COMMSCOPE®

S1000C
User Guide

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New in this release

The following section lists documentation changes in *CommScope S1000C User Guide* (913114) for Release 1.5.

Revision 1.5.01

- Initial release of document

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About this document

This document describe S1000C device components, and gives basic installation and setup instructions.

Audience

This guide is intended for network administrators.

Purpose

This guide provides the reader with installation and setup instructions for an S1000C device.

What you need to know

The reader should have a basic understanding of data networks, CDMA, LTE, and general telecommunications practices.

Customer documentation

The following table lists available documents in the S1000C Device documentation suite.

Table 1. Customer documentation

Title	Contents
CommScope S1000C Getting Started Guide (913113)	One sheet, double-sided installation instructions for S1000C
CommScope S1000C User Guide (913114)	Device installation and user information

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Table 1. Customer documentation

Title	Contents
Airvana Small Cell Deployment Guide (913111)	Describes the DMS platform software upgrade procedures from the previous patch release to the current patch release and the DMS rollback and downgrade procedures from the current patch release to the previous patch release.
Airvana S1000 Web GUI User Guide (913110)	Describes the S1000 Web GUI and how to configure the S1000.
Airvana S1000 Troubleshooting Guide (913112)	Describes how to troubleshoot problems that customers may encounter with their S1000s.

Conventions

This guide uses the following text conventions, as applicable.

Table 2. Conventions

Convention	Description
Syntax symbols	
< >	Enclose a required parameter or set of parameters. For example: **`>band-class <class>`** **`<class>`** is a required parameter.
[ ]	Enclose an optional parameter or set of parameters. For example: **`>activate image <version> [reboot]`** **`[reboot]`** is an optional parameter.
|	Separates items on a list of parameters, only one of which can be used. For example: **`>channel-included <yes|no>`** A valid command is: **`>channel-included yes`**

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Table 2. Conventions

Convention	Description
Font usage	
`Bold input font`	Indicates text that must be entered exactly as shown. For example: Enter **`ping 192.23.10.12`**.
`Italic input font`	Indicates a variable parameter for which you must provide an actual value. For example: **`>authentication key <aukey>`** **`<aukey>`** is a variable parameter. A valid command is: **`>authentication key 9782503000`**
`Plain output font`	Indicates system output in a command line or system-generated file. For example: `IP address 192.23.10.12 is alive.`
`Italic output font`	Indicates a variable in system output in a command line or system-generated file. For example: `Installation of release <release> is complete.`
Plain italic font	Indicates file names, directory paths, book titles, chapter titles, and user accounts.
Bold font	Indicates text that appears on screen exactly as shown, for example, names of screens, names of buttons, items on menus, and items on pull down lists.
blue text	Indicates a hypertext link.
Other conventions	
>	Indicates graphical user interface (GUI) menu path. For example: Select **Edit** > **Add Network** to open the Add Network screen.

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Notes, cautions, and warnings

NOTE

Notes provide additional information about the subject text.

CAUTION

Cautions indicate that procedures, if performed incorrectly, can cause equipment damage or data loss.

WARNING

Warnings indicate that procedures, if performed incorrectly, can harm you.

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Chapter 1

Introduction

The S1000C 3G+4G Small Cell Device is an indoor small cell intended for use by small to medium size businesses. The device contains an S1000 coupled with the CDMA FAP in a single enclosure. The combination of the S1000 and cFAP allows both data and voice capability in a single offering.

The S1000C offers any-to-any mobility through LTE technology, offering users seamless mobility between indoor and outdoor coverage. It also offers dual-concurrent 2.4/5 GHz 802.11ac WiFi to deliver high data rates and performance.

The WiFi capabilities include automatic channel selection and Interference avoidance, and Band steering to 5GHz for supporting devices. Up to 12 SSIDs are supported with transparent authentication of public SSIDs using the 802.1x protocol.

Circuit Switched Fallback (CSFB) enables circuit switched voice and SMS services to be delivered to dual radio Long Term Evolution (LTE) component of the S1000C, then switched to the 3G network running on the internal cFAP. In this release, the cFAP used is the C4500 (CDMA).

Using this guide

This user guide introduces you to the services and features of the CommScope S1000C. The guide is divided into the following chapters:

- Getting Started on page 2-1
- Configuring the S1000C Router on page 3-1
- Using the S1000C on page 4-1
- Troubleshooting on page 5-1
- Safety information on page 6-1

It is important that you read each section and note any special requirements before you use the device.

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WARNING

Please read the Safety information on page 6-1 to learn about how to safely use your device. Failure to read and follow the safety information in this user guide may result in serious bodily injury, death, or property damage.

NOTE

Use the following key when viewing 4G DATA LED tables in this document:

Table 1-1. 4G DATA LED color key

Solid Green	Solid Red	Off	Blinking Red

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Chapter 2

Getting Started

This chapter describes the contents of the S1000C box and setting up your S1000C.

- What's in the box on page 2-2
- Setup at a glance on page 2-3
- Setting up your S1000C on page 2-4
- Setting up optional components on page 2-9

NOTE

When you complete this chapter, configure WiFi and other services of the internal router in Chapter 3, Configuring the S1000C Router.

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What's in the box

Ensure that the following items are in the box, along with the Quick Start Guide.

Figure 2-1. Box contents

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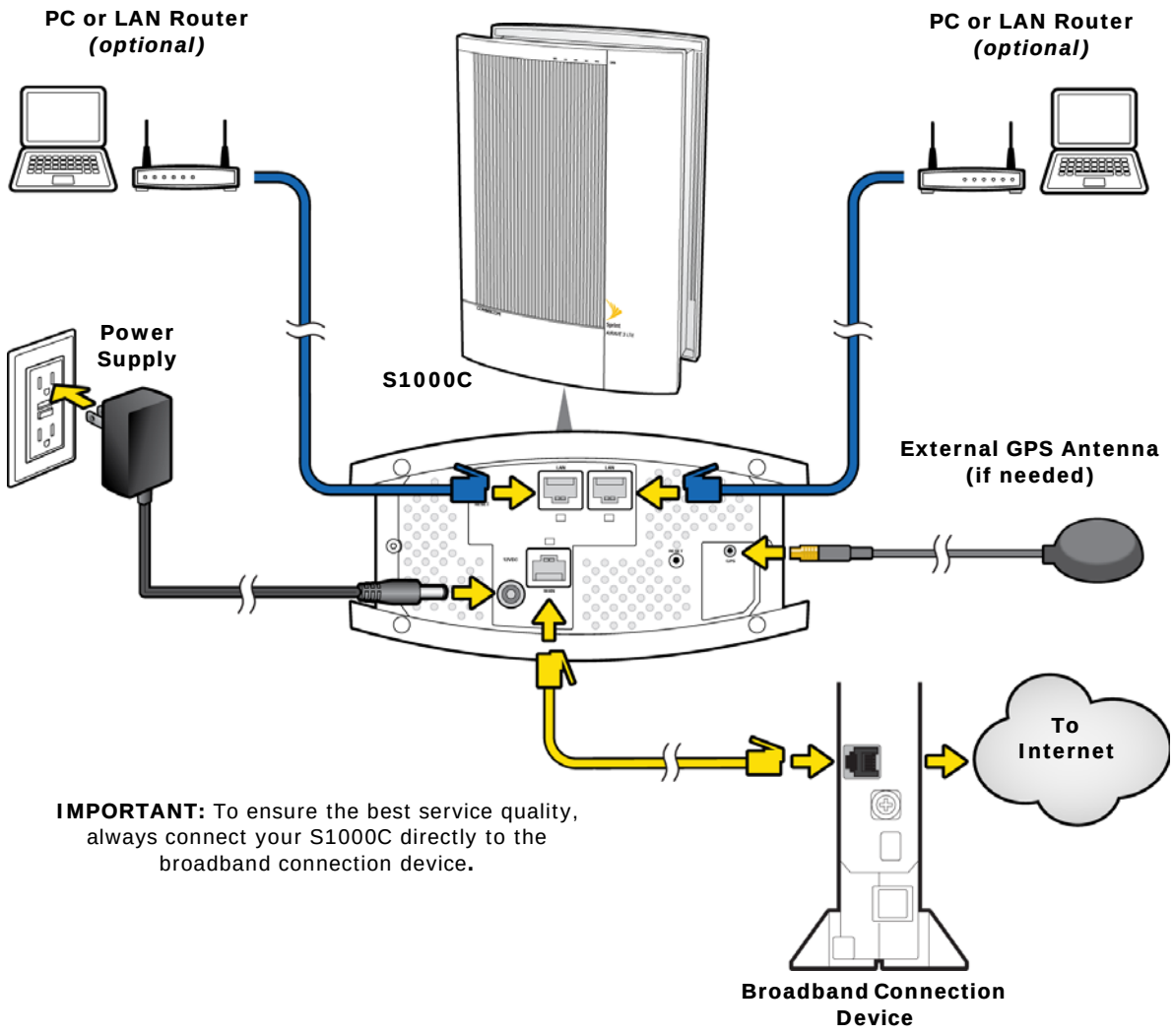
Setup at a glance

The following diagram shows a typical S1000C desktop setup.

TIP

Place the unit on it's side on a flat surface to expose the bottom of the unit. You will attach cables to the bottom of the unit.

Figure 2-2. Setup at a glance



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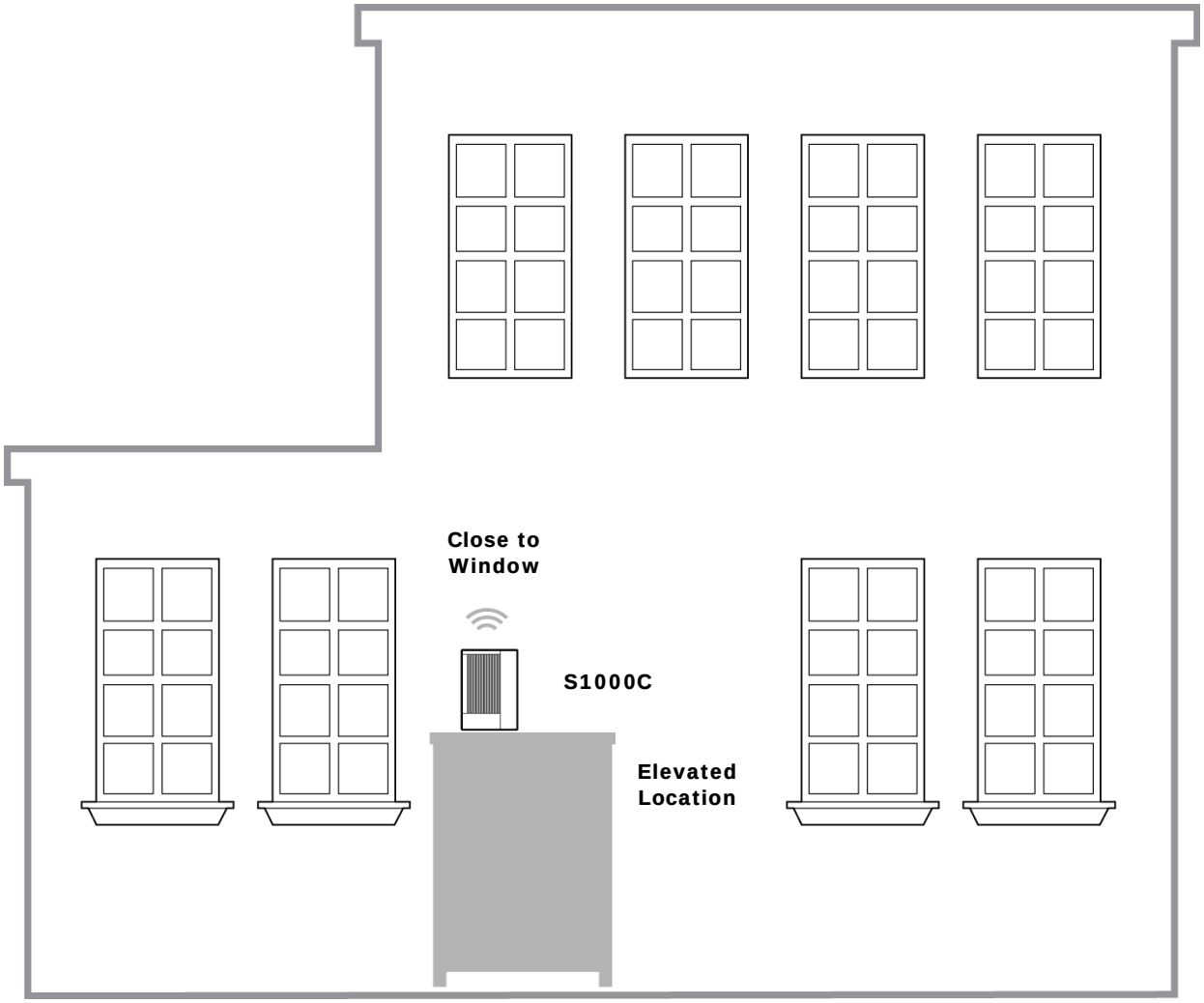
Setting up your S1000C

Follow these steps to set up your S1000C inside your office or other location.

Figure 2-3. S1000C location in a building



1. Disconnect the power from all devices on your network.
2. Place your S1000C in a central location. For best results, place the S1000 in an elevated location, such as the top of a bookshelf or tall cabinet.
3. Place the unit on it's side to expose the bottom of the unit.

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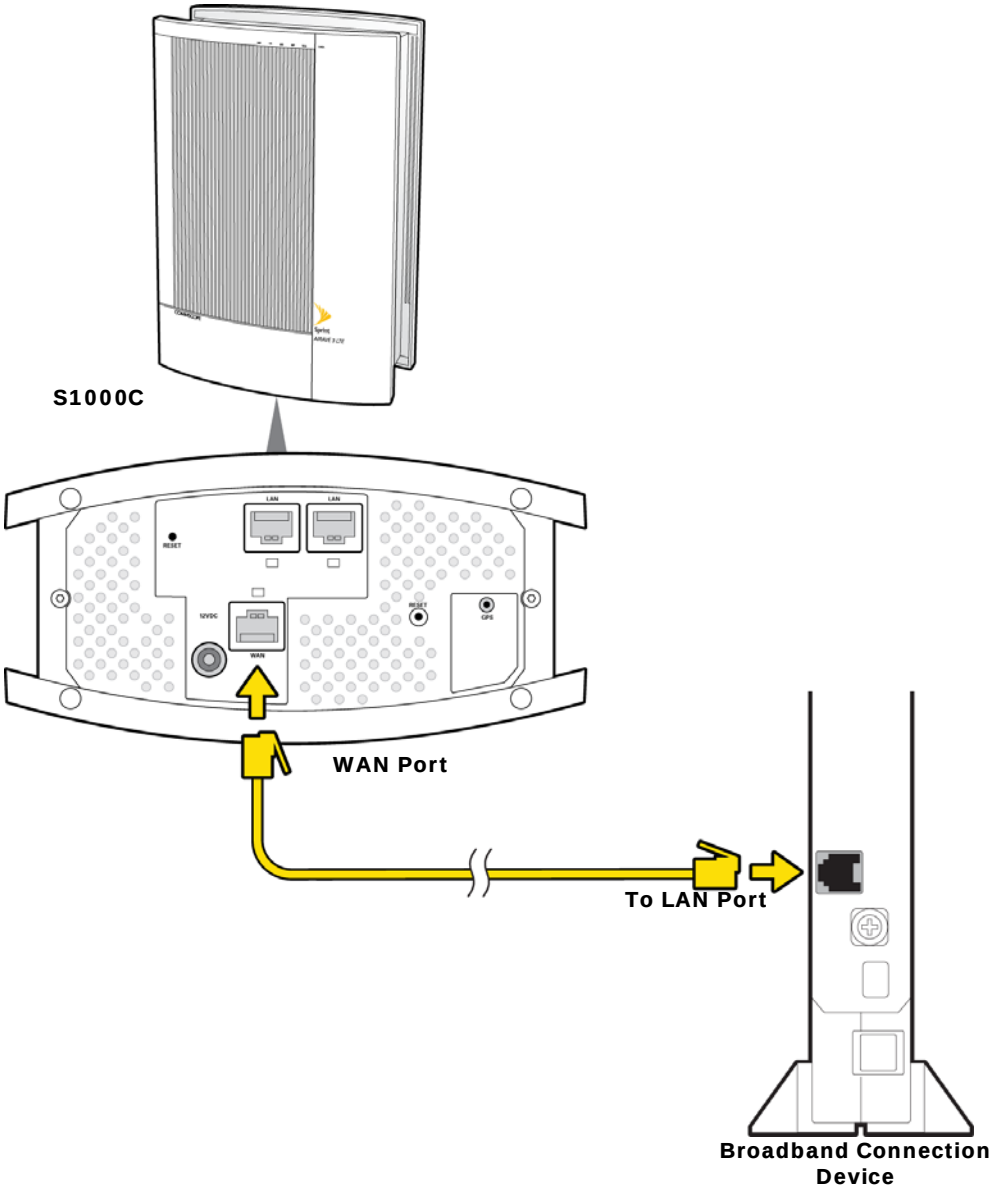
4 Connect one end of the yellow Ethernet cable to an available LAN port on your broadband connection device.

5 Connect the other end of the yellow Ethernet cable to your S1000C's WAN port.

Figure 2-4. WAN port connection



6 Turn on your broadband connection device.

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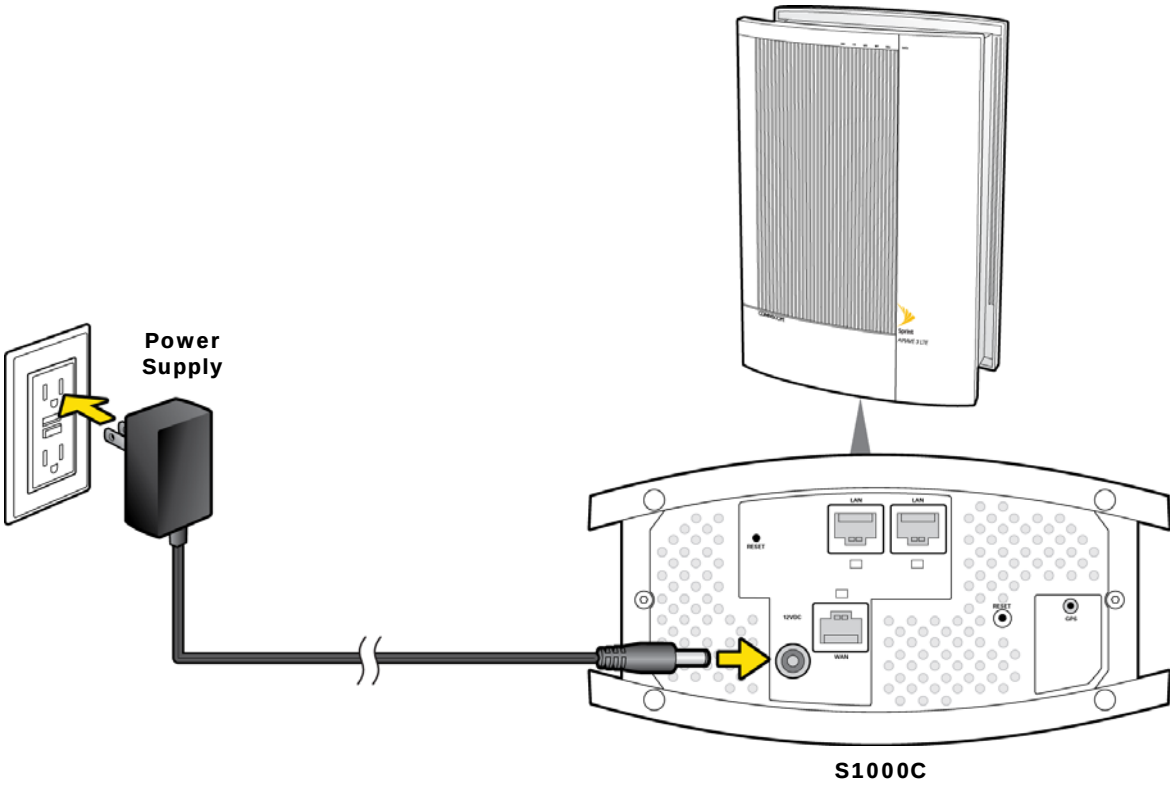
NOTE

Wait a couple of minutes for the broadband device to fully initialize before continuing.

7 Plug the power supply connector into the black power port on your S1000C.

Figure 2-5. Power supply connection



8 Stand the unit upright and carefully move all cables so they come out of one long end of the unit.

NOTE: There is room for cables to come out from the beneath the unit once it is placed upright.

9 Plug the other end of the power cable into an available electrical outlet. (We recommend a surge protected outlet.)

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When is your S1000C ready to use?

When you install and power on your S1000C for the first time, it will go through an automated setup sequence.

The side of the device marked 'DATA' displays LEDs for 4G LTE data passing through the device. The side of the device labeled 'VOICE' displays LEDs for 3G voice signals.

NOTE

Data LEDs and Voice LEDS must be solid green before the S1000C is ready for data and voice traffic.

4G DATA LEDs

Table 2-1 shows the S1000C LED states on the DATA side during normal boot-up. Refer to Table 1-1 for LED color codes.

Table 2-1. 4G Data LED states during S1000C boot sequence

WAN	NET	GPS	LTE	WiFi	S1000C State
					Performing initial HW tests (1-2 seconds)
					HW tests are complete; software is loading.
					Software is loaded; services are initializing.
					WAN port is connected over the local network; IPSec tunnel is not established.
					WAN port is connected; IPSec tunnel is established and UP.
					WAN port is connected; IPSec tunnel is established and UP; GPS Time Fix is available; LTE service is UP.

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Table 2-1. 4G Data LED states during S1000C boot sequence *(continued)*

WAN	NET	GPS	LTE	WiFi	S1000C State
					WAN port is connected; IPSec tunnel established and UP; GPS Time Fix is available; LTE service is UP; WiFi service is UP.

During boot-up the device's green LED will be solid for a few seconds during initial hardware tests. Upon completion of hardware tests, all LEDs, except the WAN LED, will turn off until the software loads. This takes 1 to 2 seconds.

When the WAN, NET, GPS, LTE, and WIFI LEDs are solid green, your S1000C is ready for data traffic.

NOTE

On the 3G side, the LEDs will change color during the automated setup sequence. This process may take up to 2 hours. When the CDMA, NET, GPS, and WAN LEDs are solid green, your S1000C is ready for voice traffic.

NOTE

For a summary of LED status indicators, see LED quick reference on page 5-4. For a complete description of LED states, see Using LEDs on page 5-9.

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Setting up optional components

In this section:

- External GPS antenna setup on page 2-9
- PC or LAN Router Setup on page 2-11

External GPS antenna setup

Use the external GPS antenna if the internal antenna of your S1000C does not gain a signal for GPS lock (indicated by a solid red GPS LED for more than 2 hours, solid green indicates GPS lock). Connect the external GPS antenna to your device's GPS connection port.

NOTE

After initial installation, GPS may take 30-40 minutes to get a GPS fix.

1. Place the external GPS antenna horizontally on a flat surface as close to a window as possible. The antenna works best in an open area where it can easily pick up signals.
2. Place the S1000C on it’s side to expose the bottom of the unit.
3. Plug the GPS cable into the GPS port on the bottom of the unit as shown in the following diagram.
4. Stand the unit upright and gently pull the cables to the one of the long sides of the unit.

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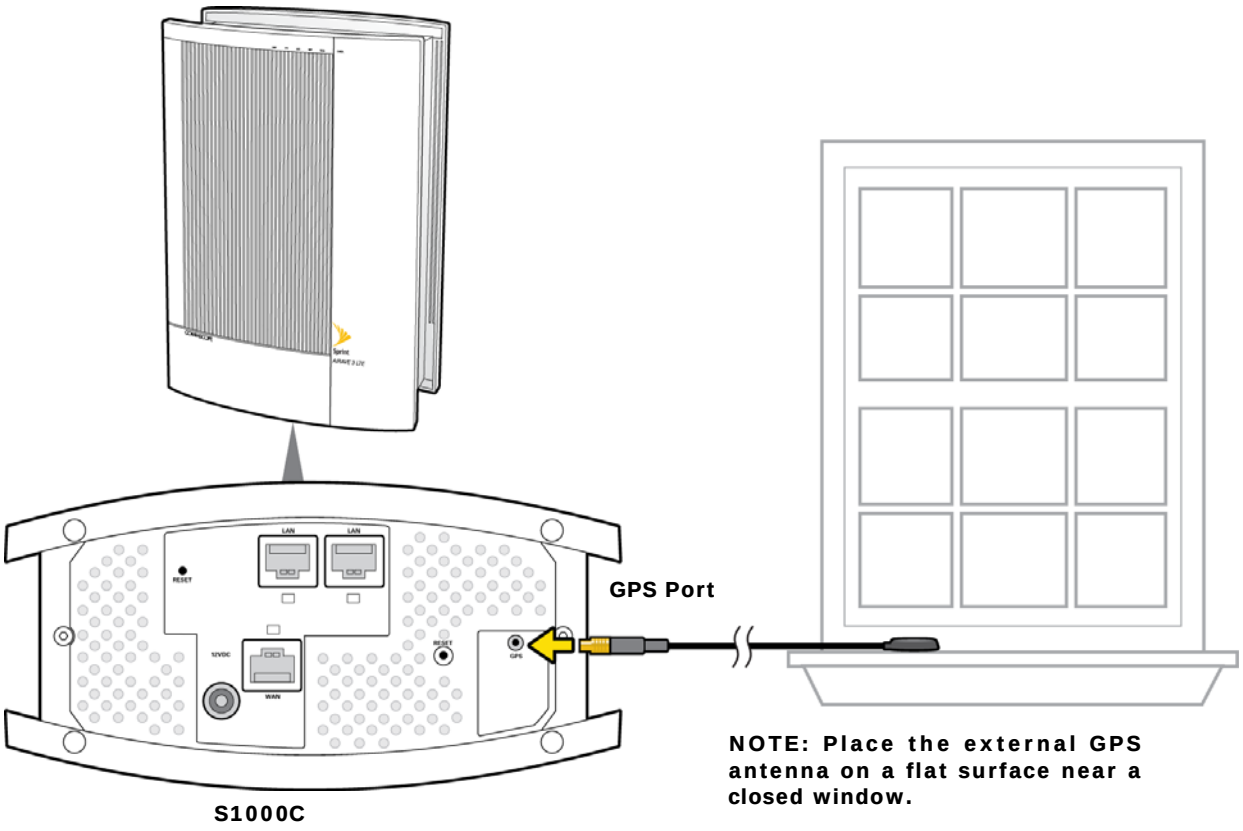
This diagram shows the proper placement of the external GPS antenna.

Figure 2-6. External GPS antenna connection



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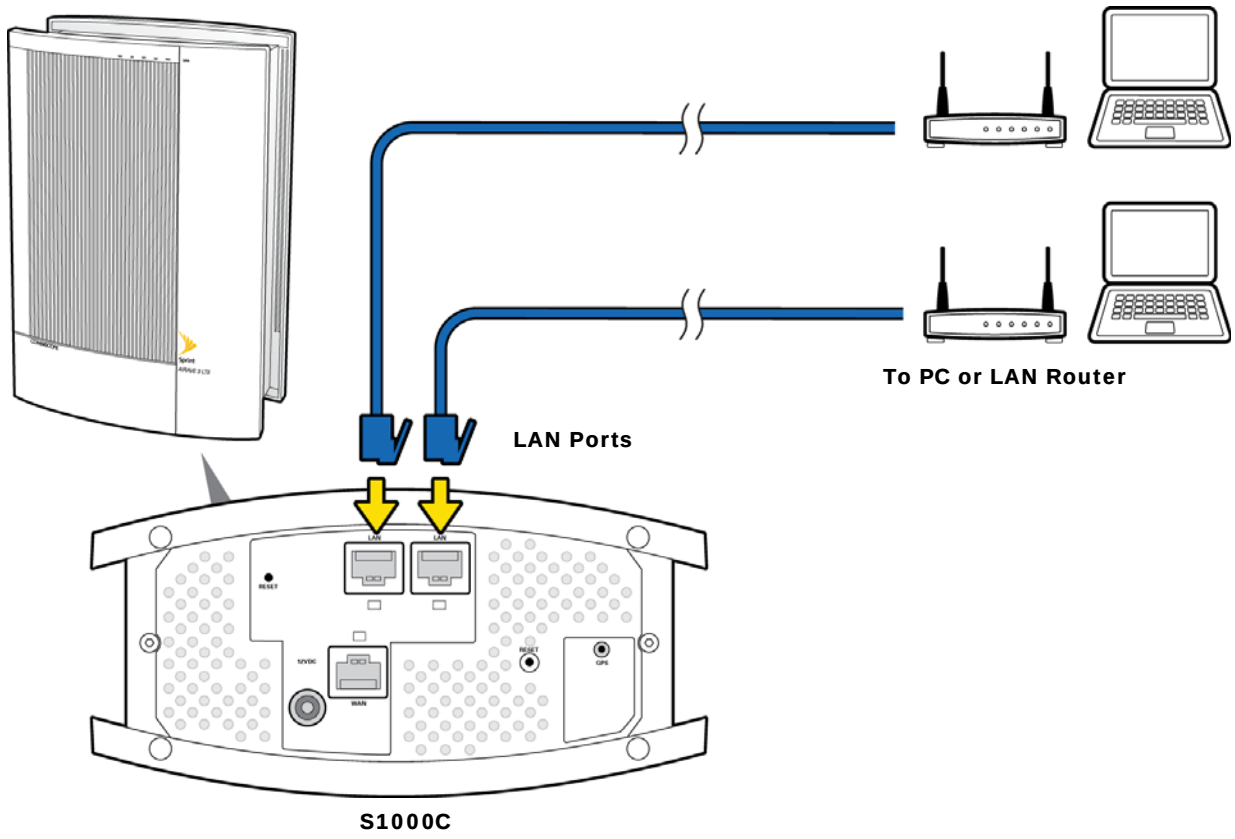
PC or LAN Router Setup

Connect a device that you have, such as a PC or a LAN router, to one of the S1000C's LAN ports.

TIP

To ensure the best service quality, always connect the LAN router to your S1000C. Do not connect it to the broadband connection device.

Figure 2-7. PC or LAN router setup



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Chapter 3

Configuring the S1000C Router

This chapter describes how to configure the internal router:

- Overview on page 3-1
- Logging in to the S1000C router on page 3-3
- Configuring WiFi service on page 3-5
- Adding your ISP User Name and Password on page 3-14

Overview

Your S1000C contains a built-in router. Usually, you can plug your S1000C into your broadband connection device, such as a cable modem, DSL modem or FIOS (a high-speed, fiber optic broadband Internet service), without performing any additional steps. However, you may need to configure the built-in router to work with your ISP modem or connection device.

The following table lists typical ISP setups and actions to take so that the built-in router works with your existing ISP setup.

For a complete description of the S1000C router configuration, refer to *Airvana S1000 Web GUI User Guide* (913110).

Broadband connection device	LED display pattern	Symptom	Action to take
Cable modem	WAN, LTE and WiFi solid green	Not applicable (working properly)	Not applicable
DSL modem	WAN LED blinking red	Cannot access Internet	Go to Adding your ISP User Name and Password

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Broadband connection device	LED display pattern	Symptom	Action to take
DSL modem with built-in router	WAN led blinking red	Cannot access Internet	See FAQs. If the problem persists, contact Customer Support as described in Getting help.
DSL modem	WIFI LED blinking red	Cannot access Internet	Go to Configuring WiFi service

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Logging in to the S1000C router

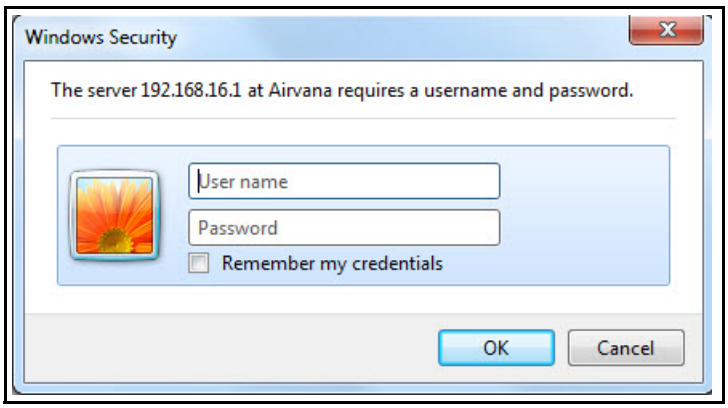
1. Connect a computer to the S1000C LAN ports.
2. Start the computer. (If it is already running, restart it.)
3. In a web browser, enter the following URL:

   `http://192.168.16.1`

NOTE

This IP address is the LAN bridge IP address.

The login dialog box appears.



4. Enter the User name *admin* and the Password *admin*.
5. Click **OK**.

NOTE

If you cannot connect to the router, diagnose the problem using the steps in section Router connection problems on page 5-7.

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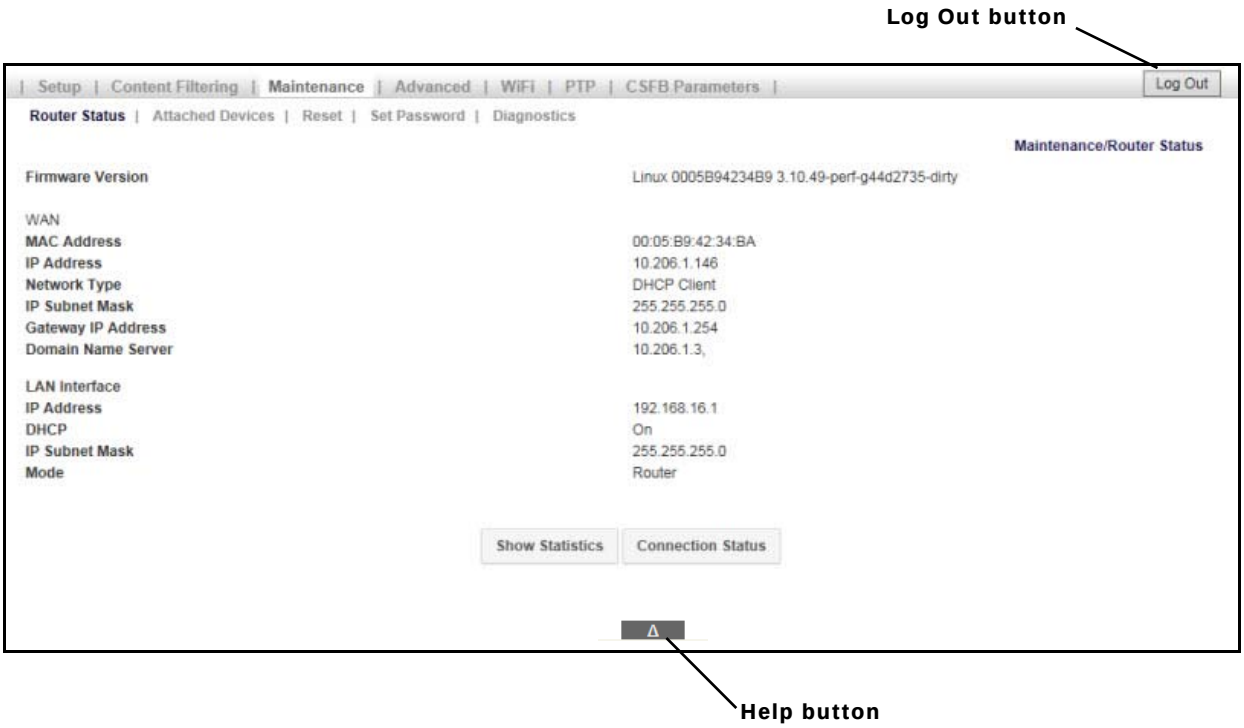
Home page

When connected to the router, the Router Status screen appears as shown below.



Main menu

The main menu, on the top of the screen, contains a menu bar to access the major screens.

The main menu also contains the following buttons:

- **Log Out** – When finished, click this button to log out.
- **Help** – Located at the bottom of the screen, click to view help for the current screen.

Navigation and data input

Use the menu bar on the top of the screen and the browser's Back button to navigate.

You must click **Save** before changing screens or the software does not save changes.

In order to use WiFi features of the S1000C, you need to configure WiFi service. Proceed to Configuring WiFi service.

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Configuring WiFi service

Follow this section to setup the S1000C's WiFi service. You will create and configure SSIDs in the router.

1. Log into the S1000C router by following the procedure in Logging in to the S1000C router.
2. From the Home page click **WiFi**.

Basic Settings

On the Basic Settings tab, you to enable and configure the two radios available in the S1000C. Radio 1 has a frequency of 5.0 GHz and Radio 2 has a frequency of 2.4 GHz

Figure 3-1. Basic Settings page

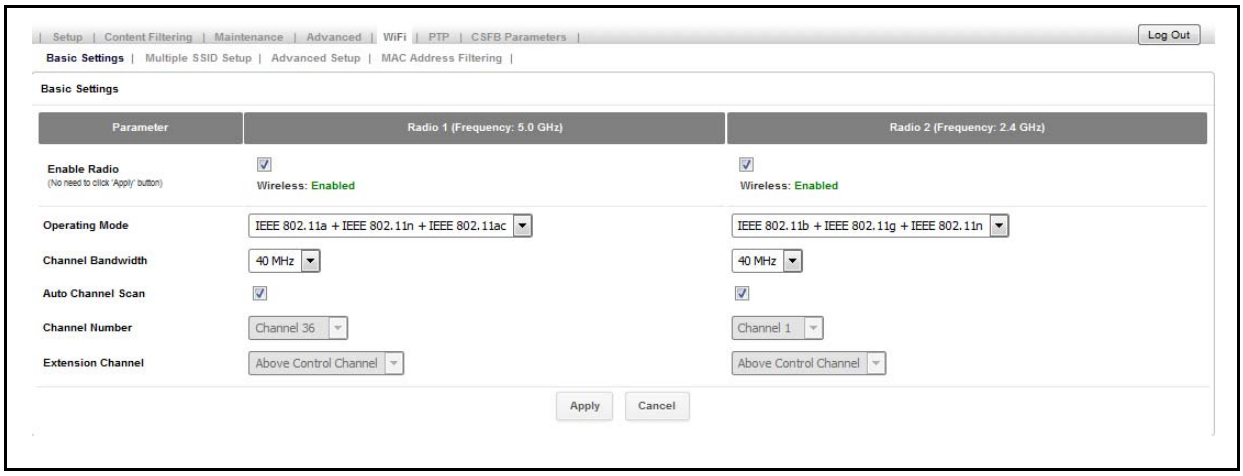

Table 3-1. Basic Settings parameters

Parameter	Description
Enable Radio	Enable or disable Radio 1 and Radio 2
Operating Mode	The following options are supported on Radio 1: • IEEE 802.11ac • IEEE 802.11n • IEEE 802.11a The following options are supported on Radio 2: • IEEE 802.11n • IEEE 802.11g • IEEE 802.11b

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Table 3-1. Basic Settings parameters *(continued)*

Parameter	Description
Channel Bandwidth	The following channel bandwidths are supported on Radio 1 and Radio 2: • 20 MHz • 40 MHz • 80 MHz
Auto Channel Scan	To enable/disable auto channel scan, check/uncheck the box.
Channel Number	This field shows the list of available channels under the respective radio. **Note**: To select a channel manually, the Auto Channel Scan option must be disabled.
Extension Channel	Automatically selected based on the selected channel

Table 3-2. Mode, bandwidth and data rate configurations

Mode	Channel Bandwidth	Data Rates
Radio 1 (5 GHz)		
IEEE 802.11ac	20 MHz	up to 87.6 Mbps
	40 MHZ	up to 200 Mbps
	80 MHz	up to 433 Mbps
IEEE 802.11n	20 MHz	up to 72.2 Mbps
	40 MHz	up to 150 Mbps
IEEE 802.11a	20 MHz	up to 54 Mbps
Radio 2 (2.4 GHz)		
IEEE 802.11n	20 MHz	up to 72.2 Mbps
	40 MHz	up to 150 Mbps
IEEE 802.11g	20 MHz	up to 54 Mbps
IEEE 802.11b	20 MHz	up to 11 Mbps

3 It is recommended to keep the ACS (Auto Channel Select) feature checked. This feature ensures that the device will be able to select the most optimal available channel, even in a congested RF environment.

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Multiple SSID Setup

The S1000C router supports twelve SSIDs. Eight SSIDs are Private and user configurable; four are Public and configured only by the Operator.

1 Click **Multiple SSID Setup**.

NOTE: Public SSIDs can only be enabled or disabled in the S1000 Router. Public SSIDs are configured from the DMS Device Management Portal under Device Configuration. Refer to *DMS Device Management Portal User Guide for S1000 Devices* (913157) for details.

Figure 3-2. Multiple SSID Setup page

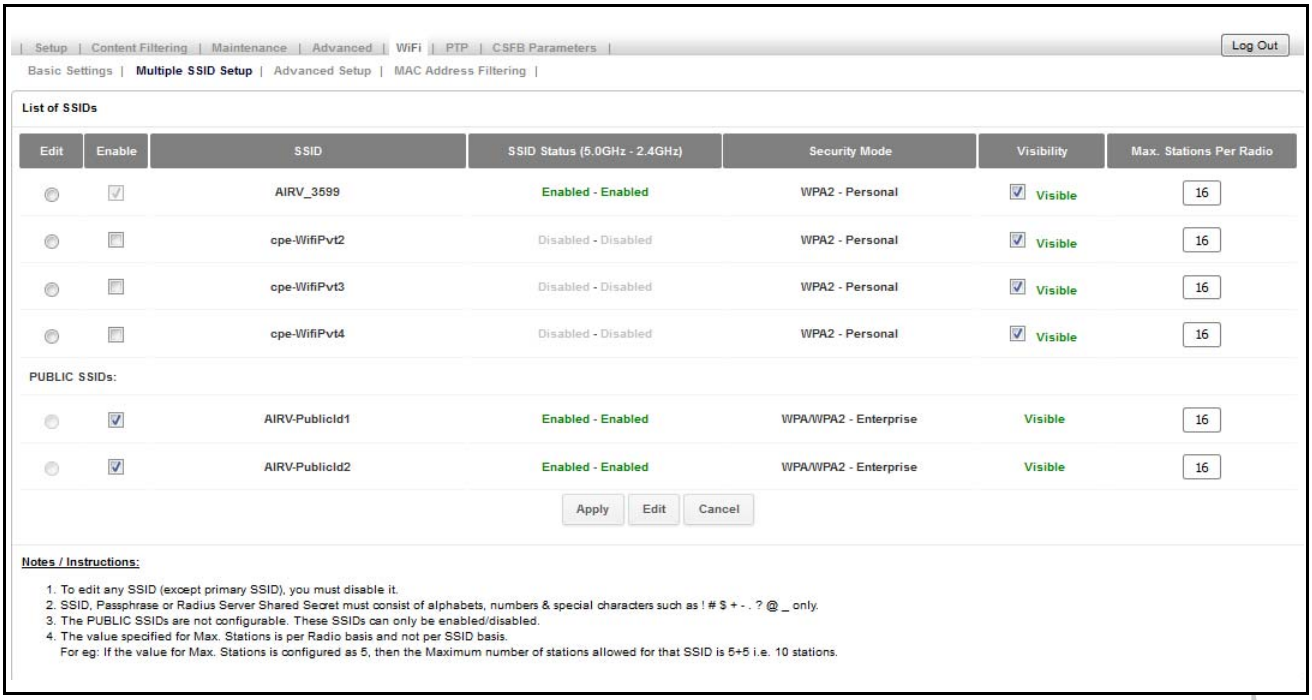

Table 3-3. Multiple SSID List parameters

Parameter	Description
SSID	The name of the network to which a device associates
Enable	To enable/disable a SSID, check/uncheck the box for the SSID. Click **Apply**.
Status	Shows the status of a SSID per Radio

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Table 3-3. Multiple SSID List parameters

Parameter	Description
Security Mode	Shows the security mode in which the SSID is currently operating By default, the security mode is WPA2-Personal for Private SSIDs.
Visibility	To enable/disable SSID broadcast, check/uncheck the box for each of the Private SSIDs and click **Apply**.
Max. Stations Per Radio	This feature can be used to restrict the number of connections per SSID. A minimum of one station and a maximum of 128 stations can be specified per SSID. The maximum stations per radio is for the number of radios and not for SSIDs. For example, if the value of Max. Stations Per Radio is configured for 5, the maximum stations allowed for that SSID is 5 + 5, or 10 stations.

To edit an SSID

To edit SSID details:

1 Find the SSID you want to modify, disable it (uncheck the Enable box), then click **Edit**.

Figure 3-3. Edit SSID Details page

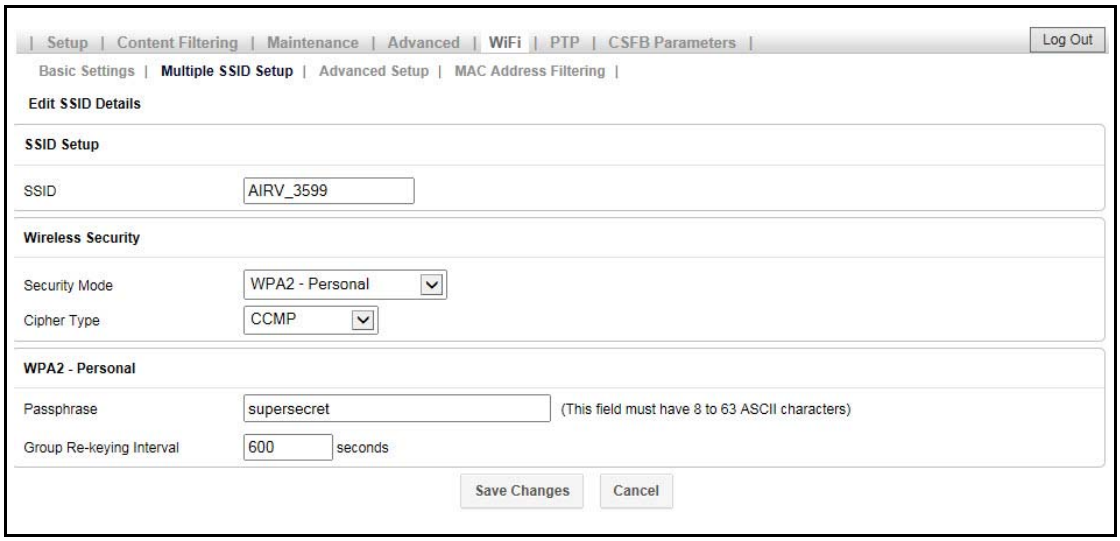

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Table 3-4. Edit SSID Details parameters

Parameter	Description
SSID Setup	
SSID	The name of the network to which a device can associate. SSID must be in the range of 1 to 32 characters, and must be unique. **Note:** If you want to change the name of the SSID, change the text of the SSID text box, then click **Save Changes**. All SSID values will remain the same; only the name will change.
Wireless Security	
Security Mode	The security mode in which the SSID is currently operating. **Valid values** • open • WPA-Personal • WPA-Enterprise • WPA2-Personal • WPA2-Enterprise • WPA/WPA2-Personal • WPA/WPA2-Enterprise **Note:** For Enterprise versions, a RADIUS server based security check is performed: You will enter values for Radius Server: – Server IP Address (A.B.C.D) – Server Port (Range: 1 to 65535, Default: 1812) – Server Shared Secret (WAP to Radius Server) – Server re-keying interval; this is the time after which the key must be re-generated. (Range: 600 to 7200 seconds, 0 - disable, Default: 600 seconds)
Cipher Type	This field can be set to one of the following options: • TKIP – Temporal Key Integrity Protocol • CCMP – Counter Mode CBC MAC Protocol • TKIP & CCMP
<Security Mode> - Personal	
Passphrase	Password required to associate with AP. This can be 8-63 ASCII characters.
Group Re-keying interval	The period of time between automatic changes of the group-key with the devices on the network.

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2 Click **Save Changes** to save your configuration changes.

SSID IP configuration

To configure the IP address and subnet for an SSID, navigate to **Advanced→LAN IP Setup**. On this page, you can view the various subnets, including the default IP address range and subnet mask, for every WiFi SSID. You can edit these fields for each SSID by clicking the **Edit** button for the SSID and entering new values.

Figure 3-4. LAN IP Setup page

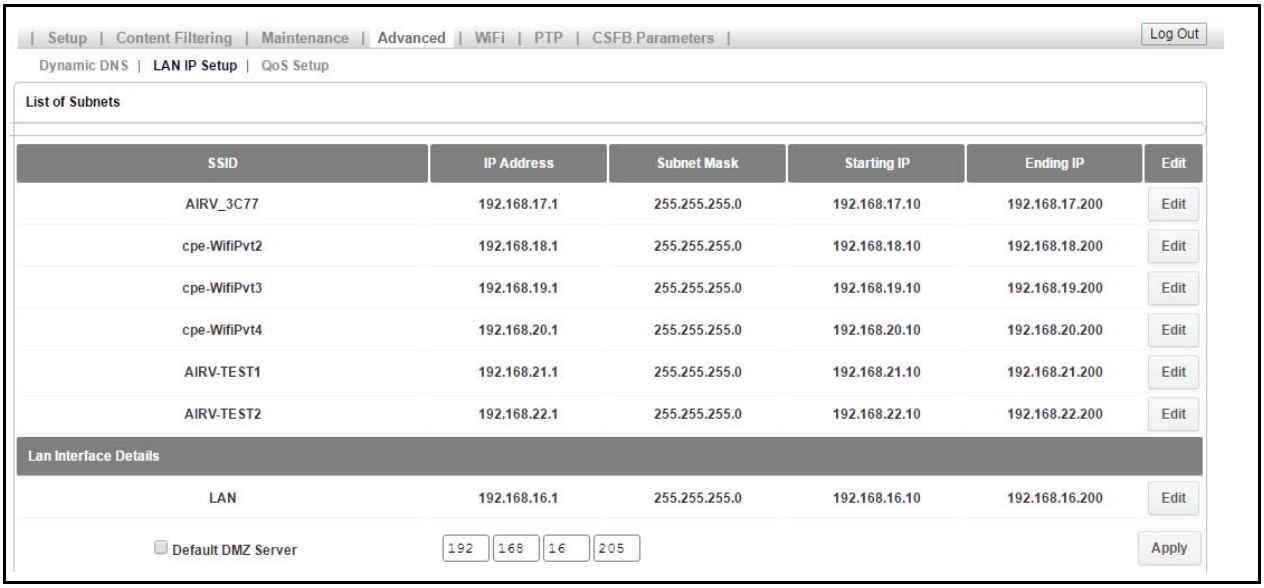

Table 3-5. LAN IP Setup parameters

Parameter	Description
SSID	The name of the SSID.
IP Address	The configured IP Address for the router for the SSID. Format: <A.B.C.D>
Subnet Mask	The configured subnet mask for the router in the SSID This is calculated by the router based on the IP Address. Format: <A.B.C.D> Default: 255.255.255.0

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Table 3-5. LAN IP Setup parameters *(continued)*

Parameter	Description
Starting IP	The starting range of the reserved pool of IP Addresses for this SSID.
Ending IP	The ending range of the reserved pool of IP Addresses for this SSID.
Edit	Click this button to edit the configuration for the SSID.
Lan Interface Details	
SSID	**Note:** All parameters described above apply to the SSID for the Local Area Network (LAN).
Default DMZ Server	When checked, the IP Address for this "Demilitarized zone" is the default server. The IP Address can be configured. **Note:** Use this cautiously, as there are security issues associated with a DMZ server.
Apply	Click this button to commit the DMS server configuration.

Advanced Settings

On the WiFi Advanced Setup page you can configure some WiFi advanced parameters such as Beacon Interval, Transmit Power and Block DFS channel. Generally no configuration change is required on this page.

Figure 3-5. Advanced Settings page

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Table 3-6. Advanced Settings parameters

Parameter	Description
Beacon Interval	Specifies the time in which a beacon packet must be broadcast. By default, all the SSIDs will be beaconing at an interval of 100msec. (Range: 50 msec to 3500 msec)
Transmit Power	This defines the strength of the signal being transmitted from a radio. By default, both the radios will be transmitting at the highest Transmit Power.
Block Dynamic Frequency Selection (DFS) Channels	This option allows the Auto Channel Selection (ACS) mechanism to either select/unselect DFS channels. The following channels are classified as DFS channels: 52,56,60,64,100,104,108,112,116,120,124,128,132,136,140 By default, the 5GHz radio will block all the DFS channels. One can enable the use of these channels by unchecking the checkbox and applying the settings. **NOTE:** It is NOT recommended to use these channels.

MAC Address Filtering

This feature is used to ALLOW or BLOCK MAC addresses from associating with a Private SSID.

By default, this feature is DISABLED on every Private SSID.

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Figure 3-6. MAC Address Filtering page

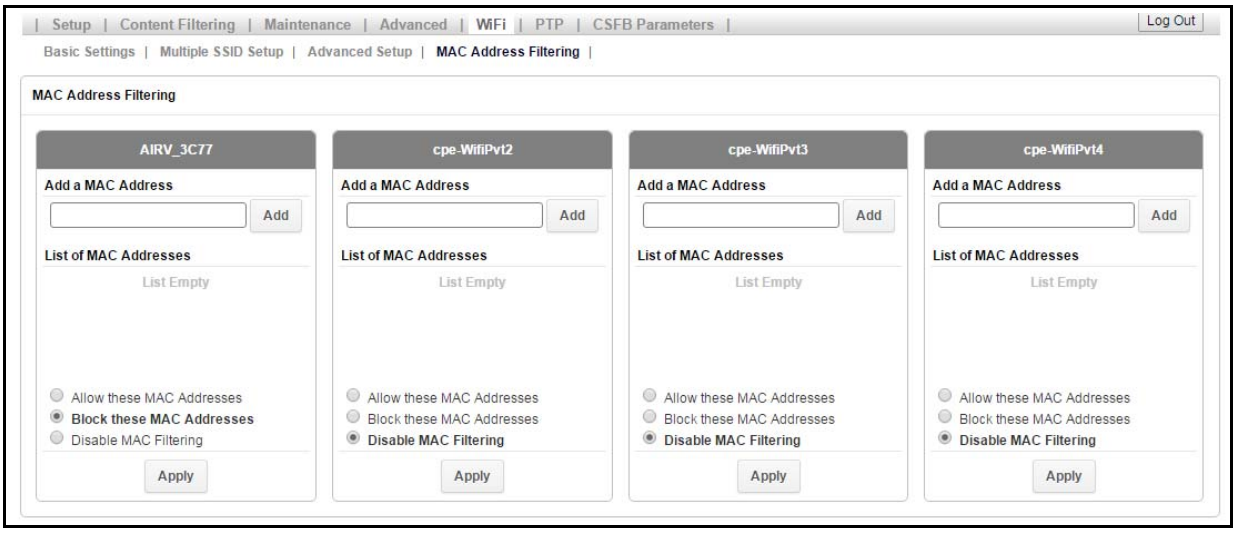

Table 3-7. MAC Address Filtering parameters

Parameter	Description
Add a MAC Address	To add a MAC address in the list, enter a valid MAC address in the text field provided under a SSID and click **Add**.
List of MAC Addresses	Displays the list of MAC addresses added.
MAC Command	This option is used to select the operation for the MAC addresses added in the list. • Allow these MAC Addresses – used to ALLOW only the MAC addresses added to the list • Block these MAC Addresses – used to BLOCK only the MAC addresses added to the list • Disable MAC Filtering – used to DISABLE MAC Address Filtering

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Adding your ISP User Name and Password

If you are using a DSL modem and your device cannot connect to the Internet, you may need to enter your ISP account user name and password so that the S1000C can connect to the Internet.

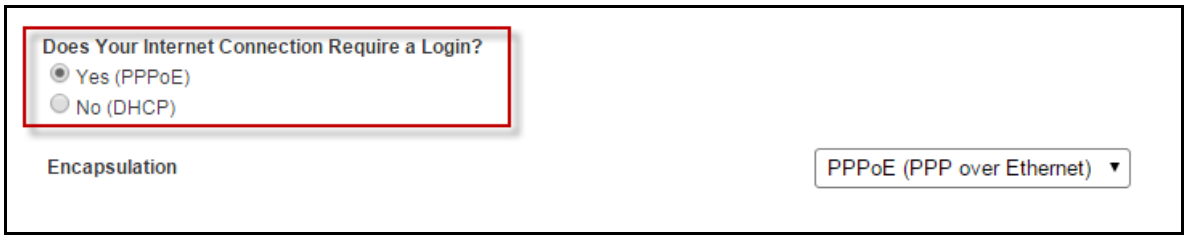
You will use the User Interface of the S1000C internal router to configure this information.

TIP

Before you begin, obtain your ISP user name and password. Contact your ISP if you do not have this information.

1. Log into the S1000C router by following the procedure in Logging in to the S1000C router.
2. Click the **Setup** tab on the Router status page menu bar.
3. Click **WAN Settings**.

4. Ensure that **Yes (PPPoE)** is selected.



5. Enter your ISP user name in the Login box and your password in the Password box. Select authentication type (PAP, CHAP) from the drop down menu. Enter the Service name information if you have it. Click **OK**.

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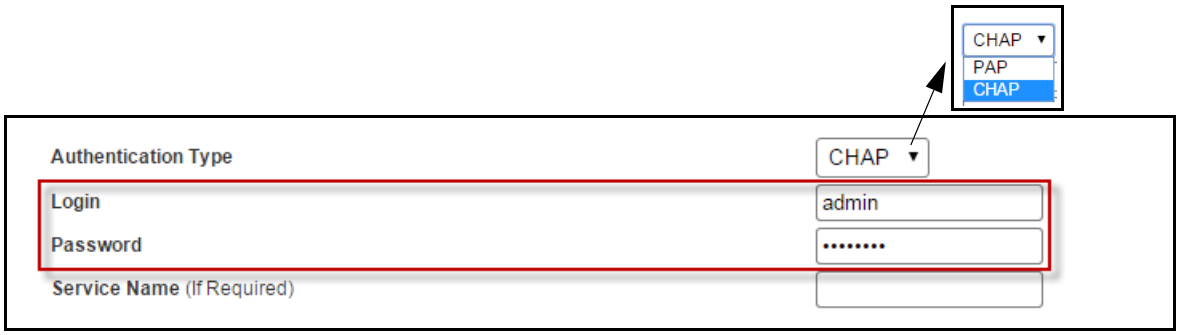
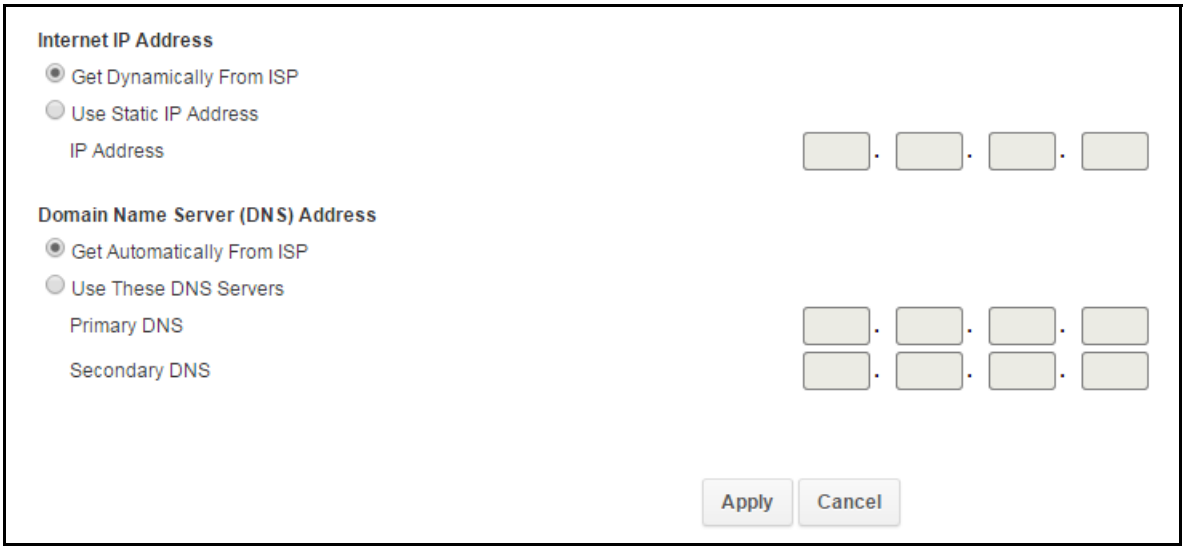


6 Accept the defaults in other fields on the screen. Click **Apply**.



When the WAN LED is solid green your Internet connection is available. If setting up PPPoE takes more than 15 minutes at startup, the WAN LED will turn solid red. Once the PPPoE connection is set up, the LED turns solid green. If the LED remains solid red, contact your ISP.

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Chapter 4

Using the S1000C

This chapter describes how the S1000C works at a high-level, and provides maintenance guidelines.

- How the S1000C works on page 4-1
- How data goes over the Internet on page 4-4
- Using the External GPS Antenna on page 4-5
- Maintenance on page 4-6

How the S1000C works

The S1000C is a small cell base station with a radio unit that is similar to a cell tower radio. The base station uses a low-power antenna to transmit data cellular signals in your small and medium business locations.

Base stations give you better cellular coverage because they provide a stronger signal. A strong signal can extend battery life. Also, data applications on Smartphones and other mobile email devices, work faster.

WiFi

The S1000 has an internal router that supports dual band radios (2.4GHz and 5GHz). Each radio supports 6 Virtual Access Points (VAP), 2 public and 4 private. Both radios share SSIDs that are not editable across VAPs.

Users with dual band radio capable receivers will reap the benefits of shared SSID and security credentials, and will enjoy a high quality user experience.

Users who travel out of range will migrate to the 2.4 GHz Radio band, and users near the S1000 will migrate to the 5GHz Radio Band to utilize higher data rates.

You can manage the WiFi capabilities of the S1000 internal router. For more information, see the *Airvana S1000 Router Guide* (913110).

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Broadband connection

The S1000C connects to an Operator's network through a broadband Internet connection.

Connection speed

The S1000C's actual transmission speed is only as fast as the maximum broadband connection speed. Internet congestion, the number of users on the provider's network, and other factors can decrease the actual broadband connection speed. Individual bandwidth needs vary per customer. CommScope recommends a minimum of 3 Mbps downstream and 1.8 Mbps upstream for data services.

The following table shows recommended bandwidth by usage type:

Usage Type	Recommended Download Speed	Recommended Upload Speed
Wireless Data	Up to 3 Mbps per session	Up to 1.0 Mbps per session

eCSFB

Circuit Switched Fallback (CSFB) enables circuit switched voice and SMS services to be delivered to dual radio Long Term Evolution (LTE) devices such as the S1000. Because the S1000 cannot process the 3G traffic internally, it switches the traffic ("falls back") to the 3G network running on the internal CMDA cFAP device.

In this release, the cFAP used is the C4500 (CDMA). The cFAP does not require special configuration; the ability to discover and employ the services of the cFAP is enabled by default.

Refer to the *Airvana Small Cell Deployment Guide* (913111) to learn more about the eCSFB feature.

Discovery and data exchange

Figure 4-1 shows the internal layout of the S1000C. Data and voice traffic from the backhaul passes through a switch and into the WAN port of the S1000 board. Data traffic is handled by the 4G capabilities of the S1000 board. Voice traffic is routed to the LAN port of the cFAP board to be processed on the 3G network.

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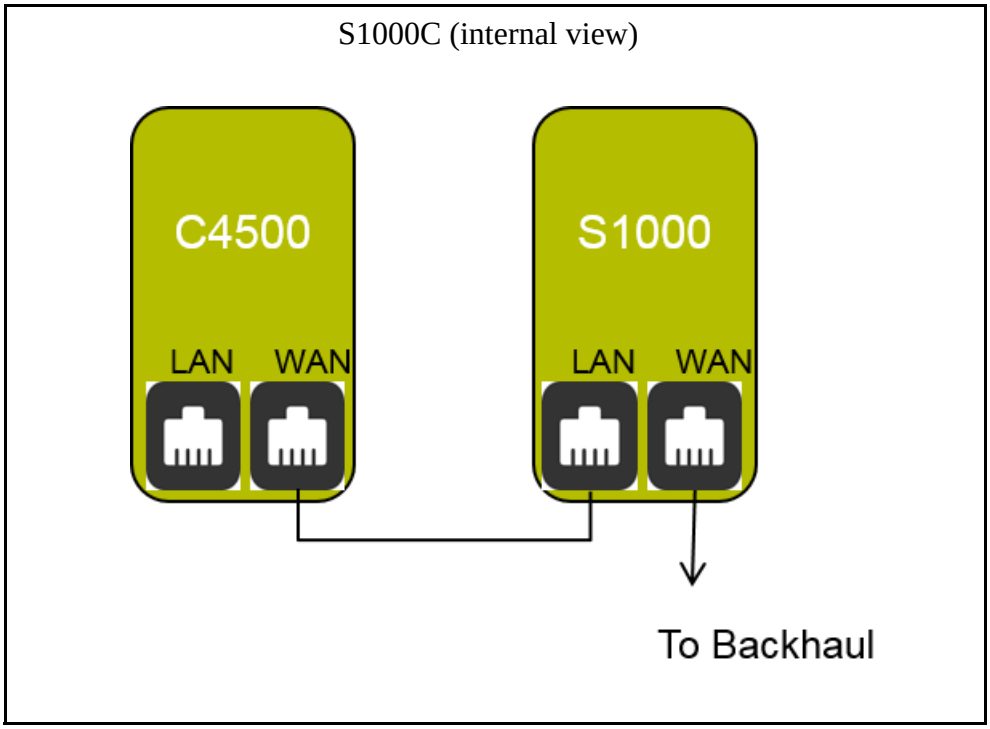
Figure 4-1. S1000C internal view



Discovery and information exchange

The S1000C WAN port is connected to a switch to the network backhaul. The cFAP board's WAN port is connected to the S1000 board's LAN port.

1. The S1000C FAP broadcasts its presence on its LAN port from boot up if CSFB to cFAP is enabled and the PairedRefCellId parameter is configured.
2. The cFAP device listens on the WAN port for broadcast messages.
3. The cFAP device, upon receiving this message, acquires the S1000C IP address/port number.
4. The cFAP initiates a dedicated connection towards the S1000C, where the cFAP and S1000 exchange CDMA2000 parameters.
5. The interface is UDP based.

Refer to the *Airvana S1000 Web GUI User Guide* (913110) to learn more about configuring the CSFB feature.

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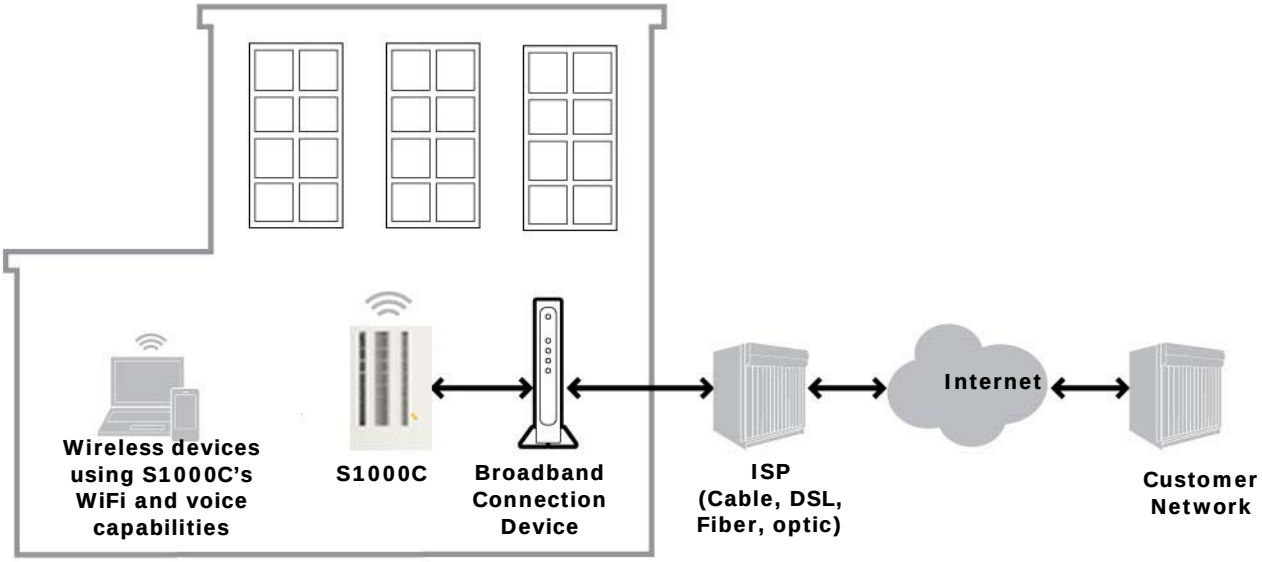
How data goes over the Internet

LTE data and voice traffic passes between the S1000C and the Internet over the broadband connection device attached to the WAN port of the S1000C. Services and applications provided by the ISP, such as Internet browsing, make use of this path. Voice traffic is switched internally to the 3G network.

The S1000's internal WiFi router generates signals on 2.4G and 5G modes. This WiFi capability allows wireless devices, such as smartphones and tablets to connect to the S1000C's WiFi network and use local services such as data sharing and printing. Access to the Internet for the users of the WiFi network is provided over the S1000C's WAN port. WiFi performance rates can be affected by the WAN connection speed (refer to Broadband connection on page 4-2).

Figure 4-2. How data goes over the Internet



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Using the External GPS Antenna

Use the external GPS antenna if the internal antenna of your S1000C does not work (indicated by a solid red GPS LED for more than 2 hours). Connect the external GPS antenna to your device's GPS connection port.

If you use the optional GPS antenna:

- Place the external GPS antenna horizontally on a flat surface as close to a window as possible. The antenna works best in an open area where it can easily pick up signals.
- Do not place the GPS antenna:
  - Outdoors; it is not weatherproof
  - Behind large, heavy objects such as furniture; doing so could affect the signal.

Refer to External GPS antenna setup on page 2-9 for external GPS antenna setup.

TIP

Using the external GPS antenna in buildings with open floor plans allows the S1000C to be positioned in a central location; improving coverage throughout the building.

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Maintenance

With normal use, S1000C is maintenance-free. Follow the recommendations below to ensure that it runs optimally.

Ventilation

The S1000C has ventilation slots that work best if you don't block the flow of air to them. For desk mounted devices, keep the device at least 2 inches (5 cm) from walls and other surfaces to ensure proper air flow.

NOTE

For wall mounted devices, keep the a 6 inch (15 cm) clearance above and below the device.

Cleaning

Dust the S1000C occasionally to keep air vents clear of debris. Do not use liquid cleaners.

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Chapter 5

Troubleshooting

This chapter contains tips and procedures to help you troubleshoot your S1000C.

- Troubleshooting installation problems on page 5-1
- Resetting the S1000C on page 5-3
- LED quick reference on page 5-4
- Router connection problems on page 5-7
- Using LEDs on page 5-9
- Using 4G DATA LEDs to diagnose Errors and Faults on page 5-11
- FAQs on page 5-16
- Getting help on page 5-19

For complete Troubleshooting information, refer to *CommScope S1000 Troubleshooting Guide* (913112).

Troubleshooting installation problems

If your Broadband turns solid red after 15 minutes, reversing the order of turning on the S1000 and your broadband connection device can often resolve this problem. To reverse the order, follow these procedures:

1. Unplug all cables, including power cables from all devices. You can unplug devices in any order.
2. Connect all Ethernet and GPS cables as described in Setting up your S1000C on page 2-4.

CAUTION

Do not connect any power cables at this point in the procedure.

3. Plug the S1000C into an electrical outlet, preferably a surge protected outlet.

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4. Wait 4 minutes.
5. Plug your broadband connection device into an electrical outlet.

TIP

You may want to consult the documentation of your broadband connection device for any special procedures for connecting a device directly to your broadband connection device.

If the WAN LED turns solid red after 15 minutes, call Customer Support as described in Getting help on page 5-19.

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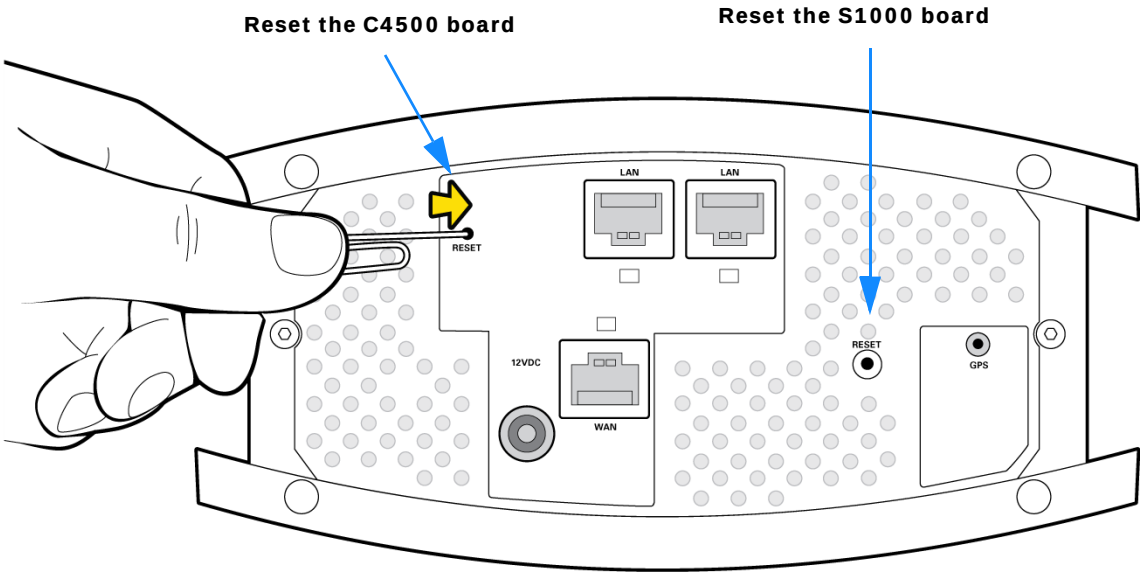
Resetting the S1000C

The S1000C has 2 reset buttons on the bottom of the unit.

If your S1000C operates properly for an extended period and the WAN LED on the 4G side of the device suddenly starts blinking red, the S1000 may have a problem requiring a reset. To reset the S1000 board, push the Reset button for at least 10 seconds.

If the WAN LED on the 3G side starts blinking red, the CFAP may have a problem requiring a reset. To reset the C4500 board, push the Reset button for at least 10 seconds.

Figure 5-1. Resetting the S1000C



After resetting, your S1000C goes through an automated setup sequence. During this time, the device's green LEDs will be solid for a few seconds, and then all LEDs will turn off until the software loads. The reset process may take 30-45 minutes.

After resetting the S1000C, if the failure persists, contact Customer Care. See Getting help on page 5-19.

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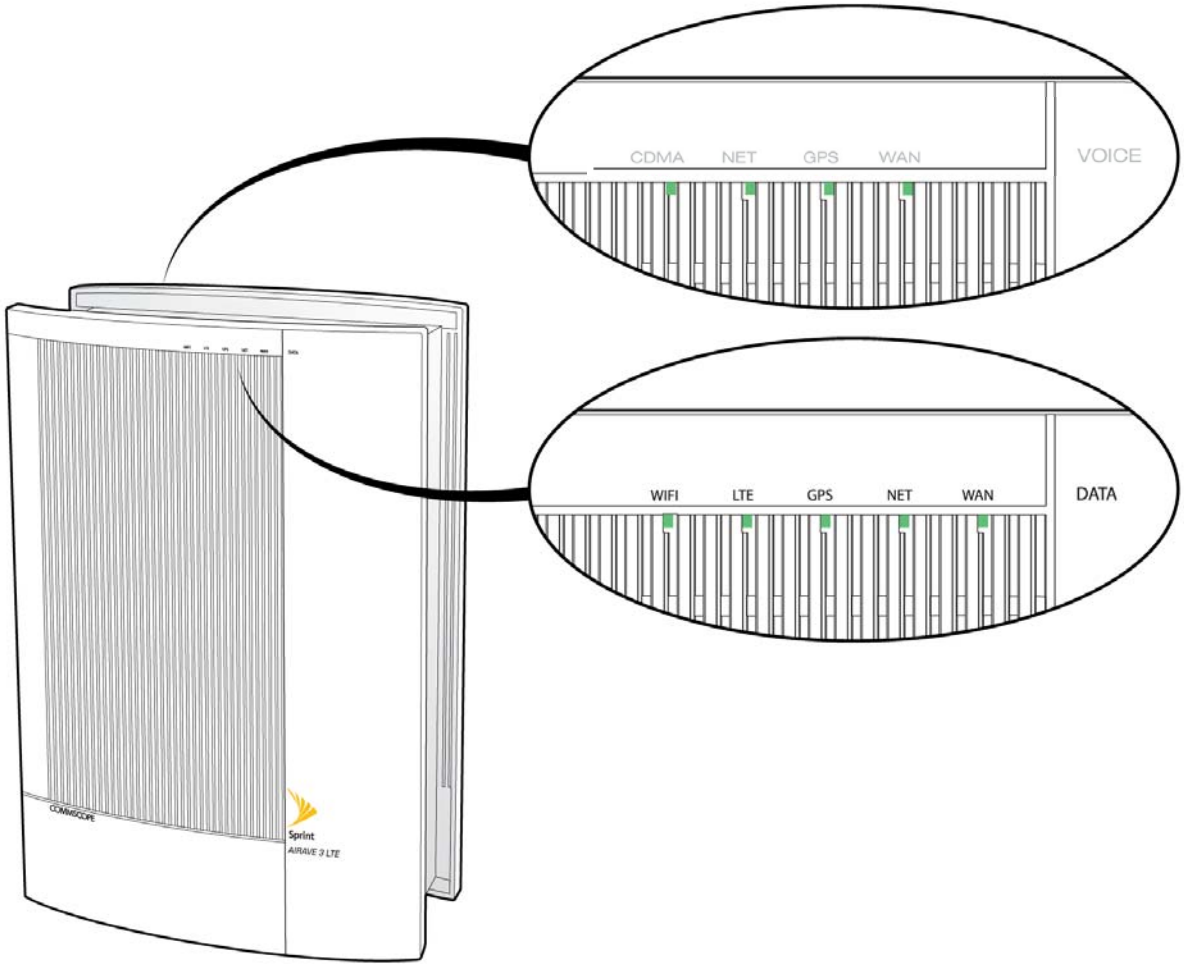
LED quick reference

Each side of the S1000C has a set of LEDs specific to 4G LTE or 3G VOICE.

Figure 5-2. S1000C LED layout



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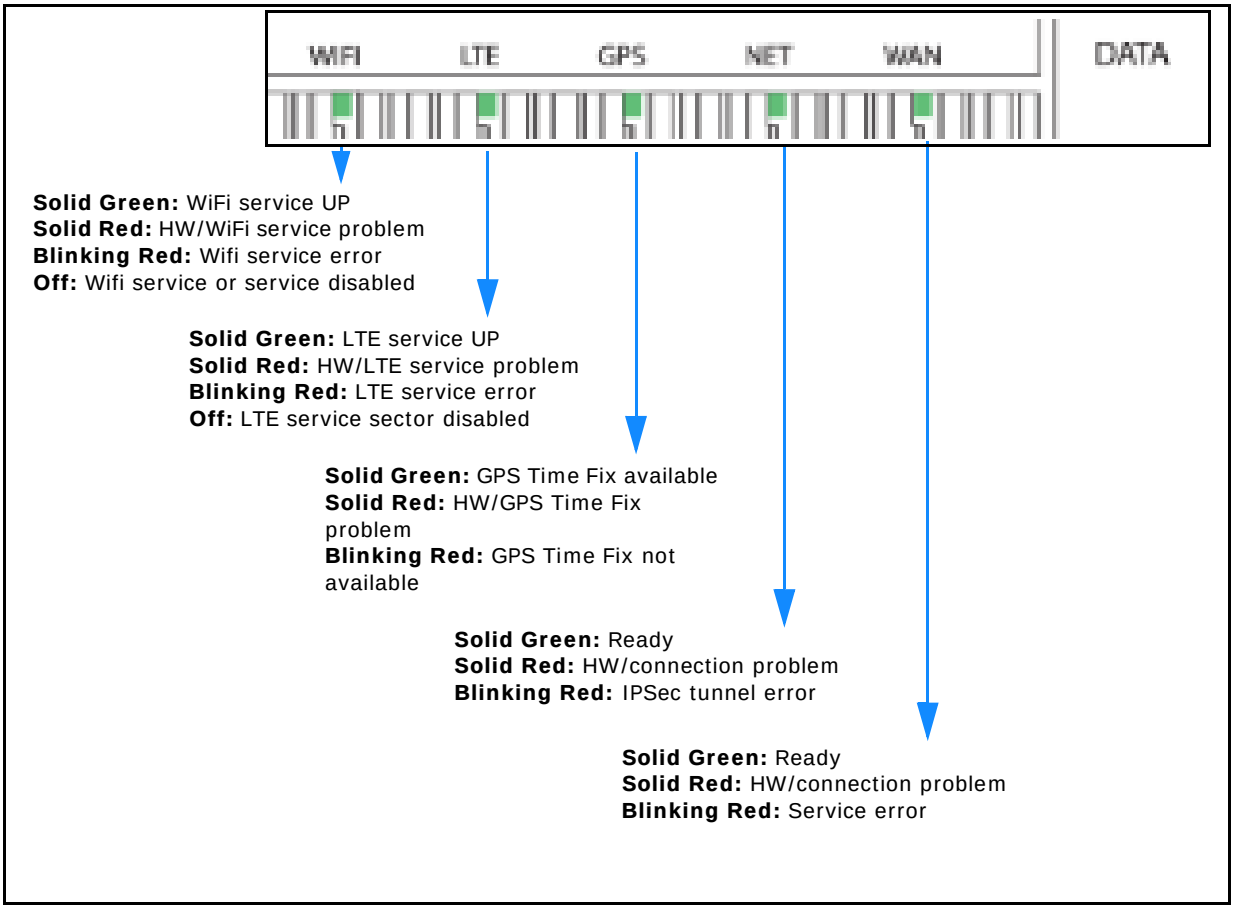
4G DATA LEDs

Figure 5-3 shows the quick reference for data LED functions.

Figure 5-3. 4G Data LEDs quick reference



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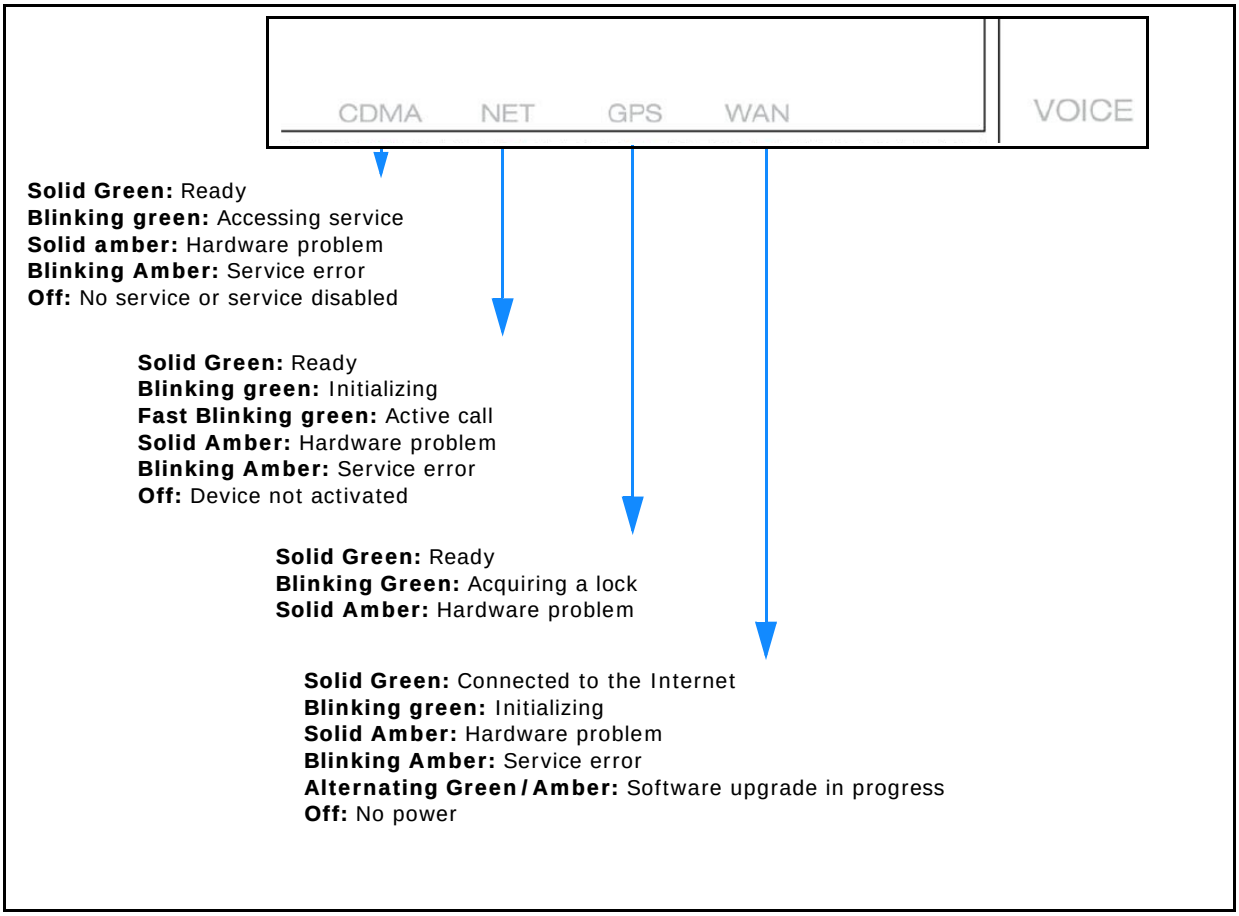
3G VOICE LEDs

Figure 5-3 shows the quick reference for voice LED functions.

Figure 5-4. 3G VOICE LEDs quick reference



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Router connection problems

If you cannot connect to the S1000C router, there may be a problem with the router, use the following procedures to diagnose the problem.

Test for connectivity

If the router is properly installed, the LAN connection is OK, and it is powered ON, test the connection by using the Ping command:

- Open the command prompt window and enter the command:

  `ping 192.168.16.1`
- If no response is received, either the connection is not working, or your PC's IP address is not compatible with the router's IP Address. Follow steps in Verify IP addresses.

Verify IP addresses

If the PC is using a fixed IP address, its IP address must be within the range 192.168.16.2 to 192.168.16.254 to be compatible with the S1000 router's default IP address of 192.168.16.1. Also, the Network Mask must be set to 255.255.255.0.

- Refer to *Airvana S1000 Web GUI User Guide* (913110) for details on checking the PC's TCP/IP settings.
- Ensure that your PC and the S1000C router are on the same network segment.
- Ensure you are using the wired LAN interface.

Common connection types

Table 5-1. Common connection types

Type	Details	ISP Data required
Dynamic IP Address	Your IP Address is allocated automatically, when you connect to your ISP.	Some ISPs may require a particular Hostname or Domain name, or MAC (physical) address.
Static (Fixed) IP Address	Your ISP allocates a permanent IP Address to you. Usually, the connection is "Always on."	The IP Address allocated to your PC, and related information, such as Network Mask, Gateway IP address, and DNS address.
PPPoE, PPPoA	Your PC connects to the ISP only when required. The IP address is usually allocated automatically.	User name and password are always required. If using a Static (Fixed) IP address, you need the IP address and related information (Network Mask, Gateway IP address, and DNS address).

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Table 5-1. Common connection types *(continued)*

Type	Details	ISP Data required
IPoA (IP over ATM)	Normally, the connection is Always on.	The IP Address allocated to your PC and related information, such as Network Mask, Gateway IP address, and DNS address.

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Using LEDs

Use the LEDs to troubleshoot your device.

4G DATA LEDs

Table 5-2 lists 4G DATA LEDs. Use these LEDs to troubleshoot LTE data issues with your device.

Table 5-2. 4G DATA LED usage and description

LED	Display Pattern	S1000 State	Description
WAN		WAN port connected	The WAN port is connected to a peer and has obtained an IP address over the local network
		WAN port not connected -or- hardware error	The WAN port not connected to a peer, or has not obtained an IP address (more than 15 minutes) -or- a hardware error occurred during startup
		WAN port not connected	The WAN port is not connected to a peer, or has not obtained an IP address (15 minutes or less)
NET		IPSec tunnel is established	The IPSec tunnel is established to the Operator's core network and is functioning properly
		IPSec tunnel is either down or re-establishing -or- hardware error	The IPSec tunnel to the Operator's core network is down, or has not established a connection (more than 15 minutes) -or- a hardware error occurred during startup
		IPSec tunnel is DOWN or setting up	The IPSec tunnel to the Operator's core network has gone down or has not come up since boot-up. (15 minutes or less)

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Table 5-2. 4G DATA LED usage and description *(continued)*

LED	Display Pattern	S1000 State	Description
GPS		GPS Time Fix is available	The current GPS Time Fix is available
		GPS Time Fix has not been achieved -or- hardware error	GPS Time Fix has not been achieved since boot-up or DSP reload (30 minutes or more) -or- a hardware error occurred during startup
		GPS Time Fix is not available	The current GPS Time Fix is not available, including the GPS Holdover case. In poor GPS reception conditions, the device can go into GPS Holdover. The Holdover is 24 hours. During this time LTE services are available. The GPS led will blink red even though LTE service is still available. If you see this condition call Customer Care.
LTE		LTE service is UP	LTE service is UP
		LTE service is DOWN -or- hardware error	LTE service has not come up (30 minutes or more) -or- a hardware error occurred during startup
		LTE service is coming up or coming down	LTE service has not come up since boot-up, or has gone down
		LTE service is turned Off.	The LTE service sector has been turned off from the DMS

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Table 5-2. 4G DATA LED usage and description *(continued)*

LED	Display Pattern	S1000 State	Description
WIFI		WiFi service is UP	2.4 GHz, 5.0 GHz or both WiFi services are UP
		WiFi service is DOWN -or- hardware error	WiFi service has not come up (30 minutes or more) -or- a hardware error occurred during startup
		WiFi service is coming up or coming down	Wifi service has not come up since boot-up, or has gone DOWN.
		WiFi service is OFF	WiFi service has been turned OFF either from the DMS or via local device GUI

NOTE

In the table above, a hardware error is indicated only if all LEDs are in the Red Solid display pattern.

Using 4G DATA LEDs to diagnose Errors and Faults

The following table shows some of the general errors and fault conditions that you may encounter with data traffic on the S1000C. Use the table to help diagnose and resolve potential problems with your device setup.

Refer to Table 5-2 for LED color codes.

Table 5-3. LED error and fault conditions

WAN	NET	GPS	LTE	WIFI	S1000C Error/Fault
					HW error detected

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Table 5-3. LED error and fault conditions *(continued)*

WAN	NET	GPS	LTE	WIFI	S1000C Error/Fault
					WAN port is connected; IPSec tunnel is UP; **GPS Holdover**; LTE and WiFi Service is UP.
					WAN port is connected; IPSec tunnel is UP; **GPS Time Fix is not available**; **LTE Service is DOWN**; WiFi Service is UP.
					WAN port is connected; **IPSec tunnel is DOWN;** GPS Time Fix is available; **LTE service is DOWN**; WiFi service is UP.
					WAN port is connected; IPSec tunnel established and UP; GPS Time Fix is available; **LTE service could not come up**; WiFi service is UP.
					WAN port is connected; IPSec tunnel established and UP; GPS Time Fix is available; LTE service is UP; **2.4 GHz and 5.0 GHz WiFi Service could not come up.**

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3G VOICE LEDs

Table 5-4 lists 3G VOICE LEDs. Use these LEDs to troubleshoot voice traffic issues with your device.

NOTE

If all LEDs are Solid Amber, the C4500 cannot pass a hardware self-test. Call Customer Support as described in Getting help on page 5-19.

Table 5-4. 3G VOICE LED display patterns and actions

LED	Display Pattern	Action to take
CDMA	Solid green	None. Ready state.
	Blinking green	Wait. Accessing service.
	Solid amber	Hardware problem. Call Customer Support as described in Getting help on page 5-19.
	Blinking amber	Service error. Plug the telephone line into a phone and restart your device by turning the power off and on. If this problem persists, call Customer Support as described in Getting help on page 5-19.
	Off	No service or CDMA service has not been activated. To activate CDMA service, contact Customer Support as described in Getting help on page 5-19.
NET	Solid green	None. Ready.
	Fast blinking green	None. Active call
	Blinking green	Wait. Your device is initializing.
	Solid amber	hardware problem. Call Customer Support as described in Getting help on page 5-19.
	Blinking amber	No service. Restart the device by turning the power off and on. If this problem persists, call Customer Support as described in Getting help on page 5-19.
	Off	The CDMA board is not activated. Call Customer Support as described in Getting help on page 5-19.

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Table 5-4. 3G VOICE LED display patterns and actions *(continued)*

LED	Display Pattern	Action to take
GPS	Solid green	None. GPS is ready.
	Blinking green	GPS is trying to aacquire a lock. Perform the following steps if the GPS LED does not turn solid green within 30 minutes: • If you have not already done so, connect the external GPS antenna to your device. • If the external GPS antenna is already connected, move it to a different location, as close to a window as possible. • If this problem persists, call Customer Support as described in Getting help on page 5-19.
	Solid amber	Restart the device by turning the power off and on. If this problem persists, call Customer Support as described in Getting help on page 5-19.

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Table 5-4. 3G VOICE LED display patterns and actions *(continued)*

LED	Display Pattern	Action to take
WAN	Solid green	None. Connected to the Internet.
	Blinking green	Wait. Accessing the Internet connection.
	Alternating blinking green and amber	Wait. Software upgradein progress.
	Solid amber	Hardware problem. Call Customer Support as described in Getting help on page 5-19.
	Blinking amber	Service error. Failed to acquire the Internet connection. • Check if your broadband modem or broadband router has a problem. Reset your broadband connection device. If the problem with the broadband device persists, contact your Internet service provider (ISP). • Ensure that the S1000C's router is correctly configured to access the Internet service. See Configuring WiFi service on page 3-5. • Restart the device by turning the power off and on. • If this problem persists, call Customer Support as described in Getting help on page 5-19.
	Off	• The LED is not working or the unit has no power. If this problem persists, call Customer Support as described in Getting help on page 5-19.

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FAQs

Why does the S1000C need a GPS antenna?

The S1000C has a GPS antenna so that it can:

- Synchronize properly with the rest of the Operator's network.
- Determine and select the correct radio frequencies available in your area so that the S1000C uses the correct ones.

Why does the S1000C need an external GPS antenna?

Your device needs the external antenna only when the internal GPS antenna cannot lock on to sufficient satellite signals. The external antenna lets the S1000C lock on to the greatest number of satellites.

What should I do if the GPS fails to acquire a lock?

NOTE

For first-time S1000C startup, it could take up to 2 hours for the S1000C to achieve GPS lock.

If you have not already connected the external GPS antenna, connect the antenna following the steps in When is your S1000C ready to use? on page 2-7.

If you have connected the external GPS antenna and the GPS LED blinks red after 30 minutes, the GPS has failed to acquire a Time Fix. The S1000C will go into GPS Holdover for a 24 hour period. Call Customer Care during this time period.

What happens to the S1000C if there is a power outage or if you lose Internet access?

The S1000C needs both a broadband Internet connection and a constant power supply to work. During a power outage your device will immediately switch to the Sprint network.

Can you move the S1000C to another location?

Yes, you can move your device to another location within the Sprint network. However, to move your device to a different address, you must first update your service address by logging into your account on www.sprint.com.

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I have a DSL modem and cannot connect to the Internet

If you are using a DSL modem and your S1000C cannot connect to the Internet, you may need to enter your Internet service provider (ISP) account user name and password so that the device can connect to the Internet. See Adding your ISP User Name and Password on page 3-14.

You may also need to adjust the WiFi settings. See Configuring WiFi service on page 3-5.

My calls work fine outside but drop indoors

If you are notice poor coverage indoors, check the LTE and WIFI LEDs. If you see a solid or blinking red WIFI LED you may also need to adjust the WiFi settings. See Configuring WiFi service on page 3-5.

If the problem persists contact Customer Care.

My Internet connection is slow when my laptop is connected to the S1000C

If you are experiencing slow Internet speeds when your laptop is connected to the LAN port of your S1000C, you may need to change the bandwidth speed on your S1000.

1. Connect your laptop to the LAN port of your S1000C and disable WiFi.
2. In a Web browser on your laptop, go to a Web site to test the uplink speed.

   NOTE: Contact Customer Care for the URL to a recommended Web site. See Getting help for Customer Care contact information.

3. Run a speed test on your uplink speed. Note the maximum speed value.
4. In a Web browser, enter the following IP address:

   192.168.16.1

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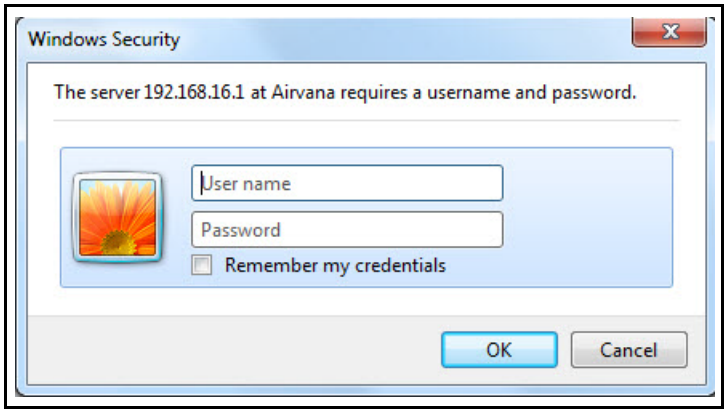
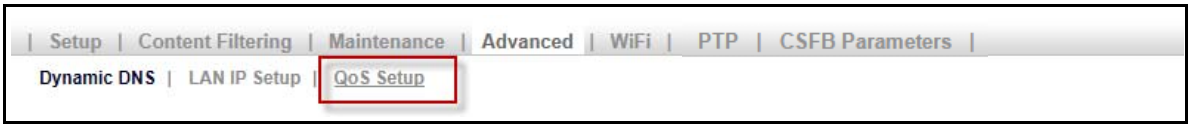


5 Enter User name ‘admin’ and Password ‘admin’. Click **Log In**.

6 In the Advanced tab, click **Qos Setup**.



7 Verify that the Total Uplink Bandwidth value is large enough to support the value recorded from the uplink test**.** You will need to consider the rate and priority assigned to the LANTC traffic class.

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QoS Settings

Total Uplink Bandwidth	:	2000000 bps
Aggregate Bandwidth (Private SSID)	:	300000 bps
Aggregate Bandwidth (Public SSID)	:	300000 bps

QoS Policies

Traffic Class	Priority	Rate	Ceiling Rate	Status
WIFI1	4	100 %	100 %	Enabled
WIFI2	4	100 %	100 %	Disabled
WIFI3	4	100 %	100 %	Disabled
WIFI4	4	100 %	100 %	Disabled
WIFI5	5	15 %	100 %	Enabled
WIFI6	5	15 %	100 %	Enabled
LANTC	4	15 %	100 %	Enabled
FAPTC	4	50 %	100 %	Enabled

8. If the problem persists, check the QoS setting in your home router. Ensure that the S1000 has the highest priority. See the home router's user manual for instructions.
9. If the problem persists, contact your Internet Service Provider.

Getting help

If you need help with your S1000C, contact Customer Care.

- Online at *www.commscope.com/support*
- By Phone: *Sprint Customer Care* (888-206-3585)

NOTE

Call your Internet Service Provider for Internet access troubleshooting.

e interference by one of the following measures:

- Re-orient or relocate the receiving antennas of other devices.
- Increase the separation between the S1000C and other device receivers.
- Connect the S1000C into an outlet on a circuit different from that to which the other device receiver is connected.

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- Consult the dealer or an experienced radio/TV technician for help.

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Chapter 6

Safety information

This chapter contains safety information for your S1000C.

- General precautions on page 6-1
- FCC information on page 6-2

General precautions

- Dust the S1000C occasionally to keep air vents clear of debris. Do not wash it.
- The S1000C has ventilation slots that work best if you don't block them. Keep the S1000C at least 2 inches (5 cm) from walls and other surfaces to ensure proper air flow.
- Do not operate the S1000C in an extremely dusty or humid environment.
- Avoid placing the S1000C near radiators or other heating sources.
- Avoid locating the S1000C where it could be exposed to direct sunlight for prolonged periods.
- Do not connect the S1000C to a power strip containing an excessive number of other devices.
- Although your S1000C is quite sturdy, it is a complex piece of equipment and can be broken. Avoid dropping, hitting, bending, or sitting on it.
- Do not immerse the S1000C in water or get it wet. If your device does get wet, unplug it immediately until it dries.
- Do not allow children to play with the S1000C. They could hurt themselves and others or damage the device.

NOTE

For the best care of your S1000C, only CommScope-authorized personnel should service your device and accessories. Failure to do so may be dangerous and void your warranty.

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FCC information

FCC ID: QHY-S1000C

! FCC radiation exposure statement

WARNING

Changes or modifications not expressly approved by CommScope could void your authority to operate the equipment.

This device complies with FCC's RF radiation exposure limits set forth for an uncontrolled environment under the following conditions:

This device complies with FCC's RF radiation exposure limits set forth for an uncontrolled environment under the following conditions:

- This device should be installed and operated such that a minimum separation distance of 8 inches (20 cm) is maintained between the radiator (antenna) and the user's or nearby person's body at all times.
- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

For more information, see the publication Femtocells and Health at http://www.femtoforum.org or visit the FCC website at www.fcc.gov.

FCC Part 15

This device 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 device 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 device does cause harmful interference to radio or television reception, which can be determined by turning the device off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Re-orient or relocate the receiving antennas of other devices.
- Increase the separation between the S1000C and other device receivers.
- Connect the S1000C into an outlet on a circuit different from that to which the other device receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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