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User manual SMC 2890W-AG
User guide SMC 2890W-AG
Operating instructions SMC 2890W-AG
Instructions for use SMC 2890W-AG
Instruction manual SMC 2890W-AG



USER GUIDE

| | |
|------------------------------|-------------------------------------------------------------|
| SMC2890W-AG / SMC2891W-AG | Elite Connect™ 802.11a/g Outdoor Enterprise Access Point |
|------------------------------|-------------------------------------------------------------|



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Manual abstract:

@@@ Copyright © 2005 by SMC Networks, Inc. 20 Mason Irvine, CA 92618 All rights reserved. Trademarks: SMC is a registered trademark; and EliteConnect is a trademark of SMC Networks, Inc. Other product and company names are trademarks or registered trademarks of their respective holders. **Compliance Federal Communication Commission 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 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:** Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. 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. **IMPORTANT NOTE: FCC Radiation Exposure Statement** This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters (8 inches) between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. **Wireless 5 GHz Band Statement:** As the access point can operate in the 5150-5250 MHz frequency band it is limited by the FCC, Industry Canada and some other countries to indoor use only so as to reduce the potential for harmful interference to co-channel Mobile Satellite systems.

High power radars are allocated as primary users (meaning they have priority) of the 5250-5350 MHz and 5650-5850 MHz bands. These radars could cause interference and/or damage to the access point. **VCCI Notice** This is a class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

EC Conformance Declaration Marking by the above 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: · · · EN 60950 (IEC 60950) - Product Safety EN 301 893 - Technical requirements for 5 GHz radio equipment EN 300 328 - Technical requirements for 2.4 GHz radio equipment EN 301 489-1 / EN 301 489-17 - EMC requirements for radio equipment **Countries of Operation & Conditions of Use in the European Community** This device is intended to be operated in all countries of the European Community. Requirements for indoor vs. outdoor operation, license requirements and allowed channels of operation apply in some countries as described below: **Note:** The user must use the configuration utility provided with this product to ensure the channels of operation are in conformance with the spectrum usage rules for European Community countries as described below. · This device requires that the user or installer properly enter the current country of operation in the command line interface as described in the user guide, before operating this device. · This device will automatically limit the allowable channels determined by the current country of operation. Incorrectly entering the country of operation may result in illegal operation and may cause harmful interference to other system. The user is obligated to ensure the device is operating according to the channel limitations, indoor/outdoor restrictions and license requirements for each European Community country as described in this document. ii · This device employs a radar detection feature required for European Community operation in the 5 GHz band.

This feature is automatically enabled when the country of operation is correctly configured for any European Community country. The presence of nearby radar operation may result in temporary interruption of operation of this device. The radar detection feature will automatically restart operation on a channel free of radar. · The 5 GHz Turbo Mode feature is not allowed for operation in any European Community country. The current setting for this feature is found in the 5 GHz 802.11a Radio Settings Window as described in the user guide. · The 5 GHz radio's Auto Channel Select setting described in the user guide must always remain enabled to ensure that automatic 5 GHz channel selection complies with European requirements. The current setting for this feature is found in the 5 GHz 802.11a Radio Settings Window as described in the user guide. · This device may be operated indoors or outdoors in all countries of the European Community using the 2.

4 GHz band: Channels 1 - 13, except where noted below. - In Italy the end-user must apply for a license from the national spectrum authority to operate this device outdoors. - In Belgium outdoor operation is only permitted using the 2.46 - 2.4835 GHz band: Channel 13.

- In France outdoor operation is only permitted using the 2.4 - 2.454 GHz band: Channels 1 - 7 **Operation Using 5 GHz Channels in the European Community** The user/installer must use the provided configuration utility to check the current channel of operation and make necessary configuration changes to ensure operation occurs in conformance with European National spectrum usage laws as described below and elsewhere in this document. Allowed 5GHz Channels in Each European Community Country Allowed Frequency Bands 5.15 - 5.

25 GHz* 5.15 - 5.35 GHz* 5.15 - 5.35* & 5.470 - 5.725 GHz Allowed Channel Numbers 36, 40, 44, 48 36, 40, 44, 48, 52, 56, 60, 64 36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140 **Countries** Austria, Belgium France, Switzerland, Liechtenstein Denmark, Finland, Germany, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, U.



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K. iii Allowed 5GHz Channels in Each European Community Country Allowed Frequency Bands 5 GHz Operation Not Allowed Allowed Channel Numbers
None Countries Greece * Outdoor operation is not allowed using 5.15-5.

35 GHz bands (Channels 36 - 64). Channels 36 - 64 are currently not available for use. Safety Compliance Power Cord Safety Please read the following safety information carefully before installing the device: Warning: Installation and removal of the unit must be carried out by qualified personnel only. The unit must be connected to an earthed (grounded) outlet to comply with international safety standards. Do not connect the unit to an A.C. outlet (power supply) without an earth (ground) connection. The appliance coupler (the connector to the unit and not the wall plug) must have a configuration for mating with an EN 60320/IEC 320 appliance inlet. The socket outlet must be near to the unit and easily accessible. You can only remove power from the unit by disconnecting the power cord from the outlet.

This unit operates under SELV (Safety Extra Low Voltage) conditions according to IEC 60950. The conditions are only maintained if the equipment to which it is connected is also operated under SELV conditions. France and Peru only This unit cannot be powered from IT supplies. If your supplies are of IT type, this unit must be powered by 230 V (2P+T) via an isolation transformer ratio 1:1, with the secondary connection point labelled Neutral, connected directly to earth (ground). Impédance à la terre Important! Before making connections, make sure you have the correct cord set.

Check it (read the label on the cable) against the following: iv Power Cord Set U.S.A. and Canada The cord set must be UL-approved and CSA certified. The minimum specifications for the flexible cord are: - No.

18 AWG - not longer than 2 meters, or 16 AWG. - Type SV or SJ - 3-conductor The cord set must have a rated current capacity of at least 10 A The attachment plug must be an earth-grounding type with NEMA 5-15P (15 A, 125 V) or NEMA 6-15P (15 A, 250 V) configuration. Denmark Switzerland U.K. The supply plug must comply with Section 107-2-D1, Standard DK2-1a or DK2-5a. The supply plug must comply with SEV/ASE 1011. The supply plug must comply with BS1363 (3-pin 13 A) and be fitted with a 5 A fuse which complies with BS1362. The mains cord must be <HAR> or <BASEC> marked and be of type HO3VVF3GO.75 (minimum). Europe The supply plug must comply with CEE7/7 ("SCHUKO").

The mains cord must be <HAR> or <BASEC> marked and be of type HO3VVF3GO.75 (minimum). IEC-320 receptacle. Veuillez lire à fond l'information de la sécurité suivante avant d'installer l'appareil: AVERTISSEMENT: L'installation et la dépose de ce groupe doivent être confiés à un personnel qualifié. Ne branchez pas votre appareil sur une prise secteur (alimentation électrique) lorsqu'il n'y a pas de connexion de mise à la terre (mise à la masse). Vous devez raccorder ce groupe à une sortie mise à la terre (mise à la masse) afin de respecter les normes internationales de sécurité. Le coupleur d'appareil (le connecteur du groupe et non pas la prise murale) doit respecter une configuration qui permet un branchement sur une entrée d'appareil EN 60320/IEC 320. La prise secteur doit se trouver à proximité de l'appareil et son accès doit être facile. Vous ne pouvez mettre l'appareil hors circuit qu'en débranchant son cordon électrique au niveau de cette prise. v L'appareil fonctionne à une tension extrêmement basse de sécurité qui est conforme à la norme IEC 60950. Ces conditions ne sont maintenues que si l'équipement auquel il est raccordé fonctionne dans les mêmes conditions. France et Pérou uniquement: Ce groupe ne peut pas être alimenté par un dispositif à impédance à la terre. Si vos alimentations sont du type impédance à la terre, ce groupe doit être alimenté par une tension de 230 V (2 P+T) par le biais d'un transformateur d'isolement à rapport 1:1, avec un point secondaire de connexion portant l'appellation Neutre et avec raccordement direct à la terre (masse). Cordon électrique - Il doit être agréé dans le pays d'utilisation Etats-Unis et Canada: Le cordon doit avoir reçu l'homologation des UL et un certificat de la CSA. Les spécifications minimales pour un câble flexible sont AWG No.

18, ou AWG No. 16 pour un câble de longueur inférieure à 2 mètres. - type SV ou SJ - 3 conducteurs Le cordon doit être en mesure d'acheminer un courant nominal d'au moins 10 A. Location Filter Control VLAN WDS Settings AP Management Administration System Log RSSI SNMP Configuring SNMP and Trap Message Parameters Configuring SNMPv3 Users Configuring SNMPv3 Trap Filters Configuring SNMPv3 Targets Radio Interface Radio Settings A (802.11a) Radio Settings G (802.

11g) Security Status Information Access Point Status Station Status Event Logs STP Status 4-4 4-5 4-6 4-7 4-8 5-1 5-1 5-1 5-2 5-3 6-1 6-2 6-3 6-5 6-7 6-11 6-12 6-17 6-19 6-21 6-27 6-28 6-33 6-37 6-40 6-41 6-46 6-48 6-50 6-51 6-53 6-68 6-70 6-88 6-88 6-91 6-93 6-95 x Contents Chapter 7: Command Line Interface Using the Command Line Interface Accessing the CLI Console Connection Telnet Connection Entering Commands Keywords and Arguments Minimum Abbreviation Command Completion Getting Help on Commands Partial Keyword Lookup Negating the Effect of Commands Using Command History Understanding Command Modes Exec Commands Configuration Commands Command Line Processing Command Groups General Commands configure end exit ping reset show history show line System Management Commands country prompt system name username password ip ssh-server enable ip ssh-server port ip telnet-server enable ip http port ip http server ip http session-timeout ip https port ip https server web-redirect APmgmtIP APmgmtUI show apmanagement 7-1 7-1 7-1 7-1 7-1 7-2 7-2 7-2 7-3 7-3 7-4 7-4 7-4 7-4 7-5 7-5 7-6 7-6 7-7 7-8 7-8 7-8 7-9 7-10 7-10 7-11 7-11 7-12 7-14 7-14 7-15 7-15 7-16 7-16 7-17 7-17 7-18 7-18 7-19 7-19 7-20 7-21 7-22 7-22 xi Contents show system show version show config show hardware System Logging Commands logging on logging host logging console logging level logging facility-type logging clear show logging show event-log System Clock Commands snmp-server ip snmp-server enable snmp-server date-time snmp-server daylight-saving snmp-server timezone show snmp DHCP Relay Commands dhcp-relay enable dhcp-relay show dhcp-relay SNMP Commands snmp-server community snmp-server contact snmp-server location snmp-server enable server snmp-server host snmp-server trap snmp-server engine-id snmp-server user snmp-server targets snmp-server filter snmp-server filter-assignments show snmp groups show snmp users show snmp group-assignments show snmp target show snmp filter show snmp filter-assignments show snmp Flash/File Commands bootfile xii 7-24 7-25 7-25 7-29 7-29 7-30 7-30 7-31 7-31 7-32 7-33 7-33 7-34 7-34 7-35 7-35 7-36 7-37 7-37 7-38 7-39 7-39 7-40 7-40 7-41 7-42 7-42 7-43 7-43 7-44 7-45 7-46 7-47 7-49 7-50 7-51 7-51 7-52 7-52 7-53 7-53 7-54 7-55 7-56 7-56 Contents copy delete dir show bootfile RADIUS Client radius-server address radius-server port radius-server key radius-server retransmit radius-server timeout radius-server port-accounting radius-server timeout-interim radius-server radius-mac-format radius-server vlan-format show radius 802.



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IX Authentication 802.1x 802.1x broadcast-key-refresh-rate 802.1x session-key-refresh-rate 802.1x session-timeout 802.1x-supplicant enable 802.1x-supplicant user show authentication MAC Address Authentication address filter default address filter entry address filter delete mac-authentication server mac-authentication session-timeout Filtering Commands filter local-bridge filter ap-manage filter enable filter uplink filter ethernet-type enable filter ethernet-type protocol show filters WDS Bridge Commands bridge mode bridge role (WDS) bridge channel-auto-sync bridge-link parent bridge-link child bridge dynamic-entry age-time show bridge aging-time 7-57 7-58 7-59 7-59 7-60 7-60 7-61 7-61 7-62 7-62 7-63 7-63 7-64 7-64 7-65 7-66 7-67 7-68 7-68 7-69 7-69 7-70 7-71 7-71 7-72 7-72 7-73 7-73 7-74 7-75 7-75 7-76 7-76 7-77 7-78 7-78 7-79 7-79 7-80 7-80 7-81 7-82 7-82 xiii Contents show bridge filter-entry show bridge link Spanning Tree Commands bridge stp enable bridge stp forwarding-delay bridge stp hello-time bridge stp max-age bridge stp priority bridge-link path-cost bridge-link port-priority show bridge stp Ethernet Interface Commands interface ethernet dns server ip address ip dhcp speed-duplex shutdown show interface ethernet Wireless Interface Commands interface wireless vap speed turbo multicast-data-rate channel transmit-power radio-mode preamble antenna control antenna id antenna location beacon-interval dtim-period fragmentation-length rts-threshold super-a super-g description ssid closed-system max-association assoc-timeout-interval auth-timeout-value shutdown xiv 7-83 7-83 7-85 7-85 7-86 7-86 7-87 7-87 7-88 7-88 7-89 7-90 7-90 7-91 7-91 7-92 7-93 7-94 7-94 7-95 7-97 7-97 7-98 7-98 7-99 7-100 7-100 7-101 7-102 7-103 7-103 7-104 7-104 7-105 7-105 7-106 7-107 7-108 7-108 7-109 7-109 7-110 7-110 7-111 7-111 7-111 7-111 Contents show interface wireless show station Rogue AP Detection Commands rogue-ap enable rogue-ap authenticate rogue-ap duration rogue-ap interval rogue-ap scan show rogue-ap Wireless Security Commands auth encryption key transmit-key cipher-suite mic_mode wpa-pre-shared-key pmksa-lifetime pre-authentication Link Integrity Commands link-integrity ping-detect link-integrity ping-host link-integrity ping-interval link-integrity ping-fail-retry link-integrity ethernet-detect show link-integrity IAPP Commands iapp VLAN Commands vlan management-vlanid vlan-id WMM Commands wmm wmm-acknowledge-policy wmmparam Appendix A: Troubleshooting Appendix B: Cables and Pinouts Twisted-Pair Cable Assignments 10/100BASE-TX Pin Assignments Straight-Through Wiring 7-113 7-115 7-116 7-116 7-117 7-118 7-118 7-119 7-120 7-120 7-121 7-123 7-124 7-125 7-126 7-127 7-128 7-128 7-129 7-130 7-131 7-131 7-132 7-132 7-132 7-133 7-134 7-134 7-135 7-135 7-136 7-136 7-137 7-138 7-138 7-139 A-1 B-1 B-1 B-1 B-2 xv Contents Crossover Wiring 8-Pin DIN Connector Pinout 8-Pin DIN to RJ-45 Cable Wiring Appendix C: Specifications General Specifications Sensitivity Transmit Power Appendix D: Montieren der Bridge Verwenden der Halterung für Mastmontage Verwenden der Halterung für Wandmontage Anschließen der externen Antennen Anschließen der Kabel an das Gerät Anschließen des PoE Injectors Glossary Index B-3 B-3 B-4 C-1 C-1 C-4 C-5 D-1 D-1 D-3 D-5 D-6 D-7 xvi Chapter 1: Introduction The Dual-band Outdoor Access Point / Bridge system consists of two models that provide point-to-point or point-to-multipoint bridge links between remote Ethernet LANs, and wireless access point services for clients in the local LAN area: · SMC2891W-AG Includes an integrated high-gain antenna for the 802.11a radio and is designed to operate as a "bridge node" in point-to-multipoint configurations, or provide a high-speed point-to-point wireless link between two sites that can be up to 15.4 km (9.6 miles) apart. The 802.11b/g radio requires an external antenna option. · SMC2890W-AG Provides only external antenna options and is designed to operate as the "root bridge" in point-to-multipoint configurations, supporting wireless bridge connections to as many as six units. Note: Both models can be set to operate in either "root bridge" or "bridge node" mode. Each model is housed in a weatherproof enclosure for mounting outdoors and includes its own brackets for attaching to a wall, pole, radio mast, or tower structure. The unit is powered through its Ethernet cable connection from a power injector module that is installed indoors. The wireless bridge system offers a fast, reliable, and cost-effective solution for connectivity between remote Ethernet wired LANs or to provide Internet access to an isolated site. The system is also easy to install and operate, ideal for situations where a wired link may be difficult or expensive to deploy. The wireless bridge connection provides data rates of up to 108 Mbps. In addition, both wireless bridge models offer full network management capabilities through an easy-to-use web interface, a command-line interface, and support for Simple Network Management Protocol (SNMP) tools. Radio Characteristics The IEEE 802.11a and 802.11g standards use a radio modulation technique known as Orthogonal Frequency Division Multiplexing (OFDM), and a shared collision domain (CSMA/CA). The 802.11a standard operates in the 5 GHz Unlicensed National Information Infrastructure (UNII) band, and the 802.11g standard in the 2.4 GHz band. IEEE 802.11g includes backward compatibility with the IEEE 802.11b standard. IEEE 802.11b also operates at 2.4 GHz, but uses Direct Sequence Spread Spectrum (DSSS) and Complementary Code Keying (CCK) modulation technology to achieve a communication rate of up to 11 Mbps. The wireless bridge provides a 54 Mbps half-duplex connection for each active channel (up to 108 Mbps in turbo mode on the 802.11a interface). 1-1 1 Introduction Package Checklist The Dual-band Outdoor Access Point / Bridge package includes: · · · · One Wireless Dual-band Access Point (SMC2890W-AG or SMC2891W-AG) One Category 5e network PoE cable, length 98 ft (30 m) One power injector module and power cord 5.9 ft (1.8 m) One RS232 console cable 5.9ft (1.8 m) Outdoor pole- and wall-mounting bracket kit · User Guide CD Inform your dealer if there are any incorrect, missing or damaged parts. If possible, retain the carton, including the original packing materials. Use them again to repack the product in case there is a need to return it. Hardware Description Bottom View (both models) Console Port Cover Attachment Console Port Ethernet/PoE Connector Water-Tight Test Point (DO NOT REMOVE) Integrated Antenna Top View (SMC2891W-AG) N-Type External Antenna Connector (2.4 GHz) N-Type External Antenna Connector (5 GHz) N-Type External Antenna Connector (2.4 GHz) 1-2 LED Indicators 1 Top View (SMC2890W-AG) N-Type External Antenna Connector (2.



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4 GHz) Right Antenna N-Type External Antenna Connector (5 GHz) Right Antenna N-Type External Antenna Connector (5 GHz) Left Antenna N-Type External Antenna Connector (2.4 GHz) Left Antenna LED Indicators The access point includes eight status LED indicators, as indicated in the following figure. 802.11b/g Wireless Link/Activity 11b/g 11a Power Link Power Ethernet Link/Activity 802.

11a Wireless Link/Activity The following table describes the system status LEDs. LED Power Link Status On Green On Amber On Green Flashing Green Description Indicates that the system is working normally. Indicates a system reset. Indicates a valid 10/100 Mbps Ethernet cable link. Indicates that the access point is transmitting or receiving data on a 10/100 Mbps Ethernet LAN.

Flashing rate is proportional to network activity. 1-3 1 Introduction The 11a and 11b/g LEDs operate in two display modes, which are configurable through the management interface. The RSSI mode is for aligning antennas in a bridge link. The AP mode is for indicating data traffic rates. The following table describes the wireless status LEDs in AP mode.

LED 11a (three LEDs) Status Off Description No signal detected or the 802.11a radio is disabled. Slow Flashing Green The 802.11a radio is enabled with a low level of network activity. Fast Flashing Green On Green Indicates a medium level of network activity. Indicates a high level of network activity. No signal detected or the 802.11b/g radio is disabled. 11b/g (three LEDs) Off Slow Flashing Green The 802.11b/g radio is enabled with a low level of network activity.

Fast Flashing Green On Green Indicates a medium level of network activity. Indicates a high level of network activity. The following table describes the wireless status LEDs in RSSI mode. LED 11a (three LEDs) Status Off Fast Flashing Green On Green 11b/g (three LEDs) Off Fast Flashing Green On Green Description No signal detected or the 802.11a radio is disabled. Indicates a medium level signal. Indicates a high level signal. No signal detected or the 802.11b/g radio is disabled. Indicates a medium level signal.

Indicates a high level signal. Slow Flashing Green The 802.11a radio is enabled with a low level signal. Slow Flashing Green The 802.11b/g radio is enabled with a low level signal.

1-4 1 Introduction Ethernet Port The wireless bridge has one 10BASE-T/100BASE-TX 8-pin DIN port that connects to the power injector module using the included Ethernet cable. The Ethernet port connection provides power to the wireless bridge as well as a data link to the local network. The wireless bridge appears as an Ethernet node and performs a bridging function by moving packets from the wired LAN to the remote end of the wireless bridge link. Note: The power injector module does not support Power over Ethernet (PoE) based on the IEEE 802.3af standard.

The wireless bridge unit must always be powered on by being connected to the power injector module. Power Injector Module The wireless bridge receives power through its network cable connection using power-over-Ethernet technology. A power injector module is included in the wireless bridge package and provides two RJ-45 Ethernet ports, one for connecting to the wireless bridge (Output), and the other for connecting to a local LAN switch (Input). The Input port uses an MDI (i.e., internal straight-through) pin configuration. You can therefore use straight-through twisted-pair cable to connect this port to most network interconnection devices such as a switch or router that provide MDI-X ports. However, when connecting the access point to a workstation or other device that does not have MDI-X ports, you must use crossover twisted-pair cable. LED Indicator AC Power Socket (Hidden) Input Output Ethernet from Local Network Ethernet and Power to Wireless Bridge The wireless bridge does not have a power switch. It is powered on when its Ethernet port is connected to the power injector module, and the power injector module is connected to an AC power source.

The power injector includes one LED indicator that turns on when AC power is applied. 1-6 Grounding Point The power injector module automatically adjusts to any AC voltage between 100-240 volts at 50 or 60 Hz. No voltage range settings are required. Warning: The power injector module is designed for indoor use only. Never mount the power injector outside with the wireless bridge unit. Grounding Point Even though the wireless bridge includes its own built-in lightning protection, it is important that the unit is properly connected to ground. A grounding screw is provided for attaching a ground wire to the unit. Water Tight Test Point Caution: Do not remove or loosen this screw. Doing so could lead to damage of the unit. Wall- and Pole-Mounting Bracket Kit The wireless bridge includes a bracket kit that can be used to mount the bridge to a wall, pole, radio mast, or part of a tower structure.

1-7 1 Introduction System Configuration At each location where a unit is installed, it must be connected to the local network using the power injector module. The following figure illustrates the system component connections. External Antenna Indoor LAN Switch Ethernet Cable Power Injector AC Power Outdoor Ethernet Cable Lightning Arrestor RF Coaxial Cable Wireless Bridge Unit Ground Wire Features and Benefits · SMC2891W-AG units support a 5 GHz point-to-point wireless link up 15.4 km (at 6 Mbps data rate) using integrated high-gain 17 dBi antennas · SMC2890W-AG units support 5 GHz point-to-multipoint links using various external antenna options · Both SMC2890W-AG and SMC2891W-AG units also support access point services for the 5 GHz and 2.4 GHz radios using various external antenna options · Maximum data rate up to 108 Mbps on the 802.

11a (5 GHz) radio · Outdoor weatherproof design · IEEE 802.11a and 802.11b/g compliant · Local network connection via 10/100 Mbps Ethernet port · Powered through its Ethernet cable connection to the power injector module · Includes wall- and pole-mount bracket · Security through 64/128/152-bit Wired Equivalent Protection (WEP) or 128-bit Advanced Encryption Standard (AES) encryption · Scans all available channels and selects the best channel and data rate based on the signal-to-noise ratio · Manageable through an easy-to-use web-browser interface, command line (via Telnet), or SNMP network management tools 1-8 Chapter 2: Network Configuration The Dual-band Outdoor Access Point / Bridge system provides access point and bridging services through either the 5 GHz or 2.4 GHz radio interfaces. The wireless bridge units can be used just as normal 802.

11a/b/g access points connected to a local wired LAN, providing connectivity and roaming services for wireless clients in an outdoor area. Units can also be used purely as bridges connecting remote LANs.



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Alternatively, you can employ both access point and bridging functions together, offering a flexible and convenient wireless solution for many applications. This chapter describes the role of Dual-band Outdoor Access Point / Bridge in various wireless network configurations. Access Point Topologies Operating as an outdoor access point, the unit is deployed in an integrated configuration with wired Ethernet LANs, providing network access to wireless stations in the wireless coverage area. The access point's radios can support these modes: · Infrastructure wireless LAN · Infrastructure wireless LAN with roaming · Point-to-point bridge link · Point-to-multipoint bridge links The 802.11b and 802.11g frequency band, which operates at 2.4 GHz, can easily encounter interference from other 2.4 GHz devices, such as other 802.

11b or g wireless devices, cordless phones and microwave ovens. If you experience poor wireless LAN performance, try the following measures: · Limit any possible sources of radio interference within the service area · Increase the distance between neighboring access points · Increase the channel separation of neighboring access points (e.g., up to 3 channels of separation for 802.11b or up to 5 channels for 802.11g) 2-1 2 Network Configuration Infrastructure

Wireless LAN The access point function of the wireless bridge provides access to a wired LAN for 802.11a/b/g wireless workstations. An integrated wired/wireless LAN is called an Infrastructure configuration. A Basic Service Set (BSS) consists of a group of wireless PC users and an access point that is directly connected to the wired LAN. Each wireless PC in a BSS can connect to any computer in its wireless group or access other computers or network resources in the wired LAN infrastructure through the access point.

The infrastructure configuration not only extends the accessibility of wireless PCs to the wired LAN, but also increases the effective wireless transmission range for wireless PCs by passing their signals through one or more access points. A wireless infrastructure can be used for access to a central database, or for connection between mobile workers, as shown in the following figure. Wired LAN Extension to Wireless Clients Server Desktop PC Switch Access Point Notebook PC Desktop PC 2-2 Access Point Topologies 2 Infrastructure Wireless LAN for Roaming Wireless PCs The Basic Service Set (BSS) defines the communications domain for each access point and its associated wireless clients. The BSS ID is a 48-bit binary number based on the access point's wireless MAC address, and is set automatically and transparently as clients associate with the access point. The BSS ID is used in frames sent between the access

point and its clients to identify traffic in the service area.

The BSS ID is only set by the access point, never by its clients. The clients only need to set the Service Set Identifier (SSID) that identifies the service set provided by one or more access points. The SSID can be manually configured by the clients, can be detected in an access point's beacon, or can be obtained by querying for the identity of the nearest access point. For clients that do not need to roam, set the SSID for the wireless card to that used by the access point to which you want to connect. A wireless infrastructure can also support roaming for mobile workers.

More than one access point can be configured to create an Extended Service Set (ESS). By placing the access points so that a continuous coverage area is created, wireless users within this ESS can roam freely. All wireless network card adapters and wireless access points within a specific ESS must be configured with the same SSID. Seamless Roaming Between Access Points Server Desktop PC Switch Access Point Notebook PC Access Point <BSS 2> <BSS 1> Desktop PC <ESS> 2-3 2 Network Configuration Bridge Link Topologies The IEEE 802.11 standard defines a Wireless Distribution System (WDS) for bridge connections between BSS areas (access points). The outdoor wireless bridge uses WDS to forward traffic on links between units. Up to 5 WDS links can be specified for a SMC2890W-AG unit, which acts as the "Master" in the wireless bridge network. Other SMC2891W-AG units support only one WDS link, which must be to the network's master unit. The unit supports WDS bridge links on either the 5 GHz (802.11a) or 2.

4 GHz (802.11b/g) bands and can be used with various external antennas to offer flexible deployment options. Note: The external antennas offer longer range options using the 5 GHz radio, which makes this interface more suitable for bridge links. The 2.4GHz radio has various types of antenna options, but the 8dBi omnidirectional antenna is better suited for local access point services. When using WDS on a radio band, only wireless bridge units can associate to each other. Wireless clients can only associate with the wireless bridge using a radio band set to access point mode. Point-to-Point Configuration Two SMC2891W-AG bridges can form a wireless point-to-point link using their integrated 5 GHz (802.11a) antennas. A point-to-point configuration can provide a limited data rate (6 Mbps) link over a long range (up to 15.

4 km), or a high data rate (108 Mbps) over a short range (1.3 km). SMC2891W-AG SMC2891W-AG LAN LAN 2-4 Bridge Link Topologies 2 Point-to-Multipoint Configuration A SMC2890W-AG wireless bridge can use an omnidirectional or sector antenna to connect to as many as 6 bridges in a point-to-multipoint configuration. There can only be one "Master" unit in the wireless bridge network, all other bridges must be "Slave" units. Using the 5 GHz 8 dBi omnidirectional external antenna, the SMC2890W-AG can connect to SMC2891W-AG units up to 3.

3 km (2 miles) away. Using the 13.5 dBi 120-degree sector antenna, the SMC2890W-AG can connect to SMC2891W-AG units up to 10.3 km (6.4 miles) away.

SMC2891W-AG SMC2891W-AG SMC2891W-AG SMC2890W-AG with Omnidirectional Antenna SMC2891W-AG SMC2891W-AG SMC2891W-AG SMC2891W-AG SMC2890W-AG with Sector Antenna SMC2891W-AG SMC2891W-AG 2-5 2 Network Configuration 2-6 Chapter 3: Bridge Link Planning The Dual-band Outdoor Access Point / Bridge supports fixed point-to-point or point-to-multipoint wireless links. A single link between two points can be used to connect a remote site to larger core network. Multiple bridge links can provide a way to connect widespread Ethernet LANs. For each link in a wireless bridge network to be reliable and provide optimum performance, some careful site planning is required. This chapter provides guidance and information for planning your wireless bridge links. Note: The planning and installation of the wireless bridge requires professional personnel that are trained in the installation of radio transmitting equipment.



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The user is responsible for compliance with local regulations concerning items such as antenna power, use of lightning arrestors, grounding, and radio mast or tower construction. Therefore, it is recommended to consult a professional contractor knowledgeable in local radio regulations prior to equipment installation. Data Rates Using its 5 GHz integrated antenna, the SMC2891W-AG bridge can operate over a range of up to 15.4 km (9.

6 miles) or provide a high-speed connection of 54 Mbps (108 Mbps in turbo mode). However, the maximum data rate for a link decreases as the operating range increases. When you are planning each wireless bridge link, take into account the maximum distance and data rates for the various antenna options. See "Transmit Power" on page C-5. Radio Path Planning Although the wireless bridge uses IEEE 802.11a radio technology, which is capable of reducing the effect of multipath signals due to obstructions, the wireless bridge link requires a "radio line-of-sight" between the two antennas for optimum performance. The concept of radio line-of-sight involves the area along a radio link path through which the bulk of the radio signal power travels. This area is known as the first Fresnel Zone of the radio link. For a radio link not to be affected by obstacles along its path, no object, including the ground, must intrude within 60% of the first Fresnel Zone. The following figure illustrates the concept of a good radio line-of-sight.

3-1 3 Bridge Link Planning Visual Line of Sight Radio Line of Sight If there are obstacles in the radio path, there may still be a radio link but the quality and strength of the signal will be affected. Calculating the maximum clearance from objects on a path is important as it directly affects the decision on antenna placement and height. It is especially critical for long-distance links, where the radio signal could easily be lost. When planning the radio path for a wireless bridge link, consider these factors:

- Avoid any partial line-of-sight between the antennas.
- Be cautious of trees or other foliage that may be near the path, or may grow and obstruct the path.

- Be sure there is enough clearance from buildings and that no building construction may eventually block the path.
- Check the topology of the land between the antennas using topographical maps, aerial photos, or even satellite image data (software packages are available that may include this information for your area)
- Avoid a path that may incur temporary blockage due to the movement of cars, trains, or aircraft.

Antenna Height A reliable wireless link is usually best achieved by mounting the antennas at each end high enough for a clear radio line of sight between them. The minimum height required depends on the distance of the link, obstacles that may be in the path, topology of the terrain, and the curvature of the earth (for links over 3 miles). For long-distance links, a mast or pole may need to be constructed to attain the minimum required height.

Use the following table to estimate the required minimum clearance above the ground or path obstruction. 3-2 Radio Path Planning . 3 Total Link Distance Max Clearance for 60% of First Fresnel Zone at 5.8 GHz

| | | | | | | | | | | | | |
|----------------|-----------------|--------------|-----------------|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|----------------|-------------------------------------------|
| 4.5 ft (1.4 m) | 6.4 ft (1.95 m) | 9 ft (2.7 m) | 12.7 ft (3.9 m) | 15.6 ft (4.8 m) | 18 ft (5.5 m) | 20 ft (6.1 m) | 24 ft (7.3 m) | 27 ft (8.2 m) | 31 ft (9.5 m) | 35 ft (10.7 m) | 37 ft (11.3 m) | Approximate Clearance for Earth Curvature |
| 0 | 0 | 0 | 0 | 1 | | | | | | | | |

| | | | | | | | | | | | | |
|--------------|----------------|--------------|--------------|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|----------------|-------------------------------------------|
| 8 ft (0.5 m) | 3.2 ft (1.0 m) | 5 ft (1.5 m) | 9 ft (2.7 m) | 15.6 ft (4.8 m) | 18 ft (5.5 m) | 20 ft (6.1 m) | 24 ft (7.3 m) | 27 ft (8.2 m) | 31 ft (9.5 m) | 35 ft (10.7 m) | 37 ft (11.3 m) | Approximate Clearance for Earth Curvature |
| 0 | 0 | 0 | 0 | 1 | | | | | | | | |

| | | | | | | | | | | | | |
|--------------|----------------|--------------|--------------|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|----------------|-------------------------------------------|
| 8 ft (0.5 m) | 3.2 ft (1.0 m) | 5 ft (1.5 m) | 9 ft (2.7 m) | 15.6 ft (4.8 m) | 18 ft (5.5 m) | 20 ft (6.1 m) | 24 ft (7.3 m) | 27 ft (8.2 m) | 31 ft (9.5 m) | 35 ft (10.7 m) | 37 ft (11.3 m) | Approximate Clearance for Earth Curvature |
| 0 | 0 | 0 | 0 | 1 | | | | | | | | |

| | | | | | | | |
|------|-----------------------------------------------|----------------|-----------------|--------------|-----------------|-----------------|-----------------|
| 7 m) | Total Clearance Required at Mid-point of Link | 4.5 ft (1.4 m) | 6.4 ft (1.95 m) | 9 ft (2.7 m) | 12.7 ft (3.9 m) | 17.4 ft (5.3 m) | 21.1 ft (6.4 m) |
|------|-----------------------------------------------|----------------|-----------------|--------------|-----------------|-----------------|-----------------|

| | | | | | | | | | |
|--------------|---------------|------------------|----------------|----------------|----------------|--------------|-------------------|------------------|-----------------|
| 2 ft (0.6 m) | 25 ft (7.6 m) | 33.8 ft (10.3 m) | 43 ft (13.1 m) | 60 ft (18.3 m) | 80 ft (24.4 m) | 95 ft (29 m) | 0.25 mile (402 m) | 0.5 mile (805 m) | 1 mile (1.6 km) |
|--------------|---------------|------------------|----------------|----------------|----------------|--------------|-------------------|------------------|-----------------|

| | | | | | | |
|-------|------------------|------------------|------------------|----------------|-------------------|-------------------|
| 6 km) | 2 miles (3.2 km) | 3 miles (4.8 km) | 4 miles (6.4 km) | 5 miles (8 km) | 7 miles (11.3 km) | 9 miles (14.4 km) |
|-------|------------------|------------------|------------------|----------------|-------------------|-------------------|

5 km) 12 miles (19.3 km) 15 miles (24.1 km) 17 miles (27.4 km) Note that to avoid any obstruction along the path, the height of the object must be added to the minimum clearance required for a clear radio line-of-sight. Consider the following simple example, illustrated in the figure below.

Visual Line of Sight Radio Line of Sight 3 miles (4.8 km) 2.4 m A 17 m 5.4 m B 1.4 m 9m 20 m 12 m A wireless bridge link is deployed to connect building A to a building B, which is located three miles (4.8 km) away. Mid-way between the two buildings is a small tree-covered hill. From the above table it can be seen that for a three-mile link, the object clearance required at the mid-point is 5.3 m (17.4 ft).

The tree-tops on the hill are at an elevation of 17 m (56 ft), so the antennas at each end of the link need to be at least 22.3 m (73 ft) high. Building A is six stories high, or 20 m (66 ft), so a 2.3 m (7.5 ft) mast or pole must be constructed on its roof to achieve the required antenna height.

Building B is only three stories high, or 9 m (30 ft), but is located at an elevation that is 12 m (39 ft) higher than building A. To mount an antenna at the required height on building B, a mast or pole of only 1.3 m (4.3 ft) is needed. Warning: Never construct a radio mast, pole, or tower near overhead power lines.

Note: Local regulations may limit or prevent construction of a high radio mast or tower. If your wireless bridge link requires a high radio mast or tower, consult a professional contractor for advice. Antenna Position and Orientation Once the required antenna height has been determined, other factors affecting the precise position of the wireless bridge must be considered:

- Be sure there are no other radio antennas within 2 m (6 ft) of the wireless bridge
- Place the wireless bridge away from power and telephone lines
- Avoid placing the wireless bridge too close to any metallic, reflective surfaces, such as roof-installed air-conditioning equipment, tinted windows, wire fences, or water pipes
- The wireless bridge antennas at both ends of the link must be positioned with the same polarization direction, either horizontal or vertical

Antenna Polarization -- The wireless bridge's integrated antenna sends a radio signal that is polarized in a particular direction. The antenna's receive sensitivity is also higher for radio signals that have the same polarization. To maximize the performance of the wireless link, both antennas must be set to the same polarization direction.

The unit should be mounted with the antenna sockets facing upwards. Antenna sockets should point upwards in a vertical manner 3-4 Ethernet Cabling 3 Radio Interference The avoidance of radio interference is an important part of wireless link planning. Interference is caused by other radio transmissions using the same or an adjacent channel frequency. You should first scan your proposed site using a spectrum analyzer to determine if there are any strong radio signals using the 802.



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11a channel frequencies.

Always use a channel frequency that is furthest away from another signal. If radio interference is still a problem with your wireless bridge link, changing the antenna polarization direction may improve the situation. This is only recommended when the integrated internal antenna is used. Weather Conditions When planning wireless bridge links, you must take into account any extreme weather conditions that are known to affect your location. Consider these factors: · Temperature -- The wireless bridge is tested for normal operation in temperatures from -40°C to 60°C. Operating in temperatures outside of this range may cause the unit to fail. · Wind Velocity -- The wireless bridge can operate in winds up to 44 m/s and survive higher wind speeds up to 66 m/s. You must consider the known maximum wind velocity and direction at the site and be sure that any supporting structure, such as a pole, mast, or tower, is built to withstand this force. · Lightning -- The wireless bridge includes its own built-in lightning protection. However, you should make sure that the unit, any supporting structure, and cables are all properly grounded.

Additional protection using lightning rods, lightning arrestors, or surge suppressors may also be employed. · Rain -- The wireless bridge is weatherproofed against rain. Also, prolonged heavy rain has no significant effect on the radio signal. However, it is recommended to apply weatherproof sealing tape around the Ethernet port and antenna connectors for extra protection. If moisture enters a connector, it may cause a degradation in performance or even a complete failure of the link. · Snow and Ice -- Falling snow, like rain, has no significant effect on the radio signal. However, a build up of snow or ice on antennas may cause the link to fail. In this case, the snow or ice has to be cleared from the antennas to restore operation of the link. Ethernet Cabling When a suitable antenna location has been determined, you must plan a cable route from the wireless bridge outdoors to the power injector module indoors. Consider these points: · The Ethernet cable length should never be longer than 100 m (328 ft) · Determine a building entry point for the cable 3-5 3 Bridge Link Planning · Determine if conduits, bracing, or other structures are required for safety or protection of the cable · For lightning protection at the power injector end of the cable, consider using a lightning arrestor immediately before the cable enters the building Grounding It is important that the wireless bridge, cables, and any supporting structures are properly grounded.

The wireless bridge unit includes a grounding screw for attaching a ground wire. Be sure that grounding is available and that it meets local and national electrical codes. 3-6 Chapter 4: Hardware Installation Before mounting antennas to set up your wireless bridge links, be sure you have selected appropriate locations for each antenna. Follow the guidance and information in Chapter 2, "Wireless Link Planning." Also, before mounting units in their intended locations, you should first perform initial configuration and test the basic operation of the wireless bridge links in a controlled environment over a very short range.

(See the section "Testing Basic Link Operation" in this chapter.) The wireless bridge includes its own bracket kit for mounting the unit to a 1.5 to 2 inch diameter steel pole or tube, or to a wall. The pole-mounting bracket allows the unit to be mounted to part of a radio mast or tower structure. The wall-mounting option enables it to be fixed to a building wall or roof when using external antennas.

Hardware installation of the wireless bridge involves these steps: 1. Mount the unit on a wall, pole, mast, or tower using the mounting bracket. 2. 3. 4. 5. Mount external antennas directly on the bridge or on the same supporting structure as the bridge and connect them to the bridge unit. Connect the Ethernet cable and a grounding wire to the unit. Connect the power injector to the Ethernet cable, a local LAN switch, and an AC power source. Align antennas at both ends of the link.

Testing Basic Link Operation Set up the units over a very short range (15 to 25 feet), either outdoors or indoors. Connect the units as indicated in this chapter and be sure to perform all the basic configuration tasks outlined in Chapter 5: "Initial Configuration." When you are satisfied that the links are operating correctly, proceed to mount the units in their intended locations. Mount the Unit The bridge can be mounted in the following ways using the included mounting bracket: · To a 1.5 to 2 inch diameter Pole · To a wall 4-1 4 Hardware Installation The bridge's mounting bracket has four parts. One rectangular plate that is used for pole and wall mounting, one square plate that attaches directly to the bridge, and two plates that form an adjustable V-shaped clamp for pole mounting. Mounting on a Pole Perform the following steps to mount the unit to a 1.5 to 2 inch diameter steel pole or tube using the mounting bracket: 1.

Fit the edges of the V-shaped clamp parts into the slots on the flat side of the rectangular plate. The inner slots are for a 1.5 inch diameter pole and the outer slots for a 2 inch diameter pole. Place the V-shaped clamp parts of the bracket around the pole and tighten the securing nuts just enough to hold the bracket to the pole. (The bracket may need to be rotated around the pole during the antenna alignment process.) 2. Fit the edges of the V-shaped part into the slots Tighten the securing bolts 3.

Attach the square mounting plate to the bridge with the supplied screws. 4-2 Mount the Unit 4 Attach the adjustable rectangular plate to the bridge with supplied screws 4. Attach the bridge with its mounting plate to the bracket already fixed to the pole. Attach the bridge to the plate on the pole 5. Use the included nuts to secure the wireless bridge to the pole bracket.

Note that the wireless bridge tilt angle may need to be adjusted during the antenna alignment process. 4-3 4 Hardware Installation Be sure to take account of the antenna polarization direction; all antennas in a link must be mounted with the same polarization. Mounting to a Wall Perform the following steps to mount the unit to a wall using the wall-mounting bracket: Note: The wall-mounting bracket does not allow the wireless bridge's integrated antenna to be aligned. It is intended for use with the unit using external antennas. 1. Attach the bracket to a wall with flat side flush against the wall (see following figure).

Position the bracket in the intended location and mark the position of the four mounting screw holes. 2. 3. 4.

Drill four holes in the wall that match the screws and wall plugs included in the bracket kit, then secure the bracket to the wall.



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Attach the square mounting plate to the bridge with the supplied screws. Use the included nuts to tightly secure the wireless bridge to the bracket. 4-4 Connect External Antennas 4 Connect External Antennas When deploying a SMC2891W-AG unit for a bridge link or access point operation, you need to mount external antennas and connect them to the bridge. Typically, a bridge link requires a 5 GHz antenna, and access point operation a 2.4 GHz antenna. SMC2890W-AG units also require an external antenna for 2.4 GHz operation. Perform these steps: 1. Mount the external antenna to the same supporting structure as the bridge, within 3 m (10 ft) distance, using the bracket supplied in the antenna package.

2. Connect the antenna to the bridge's N-type connector using the RF coaxial cable provided in the antenna package. Some omnidirectional external antennas attach directly to an N-type connector without using a coaxial cable. Apply weatherproofing tape to the antenna connectors to help prevent water entering the connectors. Set the antenna option for the corresponding antenna through the user interface. See "Antenna ID" on page 6-59 and "Antenna Control Method" on page 6-59. 3. 4. 4-5 4 Hardware Installation 2.4 GHz N-type Connector 5 GHz N-type Connector 5 GHz External High-gain Panel Antenna 2.

4 GHz External Omnidirectional Antenna RF Coaxial Cable Connect Cables to the Unit Warning: Do not connect or disconnect cables or otherwise work with the bridge during periods of lightning activity. 1. 2. 3. Attach the Ethernet cable to the Ethernet port on the wireless bridge. For extra protection against rain or moisture, apply weatherproofing tape (not included) around the Ethernet connector. Be sure to ground the unit with an appropriate grounding wire (not included) by attaching it to the grounding point on the base of the unit using the screw provided in the package. electrical codes. For additional lightning protection, use lightning rods, lightning arrestors, or surge suppressors. Caution: Be sure that grounding is available and that it meets local and national Note: The Ethernet cable included with the package is 30 m (100 ft) long.

4-6 Connect the Power Injector Console Port PoE (Ethernet) Port 4 Ground Wire Grounding Screw Ethernet Cable Connect the Power Injector To connect the wireless bridge to a power source: Caution: Do not install the power injector outdoors. The unit is for indoor installation only. Caution: Install lightning protection at the power injector end of the Ethernet cable, use a lightning arrester immediately before the cable enters the building. Note: The wireless bridge's Ethernet port does not support Power over Ethernet (PoE) based on the IEEE 802.3af standard. Do not try to power the unit by connecting it directly to a network switch that provides IEEE 802.3af PoE. Always connect the unit to the included power injector module. 1. 2. Connect the Ethernet cable from the wireless bridge to the RJ-45 port labeled "Output" on the power injector. Connect a straight-through unshielded twisted-pair (UTP) cable from a local LAN switch to the RJ-45 port labeled "Input" on the power injector. Use Category 5e or better UTP cable for 10/100BASE-TX connections. Note: The RJ-45 port on the power injector is an MDI port. If connecting directly to a computer for testing the link, use a crossover cable.

4-7 4 Hardware Installation AC power Ethernet cable from LAN switch Inp ut Ou tpu t Power LED indicator Ethernet cable to wireless bridge 1. 2. Insert the power cable plug directly into the standard AC receptacle on the power injector. Plug the other end of the power cable into a grounded, 3-pin socket, AC power source. Note: For International use, you may need to change the AC line cord. You must use a line cord set that has been approved for the receptacle type in your country. 3. Check the LED on top of the power injector to be sure that power is being supplied to the wireless bridge through the Ethernet connection. Align Antennas After wireless bridge units have been mounted, connected, and their radios are operating, the antennas must be accurately aligned to ensure optimum performance on the bridge links. This alignment process is particularly important for long-range point-to-point links. In a point-to-multipoint configuration the root bridge uses an omnidirectional or sector antenna, which does not require alignment, but bridge nodes still need to be correctly aligned with the root bridge antenna. · Point-to-Point Configurations In a point-to-point configuration, the alignment process requires two people, one at each end of the link. The use of cell phones or two-way radio communication may help with coordination. To start, you can just point the antennas at each other, using binoculars or a compass to set the general direction. For accurate alignment, you must monitor the signal strength LEDs as the antenna moves horizontally and vertically.

· Point-to-Multipoint Configurations In a point-to-multipoint configuration all bridge nodes must be aligned with the root bridge antenna. The alignment process is the same as in point-to-point links, but only the bridge node end of the link requires the alignment. 4-8 Align Antennas The signal strength LEDs indicate the received radio signal strength for a particular bridge link. The more LEDs that turn on, the stronger the signal. Alternatively, you can monitor the Receive Signal Strength Indicator (RSSI) value directly from the management interface. The higher the RSSI value, the stronger the signal. 4 When you move the antenna during alignment, the radio signal from the remote antenna can be seen to have a strong central main lobe and smaller side lobes. The object of the alignment process is to set the antenna so that it is receiving the strongest signal from the central main lobe. Vertical Scan Remote Antenna Maximum Signal Strength Position for Vertical Alignment Horizontal Scan Main Lobe Maximum RSSI Value RSSI Value Side Lobe Maximum Maximum Signal Strength Position for Horizontal Alignment To align the antennas in the link, monitor the signal strength LEDs or the RSSI value in the management interface. Start with one antenna fixed and then perform the following procedure on the other antenna: Note: The RSSI value can be configured through management interfaces to display a value for specific WDS bridge links.

See page 6-40 for more information. 11b/g Power Link High 11a Signal 11a 11b/g Power Link Medium 11a Signal 11a 11b/g Power Link Low 11a Signal 11a 4-9 4 1. Hardware Installation Pan the antenna horizontally back and forth while checking the LEDs. If using the pole-mounting bracket with the unit, you must rotate the mounting bracket around the pole. Other external antenna brackets may require a different horizontal adjustment.



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Find the point where the signal is strongest (all LEDs on) and secure the horizontal adjustment in that position. 2. Note: Sometimes there may not be a central lobe peak because vertical alignment is too far off; only two similar peaks for the side lobes are detected. In this case, fix the antenna so that it is halfway between the two peaks. 3.

4. Loosen the vertical adjustment on the mounting bracket and tilt the antenna slowly up and down while checking the LEDs. Find the point where the signal is strongest and secure the vertical adjustment in that position. 4-10 Chapter 5: Initial Configuration The Dual-band Outdoor Access Point / Bridge offers a variety of management options, including a web-based interface, a direct connection to the console port, Telnet, Secure Shell (SSH), or using SNMP software. The initial configuration steps can be made through the web browser interface or CLI. The access point requests an IP address via DHCP by default. If no response is received from the DHCP server, then the access point uses the default address 192.168.2.2.

If this address is not compatible with your network, you can first use the command line interface (CLI) as described below to configure a valid address. Note: Units sold in countries outside the United States are not configured with a specific country code. You must use the CLI to set the country code and enable wireless operation (page 5-3). Initial Setup through the CLI Required Connections The access point provides an RS-232 serial port that enables a connection to a PC or terminal for monitoring and configuration. Attach a VT100-compatible terminal, or a PC running a terminal emulation program to the access point. You can use the console cable provided with this package, or use a cable that complies with the wiring assignments shown on page B-3. To connect to the console port, complete the following steps: 1. Connect the console cable to the serial port on a terminal, or a PC running terminal emulation software, and tighten the captive retaining screws on the DB-9 connector. Connect the other end of the cable to the RS-232 serial port on the access point. Make sure the terminal emulation software is set as follows:4.

Select the appropriate serial port (COM port 1 or 2). Set the data rate to 9600 baud. Set the data format to 8 data bits, 1 stop bit, and no parity. Set flow control to none. Set the emulation mode to VT100.

When using HyperTerminal, select Terminal keys, not Windows keys. 2. 3. Once you have set up the terminal correctly, press the [Enter] key to initiate the console connection. The console login screen will be displayed.

5-1 5 Initial Configuration For a description of how to use the CLI, see "Using the Command Line Interface" on page 7-1. For a list of all the CLI commands and detailed information on using the CLI, refer to "Command Groups" on page 7-6. Initial Configuration Steps Logging In Enter "admin" for the user name.

The default password is null, so just press [Enter] at the password prompt. The CLI prompt appears displaying the access point's name. Username: admin Password: SMC Enterprise AP/Bridge# Setting the IP Address By default, the access point is configured to obtain IP address settings from a DHCP server. If a DHCP server is not available, the IP address defaults to 192.168.2.2, which may not be compatible with your network.

You will therefore have to use the command line interface (CLI) to assign an IP address that is compatible with your network. Type "configure" to enter configuration mode, then type "interface ethernet" to access the Ethernet interface-configuration mode. SMC AP#configure SMC AP(config)#interface ethernet SMC AP(config-if)# First type "no ip dhcp" to disable DHCP client mode. Then type "ip address ip-address netmask gateway," where "ip-address" is the access point's IP address, "netmask" is the network mask for the network, and "gateway" is the default gateway router. Check with your system administrator to obtain an IP address that is compatible with your network. SMC AP(if-ethernet)#no ip dhcp SMC AP(if-ethernet)#ip address 192.168.2.2 255.255.

255.0 192.168.2.254 SMC AP(if-ethernet)# After configuring the access point's IP parameters, you can access the management interface from anywhere within the attached network.

The command line interface can also be accessed using Telnet from any computer attached to the network. 5-2 Logging In Setting the Country Code Units sold in the United States are configured by default to use only radio channels 1-11 in 802.11b or 802.11g mode as defined by FCC regulations. Units sold in other countries are configured by default without a country code (i.

e., 99). You must use the CLI to set the country code. Setting the country code restricts operation of the access point to the radio channels and transmit power levels permitted for wireless networks in the specified country. Type "exit" to leave configuration mode. Then type "country ?" to display the list of countries. Select the code for your country, and enter the country command again, following by your country code (e.g., tw for Taiwan). SMC AP#country tw SMC AP# 5 Note: Command examples shown later in this manual abbreviate the console prompt to "AP" for simplicity.

Logging In There are only a few basic steps you need to complete to connect the access point to your corporate network, and provide network access to wireless clients. The access point can be managed by any computer using a web browser (Internet Explorer 5.0 or above, or Netscape 6.2 or above). Enter the default IP address: http://192.168.2.2 Logging In Enter the username "admin," the password is null, so just press just leave it blank and click LOGIN. For information on configuring a user name and password, see page 6-28. 5-3 5 Initial Configuration The home page displays the Main Menu.

5-4 Chapter 6: System Configuration Before continuing with advanced configuration, first complete the initial configuration steps described in Chapter 4 to set up an IP address for the access point. The access point can be managed by any computer using a web browser (Internet Explorer 5.0 or above, or Netscape 6.2 or above). Enter the configured IP address of the access point, or use the default address: http://192.

168.2.2 To log into the access point, enter the default user name "admin" and then press "LOGIN". When the home page displays, click on Advanced Setup. The following page will display.

The information in this chapter is organized to reflect the structure of the web screens for easy reference. However, it is recommended that you configure a user name and password as the first step under Administration to control management access to this device (page 6-28). 6-1 6 System Configuration Advanced Configuration The Advanced Configuration pages include the following options.



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