C500 Access Point
Quick Setup Guide

Note: The minimum software revision for the C500 is RuckOS 3.1.1 or later.

This Installation Guide provides information on how to configure the Ruckus Wireless ZoneFlex C500 802.11ac dual band two-stream access point (AP) with integrated cable modem (CM). The C500 supports dual-band 2.4GHz and 5GHz concurrent operation with internal antennas.

The C500 is placed on a desktop, or can be wall mounted using a separately-ordered wall bracket (part number 902-0121-0000). After completing the steps described in this Guide, you will be able to use the C500 at your site.

The C500 access point with integrated cable modem is referred to in the rest of this document as the **C500**.

This Guide in Other Languages

请从以下网站获取该指南的简体中文版
https://support.ruckuswireless.com
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Before You Begin

Before deploying Ruckus Wireless products, please check for the latest software and the release documentation.

- User Guides and Release Notes are available at http://support.ruckuswireless.com/documents
- Software Upgrades are available at http://support.ruckuswireless.com/software
- Open Source information is available at http://opensource.ruckuswireless.com
- Software License and Limited Warranty are available at http://support.ruckuswireless.com/warranty

Safety Warnings

- **WARNING!** Only trained and qualified personnel should be allowed to install, replace, or service this equipment. The professional installer is responsible for the proper installation and configuration of this C500. The C500 installation must comply with local regulatory requirements, especially with those regulating operation near military and/or weather radar systems.
- **WARNING!** Installation of this equipment must comply with local and national electrical codes.
- **WARNING!** Ruckus Wireless strongly recommends that you wear eye protection before mounting the C500.

Package Contents

Before configuring or deploying your C500, verify that all items listed below are included in the package. If any item is damaged or missing, notify your authorized Ruckus Wireless sales representative.

- One 901-C500-xxyy access point with integrated cable modem (A in Figure 1), where 'xx' is a country-specific code; and 'yy' is the code for the cable modem: '31' is DOCSIS 3.0 and '41' is EuroDOCSIS
- One 1.8m (6') IEC 320 power cord (B in Figure 1)
- One 902-1169-xx00 power adapter (C in Figure 1)
- Service Level Agreement/Limited Warranty Statement
- Regulatory Statement
- Declaration of Conformity, if required
- This *Quick Setup Guide*

If you are mounting the C500 on a wall, then you will also need:

- One customer-ordered 902-0121-0000 C500 wall bracket kit

Figure 1. C500 package contents
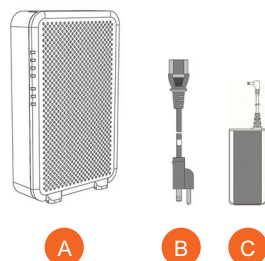
LEDs and Connectors

The C500 has seven LEDs visible on the front panel, and three connectors and a reset button on the back panel. Refer to Table 1 for a description of the front-panel LEDs and their indications. Refer to Table 2 for a description of the back-panel connectors and the reset button.

Table 1. Front-panel LED indications

LED	Indications
PWR	• Red = Booting. • Green = Normal operation.
DS (CM)	• Blinks green when searching for downstream (DS), then solid green when DS is locked. Also blinks green during CM boot when power is applied.
US (CM)	• Off when DS is searching, and then blinks green as upstream power is increased/ranged and then solid green when upstream ranging is complete. Also blinks green during CM boot when power is applied.
ON-LINE (CM)	• Off until CM DS and CM US are solid ON, then blinks green as the CM obtains an IP address and a configuration file, and then comes online and LED is solid green. Also blinks green during CM boot when power is applied.
CTL	• Off = Always off.
2.4G	• Off: The WLAN service is down. • Amber: The WLAN is up, but no clients are associated/connected. • Green: The WLAN is up and at least one client is associated.
5G	• Off: The WLAN service is down. • Amber: The WLAN is up, but no clients are associated/connected. • Green: The WLAN is up and at least one client is associated.

Table 2. Back-panel connectors and reset button

Connector or Button	Description
	• RJ-45 1000BASE-T Ethernet connector, with Link and Activities LEDs.
12VDC	• Receives 12 VDC input from a factory-supplied 100-250VAC 50-60Hz external wall adapter.
RESET	• Press and hold in this button for four seconds to reset the AP and CM to their factory settings. Refer to **Note** in Operating and Troubleshooting the C500.
(coaxial connector)	• RG59 coax cable connector input to the CM.

Continue with the following:
- Configuring the C500 (optional)
- Verifying CM and AP Operation
- What to Do Next
- Operating and Troubleshooting the C500
- Physical Installation

CONFIGURING THE C500 (OPTIONAL)

Note: The C500 normally receives its latest AP and CM firmware downloads and initial configurations from the cable modem termination system (CMTS) high speed data services equipment when it powers up; if this is the case, then skip this section and continue with Verifying CM and AP Operation.

If the C500 AP and CM do not receive their latest firmware downloads and initial configurations from the CMTS equipment when the C500 powers up, then continue with these procedures:

Step 1: Collecting Setup Requirements, Hardware, and Tools

- A computer with Ethernet adapter running Windows 7 or equivalent, with Firefox or equivalent web browser, and Telnet or SSH (secure shell) programs. (Procedures for common operating systems are similar.)
- One Cat 5e (or better) Ethernet cable.

Continue with Step 2: Powering Up the C500.

Step 2: Powering Up the C500

1. After removing your C500 from its package, place it next to your computer.
2. Use the power cord to power on the 740-64245-011 power adapter.
3. Plug the power adapter output cable into the power connector on the back of the C500.
4. Wait until the C500 *PWR*, *DS*, *US*, and *ON-LINE* LEDs stop flashing and then remain on.

Continue with Step 4: Preparing Your Computer for C500 Setup.

Step 3: Connecting Your Computer to the C500

1. Using an Ethernet cable, connect your computer's network port to the Ethernet port on the back of the C500.

Continue with Step 5A: Operating the CM.

Step 4: Preparing Your Computer for C500 Setup

NOTE: The following procedures assume that Windows 7 is the operating system. Procedures for other operating systems are similar.

1. On your Windows 7 computer, configure your network adapter from the *Local Area Connection* settings as follows:
   - **Start > Control Panel > Network and Sharing Center > Change Adapter Settings**
2. Edit the TCP/IPv4 address settings as follows:
   - **Local Area Connection > Properties > Internet Protocol Version 4 (TCP/IPv4) > Properties**

   The *Internet Protocol Version 4 (TCP/IPv4) Properties* dialog box appears.

   IMPORTANT! Write down all of the currently active settings so you can restore your computer to its current configuration when this procedure is completed.

3. Select **Obtain an IP address automatically** and **Obtain DNS server address automatically**. Avoid 192.168.100.1 which is the default CM address, and 192.168.100.2 which is the AP default IP address.
4. Click **OK** twice to save your changes.

Your changes are put into effect immediately. Continue with Step 5A: Operating the CM or Step 5B: Configuring the AP for Standalone Operation.

Step 5A: Operating the CM

Note: If the C500 CM is going to be managed by a CMTS, then skip this section and continue with Step 5B: Configuring the AP for Standalone Operation.

Note: The CM and AP each have their own independent firmware load that are each updated independently.

Continue with Logging Into the CM Web Interface via the Ethernet Port or Logging Into the CM Web Interface via a Dynamic IP Address.

Logging Into the CM Web Interface via the Ethernet Port

1. Complete Step 1: Collecting Setup Requirements, Hardware, and Tools through Step 4: Preparing Your Computer for C500 Setup.
2. On the administrative computer, open a web browser window.
3. In the address or location bar, type the CM IP address, for instance:

   192.168.100.1
       --OR--
   <DHCP-assigned CM IP address>

   The CM web interface displays a login prompt.
4. Leave *User Name* blank.
5. In *Password*, type **ADMIN**.
6. Click **Log In**. The *Connection Status* page appears, indicating that you have successfully logged on to the CM web interface.

Continue with Viewing the Software Status.

Logging Into the CM Web Interface via a Dynamic IP Address

1. Complete Step 1: Collecting Setup Requirements, Hardware, and Tools through Step 4: Preparing Your Computer for C500 Setup.
2. Connect the administrative computer to the same subnet as the C500.
3. On the administrative computer, start a Web browser.
4. In the address bar, enter the IP address that is assigned to the CM by the CMTS. The CM web interface displays a login prompt.
5. Leave *User Name* blank.
6. In *Password*, type **ADMIN**.
7. Click **Log In**. The *Connection Status* page appears, indicating that you have successfully logged on to the CM web interface.
8. Continue with any or all of the following:
   - Viewing the Software Status
   - Viewing the Connection Status
   - Configuring the Downstream Frequency
   - Administering CM Passwords

Viewing the Software Status

The *Software Status* page displays the current CM installed software version and the CM system status.

1. Log into to the *Connection Status* page as described in Logging Into the CM Web Interface via the Ethernet Port or Logging Into the CM Web Interface via a Dynamic IP Address.
2. In the left sidebar, click **Software**. The CM displays the *Software Status* page.

   There are two tables on the *Software Status* page – *Information* and *Status*. Table 3 and Table 4 describe the information that these tables display.

Table 3. Information (software) table

Item	Description
Standard Specification Compliant	The standard with which the device is compliant.
Hardware Version	The version of the CM hardware.
Software Version	The version of the CM software.
Cable Modem MAC Address	MAC address.
Cable Modem Serial Number	Serial number.
CM Certificate	Indicates whether a security certificate is installed.

Table 4. Status table

Item	Description
System Up Time	Indicates the time that has elapsed since the CM was last rebooted.
Network Access	Indicates whether or not the CM is connected to the network.
Cable Modem IP Address	IP address.

Viewing the Connection Status

The Connection Status page displays information about the CM's Hybrid Fiber Coax (HFC) and IP network connectivity, including its downstream and upstream channels and the IP address that is currently assigned to the CM.

1. Log into to the *Connection Status* page as described in Logging Into the CM Web Interface via the Ethernet Port or Logging Into the CM Web Interface via a Dynamic IP Address.
2. Click **Connection** in the left sidebar. The CM web interface displays the *Connection Status* page.

   Note: The *Downstream Power* indicated in the *Power* column is accurate to +/-3dB.

Configuring the Downstream Frequency

The Configure Status page allows you to set the downstream frequency for the CM. Configuring the downstream frequency enables the device to quickly obtain a direct frequency lock with the CMTS upon bootup and helps to save several minutes of scanning for an available downstream frequency from the CMTS.

1   Log into to the *Connection Status* page as described in Logging Into the CM Web Interface via the Ethernet Port or Logging Into the CM Web Interface via a Dynamic IP Address.
2   Click **Configure** in the left sidebar. The CM web interface displays the *Configure Status* page.
3   In the *Configure DS Frequency* text box, enter the downstream frequency (in Hertz) that you want the CM to use to connect to the CMTS when it boots up.
4   Click **Set Values and Reboot** to have the CM save your changes and reboot.

Administering CM Passwords

The parameters on the *Security Status* page allow you to change the CM login and password, and/or restore the factory defaults.

1   Log into to the *Connection Status* page as described in Logging Into the CM Web Interface via the Ethernet Port or Logging Into the CM Web Interface via a Dynamic IP Address.
2   Click **Security** in the left sidebar. The CM web interface displays the *Security Status* page.

Ruckus Wireless recommends that you change the login and password as follows:

1   Enter a new CM user ID in *Password Change User ID*.
2   Enter a new CM user password in *New Password*.
3   To change the password re-enter the new CM user password in *Re-Enter New Password*.
4   Enter the existing (before change) CM user password in *Current User ID Password*.

Restore the factory defaults as follows:

1   Select the *Restore Factory Defaults* **Yes** button to reset all the CM parameters to the factory default settings after the next reboot.

Select the *Restore Factory Defaults* **No** button to prevent resetting all CM parameters to the factory defaults after the next reboot.

2   If you have made any changes on the *Security Status* page, then click **Apply**.

If you have selected *Restore Factory Defaults* **Yes**, then the CM reboots and resets all CM parameters to the factory defaults.

If you have selected *Restore Factory Defaults* **No**, then the CM web interface saves your changes and returns you to the Security Status page.

Continue with Step 5B: Configuring the AP for Standalone Operation.

Step 5B: Configuring the AP for Standalone Operation

Note: If the C500 is going to be managed by an AP controller or manager, then skip this section and continue with Verifying CM and AP Operation. Refer to the following:

- Logging Into the AP's Web Interface
- Configuring Common Wireless Settings
- Configuring Wireless LAN Settings

Logging Into the AP's Web Interface

1   Collect the AP MAC address (12 alphanumeric digits) from the outside of the AP case.
2   Complete Step 1: Collecting Setup Requirements, Hardware, and Tools through Step 4: Preparing Your Computer for C500 Setup.
3   In an administrative computer address or location bar, type the following address:

> **https://192.168.100.2**
> --OR--
> **<CMTS DHCP-assigned IP address>**

4   Press **<Enter>**. A security alert message appears.
5   Click **Yes** or **OK** or **Proceed anyway** (depending on the browser) to continue. The AP's login page appears.
6   In *User name*, type **super**.
7   In *Password*, type **sp-admin**.
8   Click **Login**. The web interface displays the *Status > Device* page.

Continue with Configuring Common Wireless Settings.

Configuring Common Wireless Settings

The settings on the Common page are required to enable wireless devices to associate with the AP.

Note: The AP has one 2.4GHz radio and one 5GHz radio. The wireless settings for each radio need to be configured separately on the Web interface. To configure the 2.4GHz radio settings, click **Configuration > Radio 2.4G**. To configure the 5GHz radio settings, click **Configuration > Radio 5G**.

1   On the left menu of the Web interface, click **Configuration > Radio {2.4G/5G}**. The *Common* page appears.
2   Verify that the common wireless settings are configured as listed in Table 5.

Table 5. Common wireless configuration

Setting	Recommended Value
Wireless Mode	• 2.4GHz (802.11b/g/n) for Configuration > Radio 2.4G > Common. • 5GHz (802.11ac/a/n) for Configuration > Radio 5G > Common.
Channel	SmartSelect.
Channel Width	20 MHz.
Country Code	If you purchased the AP in the United States of America, this value is fixed to United States at the factory and is not user configurable. If you purchased the AP outside the United States of America, verify that the value is set to your country or region. Selecting the correct country code ensures that the AP uses only the radio channels allowed in your country or region.

Note: The two radios on the Ruckus Wireless AP are always configured with the same country code setting. If you change the country code for Radio 2.4G, for example, the same change is automatically applied to Radio 5G.

3   If you made any changes to the *Common* page, then click **Update Settings**.
4   Repeat Step 1 through Step 3 for **Configuration > Radio 5G**.

Continue with Configuring Wireless LAN Settings.

Configuring Wireless LAN Settings

The settings on at least one *Wireless* # (Wireless LAN Number) page are required to enable wireless devices to associate with the AP. The default wireless settings are listed in Table 6.

Table 6. Default wireless settings

Setting	Default Value
SSID (network name)	Wireless 1 to Wireless 8 (8 WLANs).
Encryption Method (security)	Disabled on all WLANs.

1   Click one of the **Wireless #** tabs. The selected *Wireless* # page appears.
2   In *Wireless Availability*, click **Enabled**.
3   In *Broadcast SSID*, click **Enabled**.
4   Clear the *SSID* box, and then type a unique and descriptive name that you want to call this wireless network.

For example, you can enter **Ruckus Wireless AP**. This SSID is the name that helps users identify this wireless network in their wireless network connection application.

Note: You can also configure other wireless settings on this and other *Wireless* # pages (in addition to the settings described above), although it is not necessary for completing the AP installation.

5   Click **Update Settings**. You have completed configuring the basic wireless settings of the AP.

Continue with Verifying CM and AP Operation.

VERIFYING CM AND AP OPERATION

The cable operator has their own CM and AP acceptance tests. Make sure you verify the C500 operation as defined in the acceptance tests before leaving the installation site.

WHAT TO DO NEXT

Following are some of the post-installation tasks that Ruckus Wireless recommends. Refer to the *Ruckus Wireless Indoor Access Point User Guide* for more information on configuring and managing the AP.

Changing the Administrative Password

Management access to the Web interface of the AP is controlled through administrative user name and password. As soon as you complete the AP setup, make sure you log on to the AP's Web interface and change the default administrative user name and password. This will help prevent unauthorized users from logging in to the AP's Web interface and changing the AP settings to compromise your network.

Configuring the Security Settings

Unlike wired networks, anyone with a compatible wireless adapter can receive wireless data transmissions from your network. To prevent unauthorized users from entering your wireless network and accessing your computers and files, Ruckus Wireless strongly recommends enabling and configuring wireless security on the AP. The AP supports several types of encryption and authentication methods to help prevent unauthorized access to your wireless network.

Configuring Advanced Settings and Features

The AP has been configured for basic operation. However, the Ruckus Wireless AP supports many advanced settings and features. Refer to the *Ruckus Wireless Indoor Access Point User Guide* for instructions on how to configure the advanced setting and feature parameters.

Reading Related Documentation

The latest versions of Ruckus Wireless product documentation are available for download on the Ruckus Wireless Support Web site at http://support.ruckuswireless.com/documents

Online Training Resources

To access a variety of online Ruckus Wireless training modules, including free introductory courses to wireless networking essentials, site surveys, and Ruckus Wireless products, visit the Ruckus Wireless Training Portal at https://training.ruckuswireless.com

OPERATING AND TROUBLESHOOTING THE C500

This section lists some information that may be useful in operating and troubleshooting the C500. Topics include:
- Rebooting and Resetting the C500
- How Radio Frequency Scanning Works
- Retrieving the CM's MAC Address

Rebooting and Resetting the C500

CAUTION: *If required, you can reset the C500 to its factory default settings by pressing and holding in the reset button on the back of the C500 for four or more seconds. DO NOT DO THIS UNLESS SO INSTRUCTED. (Doing this resets the C500 IP address to 192.168.100.2 and resets the C500 CM address to 192.168.100.1.)*

NOTE: *After a reset, you can access the internal C500 AP web interface using* https://192.168.100.2. *Your device must use an unused IP address, with subnet mask 255.255.255.0. The username is* super, *and the password is* sp-admin.

How Radio Frequency Scanning Works

- DOCSIS Radio Frequency Scanning
- EuroDOCSIS Radio Frequency Scanning

DOCSIS Radio Frequency Scanning

The following steps describe how a DOCSIS-compliant C500 performs radio frequency scanning:

1 Looks at the last "known good channel" (repeat this every 64 channel checks).
2 Checks the sixteen last known frequencies (repeat this every 32 channel checks).
3 Scans STD standard channels (where the center of the channel is an integer spaced by 6MHz), first [from 93MHz to 999MHz - 152 channels]).
4 Scans the harmonically related carrier (HRC) channels, which moves the channels 1.25MHz off the standard frequencies so the video carriers are all related by 6MHz [from 91.75 to 997.5MHz--152 channels].

A complete frequency scan requires approximately 469 channel checks. Since each channel takes about 0.6 seconds, a full scan is done every 281 seconds (a little under five minutes).

Note: The scanning of generic DOCSIS channels is required the first time the C500 connects to an MSO. After the initial scan, the C500 is able to retrieve the local country frequency plan without a complete scan during its normal operation.

EuroDOCSIS Radio Frequency Scanning

The following steps describe how a EuroDOCSIS-compliant C500 performs radio frequency scanning:

1 The cable modem scans DS frequencies in descending order in a group of four adjacent frequencies 8 MHz apart.
   The step between groups is 250kHz.
   From 122250000 Hz down, the scanning is not done in groups and descends in 250kHz steps to the lowest frequency of 112 MHz.
2 There is a scan list that keeps the 16 LKFs (Last Known Frequencies). They are re-scanned every 32 channels.
3 The first entry in the scan list is re-scanned every 64 channels.

A complete frequency scan requires approximately 4526 channel checks and lasts approximately 4525 seconds.

Retrieving the CM's MAC Address

There are some configuration operations that require you to enter the CM's MAC address. The CM and AP MAC addresses are printed on labels on the outside of the C500. If you cannot find the CM's MAC address on the C500, you can use the CMTS to retrieve the CM's MAC address.

PHYSICAL INSTALLATION

- Place the C500 on a flat surface with feet down for most installations. You will experience the best wireless coverage and throughput when the C500 is mounted upright. Make sure you do not place the C500 on a hot surface or in direct sunlight.
- If you are mounting the C500 on a wall or other vertical surface, then refer to the *C500 Accessory Bracket Mounting Guide*. Make sure you do not mount the C500 on a hot surface or in direct sunlight.