Installation and Configuration

This document is written assuming that you have already determined the 802.11 topology as described in the *Appliance Mode* sections in the *Product Guide*. Because the *Radio Resource Management (RRM)* feature automatically detects and configures the access points as they appear on the network, it is not necessary to have any access points on the network to install and configure controllers.

The controller is a slim 9 x 5.5 x 1.5 in. (22.9 x 14.0 x 3.8 cm) chassis that can be rack, desktop, or shelf mounted. As shown in the following figures, the controller is shipped with 19 in. (48.26 cm) EIA rack-mount ears and four rubber mounting feet.

The following figure shows the controller, which has two front-panel 1000BASE-SX connectors.

Note The 1000BASE-SX Network Adapters provides 100/1000 Mbps wired connections to a network through 850nM (SX) fiber-optic links using LC physical connectors.

Figure 1 Cisco 4100 Series Wireless LAN Controller

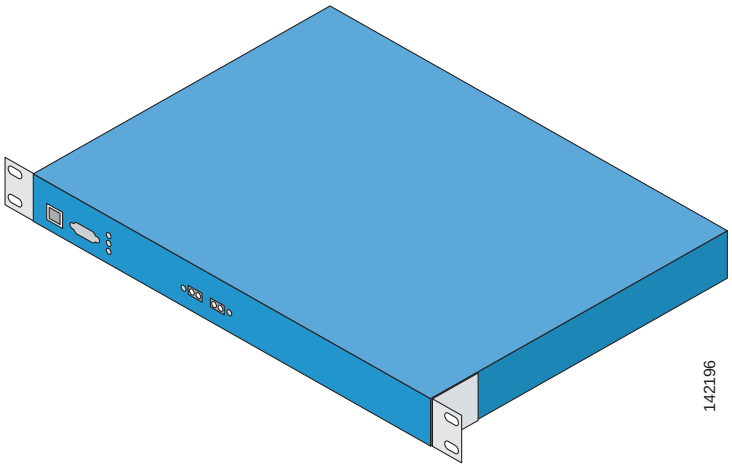
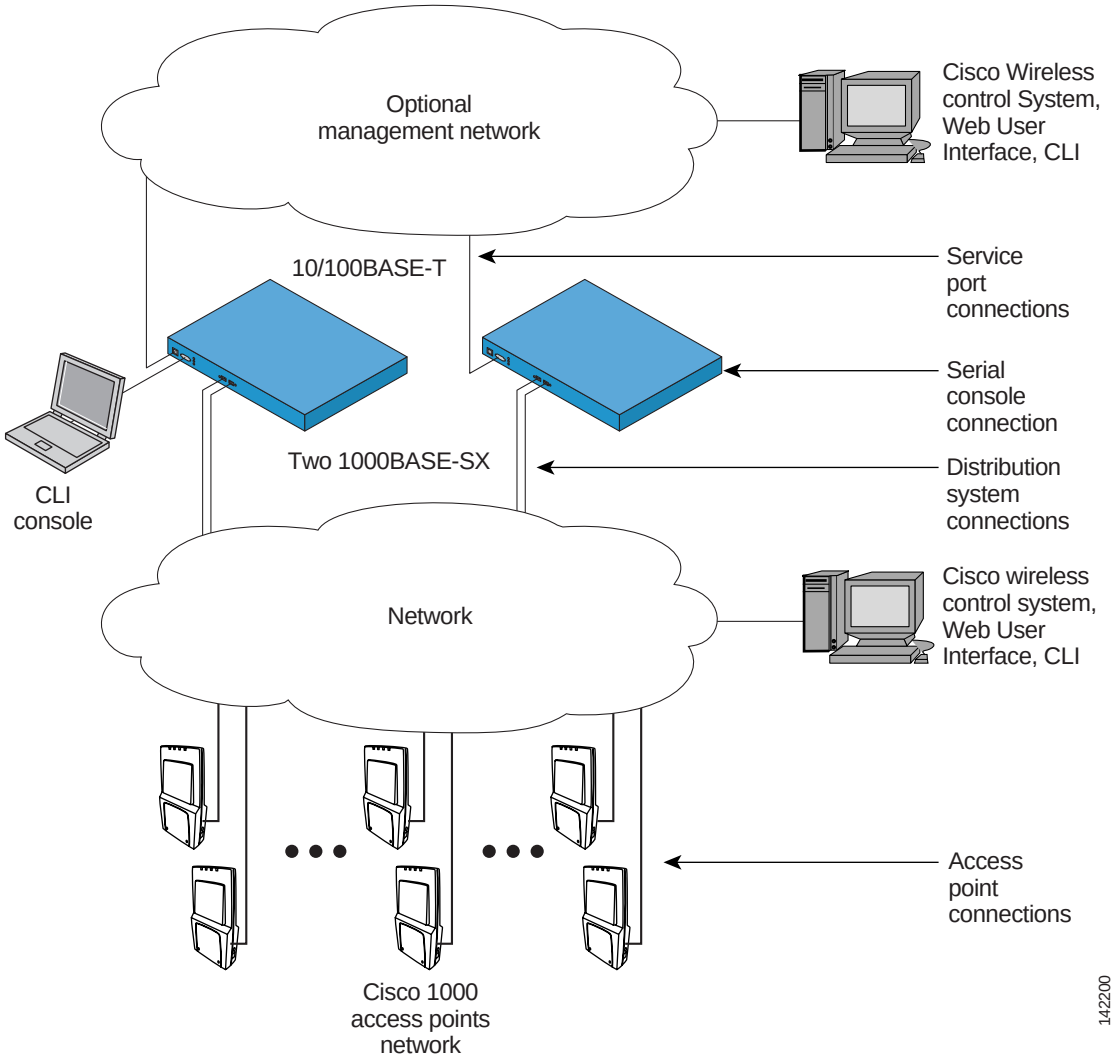


Figure 2 shows a typical controller network topology and network connections:

Figure 2 Typical Controller Topology and Network Connections

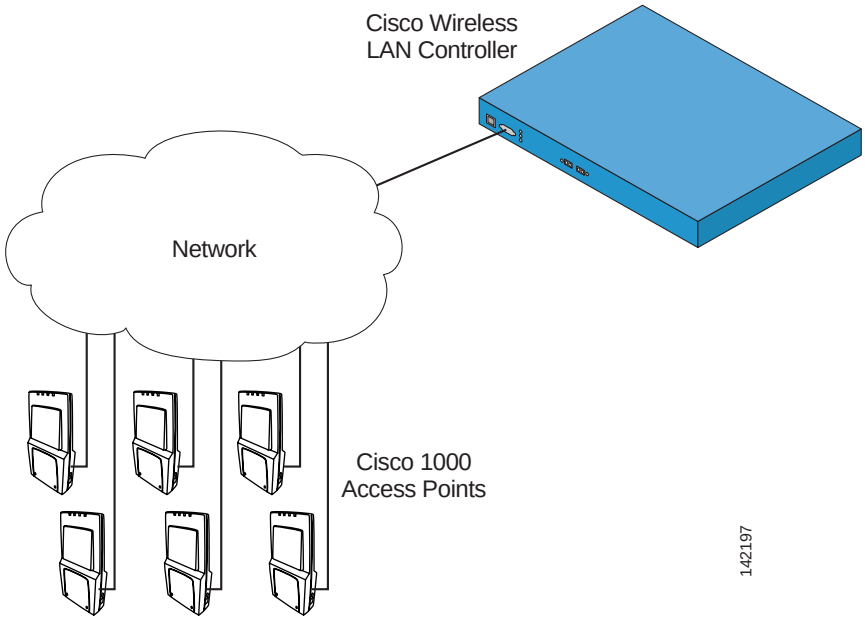


The controller communicates indirectly with up to:

- 12 associated Cisco 1000 Series lightweight access points (Model 4112).
- 24 associated Cisco 1000 Series lightweight access points (Model 4124).
- 36 associated Cisco 1000 Series lightweight access points (Model 4136).

Figure 3 shows a typical controller deployment.

Figure 3 Typical Controller Deployment



Collecting Required Tools and Information

This section lists the tools and the information that you need to have before installing the controller.

Cisco 4100 Series Wireless LAN Controller Hardware

- Controller (ships with factory-supplied power cord and mounting hardware).
- Network, Management network, and access point cables, as required.

CLI Console

- VT-100 terminal emulator on CLI console laptop or palmtop.
- Null modem serial cable to connect CLI console and the controller DB-9 console port.

Local TFTP Server

This is required for downloading error-free software updates. (Contact Cisco Technical Assistance Center (TAC) for software updates.)

Note The Cisco WCS uses an integral TFTP server. This means that third-party TFTP servers cannot run on the same workstation as the Cisco WCS, because the Cisco WCS and the third-party TFTP servers use the same communication port.

Initial System Configuration Information

Obtain the following initial configuration parameters from the wireless LAN/network planner:

- System (Controller) name.
- Administrative user name and password. (Default Administrative user name and password are *admin* and *admin*, respectively.)

Note The Service-port interface and management interface MUST be on different subnets.

- Service-Port Interface IP address configuration protocol (none or DHCP). (Refer Figure 2 for the service port location.)
- If service port configuration protocol = none, Service Port (front-panel Service port) IP Address and Service Port netmask.
- Management interface (DS Port, or Network Interface Port) IP address. (Refer to Figure 2 for the distribution system port locations.)
- Management Interface netmask.
- Management Interface default router IP address.
- VLAN identifier, if the Management Interface is assigned to a VLAN, or '0' for an untagged VLAN.
- Distribution System Physical Port number: 1 for either front panel GigE port
- IP address of the default DHCP server that will supply IP addresses to clients, the controller management interface, and optionally to the service port interface.
- LWAPP Transport Mode, LAYER2 or LAYER3 (refer to *Layer 2 and Layer 3 Operation* in the *Product Guide*).
- Virtual Gateway IP Address: one fictitious, unassigned IP address (such as 1.1.1.1) to be used by all Cisco WLAN Solution layer 3 security and mobility managers.
- Controller Mobility Group (RF Group) name, if required.
- 802.11 Network Name (SSID) for WLAN 1. This is the default SSID that the Cisco 1000 Series lightweight access points broadcast when they associate with the controller.
- Whether or not to allow Static IP Addresses for clients.
  * Yes = more convenient, but lower security (session can be hijacked), clients can supply their own IP Address, better for devices that cannot use DHCP.
  * No = less convenient, higher security, clients must use DHCP for an IP Address, works well for Windows XP devices.
- When you are configuring a RADIUS server, the server IP address, communication port, and Secret.
- Country Code for this installation. Refer to *Configuring the Cisco Wireless LAN Controller* and *Cisco WLAN Solution Supported Country Codes* in the *Product Guide*.
- 802.11b network enabled or disabled?

- 802.11a network enabled or disabled?
- 802.11g network enabled or disabled?
- *Radio Resource Management (RRM)* (Auto-RF) enabled or disabled?

Determining a Physical Location

The controller can be installed almost anywhere, but it is more secure and reliable if installed in a secure equipment room or wiring closet.

For maximum reliability, mount the controller using the following constraints:

- Be sure you can reach the controller and all cables.
- Be sure that water or excessive moisture cannot get into the controller.
- Ensure that airflow through the controller is not obstructed. Leave at least 4 inches clear on both sides of the controller chassis.
- Verify that the ambient temperature remains between 0 to 40˚ C (32 to 104˚ F).
- Be sure that the controller is within one of the following distances of equipment connected to the optional 1000BASE-SX port:
  - 220 m (722 ft.) when using 160 MHz-km rated 62.5/125 m multimode fiber.
  - 275 m (902 ft.) when using 200 MHz-km rated 62.5/125 m multimode fiber.
  - 400 m (1312 ft.) when using 400 MHz-km rated 50/125 m multimode fiber.
  - 500 m (1641 ft.) when using 500 MHz-km rated 50/125 m multimode fiber.

Note Each 1000BASE-SX connector provide 100/1000 Mbps wired connections to a network through 850nM (SX) fiber-optic links using LC physical connectors.

Warning **Class 1 laser product.** Statement 1008

Waarschuwing **Klasse-1 laser produkt.**

Varoitus **Luokan 1 lasertuote.**

Attention **Produit laser de classe 1.**

Warnung **Laserprodukt der Klasse 1.**

Avvertenza **Prodotto laser di Classe 1.**

Advarsel **Laserprodukt av klasse 1.**

Aviso **Produto laser de classe 1.**

¡Advertencia! **Producto láser Clase I.**

Varning! **Laserprodukt av klass 1.**

Figyelem **Class 1 besorolású lézeres termék.**

Предупреждение Лазерное устройство класса 1.

警告 这是 1 类激光产品。

警告 クラス1レーザー製品です。

주의 클래스 1 레이저 제품.

Aviso **Produto a laser de classe 1.**

Advarsel **Klasse 1 laserprodukt.**

تحذير **Class 1 Laser** ١ منتج

Upozorenje **Laserski proizvod klase 1**

Upozornění **Laserový výrobek třídy 1.**

Προειδοποίηση Προϊόν λέιζερ κατηγορίας 1.

אזהרה .Class 1 מוצר לייזר

Opomena Ласерски производ од класа 1.

Ostrzeżenie **Produkt laserowy klasy 1.**

Upozornenie **Laserový výrobok triedy 1.**

- Ensure that the power cord can reach a 110 or 220 VAC grounded electrical outlet.

Installing the Chassis

This section describes how to install the controller chassis.

Warning **Only trained and qualified personnel should be allowed to install, replace, or service this equipment.** Statement 1030

Waarschuwing **Deze apparatuur mag alleen worden geïnstalleerd, vervangen of hersteld door bevoegd geschoold personeel.**

Varoitus **Tämän laitteen saa asentaa, vaihtaa tai huoltaa ainoastaan koulutettu ja laitteen tunteva henkilökunta.**

Attention **Il est vivement recommandé de confier l'installation, le remplacement et la maintenance de ces équipements à des personnels qualifiés et expérimentés.**

Warnung **Das Installieren, Ersetzen oder Bedienen dieser Ausrüstung sollte nur geschultem, qualifiziertem Personal gestattet werden.**

Avvertenza **Questo apparato può essere installato, sostituito o mantenuto unicamente da un personale competente.**

Advarsel **Bare opplært og kvalifisert personell skal foreta installasjoner, utskiftninger eller service på dette utstyret.**

Aviso **Apenas pessoal treinado e qualificado deve ser autorizado a instalar, substituir ou fazer a revisão deste equipamento.**

¡Advertencia! **Solamente el personal calificado debe instalar, reemplazar o utilizar este equipo.**

Varning! **Endast utbildad och kvalificerad personal bör få tillåtelse att installera, byta ut eller reparera denna utrustning.**

Figyelem **A berendezést csak szakképzett személyek helyezhetik üzembe, cserélhetik és tarthatják karban.**

Предупреждение Установку, замену и обслуживание этого оборудования может осуществлять только специально обученный квалифицированный персонал.

警告 只有经过培训且具有资格的人员才能进行此设备的安装、更换和维修。

警告 この装置の設置、交換、保守は、訓練を受けた相応の資格のある人が行ってください。

주의 교육을 받고 자격을 갖춘 사람만 이 장비를 설치, 교체, 또는 서비스를 수행해야 합니다.

Aviso **Somente uma equipe treinada e qualificada tem permissão para instalar, substituir ou dar manutenção a este equipamento.**

Advarsel **Kun uddannede personer må installere, udskifte komponenter i eller servicere dette udstyr.**

تحذير يسمح للفنيين المتخصصين فقط بتركيب المعدة أو استبدالها أو إجراء الصيانة عليها.

Upozorenje **Uređaj smije ugrađivati, mijenjati i servisirati samo za to obučeno i osposobljeno servisno osoblje.**

Upozornění **Instalaci, výměnu nebo opravu tohoto zařízení smějí provádět pouze proškolené a kvalifikované osoby.**

Προειδοποίηση Η τοποθέτηση, η αντικατάσταση και η συντήρηση του εξοπλισμού επιτρέπεται να γίνονται μόνο από καταρτισμένο προσωπικό με τα κατάλληλα προσόντα.

אזהרה רק עובדים מיומנים ומוסמכים רשאים להתקין, להחליף, או לטפל בציד זה.

Opomena Местењето, заменувањето и сервисирањето на оваа опрема треба да му биде дозволено само на обучен и квалификуван персонал.

Ostrzeżenie **Do instalacji, wymiany i serwisowania tych urządzeń mogą być dopuszczone wyłącznie osoby wykwalifikowane i przeszkolone.**

Upozornenie **Inštaláciu, výmenu alebo opravu tohto zariadenia smú vykonávať iba vyškolené a kvalifikované osoby.**

The controller is shipped with rack-mounting ears attached, and rubber feet to mount in a separate bag. Install the controller as follows:

- When you are mounting the controller on a desktop or shelf, adhere the rubber feet to the bottom of the chassis, and place the chassis on any secure horizontal surface.

Note You can remove the rack mounting ears from the controller, if desired.

- When you are mounting the controller in an EIA-standard rack, attach the ears to the equipment rack using the factory-supplied screws.

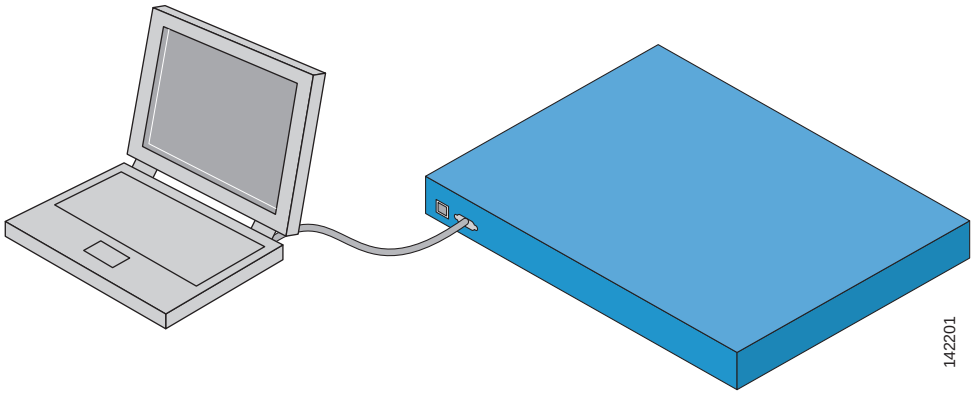
Note You can remove the rubber feet from the bottom of the controller, if desired.

You have installed the controller chassis.

Connecting and Using the CLI Console

For initial system configuration, use the CLI console. As shown in Figure 4, the CLI console connects to the controller front-panel console port.

Figure 4 CLI Console Connection to a controller



Follow these steps to connect the CLI console to the controller:

Step 1 Use a null-modem serial cable to connect the CLI console to the controller console port.

Note The controller end of the cable is female DB-9. The other end should be any kind of connector that plugs into your VT-100 terminal emulator (usually a laptop or palmtop computer).

Step 2 Be sure that the VT-100 terminal emulator (HyperTerminal, ProComm, minicom, tip, or other) is configured for the following parameters:

- 9600 baud
- 8 data bits
- no flow control
- 1 stop bit
- no parity

Performing Power On Self Test

When you plug the controller into an AC power source, the bootup script initializes the system, verifies the hardware configuration, loads its microcode into memory, verifies its Operating System software load, and initializes itself with its stored configurations.

Perform these steps to complete POST and Operating System software initialization:

Note This procedure is written assuming that you have connected the CLI console to the controller as described in "Connecting and Using the CLI Console."

Step 1 Plug an AC power cord into the rear of the controller, and connect the other end to a grounded 100 to 240 VAC 50/60 Hz electrical outlet.

Note Cisco supplies country specific standard power cord if you order it with the controller; be sure the controller end of the cord conforms with the IEC 320 standard.

Note If you wish to run a previous version of the controller code, press the <ESC> key immediately after the Model and S/N line. This will take you to the *Bootloader Boot Options Menu*.

Step 2 Monitor the controller bootup using the CLI screen:

The Bootup script displays Operating System software initialization (code download and POST verification) and basic configuration as shown in the following sample bootup display:

```
.o88b. d888888b .d8888.  .o88b.  .d88b.
  d8P  Y8   `88'   88'  YP d8P  Y8 .8P  Y8.
  8P         88    `8bo.   8P      88    88
  8b         88      `Y8b. 8b      88    88
  Y8b  d8   .88.   db   8D Y8b  d8 `8b  d8'
   `Y88P' Y888888P `8888Y'  `Y88P'  `Y88P'

                                          Model  S/N: 01012403-10037905-01007

  Press <ESC> now for additional boot options...
```

(If desired, press <ESC> now to display the Bootloader Boot Options Menu.)

```
     Boot Options
  Please choose an option from below:
    1.  Run active image (version 3.0.80.0)
    2.  Run backup image (version 3.0.57.0)
    3.  Manually perform system upgrade
    4.  Clear Configuration
  Please enter your choice:
```

(Enter 1 to run the current Code, enter 2 to run the previous Code, enter 4 to run the current Code and clear the controller configuration to factory defaults. Do not enter 3 unless directed to do so by Cisco Technical Assistance Center (TAC).)

```
  BOOT Uncompressing RTOS Image ... OK
  Loading Code at f0100000 ...
  Relocating Code to 0785e000, end 07fa649e ... OK
  Detecting hardware . . . .
```

(This may take a long time. Do not reboot the controller at this time.)

(The rest of this process takes two to three minutes. Do not reboot the controller until you receive the user login prompt.)

```
Software Copyright 2004 <company name> All rights reserved.
```

```
OS Version 3.0.80.0
Checking for new bootloader: Upgrading... ok
Initializing OS Services: ok
Initializing Serial Services: ok
Initializing Network Services: ok
Starting ARP Services: ok
Starting System Services: ok
Starting Fast Path Hardware Acceleration: ok
Starting Switching Services: ok
Starting QOS Services: ok
Starting Network Interfaces: ok
Starting Access Control List Services: ok
Starting System Interfaces: ok
Starting LWAPP: ok
Starting Crypto Accelerator: ok
Starting Certificate Database: ok
Starting VPN Services: ok
Starting Security Services: ok
Starting Policy Manager: ok
Starting Virtual AP Services: ok
Starting Director: ok
Starting Mobility Management: ok
Starting Authentication Engine: ok
Starting Broadcast Services: ok
Starting Power Over Ethernet Services: ok
Starting Logging Services: ok
Starting Management Services:
Web Server: ok
CLI: ok
Secure Web: Web Authentication Certificate not found (error).
(Cisco WLAN Solution Controller)
```

Step 3 If this is the first time the controller has been powered up, or if you enter 'Recover-Config' in the User: prompt, the bootup script runs the *Startup Wizard*, which prompts you for basic configuration input.

If this is the atleast the second time you have powered up the controller, the bootup script prompts you for a login and password. Enter the login and password as described in "Logging In," or enter *Recover-Config* to reset the controller configuration to factory defaults.

In either of the two cases explained above, the controller has passed the POST test.

Using the Startup Wizard

The first time you power up the controller with a new factory-default Operating System configuration, use the *Startup Wizard* to do the following:

Note Use the information you collected in "Collecting Required Tools and Information" for this step.

1. Enter the system (controller) name, up to 32 printable ASCII characters.
2. Enter the Administrative user name and password, each up to 24 printable ASCII characters. The default Administrative user name and password are *admin* and *admin*, respectively.

Note The *Service-Port* and *Management Interfaces* must be on different subnets

Logging In

To log into the controller, perform these steps:

Step 1 Enter a valid login and password to enter the CLI.

```
User:
Password:
```

Note The login and password functions are case sensitive. The default administrative user login and password are *admin* and *admin*, respectively.

Step 2 The CLI displays the root-level system prompt:

```
(system prompt)>
```

The system prompt can be any alphanumeric string up to 31 characters. You can change it by entering the following command:

```
(system prompt)>config prompt
```

Because this is a user-defined variable, it is omitted from the rest of this documentation.

Step 3 The CLI automatically logs you out without saving any changes after five minutes of inactivity. This automatic logout can be set from 0 (never log out) to 160 minutes entering the following command:

```
(system prompt)>config serial timeout
```

Refer to the *Navigating the CLI* and *Logging Out of the CLI* sections in the *Product Guide* for more information.

Connecting the Network (Distribution System)

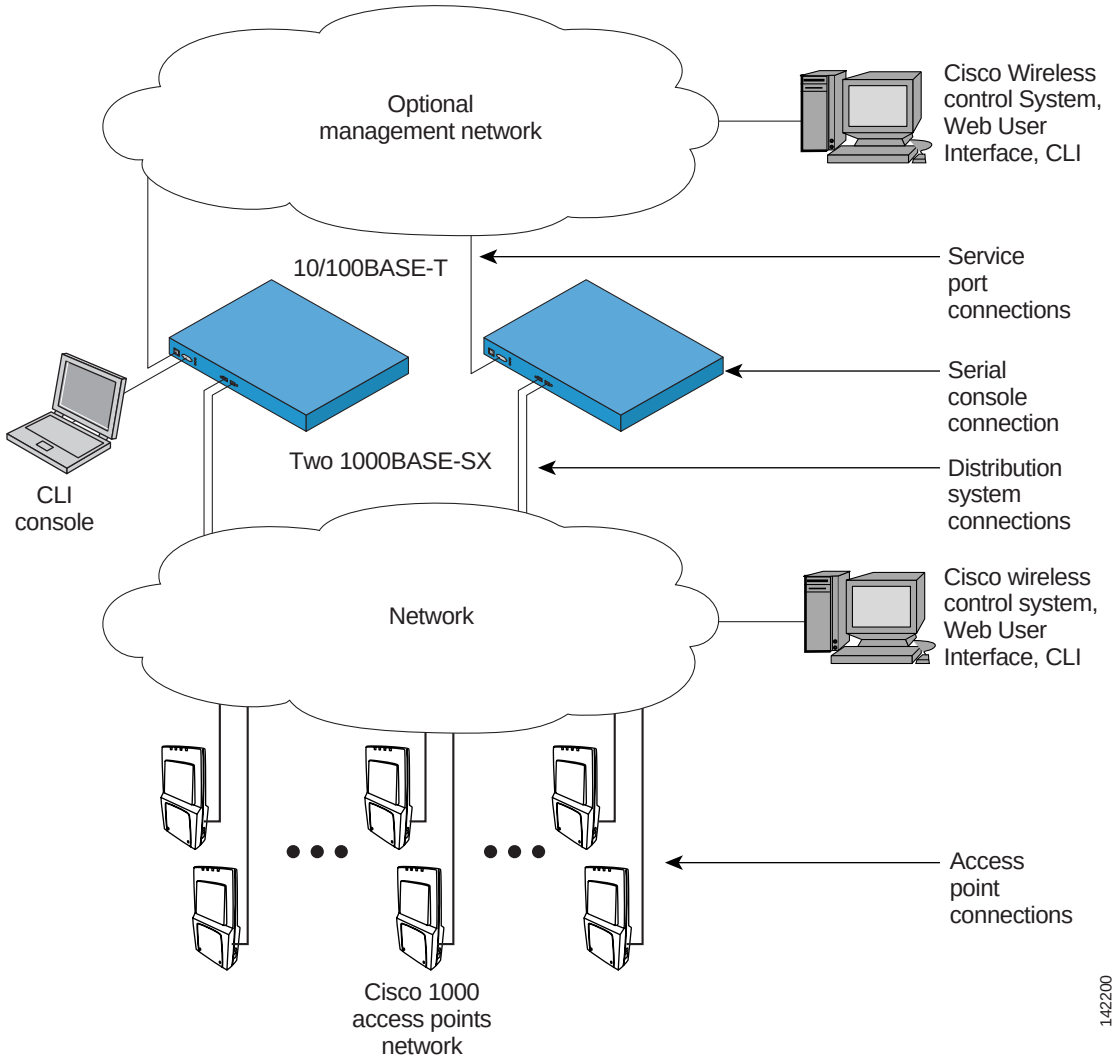
See the following figure for connections from the network (Distribution System) to the controller. The connections are:

- Two 1000BASE-SX (GigE, front panel, LC physical port, multi-mode fiber-optic cable).

Note The 1000BASE-SX connectors provide 100/1000 Mbps wired connections to a network through 850nM (SX) fiber-optic links using LC physical connectors.

Depending on the distribution system physical port to be assigned as explained in *Cisco Wireless LAN Controller Interfaces* section in the *Product Guide*, use CAT-5, CAT-5e, CAT-6, or CAT-7 ethernet cables or LC compatible fiber-optic cable to connect the network equipment to the controller.

Figure 5 External Equipment Connections to the Controller



Connecting the Service Port Interfaces

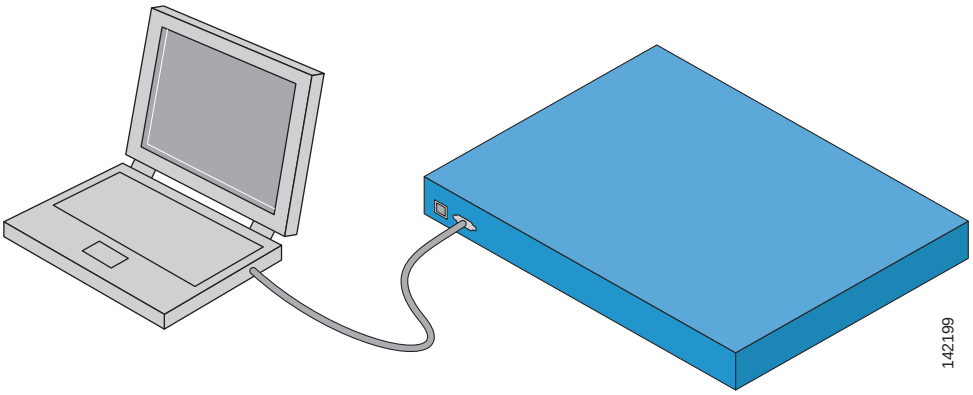
After connecting the network (Distribution System) to the controller as described in "Connecting the Network (Distribution System)," you can make Cisco Wireless Control System, Web User Interface, or CLI console (management interface) connections to the controller in any one of the following ways.

- You can connect any of the Cisco Wireless Control System, Web User Interface, or CLI console directly to the secure front-panel Service Port.
- You can connect any or all of the Cisco Wireless Control System, Web User Interface, or CLI console through a dedicated management network directly to the front-panel Service port.

Refer to the following figures when connecting the Cisco Wireless Control System, Web User Interface, and/or CLI console to the controller.

- For a front-panel Cisco Wireless Control System, Web User Interface, or CLI console connection, use CAT-5, CAT-5e, CAT-6, or CAT-7 ethernet cables to connect the Cisco Wireless Control System (Cisco WCS) Server, Web User Interface, or another CLI console to the dedicated front-panel Service port.

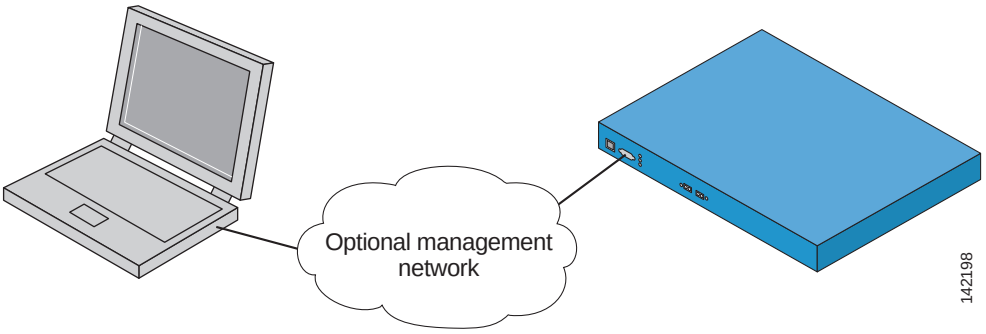
Figure 6 CLI Console Connection to a Controller through a Null-Modem Serial Cable



- For a front-panel Cisco Wireless Control System, Web User Interface, or CLI console connection, use CAT-5, CAT-5e, CAT-6, or CAT-7 ethernet cables to connect the management network to the front-panel service port.

  Use the appropriate cables to connect the Cisco Wireless Control System, Web User Interface, or CLI console to the optional management network.

Figure 7 CLI Console Connection to Controller through a Management Network

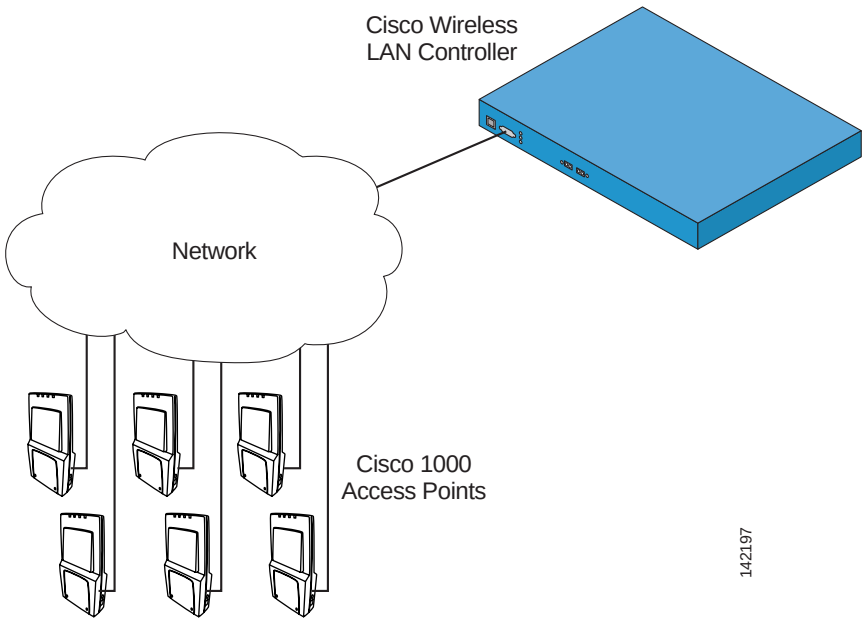


Connecting Access Points

After you have installed and configured the controller, use CAT-5, CAT-5e, CAT-6, or CAT-7 ethernet cables to connect the access points to the network (Distribution System) as shown in the following figure.

Note As soon as the controller is activated, it starts to scan for access points on all connected ports. When it detects an access point, it records its MAC address in its database. The *Radio Resource Management (RRM)* function then automatically configures the access point to start transmitting and start allowing clients to connect through the access points.

Figure 8 Access Points Connected to a Controller



Where to Go from Here

You have completely installed the controller hardware.

- Register your controller.
- Refer to the *Configuring the Cisco Wireless LAN Controllers* in the *Product Guide* for more information on configuring the controller.
- Refer to the *Product Guide* for more information on configuring, operating, maintaining and troubleshooting the controller.