



# Set Up Your Wireless LAN Controller Module

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## Introduction

This document provides instructions on how to configure your Integrated Services Router to support the Wireless LAN Controller Module (WLCM).

This document shows how to configure the WLCM solution with these subnets:

VLAN	IP Address
Wireless LAPs	192.168.14.0
WLAN Controller Management	192.168.15.0
Wireless Default	192.168.16.0
Wireless Guest	192.168.17.0

If you want to set up a WLCM at more than one site, the [Wireless LAN Controller Module IP Addressing Plan](#) provides additional subnets that you can use for up to 30 sites. To set up an additional site, replace the VLAN subnets used in this document with the appropriate subnets for your site.

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## Requirements

To configure your router to support the WLCM, you need these items:

- A [console cable](#)
- Completed worksheets from the [Site Survey](#):
  - LAN Addressing Worksheet
  - ISR Router Worksheet
- You must have completed the steps in the [Set Up Your WLCM Hardware](#) document.

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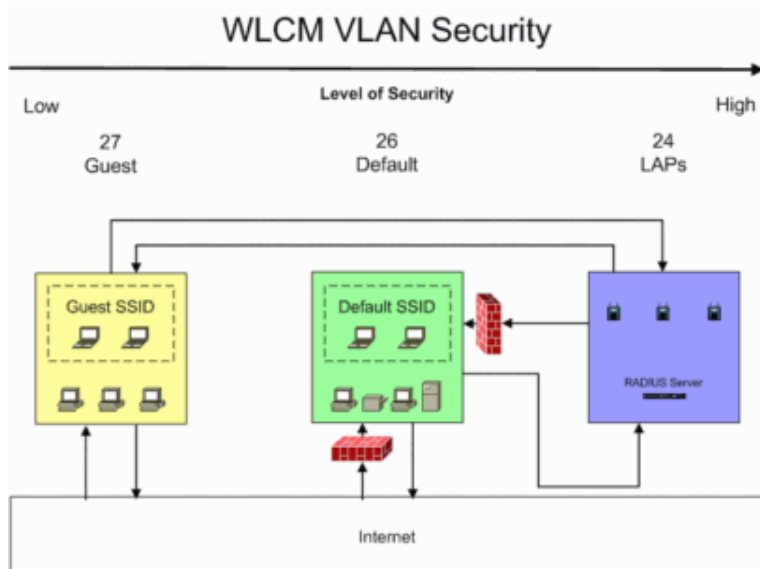
## WLCM Overview

### The Router and the WLCM

The Cisco Wireless LAN Controller Module (WLCM) depends on a specialized router configuration in order to communicate with other devices on the network. This document provides instructions on how to configure your router to support the WLCM.

The router configuration includes a specialized VLAN configuration that includes these VLANs:

- Lightweight Access Point (LAP) VLAN (24)
- Default VLAN (26)
- Guest VLAN (27)



**Note:** The WLCM configuration does not support the [Network Management VLAN \(21\)](#) and [Secure Server VLAN \(22\)](#) VLANs, and uses a different VLAN ID for the Guest VLAN. If you have assigned switchports to these VLANs, the [Move Switchports to WLCM VLANs](#) section of this document provides instructions on how to move switchports into WLCM VLANs.

The router configuration also includes a the wlan-controller interface on the router, which is used to communicate with the WLCM.

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## Configure your Router to Support the WLCM

Follow these steps to configure your router to support the WLCM:

### Connect to the Router

To connect to your router, follow these steps:

1. [Create a HyperTerminal connection](#) to your router.
2. Log into the router with the login and password you entered in fields B10 and B11 of the Router Worksheet.

```
Username: admin
Password:
```

**Note:** If you do not know the password for your router, refer to [Reset the Password on the Router](#).

3. Type **enable** and press **Enter** to access the privileged mode. Type the enable password that you entered in field B12 of the Router Worksheet and press **Enter**.

```
Router> enable
Password:
Router#
```

### Create a DHCP Pool for Lightweight Access Points

Follow these steps to configure a DHCP pool to provide IP addresses to Lightweight Access Points (LAPs):

1. Type **configure terminal** and press **Enter** to enter configuration mode.

```
Router#configure terminal
Router(config)#
```

2. Type **ip dhcp pool LAPs** and press **Enter**.

```
Router(config)#ip dhcp pool LAPs
Router(dhcp-config)#
```

3. Type **network 192.168.14.0 255.255.255.0** and press **Enter**.

```
Router(dhcp-config)#network 192.168.14.0 255.255.255.0
```

4. Type **default-router 192.168.14.1** and press **Enter**.

```
Router(dhcp-config)#default-router 192.168.14.1
```

5. Type **option 43 hex f104.c0a8.0e18** and press **Enter**. This value provides provides the WLCM IP address to wireless clients on the network in hexadecimal format.

**Note:** If you want to set up a WLCM at more than one site, see [Create a Hexadecimal Value for your Controller](#) to determine the appropriate hexadecimal value for your controller.

```
Router(dhcp-config)#option 43 hex f104.c0a8.0e18
```

6. Type **option 60 ascii "VCI-String"** and press **Enter**. For **VCI String**, use the table to determine the appropriate VCI string for your LAP model:

Model	VCI String
1130	Cisco AP c1130
1200	Cisco AP c1200
1240	Cisco AP c1240

The VCI String allows Lightweight Access Points (LAPs) to associate to the WLCM.

**Note:** Ensure that you enter the VCI String value in quotes.

```
Router(dhcp-config)#option 60 ascii "Cisco AP c1130"
```

7. Type **domain-name** *yourdomain* and press **Enter**. For *yourdomain*, use the domain name that you entered in field B48 of the Internet Worksheet.

```
Router(dhcp-config)#domain-name abcompany.com
```

8. Type **dns-server** *dns-server-address* and press **Enter**. For *dns-server-address*, use the DNS server IP address that you entered in field L4 of the LAN Addressing Worksheet.

```
Router(dhcp-config)#dns-server 198.168.10.1
```

9. Type **exit** and press **Enter**.

```
Router(dhcp-config)#exit
Router(config)#
```

10. Type **ip dhcp excluded-address** **192.168.14.1 192.168.14.49** and press **Enter**.

```
Router(config)#ip dhcp excluded-address 192.168.14.1 192.168.14.49
```

11. Type **ip dhcp excluded-address** **192.168.14.251 192.168.14.254** and press **Enter**.

```
Router(config)#ip dhcp excluded-address 192.168.14.251 192.168.14.254
```

### Create a DHCP Pool for Default VLAN Users

Follow these steps to configure a DHCP pool for users in the Default VLAN:

1. Type **ip dhcp pool** **wlcm-default** and press **Enter**.

```
Router(config)#ip dhcp pool wlcm-default
Router(dhcp-config)#
```

2. Type **network** **192.168.16.0 255.255.255.0** and press **Enter**.

```
Router(dhcp-config)#network 192.168.16.0 255.255.255.0
```

3. Type **default-router** **192.168.16.1** and press **Enter**.

```
Router(dhcp-config)#default-router 192.168.16.1
```

4. Type **exit** and press **Enter**.

```
Router(dhcp-config)#exit
Router(config)#
```

5. Type **ip dhcp excluded-address** **192.168.16.1 192.168.16.49** and press **Enter**.

```
Router(config)#ip dhcp excluded-address 192.168.16.1 192.168.16.49
```

6. Type **ip dhcp excluded-address 192.168.16.251 192.168.16.254** and press **Enter**.

```
Router(config)#ip dhcp excluded-address 192.168.16.251 192.168.16.254
```

### Create a DHCP Pool for Guest VLAN Users

Follow these steps to configure a DHCP pool for wireless users in the Guest VLAN:

1. Type **ip dhcp pool wlcg-guest** and press **Enter**.

```
Router(config)#ip dhcp pool wlcg-guest
```

```
Router(dhcp-config)#
```

2. Type **network 192.168.17.0 255.255.255.0** and press **Enter**.

```
Router(dhcp-config)#network 192.168.17.0 255.255.255.0
```

3. Type **default-router 192.168.17.1** and press **Enter**.

```
Router(dhcp-config)#default-router 192.168.17.1
```

4. Type **exit** and press **Enter**.

```
Router(dhcp-config)#exit
```

```
Router(config)#
```

5. Type **ip dhcp excluded-address 192.168.17.1 192.168.17.49** and press **Enter**.

```
Router(config)#ip dhcp excluded-address 192.168.17.1 192.168.17.49
```

6. Type **ip dhcp excluded-address 192.168.17.251 192.168.17.254** and press **Enter**.

```
Router(config)#ip dhcp excluded-address 192.168.17.251 192.168.17.254
```

### Configure Interfaces and Bridging

Follow these steps to configure interfaces and bridging on the controller:

1. The WLCM configuration uses bridge interfaces to bridge traffic between the router WLCM interfaces and the VLAN interfaces. Follow these steps to create the bridge interfaces for the WLCM:

- a. Type **interface bvi 26** and press **Enter**.

```
Router(config)# interface bvi 26
```

```
Router(config-if)#
```

- b. Type **ip address 192.168.16.1 255.255.255.0** and press **Enter**.

```
Router(config-if)#ip address 192.168.16.1 255.255.255.0
```

- c. Type **interface bvi 27** and press **Enter**.

```
Router(config-if)#interface bvi 27
```

- d. Type **ip address 192.168.17.1 255.255.255.0** and press **Enter**.

```
Router(config-if)#ip address 192.168.17.1 255.255.255.0
```

- e. Type **exit** and press **Enter**.

```
Router(config-if)#exit
Router(config)#
```

- Follow these steps to configure a VLAN for Lightweight Access Points (LAPs):

- a. Type **interface Vlan 24** and press **Enter**.

```
Router(config)#interface Vlan 24
Router(config-if)#
```

- b. Type **description LAP VLAN** and press **Enter**.

```
Router(config-if)#description LAP VLAN
```

- c. Type **ip address 192.168.14.1 255.255.255.0** and press **Enter**.

```
Router(config-if)#ip address 192.168.14.1 255.255.255.0
```

- d. Type **exit** and press **Enter**.

```
Router(config-if)#exit
Router(config)#
```

- Follow these steps to configure the Default VLAN:

- a. Type **interface Vlan 26** and press **Enter**.

```
Router(config)#interface Vlan 26
Router(config-if)#
```

- b. Type **description WLCM Default VLAN** and press **Enter**.

```
Router(config-if)#description WLCM Default VLAN
```

- c. Type **bridge-group 26** and press **Enter**.

```
Router(config-if)#bridge-group 26
```

- d. Type **exit** and press **Enter**.

```
Router(config-if)#exit
Router(config)#
```

- Follow these steps to configure the Guest VLAN:

- a. Type **interface Vlan 27** and press **Enter**.

```
Router(config)#interface Vlan 27
```

- b. Type **description WLCM Guest VLAN** and press **Enter**.

```
Router(config-if)#description WLCM Guest VLAN
```

- c. Type **Bridge-group 27** and press **Enter**.

```
Router(config-if)#Bridge-group 27
```

- d. Type **exit** and press **Enter**.

```
Router(config-if)#exit
Router(config)#
```

- Follow these steps to configure the router interfaces to the WLAN controller:
  - a. Type **interface wlan-controller slot/port** and press **Enter**. For **slot/port**, use the slot and port number that you recorded in field B39 of the ISR Router worksheet.

```
Router(config-if)#interface wlan-controller2/0
```

- b. Type **ip address 192.168.15.1 255.255.255.0** and press **Enter**.

```
Router(config-if)#ip address 192.168.15.1 255.255.255.0
```

- c. Type **interface wlan-controller2/0.26** and press **Enter**.

```
Router(config-if)#interface wlan-controller2/0.26
```

- d. Type **encapsulation dot1Q 26** and press **Enter**.

```
Router(config-if)#encapsulation dot1Q 26
```

**Note:** The router can display this error message:

```
If the interface doesn't support baby giant frame
maximum mtu of the interface has to be reduced by
bytes on both sides of the connection to properly
transmit or receive large packets. Please refer to
documentation on configuring IEEE 802.1Q vLANs.
```

- e. Type **bridge-group 26** and press **Enter**.

```
Router(config-if)#bridge-group 26
```

- f. Type **interface wlan-controller2/0.27** and press **Enter**.

```
Router(config-if)#interface wlan-controller2/0.27
```

- g. Type **encapsulation dot1Q 27** and press **Enter**.

```
Router(config-if)#encapsulation dot1Q 27
```

- h. Type **bridge-group 27** and press **Enter**.

```
Router(config-if)#bridge-group 27
```

- i. Type **exit** and press **Enter**.

```
Router(config-if)#exit
Router(config)#
```

- Follow these steps to enable interface bridging:

- a. Type **bridge irb** and press **Enter**.

```
Router(config)#bridge irb
```

- b. Type **bridge 26 route ip** and press **Enter**.

```
Router(config)#bridge 26 route ip
```

- c. Type **bridge 27 route ip** and press **Enter**.

```
Router(config)#bridge 27 route ip
```

- d. Type **exit** and press **Enter**.

```
Router(config-if)#exit
Router(config)#
```

## Configure Security for Wireless Guest VLAN

Follow these steps to configure security for the Guest VLAN:

1. Type **no access-list 127** and press **Enter**.

```
Router(config)#no access-list 127
```

2. Type **access-list 127 remark Traffic from Guest VLAN** and press **Enter**.

```
Router(config)#access-list 127 remark Traffic from Guest VLAN
```

3. Type **access-list 127 permit ip any host 255.255.255.255** and press **Enter**.

```
Router(config)#access-list 127 permit ip any host 255.255.255.255
```

4. Type **access-list 127 permit udp any any eq bootps** and press **Enter**.

```
Router(config)#access-list 127 permit udp any any eq bootps
```

5. Type **access-list 127 deny ip any 192.168.16.0 0.0.0.255** and press **Enter**.

```
Router(config)#access-list 127 deny ip any 192.168.16.0 0.0.0.255
```

6. Type **access-list 127 permit ip 192.168.17.0 0.0.0.255 any** and press **Enter**.

```
Router(config)#access-list 127 permit ip 192.168.17.0 0.0.0.255 any
```

7. Type **interface bvi 27** and press **Enter**.

```
Router(config)#interface bvi 27
Router(config-if)#
```

8. Type **ip access-group 127 in** and press **Enter**.

```
Router(config-if)#ip access-group 127 in
```

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## Configure the Management Switch Port

Follow these steps to configure the management switch port on the router:

1. Type **interface FastEthernet *interface-number*** and press **Enter**. For ***interface-number***, use the number of first available switch port listed in field B36 of the Integrated Services Router Worksheet.

```
Router(config)#interface FastEthernet0/0/1
Router(config-if)#
```

2. Type **description management-port** and press **Enter**.

```
Router(config-if)#description management-port
```

3. Type **switchport access vlan 24** and press **Enter**.

```
Router(config-if)#switchport access vlan 24
```

4. Update the device information in field S5 of the Switch Port Assignments section of the Integrated Services Router Worksheet.

### Move Switchports to WLCM VLANs

Once you have created the WLCM VLANs on the router, you need to move switchports into the appropriate VLAN to support your network. Follow these steps to move a switch port to a WLCM VLAN:

1. Review the switch port assignments section of the ISR Router Worksheet to determine which ports you need to reassign.
2. Select the appropriate VLAN for the port that you want to reassign:

- o Lightweight Access Points (LAPs): VLAN 24
- o RADIUS Server: VLAN 24

**Note:** For more information about the RADIUS server, refer to [Configure the Cisco Wireless LAN Controller Module](#).

- o Default users: VLAN 26
- o Guest users: VLAN 27

3. Complete these steps for each port that you want to reassign:

- a. Type **interface FastEthernet *interface-number*** and press **Enter**. For ***interface-number***, use the number of the switch port that you want to assign to a WLCM VLAN. The available switch ports are listed in field B36 of the Switch Port Assignments section of the Integrated Services Router Worksheet.

```
Router(config)#interface FastEthernet0/2
Router(config-if)#
```

- b. Type **description *device-description*** and press **Enter**. For ***device-description***, enter a brief description of the device.

```
Router(config-if)#Description LAP
```

- c. Type **switchport access vlan *vlan-id*** and press **Enter**. For ***vlan-id***, use appropriate VLAN ID for the switchport.

```
Router(config-if)#switchport access vlan 26
```

- d. Update the device information in fields S15-S52 in the Switch Port Assignments section of the Integrated Services Router Worksheet.
- e. If the device cannot obtain an IP Address automatically, configure the device with an available IP address in the appropriate WLCM VLAN. For example, the first device in the WLCM Default VLAN is configured with the IP address 192.168.16.2. For more information about how to configure an IP address on a PC, refer to [Configure an IP Address on Your PC](#).

**Note:** Lightweight Access Points (LAPs) obtain an IP address automatically.

4. Type **end** and press **Enter**.

```
Router(config-if)#end
Router#
```

5. Type **write memory** and press **Enter**.

```
Router#write memory
```

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## Next Step

You have completed this procedure. To configure the WLAN Controller Module, proceed to [Complete Initial Setup for the Wireless LAN Controller Module](#).

To make further changes to the wireless network, refer to the [Wireless Support Page](#).

To configure other devices in your network, refer to the [Configuration Overview Page](#).

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## Troubleshoot the Procedure

This section provides information about common problems that you may encounter. If this information does not solve your problem, contact the [SMB Technical Assistance Center \(SMB TAC\)](#) for assistance.

Problem	Cause(s) and Suggested Solution(s)
I cannot connect to the controller.	<ul style="list-style-type: none"> <li>Ensure that you type <b>https</b> before the controller IP address in your browser.</li> <li>Ensure that your PC is connected to the switch port configured in VLAN 10.</li> <li>For further assistance, contact the <a href="#">SMB Technical Assistance Center (SMB TAC)</a>.</li> </ul>

### Select a Hexadecimal Value for your Controller

In order to allow LAPs to communicate with your WLCM, you need to use a specialized hexadecimal code to provide configuration information to LAPs on the network. Use the table to determine the appropriate hexadecimal value for your controller.

**Note:** This table assumes that you have only one controller in your network and can use the IP addresses listed in the [Wireless LAN Controller Module IP Addressing Plan](#). If you have more than one controller or need to use an alternative IP address, see [Create a Custom Hexadecimal Value](#) to create a custom hexadecimal value for your controller configuration.

Controller IP Address	Hexadecimal Equivalent
192.168.14.24	f104.c0a8.0e18
192.168.22.24	f104.c0a8.1618
192.168.30.24	f104.c0a8.1e18
192.168.38.24	f104.c0a8.2618
192.168.46.24	f104.c0a8.2e18
192.168.54.24	f104.c0a8.3618
192.168.62.24	f104.c0a8.3e18

192.168.70.24	f104.c0a8.4618
192.168.78.24	f104.c0a8.4e18
192.168.86.24	f104.c0a8.5618
192.168.94.24	f104.c0a8.5e18
192.168.102.24	f104.c0a8.6618
192.168.110.24	f104.c0a8.6e18
192.168.118.24	f104.c0a8.7618
192.168.126.24	f104.c0a8.7e18
192.168.134.24	f104.c0a8.8618
192.168.142.24	f104.c0a8.8e18
192.168.150.24	f104.c0a8.9618
192.168.158.24	f104.c0a8.9e18
192.168.166.24	f104.c0a8.a618
192.168.174.24	f104.c0a8.ae18
192.168.182.24	f104.c0a8.b618
192.168.190.24	f104.c0a8.be18
192.168.198.24	f104.c0a8.c618
192.168.206.24	f104.c0a8.ce18
192.168.214.24	f104.c0a8.d618
192.168.222.24	f104.c0a8.de18
192.168.230.24	f104.c0a8.e618
192.168.238.24	f104.c0a8.ee18
192.168.246.24	f104.c0a8.f618

### Create a Custom Hexadecimal Value

If you need to create a custom hexadecimal value for your controller, follow these steps:

**Note:** Many calculator applications such as Microsoft Calculator have a scientific calculator view that can convert decimal values to hexadecimal.

The custom hexadecimal value consists of three parts:

- **Type:** This value identifies the controller type. Use "f1" as the Type value.
- **Length:** This value indicates the number of controllers in the network. To calculate the length, multiply the number of controllers in your network by 4 and convert this value to hexadecimal. For example, if there is one controller in your network, multiply 1 by 4; the decimal value 4 equals 04 in hexadecimal. If you use two controllers, multiply 2 by 4; the decimal value 8 equals 08 in hexadecimal.

**Note:** The SMB SA program does not provide support for multiple WLCMs in a single network.

- **Value:** This value indicates the controller management IP address in hexadecimal code. For example, the IP address 192.168.11.24 is equivalent to the hexadecimal address c0a8.0b18.

When you have calculated all three values, combine them into a single address with a decimal place between every four digits. In this example, a single WLAN controller with IP address 192.168.11.24 creates the value f104.c0a8.0b18.

To view more sample values, review the values in [Select a Hexadecimal Value for your Controller](#).

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## Related Information

- [Site Survey](#)
- [Complete Initial Setup for the Cisco Wireless LAN Controller Module](#)
- [Cable Descriptions](#)
- [Wireless LAN Controller Module IP Addressing Plan](#)
- [Set Up Your Cisco Wireless LAN Controller Module Hardware](#)