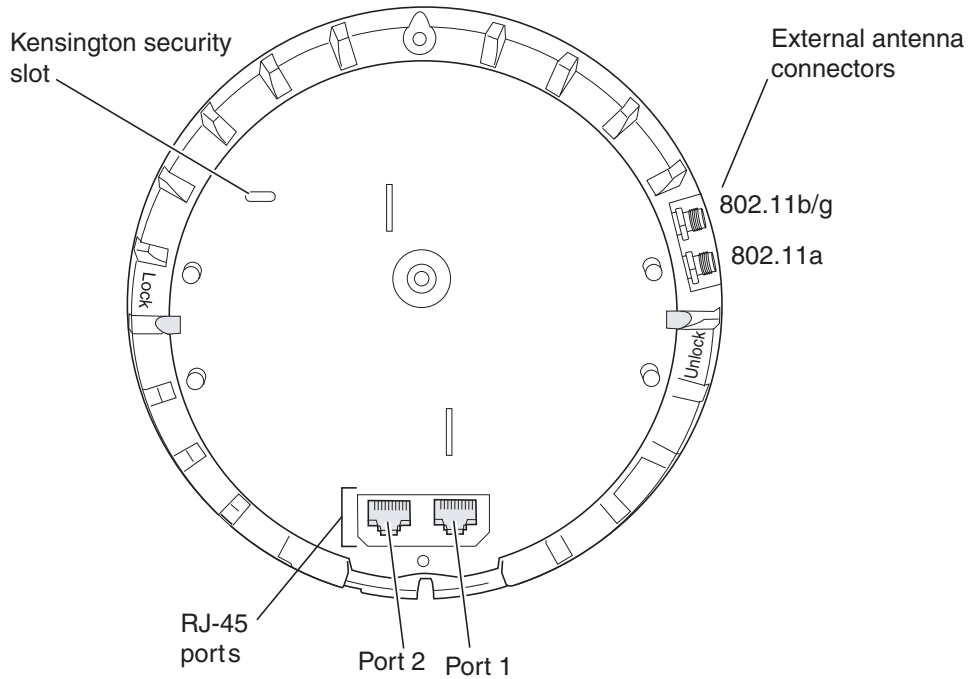
Figure 1.   AP Model —Top View

Diameter
16.76 cm
(6.6 inches)

Height
6.10 cm
(2.4 inches)

840-9502-0040
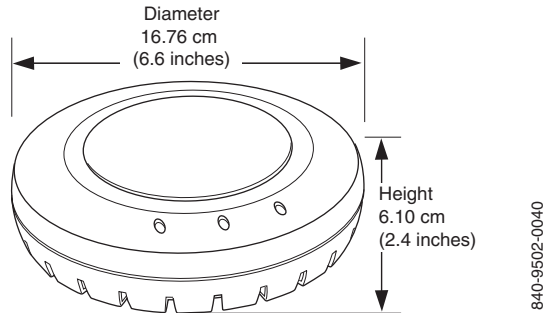
Figure 2.   AP Model 2332 Series—Bottom View

Kensington security
slot

External antenna
connectors

802.11b/g

802.11a

Lock

Unlock

840-9502-0007

RJ-45
ports

Port 2   Port 1

Cable ports

The 2332 Series has two RJ-45 ports. (Figure 2 on page 26.) Each port provides a 10/100BASE-TX Ethernet connection to an WSS. The connection can be direct to an WSS or indirect through an intermediate Layer 2 or Layer 3 network.

The AP receives power and data through the RJ-45 ports. Use a Category 5 (Cat 5) cable with straight-through signaling and standard RJ-45 connectors to connect an AP to an WSS or other device in the network. The 2332 Series supports 802.3af, and also can receive PoE from Nortel switches and Nortel-approved power injectors.

The two RJ-45 ports support dual-homed configurations for redundancy. An AP uses only one link for booting, configuration, and data transfer. If the link becomes unavailable, the AP can reboot using the other link. The ports are identical except for logical numbering (1 or 2). You can use either port to connect an AP to an WSS. However, an AP always attempts to boot on AP port 1 first. Only if the boot attempt on port 1 fails does the AP attempt to boot on port 2. If one port become s unavailable, the other port can provide full power to the AP.

➡ **Warning!** APs do not support daisy-chain configurations. Do not connect the 2332 Series to another 2332 Series through the second RJ-45 port.

Kensington security slot

Models 2332 Series2332 Serieshave a slot to attach a Kensington security cable. The cable is not included with the 2332 Series.

AP mounting options

You can mount an AP access point on any of the following types of surfaces:

• Suspended T-bar ceiling
• Junction box
• Solid surface wall or ceiling

➡ **Note.** The solid surface mounting option requires Cat-5 cable that does not have strain relief. The other mounting options can use Cat-5 cable with or without strain relief.

Status LEDs

The AP has LEDs that provide status information of the device. Figure 3 shows the locations of the LEDs. Table 1 describes the LEDs.

Figure 3.   Health and Radio LEDs—2332 Series

Radio 2 LED   Radio 1 LED

Health LED

840-9502-0010
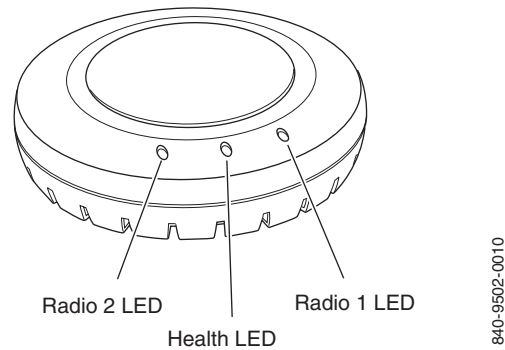
Table 1: Access Point LEDs—2332 Series

LED	Appearance	Meaning
Health	Solid green	All the following are true: • Management link with a WSS is operational. • AP has booted. • AP has received a valid configuration from a WSS. • At least one radio is enabled or is in sentry mode.
	Solid amber	AP is waiting to receive boot instructions and a configuration file from a WSS.
	Alternating green and amber	AP is booting and receiving its configuration file from a WSS.
Radio 1 Radio 2	Solid green	A client is associated with the radio.
	Blinking green	Associated client is sending or receiving traffic.
	Blinking amber	Non-associated client is sending or receiving traffic.
	Alternating green and amber	Radio is unable to transmit. This state can occur due to any of the following: • Excessive radio interference in the environment is preventing the radio from sending beacons. • The radio has failed.
	Unlit	Means one of the following: • Radio is disabled. • Radio is enabled, but no clients are associated with the radio and there is no traffic activity.

Installing and connecting an 2332 Series

> **→** **Note.** Before installing an AP, you might need to generate a network plan and an AP work order with WLAN Management Software . (See "WLAN Management software network plan and work orders" on page 32.)

Unpacking an AP

The shipping carton for an AP contains the following items:

- One AP
- Mounting kit:
  - One universal mounting bracket (attached to the AP)
  - One paper mounting template (used for marking the cutting areas and screw hole locations)
  - One two-piece 14.2-mm (9/16-inch) T-bar clamp
  - One two-piece 15.9-mm (5/8-inch) T-bar clamp
  - One two-piece 23.9-mm (15/16-inch) T-bar clamp
  - Two #6 sheet metal screws and two drywall anchors
  - Three adhesive rubber feet
- One documentation pack that includes the following documents:
  - Nortel WLAN▬Access Point 2332 Series Quick Installation Guide
  - Nortel WLAN 2332 Series Access Point Mounting Template
  - Nortel WLAN 2300 Series Outdoor Solution Guide

Figure 4 shows the contents of the shipping carton for model 2332 Series.

Figure 4.   2332 Series Shipping Carton Contents
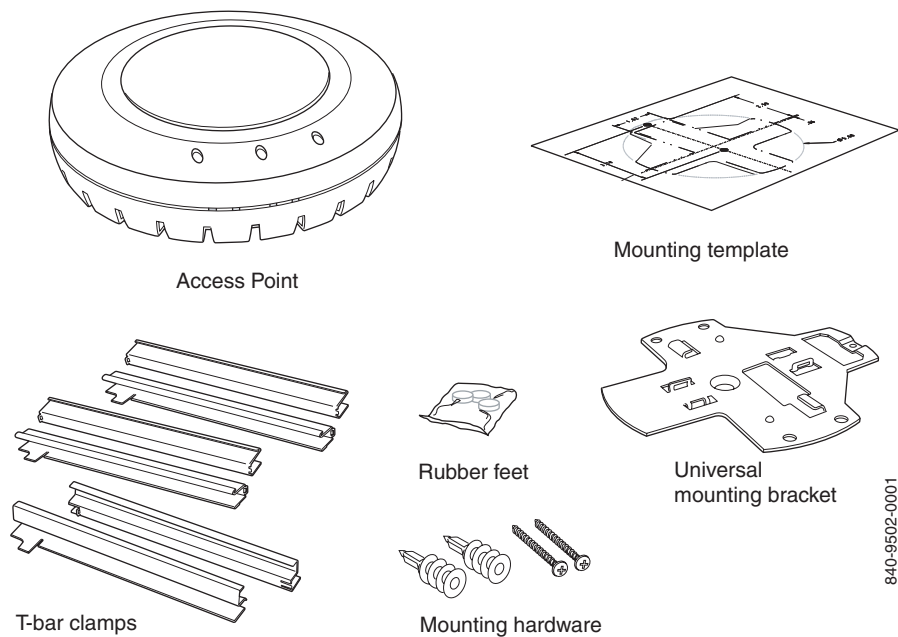
Before you begin installation:

1   Open the carton and carefully remove the contents, if you have not already done so.

2   Place the packing materials back in the carton and save the carton.

3   Verify that you received each item in the previous list. If any item is missing or damaged, contact Nortel.

Installation requirements and recommendations

For best results, follow these requirements and recommendations before installing an AP.

WLAN Management software network plan and work orders

If you are using the WLAN Management Software to plan your Nortel Mobility System installation, you might want to create and verify a network plan for the entire Nortel network installation and generate an AP work order, before

installing any access points. A network plan and the AP work orders provide the following information about AP installation and configuration:

- Number of APs required for adequate WLAN capacity in each coverage area
- Detailed installation location for each AP
- Settings for all APs in the WLAN

(For information about installing WLAN Management Software , creating and verifying a network plan, and generating an AP work order, see the *Nortel WLAN Management Software 2300 Series User Guide* and *Nortel WLAN Management Software 2300 Series Reference Guide*.)

WSS recommendation

Nortel recommends that you install and configure the WSS before installing an AP. If the switch is already installed and configured for the access points, you can immediately verify the cable connection when you plug the cable into the RJ-45 port on the AP.

> **Caution!** AP models 2332 Series are designed to receive power only from an 802.3af-compliant source, a Nortel WLAN—Security Switch (WSS), or a Nortel-approved power injector. Connecting an AP to a Power over Ethernet (PoE) device that is not approved by Nortel can damage the equipment.

(For information about connecting an AP to a WSS port, see "Connecting an AP to a WSS" on page 53.)

Wall installation recommendations

If you plan to install an AP on a partial wall or other vertical surface, orient the top of the access point (the side with the LEDs) toward the intended coverage area. The radio antennas transmit through the top of the access point but not through the bottom (where the bracket is located).

AP Radio Safety Advisories

When you enable the AP radio(s) as part of WSS configuration, the radios are able to receive and transmit radio frequency energy as soon as you connect the AP to the WSS, either directly or through the network.

Radio Frequency Exposure

Federal Communications Commission (FCC) Docket 96-8 for Spread Spectrum Transmitters specifies a safety standard for human exposure to radio frequency electromagnetic energy emitted by FCC-certified equipment. Nortel 2332 Series products meet the uncontrolled environmental limits found in OET-65 and ANSI C95.1-1991, if proper installation procedures are followed. To ensure compliance with these exposure requirements, this device must be installed in such a manner as to maintain a minimum of 20 cm separation distance between the radiating element(s) and all persons.

Additional radio safety advisories

(For translations of these warnings, see "Radio safety warnings" on page 116.)

⚠ **Warning!** Install this device in such a manner as to maintain a minimum of 20 cm (7.9 inches) separation distance between the radiating element(s) and all persons. This safety warning conforms with FCC radio frequency exposure limits.

⚠ **Warning!** Do not operate the AP near unshielded blasting caps or in an otherwise explosive environment unless the device has been modified for such use by qualified personnel.

⚠ **Warning!** Do not touch or move the AP when the antennas are transmitting or receiving.

⚠ **Warning!** Before using a wireless device in a hazardous location, consult the local codes, national codes, and safety directors of the location for usage constraints.

Cable requirements

➡ **Note.** The 2332 Series is intended for indoor use only. Do not install the device nor operate it outdoors.

➡ **Note.** To reduce the possibility of connection interference caused by dust, clean the Cat-5 connector pins before inserting a cable into an AP.

Standard Cat-5 Ethernet cabling is required for use with the 2332 Series.

Cat-5 cable with straight-through signaling must be installed at the site before you install an access point. A single connection requires one cable.

Table 2 lists the pin signals for the 10/100 Ethernet straight-through wiring. Pins 4, 5, 7, and 8 are used when Nortel Power over Ethernet (PoE) is enabled on the port. *RD* stands for *Receive Data* and *TD* stands for *Transmit Data*.

Table 2: 10/100 Ethernet Straight-Through Pin Signals

WSS		Other Device	
Pin	Function	Pin	Function
1	RD+	1	TD+
2	RD-	2	TD-
3	TD+	3	RD+
4	PoE+	4	PoE+
5	PoE+	5	PoE+
6	TD-	6	RD-
7	PoE-	7	PoE-
8	PoE-	8	PoE-

Mounting an 2332 Series on a solid surface requires using a Cat-5e cable that does not have strain relief. For installation on all other surfaces, you can use the Cat-5e cable with or without strain relief.

(For more information about cables, see "Cable ports" on page 28.)

Installing an 2332 Series

To install an 2332 Series, use one of the procedures in this section.

Installation hardware and tools

Table 3 lists the mounting hardware and tools required for each type of installation.

Table 3: Required Mounting Hardware and Tools—
Model 2332 Series

Mounting Option	Required Hardware and Tools	Included with the Product
Suspended ceiling—flush ceiling tiles	Mounting template	Yes
	Universal mounting bracket	Yes
	T-bar clamp	Yes
	Note: A T-bar clamp is not required for a 23.9-mm (15/16-inch) T-bar ceiling with flush ceiling tiles.	
	Box cutter	No
	Small screwdriver (3-mm or 1/8-inch)	No
Suspended ceiling—drop ceiling tiles	Mounting template	Yes
	Universal mounting bracket	Yes
	T-bar clamp	Yes
	Box cutter	No
	Small screwdriver (3-mm or 1/8-inch)	No
Junction box	Junction box	No
	Two #6-32 x 1-inch machine screws	Yes
	Universal mounting bracket	Yes
	Small screwdriver (3-mm or 1/8-inch)	No
	#2 Phillips-head screwdriver	No
Solid wall or ceiling	Two #6 sheet metal screws and two drywall anchors	Yes
	Universal mounting bracket	Yes
	Hammer	No
	Small screwdriver (3-mm or 1/8-inch)	No
	#2 Phillips-head screwdriver	No

> **Note.** Model 2332 Series is plenum rated, so it can also be installed in the space above the ceiling if preferred.

Figure 5 shows the universal mounting bracket.

Figure 5.   Universal Mounting Bracket
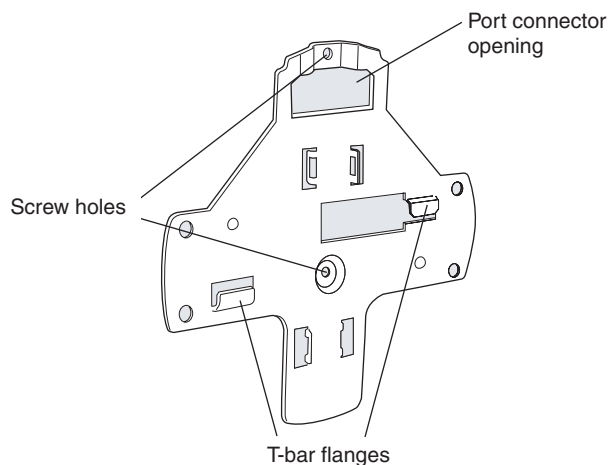
Suspended ceiling installation—flush ceiling tiles

(For required mounting hardware and tools, see Table 3 on page 36.)

1 Select an installation location that is centered over a T-bar in the ceiling.

2 Cut a hole as follows in the ceiling tile for the Cat-5 cable:

   a Place the mounting template over the area where you plan to install the AP.

   b Use the box cutter to cut along the line marking the opening for the port connector.

   c Remove the mounting template and the material you cut from the ceiling panel.

3 Determine whether to install a T-bar clamp onto the ceiling T-bar:

   • If the T-bar width is 14.2 mm (9/16 inches), you need to install the 14.2-mm (9/16-inch) T-bar clamp. Go to step 4.

   • If the T-bar width is 23.9 mm (15/16 inches), the universal mounting bracket fits directly onto the T-bar. Go to step 5.

4 Install the 14.2-mm (9/16-inch) T-bar clamp onto the ceiling T-bar as shown in Figure 6 on page 38.

   a Slide each half of the clamp onto the T-bar so that the clamp lip is fully on the T-bar.

   b Slide the two halves of the clamp toward each other until the tabs are inserted completely into the holes and the clamp fits snugly on the T-bar.

Figure 6. Step 4—Installing a T-bar Clamp
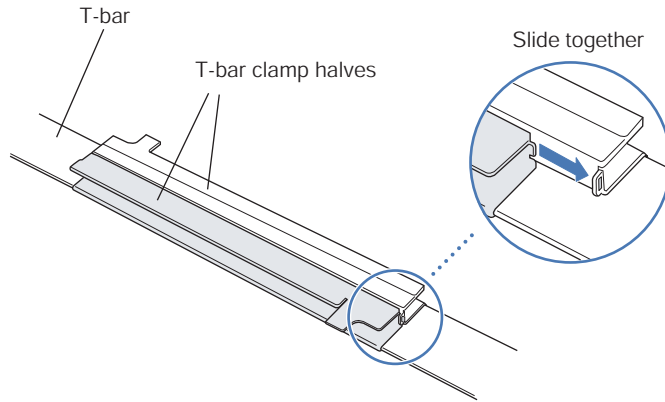
5   Unlock the universal mounting bracket from the AP by inserting the 3-mm or 1/8-inch screwdriver into the *Unlock* hole on the AP as shown in Figure 7.

Caution!   To avoid damage to the AP's lock mechanism or electronic components, do not use excessive force when inserting a tool into the *Unlock* or *Lock* hole.

Figure 7. Step 5—Unlocking the Bracket
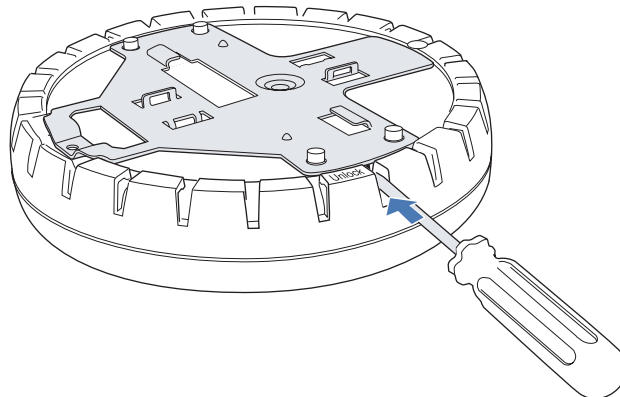

6   Remove the bracket as shown in Figure 8 on page 39.

Figure 8.   Step 6—Removing the Bracket
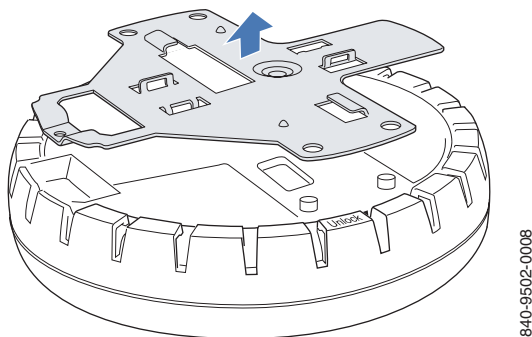
7   Install the universal mounting bracket as follows onto the T-bar or T-bar clamp:

    a   As shown in Figure 9, place the universal mounting bracket against the T-bar or clamp so that the two screw holes face downward and the two T-bar flanges face upward and are adjacent to the T-bar edges.

Figure 9.   Step 7—Top View
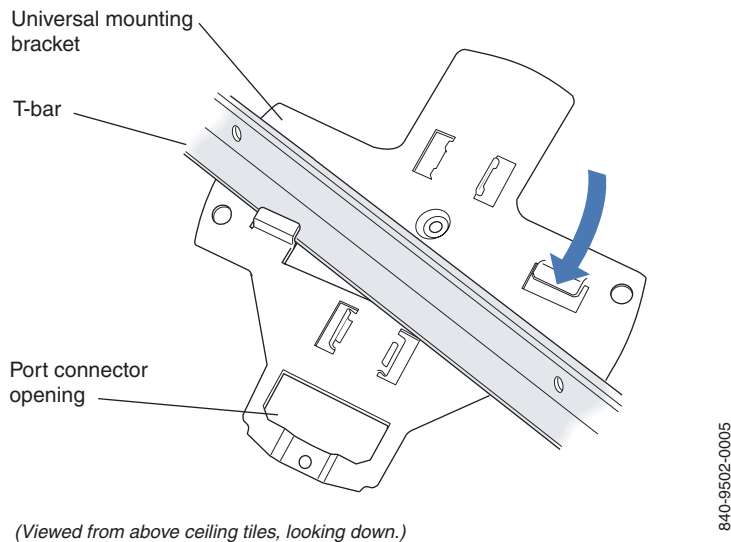
Universal mounting bracket

T-bar

Port connector opening

(Viewed from above ceiling tiles, looking down.)

    b   Properly align the bracket for mounting by placing the bracket so that its port connector opening is to the left of the hole you cut for the cables.

    c   Rotate the universal mounting bracket clockwise until the flanges snap into place on the T-bar or clamp as shown in Figure 10 on page 40.

Figure 10. Step 7—Bottom View
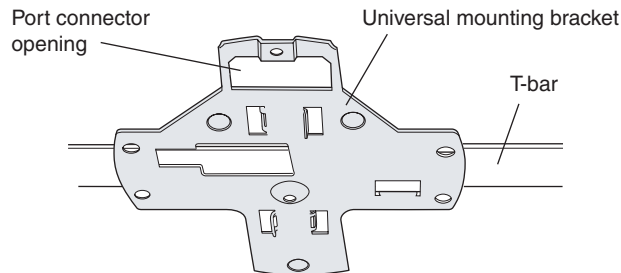
8   Pull the Cat-5 cable about 15 cm (about 6 inches) out of the hole in the ceiling tile and through the port connector opening to create enough slack to insert the cable.

9   Insert the Cat-5 cable into the connector:

10 Install the Kensington lock (optional).

    a   Loop the Kensington lock's cable around an object that cannot be moved or damaged by a person pulling on the cable.

    b   Insert the key into the Kensington lock.

    c   Insert the Kensington lock into the security slot on the AP.

    d   Rotate the key right or left to secure the lock to the AP.

    e   Pull on the lock to verify that it is secured to the AP.

    f   Remove the key.

11 Lift the AP into place on the universal mounting bracket as shown in Figure 11 on page 40.

Make sure the cable feeds properly into the ceiling as you lift the device, and does not become trapped between the access point and the bracket.

Figure 11. Step 11—Placing the AP on the Bracket
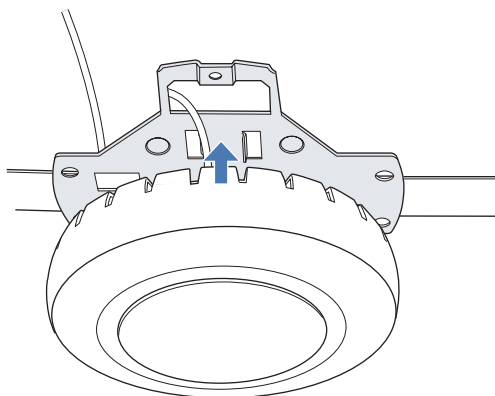
12 Lock the AP onto the bracket by inserting the 3-mm or 1/8-inch screwdriver into the *Lock* hole on the access point as shown in Figure 12.

> ⚠️ **Warning!** To prevent possible damage to the AP, make sure the device is fully locked onto the bracket before releasing it.

Figure 12. Step 12—Locking the Bracket
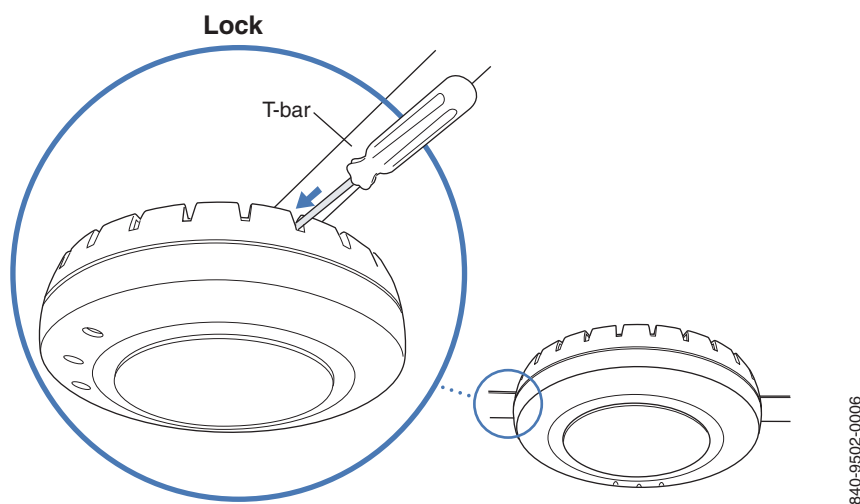
13 To ensure that the AP is fully locked onto the bracket, gently pull down on the access point and attempt to rotate it from side to side.

14 If the access point comes off the bracket, relock the device onto the bracket as described in step 12 on page 41.

15 If the other end of the Cat-5 cable is not already connected and the link activated, go to "Connecting an AP to a WSS" on page 53. Otherwise, go to "Verifying AP health" on page 55.

Suspended ceiling installation—drop ceiling tiles

(For required mounting hardware and tools, see Table 3 on page 36.)

1 Select an installation location that is centered over a T-bar in the ceiling.

2 Cut a hole as follows in the ceiling tile for the Cat-5 cable:

   a Place the mounting template over the area where you plan to install the AP.

   b Use the box cutter to cut along the line marking the opening for the point connectors.

   c Remove the mounting template and the material you cut from the ceiling panel.

3 Install the T-bar clamp that fits the T-bar:

a Slide each half of the clamp onto the T-bar so that the clamp lip is fully on the T-bar.

b Slide the two halves of the clamp toward each other until the tabs are inserted completely into the holes and the clamp fits snugly on the T-bar.

Figure 13 shows an example for a 23.9-mm (15/16-inch) T-bar. Figure 14 shows an example for a 15.9-mm (5/8-inch) T-bar.

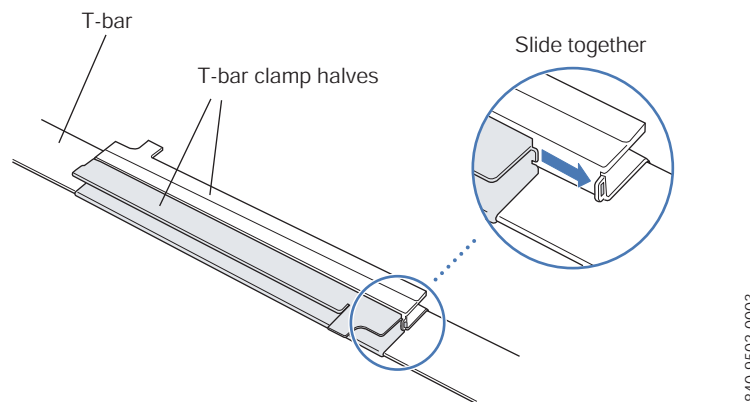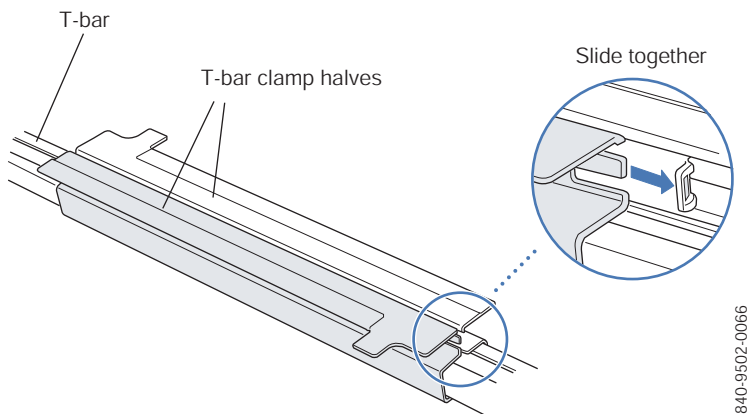**Figure 13. Step 3—Installing the T-bar Clamp for a 23.9-mm (15/16-inch) T-bar**

Figure 14. Step 3—Installing the T-bar Clamp for a 15.9-mm (5/8-inch) T-bar

4 Unlock the universal mounting bracket from the AP by inserting the 3-mm or 1/8-inch screwdriver into the *Unlock* hole on the AP as shown in Figure 15.

> ⬛ **Caution!** To avoid damage to the AP's lock mechanism or electronic components, do not use excessive force when inserting a tool into the *Unlock* or *Lock* hole.

Figure 15. Step 4—Unlocking the Bracket
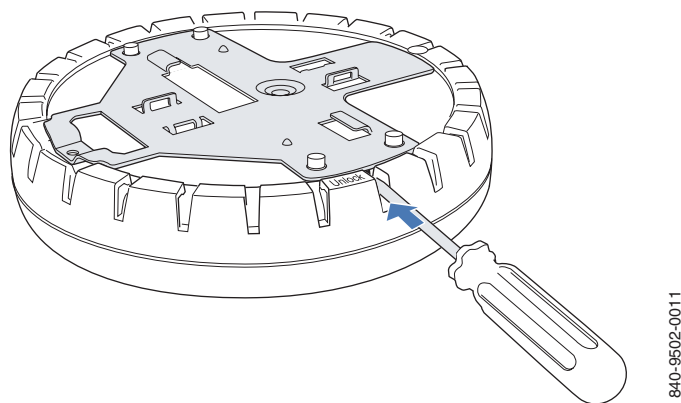
5 Remove the bracket as shown in Figure 16 on page 43.

Figure 16. Step 5—Removing the Bracket
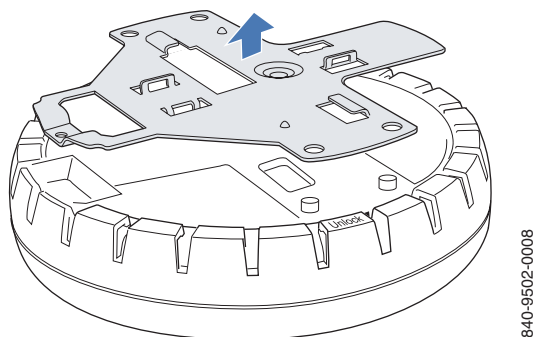
6 Install the universal mounting bracket as follows onto the T-bar clamp:

a As shown in Figure 17, place the universal mounting bracket against the T-bar clamp so that the two screw holes face downward and the two T-bar flanges face upward and are adjacent to the T-bar edges.

b Properly align the bracket for mounting by placing the bracket so that its port connector opening is to the left of the hole you cut for the cables.

c Rotate the universal mounting bracket clockwise until the flanges snap into place on the T-bar clamp as shown in Figure 18 on page 44.

Figure 17. Step 6—Top View
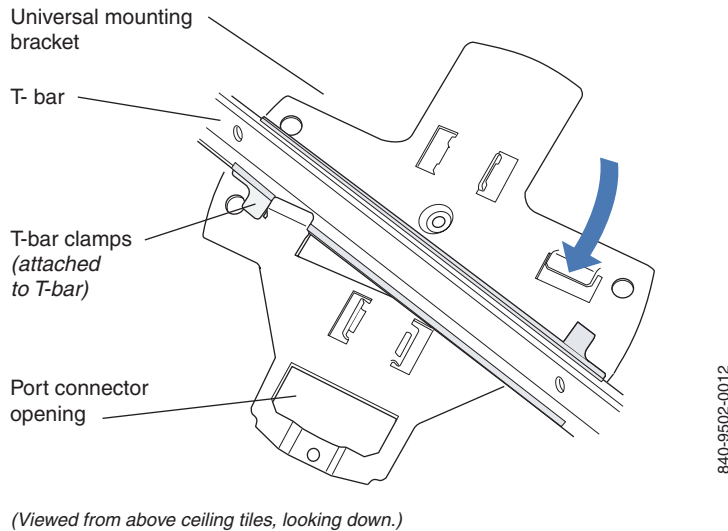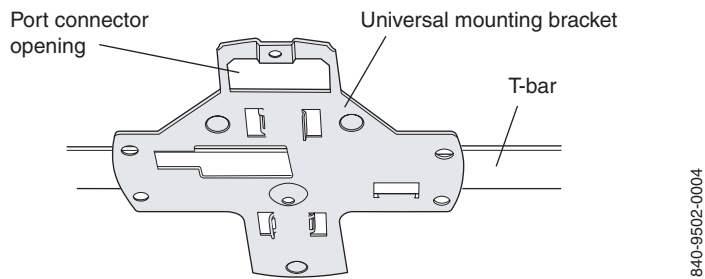
Universal mounting
bracket

T- bar

T-bar clamps
*(attached
to T-bar)*

Port connector
opening

840-9502-0012

(Viewed from above ceiling tiles, looking down.)

Figure 18. Step 6—Bottom View

Port connector
opening

Universal mounting bracket

T-bar

840-9502-0004

7 Pull the Cat-5 cable about 15 cm (about 6 inches) out of the hole in the ceiling tile and through the port connector opening to create enough slack to insert the cable.

8 Insert the Cat-5 cable into the connector.

9 Install the Kensington lock (optional).

a Loop the Kensington lock's cable around an object that cannot be moved or damaged by a person pulling on the cable.

b Insert the key into the Kensington lock.

c Insert the Kensington lock into the security slot on the AP.

d Rotate the key right or left to secure the lock to the AP.

    e   Pull on the lock to verify that it is secured to the AP.

    f   Remove the key.

10 Lift the AP into place on the universal mounting bracket as shown in .

Make sure the cable feeds properly into the ceiling as you lift the device, and does not become trapped between the access point and the bracket.
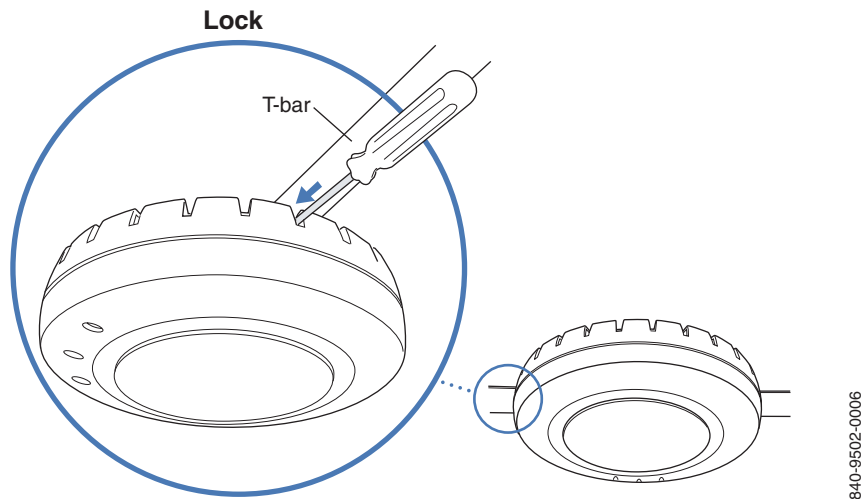
Figure 19. Step 9—Placing the AP on the Bracket

840-9502-0002
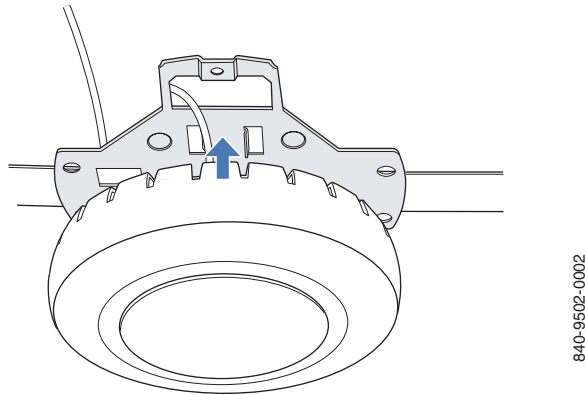
11 Lock the AP onto the bracket by inserting the 3-mm or 1/8-inch screwdriver into the *Lock* hole on the access point as shown in .

Caution! To prevent possible damage to the AP, make sure the device is fully locked onto the bracket before releasing it.

Figure 20. Step 10—Locking the Bracket

12 To ensure that the AP is fully locked onto the bracket, gently pull down on the access point and attempt to rotate it from side to side.

If the access point comes off the bracket, relock the device onto the bracket as described in step 11 on page 40.

13 If the other end of the Cat-5 cable is not already connected and the link activated, then go to "Connecting an AP to a WSS" on page 53. Otherwise, go to "Verifying AP health" on page 55.

Junction box installation

(For required mounting hardware and tools, see Table 3 on page 36.)

1 Unlock the universal mounting bracket from the AP by inserting the 3-mm or 1/8-inch screwdriver into the *Unlock* hole on the AP as shown in Figure 21.
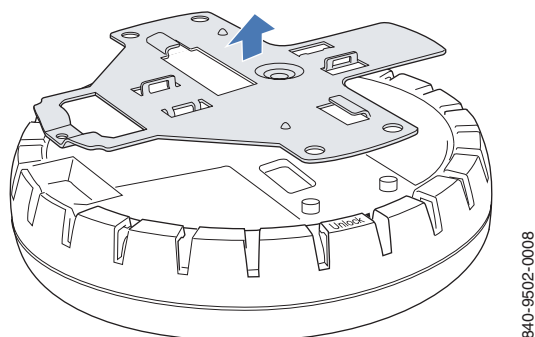
Caution! To avoid damage to the AP's lock mechanism or electronic components, do not use excessive force when inserting a tool into the *Unlock* or *Lock* hole.

Figure 21. Step 1—Unlocking the Bracket

840-9502-0011
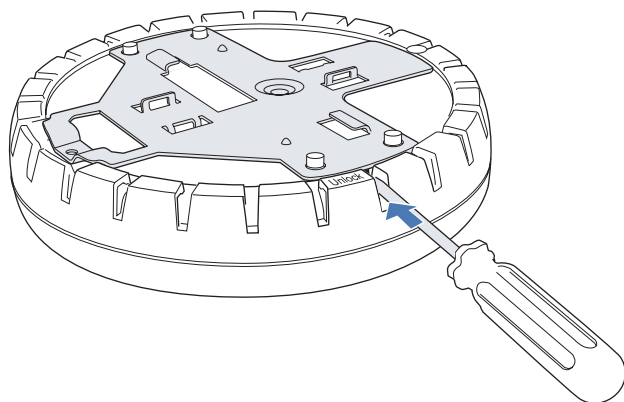
2   Remove the bracket as shown in Figure 22 on page 47.

Figure 22. Step 2—Removing the Bracket

840-9502-0008

3   Attach the universal mounting bracket to the junction box as shown in Figure 23:

  a   Place the universal mounting bracket against the junction box so that the two screw holes face the junction box and align over the screw holes in the box.

  b   Insert the #6-32 x 1-inch machine screws in the universal mounting bracket's screw holes, and use a #2 Phillips-head screwdriver to tighten them.

**Figure 23. Step 3—Placing the Bracket on the Junction Box**
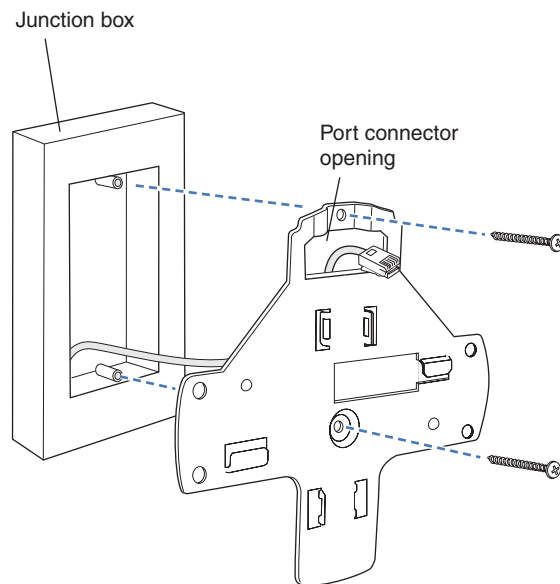
4   Pull the Cat-5 cable about 15 cm (about 6 inches) out of the junction box and through the port connector opening to create enough slack to insert the cable into the port connector.

5   Insert the Cat-5 cable into the connector.

6   Install the Kensington lock (optional).

   a   Loop the Kensington lock's cable around an object that cannot be moved or damaged by a person pulling on the cable.

   b   Insert the key into the Kensington lock.

   c   Insert the Kensington lock into the security slot on the AP.

   d   Rotate the key right or left to secure the lock to the AP.

   e   Pull on the lock to verify that it is secured to the AP.

   f   Remove the key.

7   Lift the AP into place on the universal mounting bracket.

   Make sure the cable feeds properly into the junction box as you lift the device, and does not become trapped between the access point and the bracket.

8   Lock the AP onto the bracket by inserting the 3-mm or 1/8-inch screwdriver into the *Lock* hole on the access point as shown in Figure 24.

⚠ **Warning!**   To prevent possible damage to the AP, make sure the device is fully locked onto the bracket before releasing it.

Figure 24. Step 7—Locking the Bracket

Lock

840-9502-0062
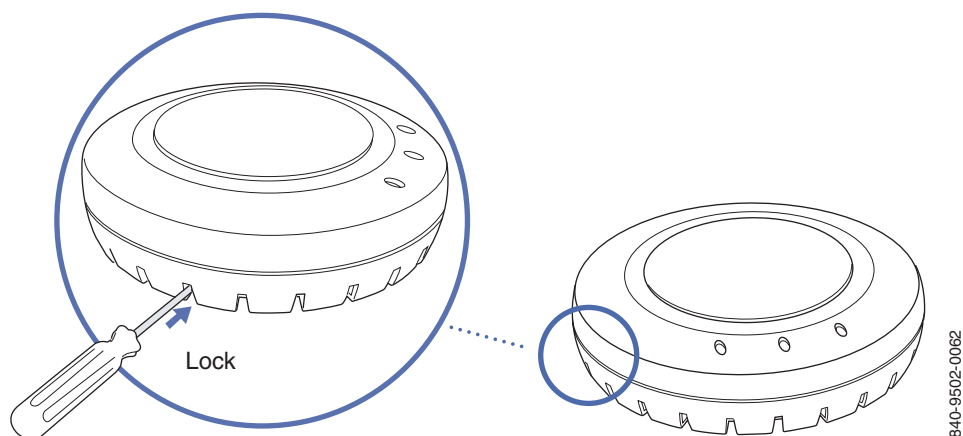
9 To ensure that the AP is fully locked onto the bracket, gently pull down on the access point and attempt to rotate it from side to side.

If the access point comes off the bracket, relock the device onto the bracket as described in step 8 on page 48.

10 If the other end of the Cat-5 cable is not already connected and the link activated, go to "Connecting an AP to a WSS" on page 53. Otherwise, go to "Verifying AP health" on page 55.

Solid wall or ceiling installation

(For required mounting hardware and tools, see Table 3 on page 36.)

1 Prepare holes in the wall or ceiling for the universal mounting bracket, using the following steps:

a Place the paper mounting template over the location where you want to install the AP.

b Mark the screw hole location(s).

- If you plan to route the Cat-5 cable externally along the wall or ceiling, mark the locations of both the center screw hole and the screw hole by the port connector opening.

- If you plan to route the Cat-5 cable through a hole in the wall or ceiling, mark the location of the center screw hole only. You cannot use the screw hole by the port connector opening if you cut a hole for the opening.

> **Note.** Do not mark the four holes on the edges of the bracket. (These are the holes indicated by the dashed lines in Figure 27 on page 51.) The AP fits into these holes. They are not screw holes.

**c** Remove the template.

2 Install the drywall anchor(s):

    a   Insert a drywall anchor into each hole, up to the beginning of the threads on the anchor.

    b   Screw each anchor the rest of the way into its hole using a #2 Phillips-head screwdriver.

    c   Remove the screw from each anchor and save the screw(s) for step 6 on page 51.

3   Unlock the universal mounting bracket from the AP by inserting the 3-mm or 1/8-inch screwdriver into the *Unlock* hole on the AP as shown in Figure 25 on page 50.

> **Caution!** To avoid damage to the AP's lock mechanism or electronic components, do not use excessive force when inserting a tool into the *Unlock* or *Lock* hole.
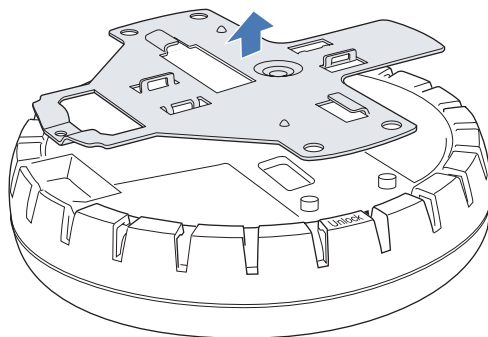
Figure 25. Step 3—Unlocking the Bracket
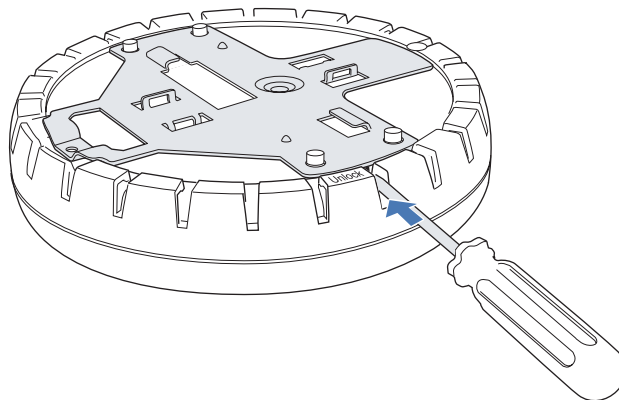
4   Remove the bracket as shown in Figure 26.

Figure 26. Step 4—Removing the Bracket

5   As shown in Figure 27 on page 51, feed the Cat-5 cable through the port connector opening and align the universal mounting bracket over the drywall anchors so that the two screw holes in the bracket face the drywall anchors.

6   Insert the #6 sheet metal screws into the screw holes, and tighten them to secure the universal mounting bracket to the wall or ceiling.

(If you routed the Cat-5 cable through a hole in the wall or ceiling, insert the screw into the center screw hole only.)

> → **Note.**   Do not insert screws in the four holes on the edges of the bracket. (These are the holes indicated by the dashed lines in Figure 27.) The AP fits into these holes. They are not screw holes.

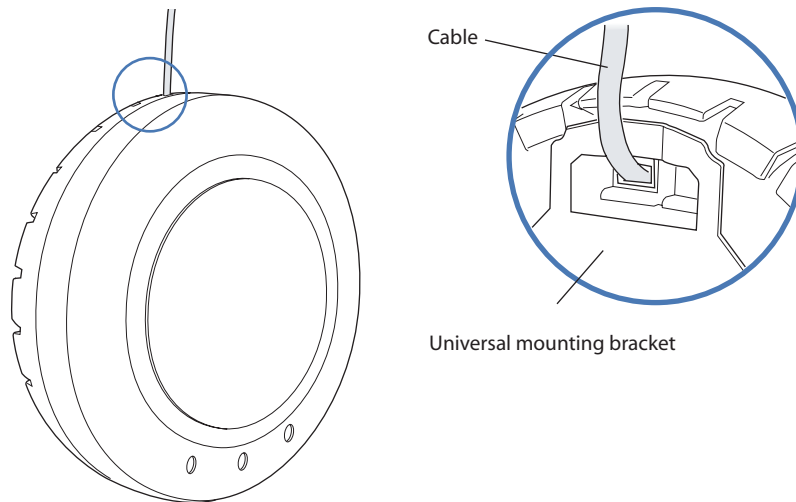**Figure 27. Steps 5 and 6—Bracket Placement on Solid Wall or Ceiling**
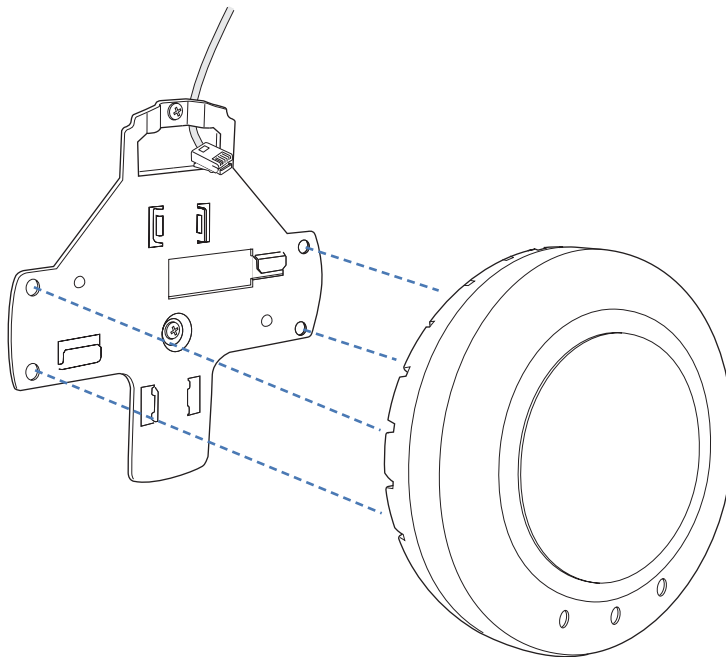
840-9502-0015

7   As shown in Figure 28, insert the Cat-5 cable into the connector:

Figure 28. Step 8—Cable Placement

Cable

Universal mounting bracket

840-9502-0016

8 Install the Kensington lock (optional).

    a Loop the Kensington lock's cable around an object that cannot be moved or damaged by a person pulling on the cable.

    b Insert the key into the Kensington lock.

    c Insert the Kensington lock into the security slot on the AP.

    d Rotate the key right or left to secure the lock to the AP.

    e Pull on the lock to verify that it is secured to the AP.

    f Remove the key.

9 Place the AP on the bracket, making sure to remove any slack that occurs in the cable between the bracket and the AP.

10 Lock the AP onto the bracket by inserting the 3-mm or 1/8-inch screwdriver into the *Lock* hole on the access point as shown in Figure 29.

> ⚠ **Warning!** To prevent possible damage to the AP, make sure the device is fully locked onto the bracket before releasing it.

Figure 29. Step 9—Locking the Bracket

Lock

840-9502-0062
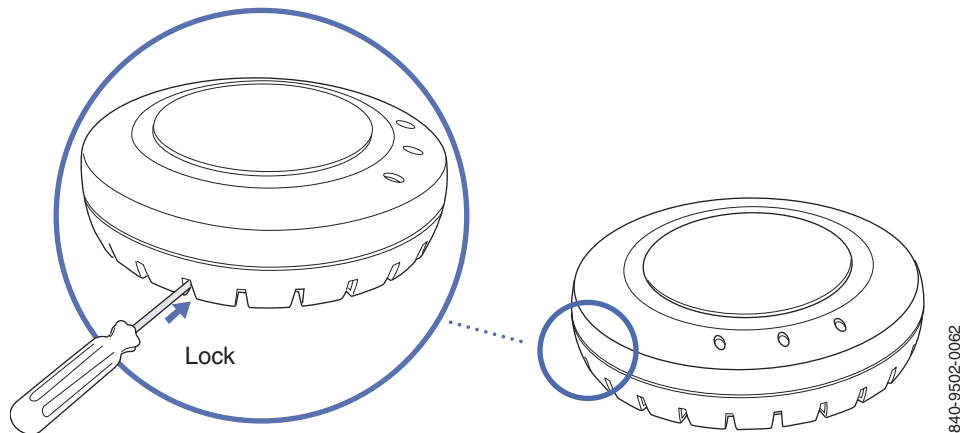
11 To ensure that the AP is fully locked onto the bracket, gently pull on the access point and attempt to rotate it from side to side.

If the access point comes off the bracket, relock the device onto the bracket as described in step 10 on page 52.

12 If the other end of the Cat-5 cable is not already connected and the link activated, then go to "Connecting an AP to a WSS" on page 53. Otherwise, go to "Verifying AP health" on page 55.

Connecting an AP to a WSS

You can connect an AP directly to a WSS or indirectly to the switch through an intermediate Layer 2 or Layer 3 network.

• To connect the AP directly to a WSS, configure the WSS port as an AP and use the following procedure to insert the cable into the WSS and verify the link.

• To connect the AP indirectly to a WSS though the network, configure a Distributed AP connection on the WSS.

You can use the CLI or WLAN Management Software to configure an AP or Distributed AP connection. (See the *Nortel WLAN Security Switch 2300 Series Configuration Guide* or the *Nortel WLAN Management Software 2300 Series User Guide*.)

Figure 30 shows how to insert a Cat-5 cable into a 10/100 Ethernet port on a WSS. Refer to this figure as you perform the procedure.

Figure 30. 10/100 Cat-5 Cable Installation
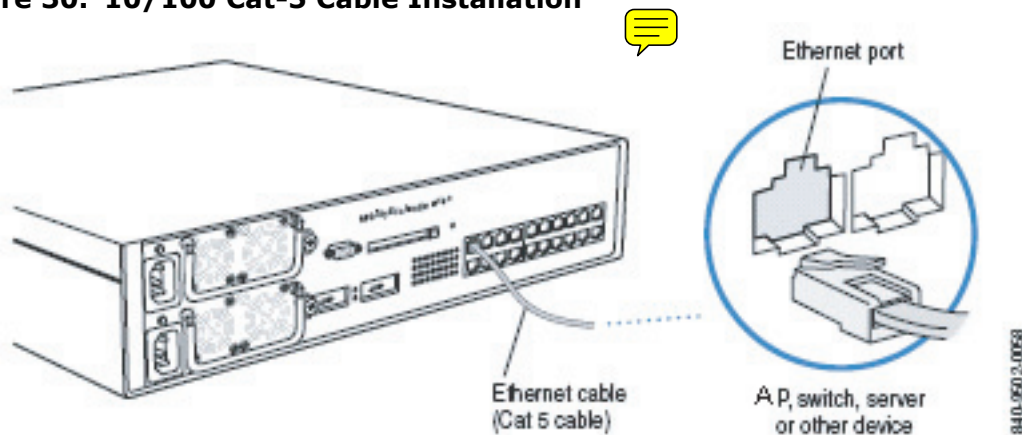
1 Insert a Cat-5 cable with a standard RJ-45 connector as shown in Figure 30. For connection to an AP, use the supplied Cat-5 straight-through cable.

2 When the link is activated, observe the AP LED for the port on the WSS:

AP LED Appearance	Meaning
Solid green	For an AP's active link, all the following are true: • AP has booted. • AP has received a valid configuration from the WSS. • Management link with an AP is operational. • At least one radio is enabled or is in sentry mode. For an AP's secondary link, the link is present.
Alternating green and amber	AP is booting with an image received from the WSS. After the access point boots and receives its configuration, this LED appearance persists until a radio is enabled or is placed in sentry mode.
Solid amber	PoE is on.
Blinking amber	AP is unresponsive or there is a PoE problem.
Unlit	PoE is off.

> → **Note.** The 10/100 Ethernet ports on a WSS are configured as wired network ports by default. You or the system administrator must change the port type for a WSS port directly connected to an AP to activate the link. (See the *Nortel WLAN 2300 Series—Security Switch Installation and Basic Configuration Guide.*)

Verifying AP health

After you install the AP and enable PoE on the Ethernet cable connected to the AP, you can easily verify the AP's status by observing the LEDs, particularly the health LED. (See Figure 3 on page 29.)

The health or LINK LED indicates whether the AP is ready for operation.

- If the LED is green and glowing steadily, the AP has been booted successfully by the WSS and is ready for operation.
- If the LED is not steadily glowing green, contact the system administrator for the WSS or, if you are the system administrator, see Appendix , "AP troubleshooting," on page 107.

External Antennas

Operation in the 5.0 GHz bands are limited to the following channels:

- 2332-A1: 36, 40, 44, 48, 149, 153, 157, 161, 165
- 2332-E1: 36, 40, 44, 48

This section introduces the external antenna portfolio available for the WLAN 2300 System 2332 Series.

- The portfolio includes 802.11b/g (2.4 GHz), 802.11a (5.0 GHz) and 802.11a/b/g (2.4/5.0 Hz) models.
- The addition of external antennas to the WLAN 2300 System portfolio improves overall system value:

  - Improved deployment flexibility – Planners can choose an antenna pattern that meets coverage requirements while allowing for convenient AP placement and installation.

  - Improved coverage and performance – External antennas allow planners to optimize coverage and deliver higher available data rates to user concentrations.

  - Can provide a low cost fix for trouble spots - Appropriately outfitting existing APs with external antennas can greatly improve coverage and available data rates in areas that are not adequately serviced.

  - Increased security – Perimeter access points outfitted with directional external antennas can focus energy inwards and increase security by preventing signal "leakage" outside the office.

  - Improved aesthetics – External antennas feature a 3 foot cable that allows the connected access point to be installed out-of-sight.

  - Lower cost of coverage – External antennas improve overall system efficiency by effectively directing available energy to where it's needed. This ensures overall system utility is maximized for any installation.

The WLAN 2300 series external antennas are the only external antennas certified by Nortel for use with WLAN 2300 systems. **WLAN Access Points 2332 Series outfitted with non-certified external antennas are not supported under Nortel support agreements.**

The WLAN 2300 system must be upgraded to WSS Software v4.1 (or later) and WMS v4.1 (or later). This upgrade includes antenna pattern libraries for the WLAN 2300 series external antenna portfolio and allows the system to:

- Accurately predict RF environments when using the WMS planning tool to calculate coverage provided by access points equipped with external antennas.
- Correctly interpret received signal strength measurements from APs with external antennas when calculating rogue device or client location.

The WLAN 2300 System external antenna portfolio is sourced from Cushcraft, a world leader in the development of advanced antenna technology and products.

- The Cushcraft products have been modified for compatibility with the 2332 Series.
- Nortel versions are equipped with an R-SMA (reverse SMA) type connector to comply with industry regulatory quality standards and correctly interface with the 2332 Series.
- The Cushcraft model numbers presented throughout this bulletin refer to the Nortel specific versions and may not exactly match similar versions promoted on Cushcraft's website or other product materials.
- Nortel has tested and measured each product. The antenna gains expressed in dBi are the Nortel tested values and may differ slightly from those published by Cushcraft for similar products.

External antenna selector guide for the 2332 Series for indoor operation

> ⚠️ **Warning!** Intentional radiators, such as the Nortel WLAN Access Point 2332 Series are not intended to be operated with any antenna(s) other than those furnished by Nortel. An intentional radiator may only be operated with the antenna(s) with which it is authorized. For a complete listing of antennas for use with this product, visit http://www.nortel.com/support.

> ➡️ **Note.** At this point of time, the below section will not be updated for 2332 Series.

Table 4: External Antenna Selector Guide for 2332 Series

Cushcraft	Nortel Model Number	WSS Model String	WLAN 2332 Series 2.4 GHz Antennas
S2403BHN36RSM	DR4000072E6 (**Discontinued**)	24453	DR4000072E6 has been replaced with the DR4000088E6. They have the same electrical characteristics and the DR4000088E6 can now be mounted on either a pole or hung from a ceiling.
S2403BPXN36RSM	DR4000088E6 (**Replaces DR4000072E6**)	24493	WLAN Collinear Omni-directional Dipole Antenna contains two collocated elements with an average gain of 4.9 dBi and a 3-foot cable with a Reverse SMA connector. For use in Warehouses, Auditoriums, Shopping Malls, industrial complexes and more. It can be mounted either on a pole or hung from a ceiling.
S2406PN36RSM	DR4000075E6	24553	WLAN Directional Patch Panel Antenna with an average gain of 6.5 dBi and a 3-foot cable with a Reverse SMA connector. For use in Hallways or corridors. Easy to disguise or hide.
SL2402PN36RSM	DR4000074E6	24203	WLAN Omni-directional Patch Panel Ceiling Mount Antenna with an average gain of 0.0 dBi and a 3-foot cable with a Reverse SMA connector. For use in contemporary in-building WLAN applications.
SQ2405DDN36RSM	DR4000073E6	24403	WLAN Bi-directional Patch Panel Ceiling Mount Antenna with an average gain of 4.5 dBi and a 3-foot cable with a Reverse SMA connector. For use in Offices, Shopping Complexes, Transportation Terminals, Educational Campuses, Hallways, and Tunnels.
S2409PN36RSM	DR4000076E6	24883	WLAN Directional Patch Panel Array Antenna with an average gain of 8.8 dBi and a 3-foot cable with a Reverse SMA connector. For use where a shaped pattern is needed to provide enhanced coverage of deep rooms, warehouse bays, or any elongated activity zone
PC2415NA36RSM	DR4000077E6	24143	WLAN 15-Element Yagi Antenna with an average gain of 14.1 dBi, 3-foot cable with a Reverse SMA connector and an articulating mount. Antenna is rugged, easy to install and provides a very symmetrical and uniform pattern. Designed for long, narrow coverage environments, like a tunnel.

SR24120DN36RSM	DR4000087E6	24113	WLAN Directional Patch Panel Array Antenna with an average gain of 11 dBi, 3-foot cable with a Reverse SMA connector and either a tilt, wall or pole mounting capability. Antenna is rugged, easy to install and provides a very symmetrical uniform 120 degree H-plane and 14 degree E-plane pattern. Designed for long, wide coverage environments.
S241290PN36RSM	DR4000086E6	24123	WLAN Directional Patch Panel Array Antenna with an average gain of 12 dBi, 3-foot cable with a Reverse SMA connector and either a tilt, wall or pole mounting capability. Antenna is rugged, easy to install and provides a very symmetrical and uniform 90 degree H-plane and 17 degree E-plane pattern. Designed for long, wide coverage environments.
Cushcraft	**Nortel Model Number**	**WSS Model String**	**WLAN 2332 Series 5.0 GHz Antennas**
SQ5153WPN36RSM	DR4000069E6	5303	WLAN Squint Ceiling Mount Omni-directional Monopole Antenna with an average gain of 3.2 dBi from 5.15 - 5.25 GHz, 2.5 dBi from 5.25 - 5.35 GHz, 1.6 dBi from 5.470 - 5.725 GHz and 0.1 dBi from 5.725 - 5.85 GHz. It has a 3-foot cable with a Reverse SMA connector. For use in large indoor spaces, locations with high ceilings, and where extending coverage is needed.
S5153WBPN36RSM	DR4000070E6	5643	WLAN Collinear Omni-directional Dipole Antenna that contains two collocated elements. It has an average gain of 4.5 dBi from 5.15 - 5.25 GHz, 3.8 dBi from 5.25 - 5.35 GHz, 4.7 dBi from 5.47 -5.725 GHz and 4.4 dBi from 5.725 - 5.85 GHz. It is 7" in height, and has a 3-foot cable with a Reverse SMA connector. For use in Warehouses, Auditoriums, Shopping Malls, industrial complexes and other locations.
S51514WPN36RSM	DR4000071E6	5133	WLAN Directional Patch Panel Antenna with an average gain of 13.1 dBi from 5.15 - 5.25 GHz, 13.0 dBi from 5.25 - 5.35 GHz, 13.0 dBi from 5.470 - 5.725 GHz and 12.9 dBi from 5.725 - 5.85 GHz. It has a 3-foot cable with a Reverse SMA connector. For use in campus or in-building applications. It offers a very precise and controllable pattern. Must order mounting bracket separately.

			WLAN 2332 Series 2.4/5.0 GHz Dual Antennas
S24493DSN36RSM	DR4000078E6	Mixed	WLAN Dual-Band, Tri-Mode 802.11 a/b/g Spatial Diversity Monopole Antenna. It operates over the 2.4 - 2.5 GHz and 4.90 - 5.875 GHz bands. It has an average gain of 3.0 dBi from 2.4 - 2.5 GHz, 4.0 dBi from 4.90 - 5.15 GHz, 3.9 dBi from 5.15 - 5.25 GHz, 3.2 dBi from 5.25 - 5.35 GHz, 2.9 dBi from 5.470 - 5.725 GHz and 2.6 dBi from 5.725 - 5.85 GHz. It is equipped with a 3-foot cable and a Reverse SMA connector. Each antenna port can be used individually to support 802.11 b/g and 802.11a systems simultaneously for dual-band, non-diversity applications. Optimal for use in high data rate, high capacity configurations such as enterprise offices.

Antenna selection decision trees

The following decision trees are intended to quickly guide users to the appropriate model(s) based on basic criteria.

- The distinction between office and industrial types refers solely to the aesthetic suitability of an antenna for each environment. Any antenna identified as suitable for office deployments can be deployed in industrial environments and vice versa.

- The Antenna # can be used to quickly identify the appropriate corresponding model in the Antenna Descriptions section.

- Only one model of dual-band antenna is available for 802.11a/b/g installations - a Dual-band, Tri-mode 802.11a/b/g Spatial Diversity Antenna, model #: DR4000078E6. This unit has a 2.4 GHz and 5 GHz antenna built-in. It is designed to connect to each of the external ports on the AP. It can be used with only one port connected, so it could be used in either **b/g** or **a** mode in a stand alone application For more information see "Dual-band, Tri-mode 802.11a/b/g Spatial Diversity Antenna" in the Antenna Descriptions section.
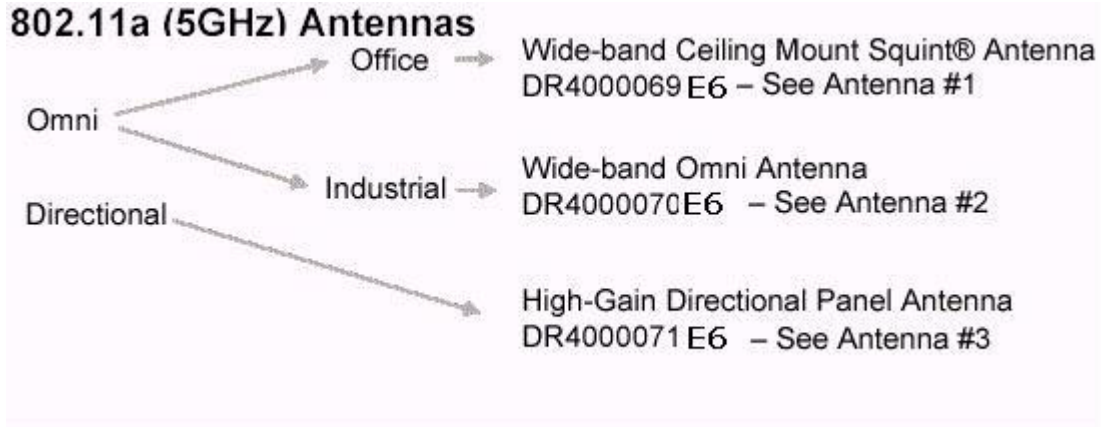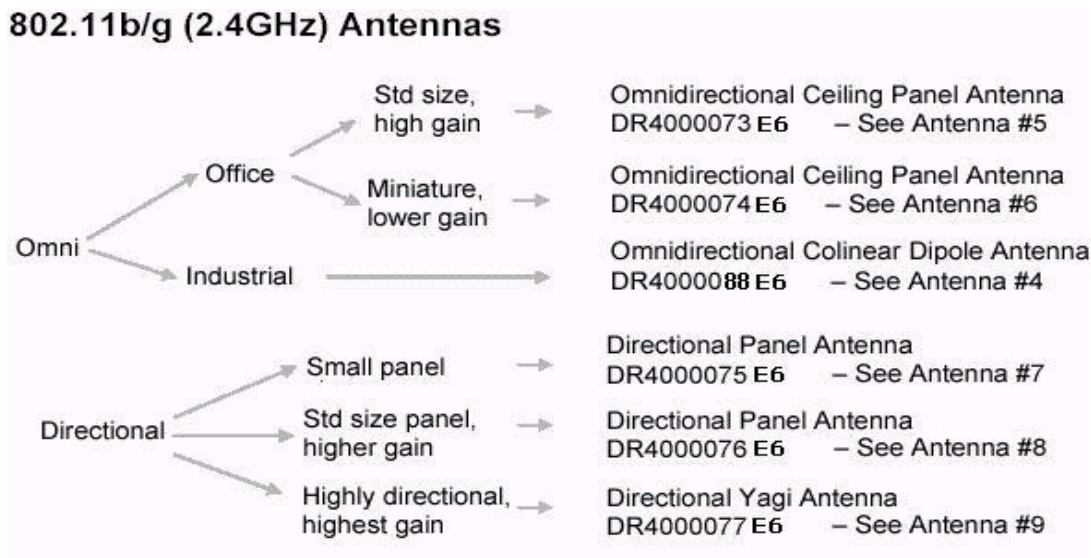
Figure 31. 5 GHz Antennas

802.11a (5GHz) Antennas

Omni → Office → Wide-band Ceiling Mount Squint® Antenna DR4000069 E6 – See Antenna #1

Omni → Industrial → Wide-band Omni Antenna DR4000070 E6 – See Antenna #2

Directional → High-Gain Directional Panel Antenna DR4000071 E6 – See Antenna #3

Figure 32. 2.4 GHz Antennas

802.11b/g (2.4GHz) Antennas

Omni → Office → Std size, high gain → Omnidirectional Ceiling Panel Antenna DR4000073 E6 – See Antenna #5

Omni → Office → Miniature, lower gain → Omnidirectional Ceiling Panel Antenna DR4000074 E6 – See Antenna #6

Omni → Industrial → Omnidirectional Colinear Dipole Antenna DR4000088 E6 – See Antenna #4

Directional → Small panel → Directional Panel Antenna DR4000075 E6 – See Antenna #7

Directional → Std size panel, higher gain → Directional Panel Antenna DR4000076 E6 – See Antenna #8

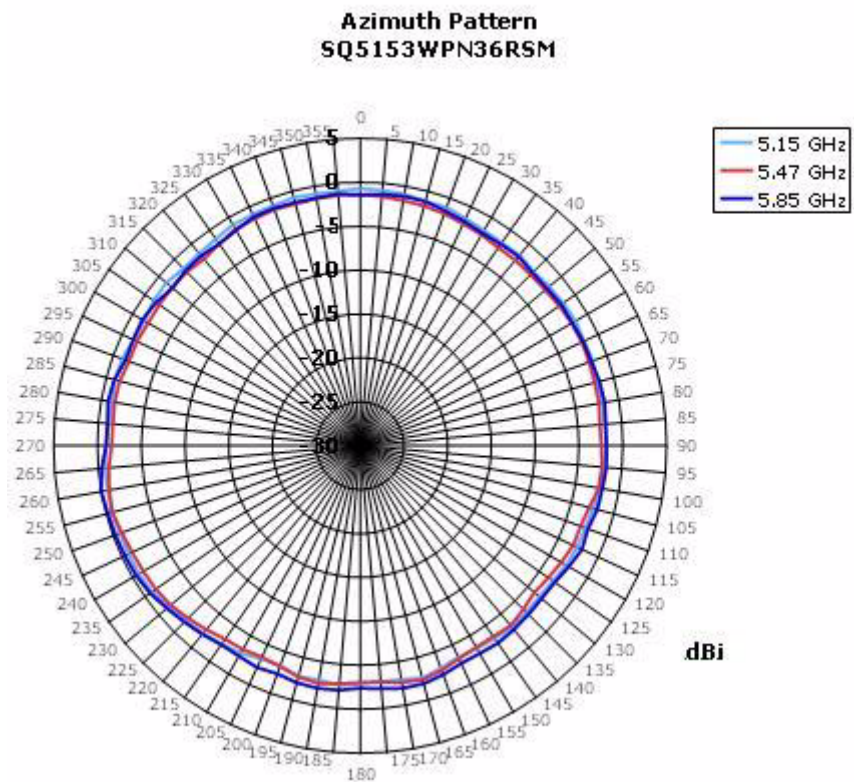Directional → Highly directional, highest gain → Directional Yagi Antenna DR4000077 E6 – See Antenna #9
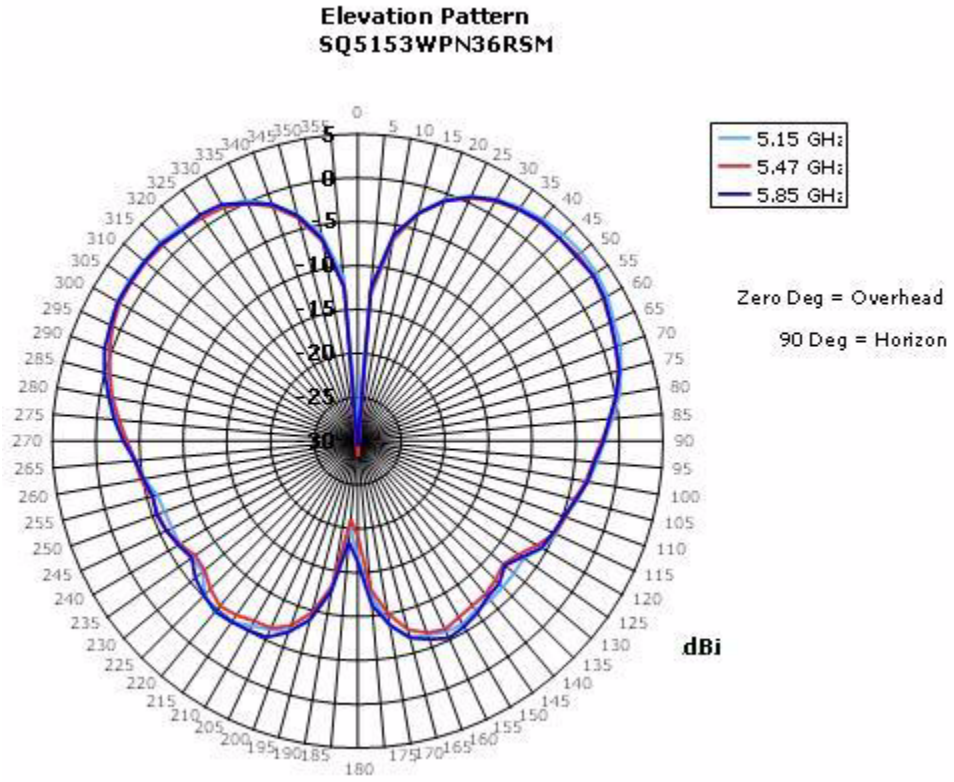
Dual-Band 802.11a/b/g (2.4/5.0 GHz)

- Dual-band, Tri-mode 802.11a/b/g Spatial Diversity Antenna, DR4000078E6 – See "Dual-band, Tri-mode 802.11a/b/g Spatial Diversity Antenna"

Antenna descriptions – 802.11a (5.0 GHz) antennas

1 Wide-band Ceiling Mount Squint® Antenna

Nortel Order Number: DR4000069E6

- ❥ Cushcraft Model SQ5153WPN36RSM
- ❥ 5.15 - 5.25 GHz, 3.2 dBi Peak Gain

5.25 - 5.35 GHz, 2.5 dBi Peak Gain

5.470 - 5.725 GHz, 1.6 dBi Peak Gain

5.725 - 5.85 GHz, 0.1 dBi Peak Gain

- ❥ Ultra-compact, low profile design with minimum visual impact
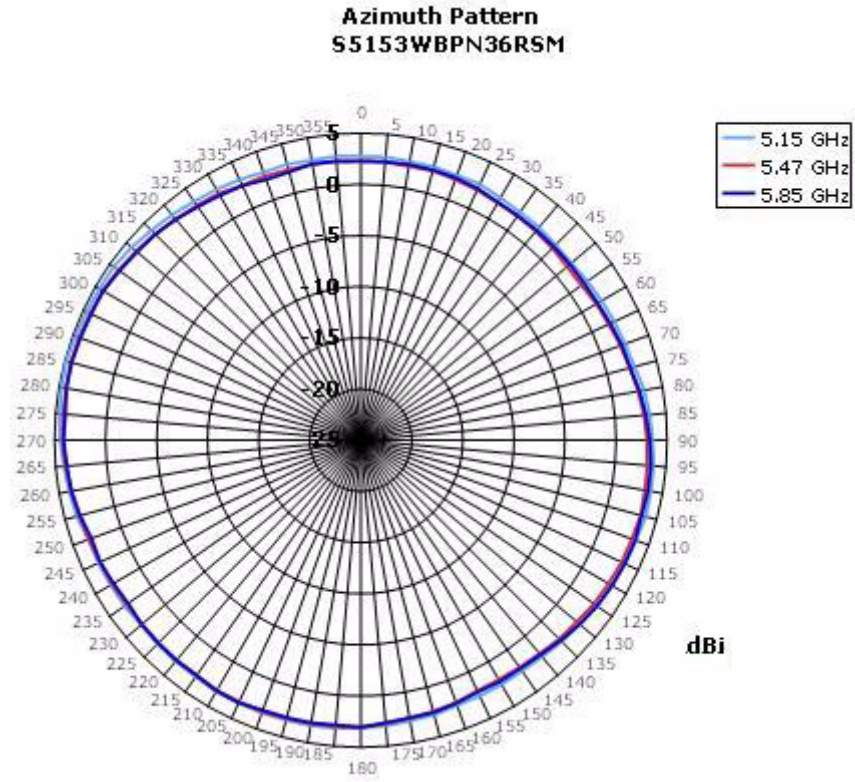- ❥ Ideal for large indoor open spaces and locations with high ceilings
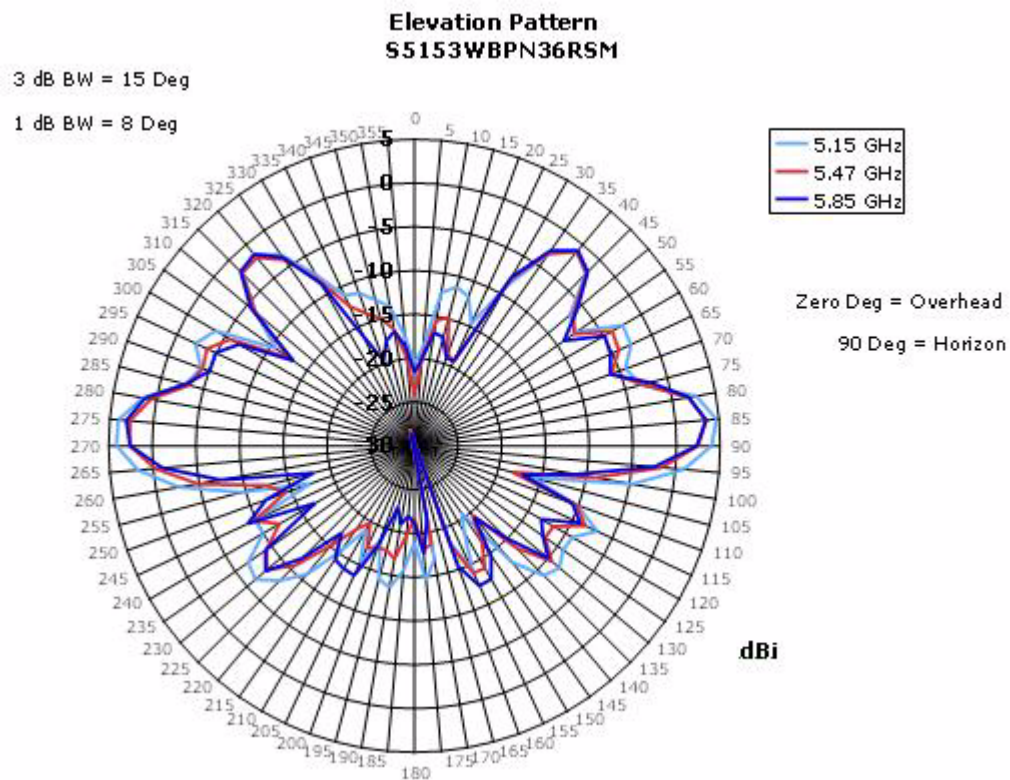- ❥ Measures 2" x 2" x ¾"

Azimuth Pattern
SQ5153WPN36RSM

Elevation Pattern
SQ5153WPN36RSM

Legend:
- 5.15 GHz
- 5.47 GHz
- 5.85 GHz

Zero Deg = Overhead

90 Deg = Horizon

dBi

2 Wide-band Omni Antenna

Nortel Order Number: DR4000070E6

❥ Cushcraft Model S5153WBPN36RSM

❥ 5.15 - 5.25 GHz, 4.5 dBi Peak Gain
5.25 - 5.35 GHz, 3.8 dBi Peak Gain
5.470 - 5.725 GHz, 4.7 dBi Peak Gain
5.725 - 5.85 GHz, 4.4 dBi Peak Gain

❥ Rugged design suitable for industrial environments

❥ Ceiling, I-beam and mast mounting options

❥ Suitable for large indoor open spaces and locations with high ceilings
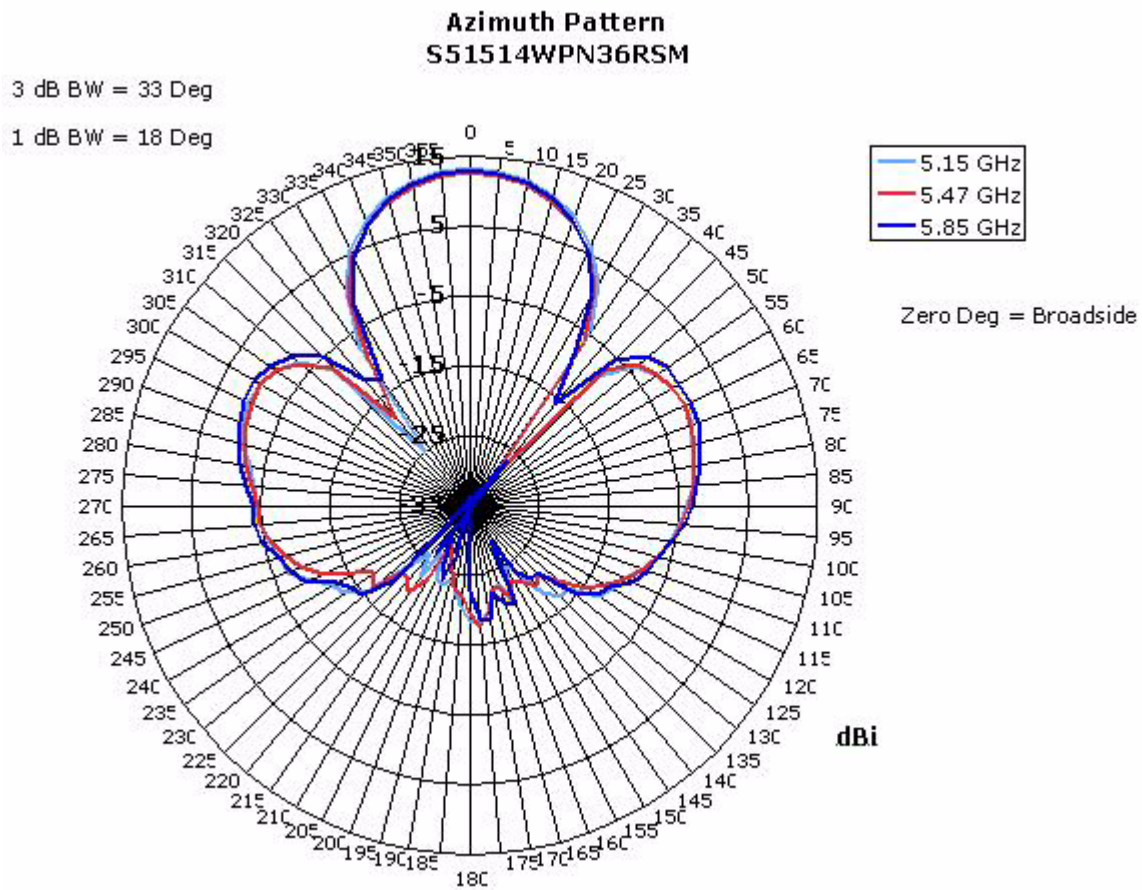
❥ Slim aspect measuring 11.5" x 1"

Azimuth Pattern
S5153WBPN36RSM

**Elevation Pattern
S5153WBPN36RSM**

3 dB BW = 15 Deg

1 dB BW = 8 Deg

5.15 GHz
5.47 GHz
5.85 GHz

Zero Deg = Overhead

90 Deg = Horizon
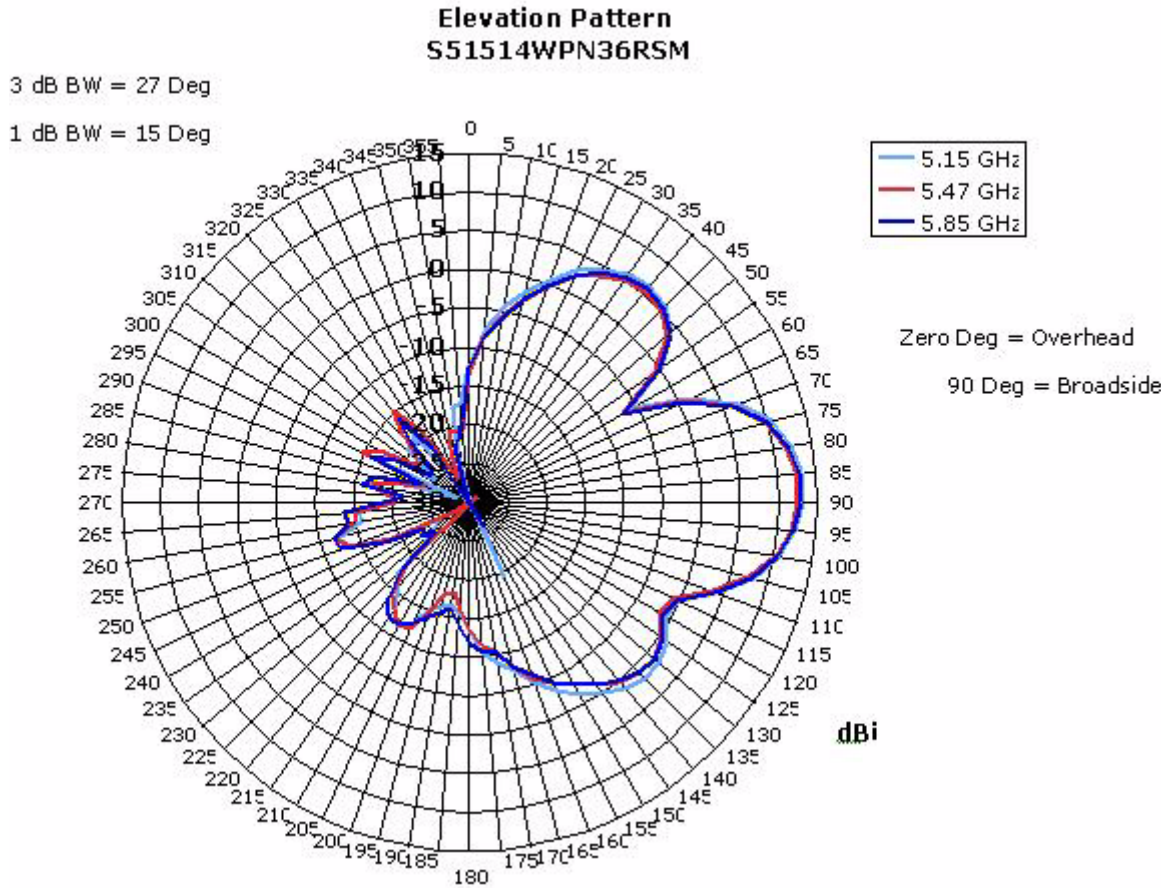
dBi

3   High-Gain Directional Panel Antenna

Nortel Order Number: DR4000071E6

❧   Cushcraft Model S51514WPN36RSM

❧   5.15 - 5.25 GHz, 13.1 dBi

5.25 - 5.35 GHz, 13.0 dBi Peak Gain

5.470 - 5.725 GHz, 13.0 dBi Peak Gain

5.725 - 5.85 GHz, 12.9 dBi Peak Gain

❧   Wall or pole mounting

❧   Articulating feature allows customizable antenna pattern

❧   Measures 4" x 4" x 1.4"

Azimuth Pattern
S51514WPN36RSM

Elevation Pattern
S51514WPN36RSM

3 dB BW = 27 Deg

1 dB BW = 15 Deg

Legend:
- 5.15 GHz
- 5.47 GHz
- 5.85 GHz

Zero Deg = Overhead

90 Deg = Broadside

dBi

## Antenna descriptions – 802.11b/g (2.4 GHz) antennas

4 Omni-directional Colinear Dipole Antenna

Nortel Order Number: DR4000088E6 (replaces DR4000072E6)

❥ Cushcraft Model S2403BPXN36RSM (replaces S2403BHN36RSM)

❥ 2.4 - 2.5 GHz, 4.9 dBi Peak Gain

❥ Rugged housing suitable for industrial deployments

❥ Ideal for large open areas

❥ Suspended ceiling mount

❥ Measures 11.5" x 1"

Azimuth Pattern
S2403BHN36RSM & S2403BPXN36RSM
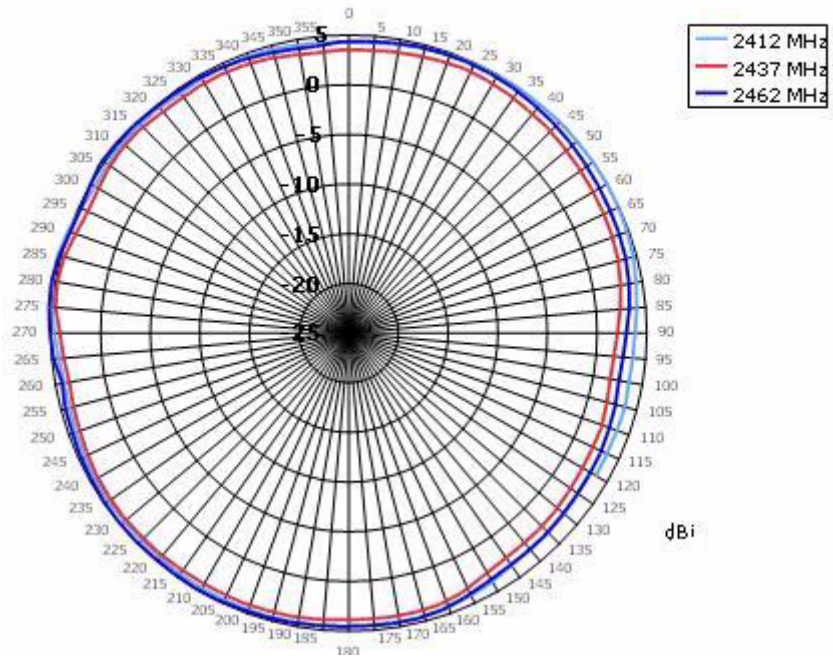
Elevation Pattern
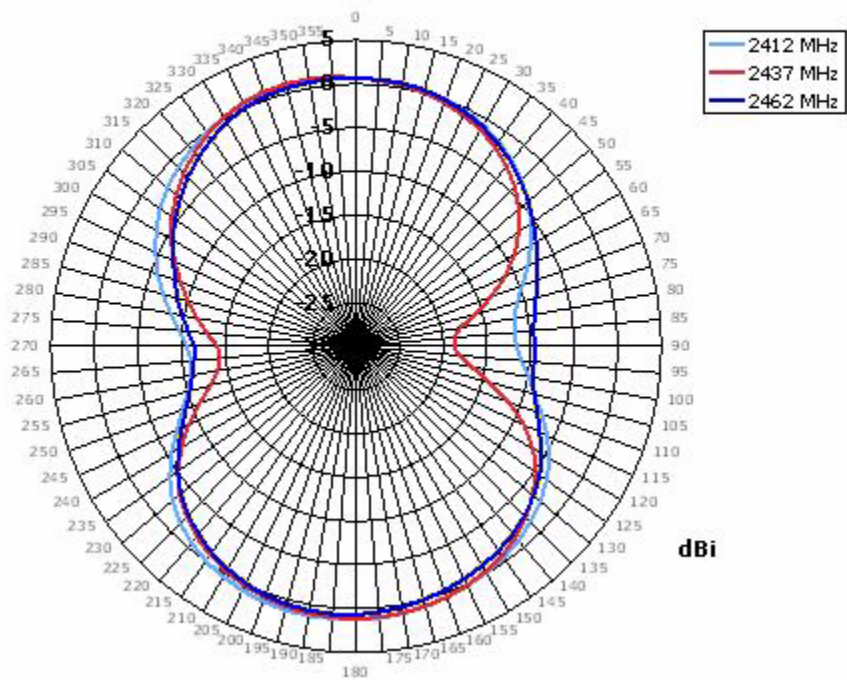S2403BHN36RSM & S2403BPXN36RSM

2412 MHz
2437 MHz
2462 MHz
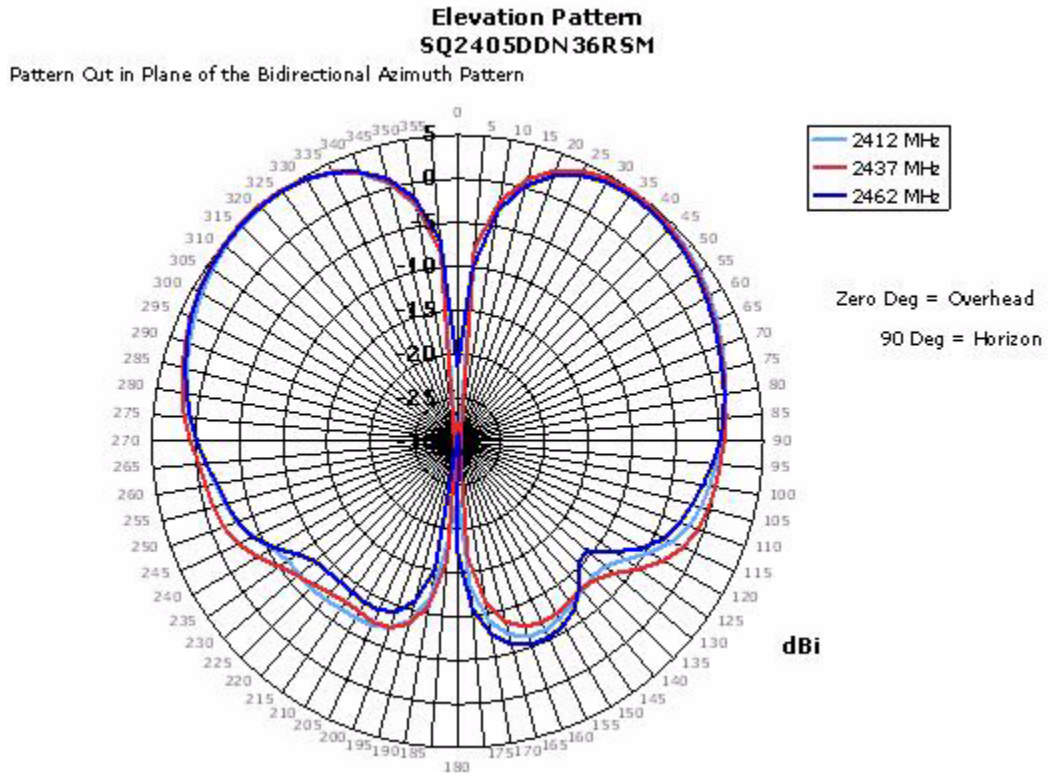
dBi
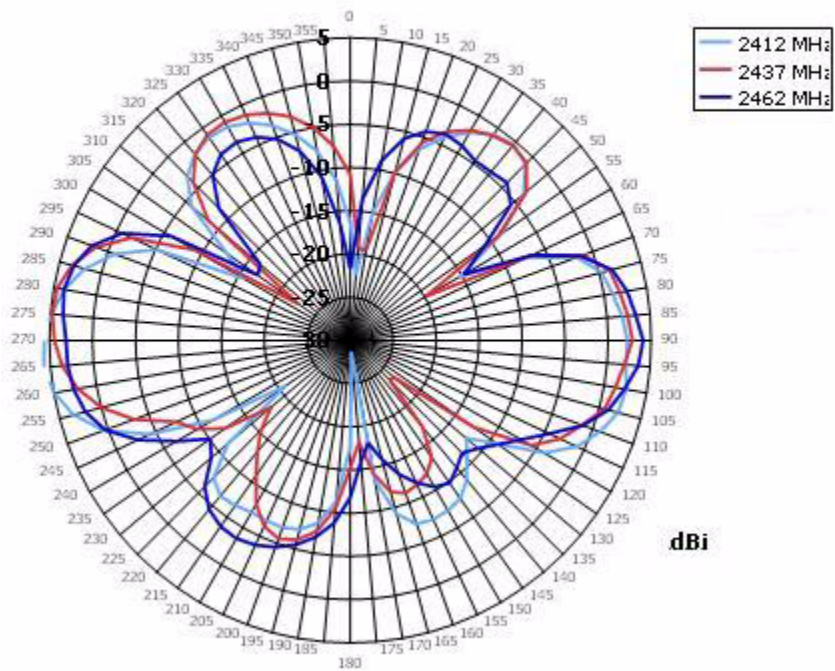
5 Omni-directional Ceiling Panel Antenna

Nortel Order Number: DR4000073E6

❥ Cushcraft Model SQ2405DDN36RSM

❥ 2.4 - 2.5 GHz, 4.5 dBi Peak Gain

❥ Bi-directional, low profile ceiling antenna

❥ Paintable with light, non-metallic coating for custom color matching

❥ 3-foot cable

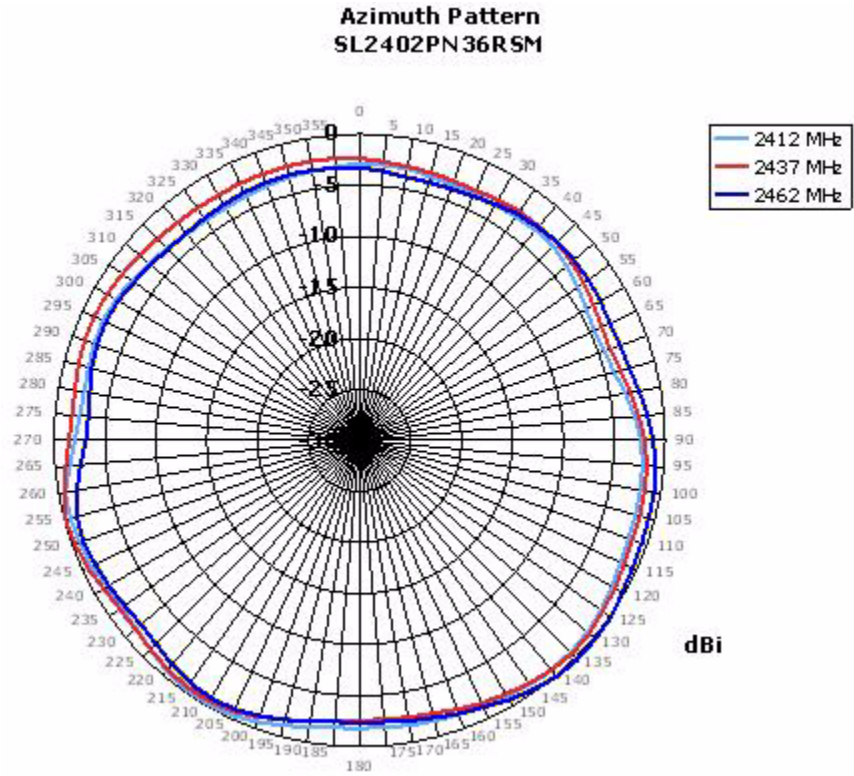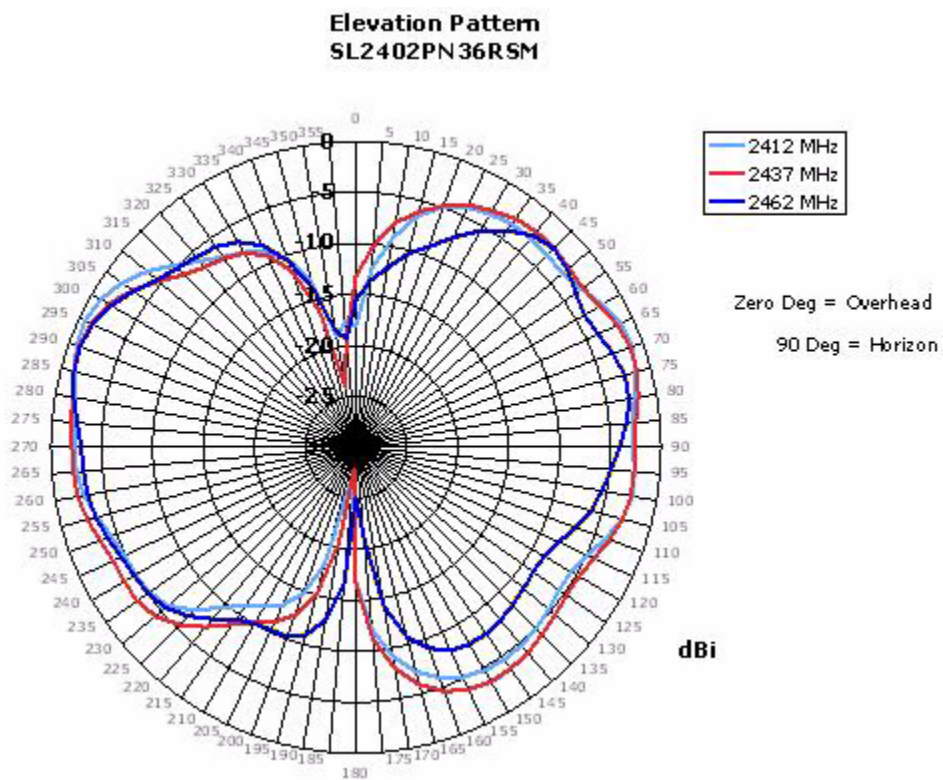❥ Measures 6.12" x 6.12" x 1.25"

Azimuth Pattern
SQ2405DDN36RSM

Elevation Pattern
SQ2405DDN36RSM

Pattern Out in Plane of the Bidirectional Azimuth Pattern

2412 MHz
2437 MHz
2462 MHz

Zero Deg = Overhead

90 Deg = Horizon

dBi

6 Omni-directional Ceiling Panel Antenna

Nortel Order Number: DR4000074E6

❥ Cushcraft Model SL2402PN36RSM

❥ 2.4 - 2.5 GHz, 0.0 dBi Peak Gain

❥ Very uniform and symmetrical antenna pattern

❥ Well-suited for high-density deployments

❥ 3-foot cable
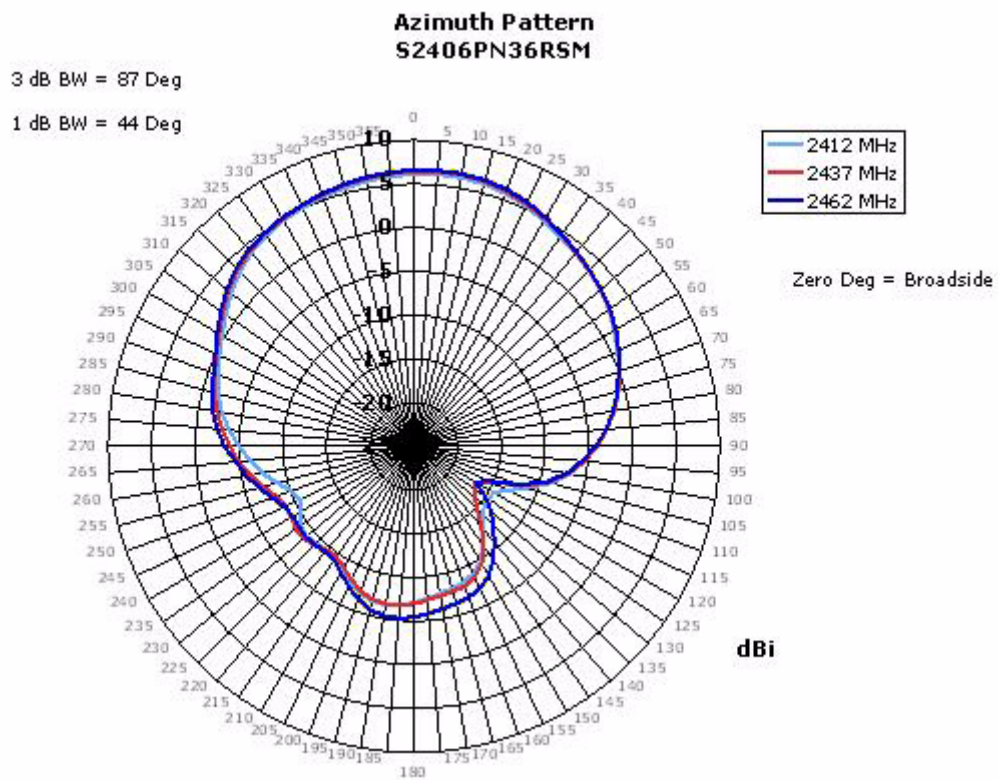
❥ Measures only 2" x 2" x 0.7"

Azimuth Pattern
SL2402PN36RSM

**Elevation Pattern
SL2402PN36RSM**

Legend:
- 2412 MHz
- 2437 MHz
- 2462 MHz

Zero Deg = Overhead

90 Deg = Horizon

dBi

7 Directional Panel Antenna

Nortel Order Number: DR4000075E6

❥ Cushcraft Model S2406PN36RSM

❥ 2.4 - 2.5 GHz, 6.5 dBi Peak Gain

❥ Well-suited for wall mounted applications

❥ Good for hallways and corridors

❥ Easy to disguise or hide

❥ 3-foot cable

❥ Measures only 5.2" x 3.8" x 0.5"

Elevation Pattern
S2406PN36RSM

3 dB BW = 58 Deg

1 dB BW = 33 Deg

Legend:
- 2412 MHz
- 2437 MHz
- 2462 MHz

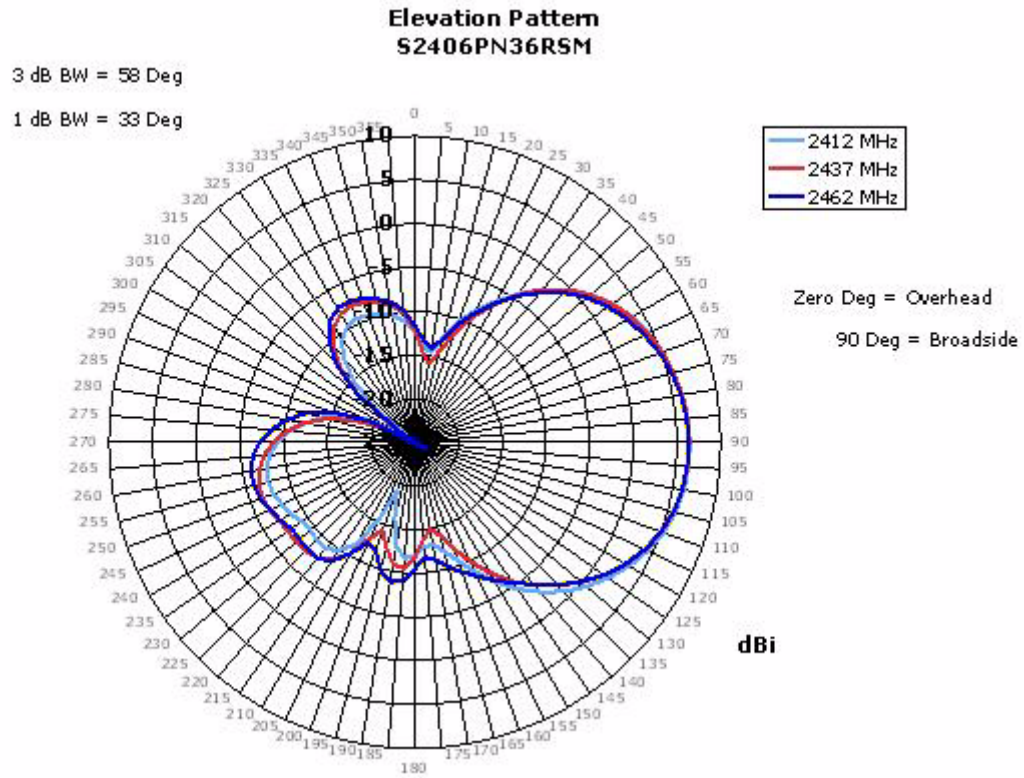Zero Deg = Overhead

90 Deg = Broadside

dBi

8   Directional Panel Antenna

Nortel Order Number: DR4000076E6

❧   Cushcraft Model S2409PN36RSM

❧   2.4 - 2.5 GHz, 8.8 dBi Peak Gain

❧   Well-suited for wall mounted applications

❧   Good for hallways and corridors where multi-path and scattering can be a problem

❧   3-foot cable

❧   Measures only 6" x 6" x 1.25"

Azimuth Pattern
S2409PN36RSM

3 dB BW = 66 Deg

1 dB BW = 30 Deg

2412 MHz
2437 MHz
2462 MHz

Zero Deg = Broadside

dBi

Elevation Pattern
S2409PN36RSM

3 dB BW = 55 Deg

1 dB BW = 31 Deg

2412 MHz
2437 MHz
2462 MHz

Zero Deg = Overhead

90 Deg = Broadside

dBi