



S1000

User Guide

Release 1.0

DRAFT

Document Number: 913109

Document Revision: 10.01

Date: June 2015



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Introduction

This User Guide introduces you to the Airvana S1000 service and all its features. It's divided into five sections:

- [Getting Started](#) on page 1-2
- [Setting up optional components](#) on page 1-11
- [Using S1000](#) on page 1-15
- [Troubleshooting](#) on page 1-18
- [Safety information](#) on page 1-28

Throughout this guide, you'll find tips and techniques that help you make the most of your new device and service. It is important that you read each section and note any special requirements. However, if you'd like to get right to a specific feature, simply locate that section in the Table of Contents and go directly to that page. Follow the instructions in that section, and you'll be ready to use your S1000 in no time.



WARNING

Please read the [Safety information](#) on page 1-28 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 LED tables in this document:

Table 1. LED color key

Solid Green	Solid Red	Off	Blinking Red
			

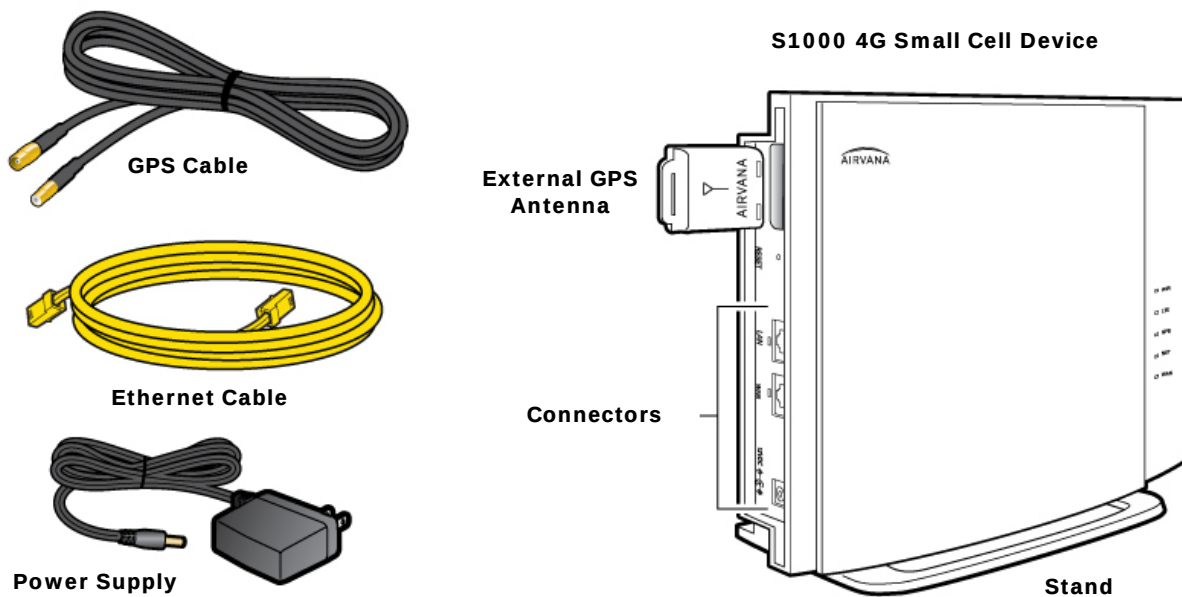
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Getting Started

This section describes the contents of the S1000 box and setting up your S1000.

What's in the box

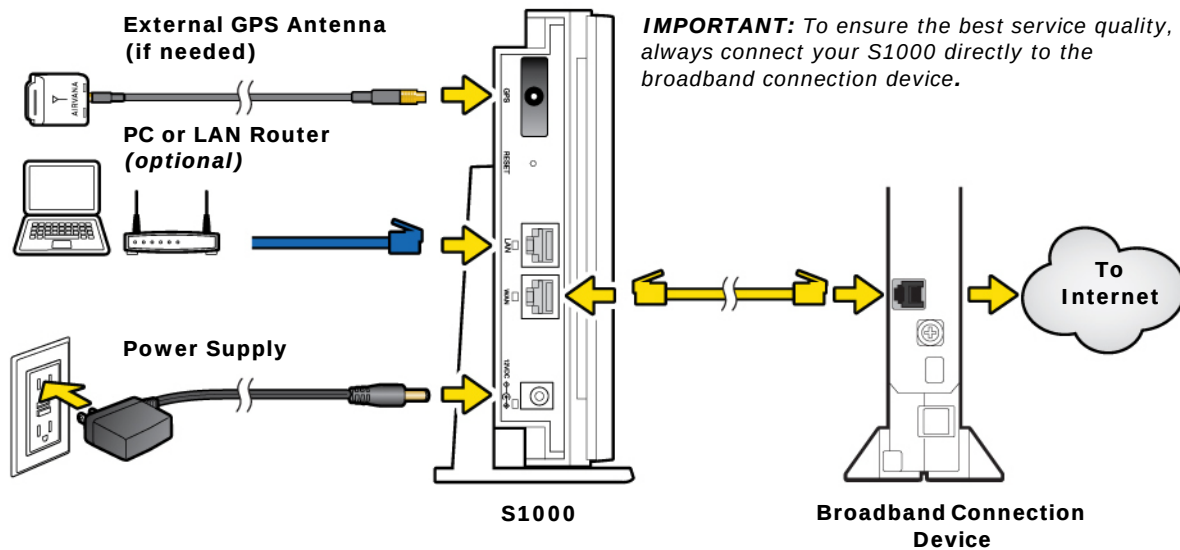
Ensure that the following items are in the box:



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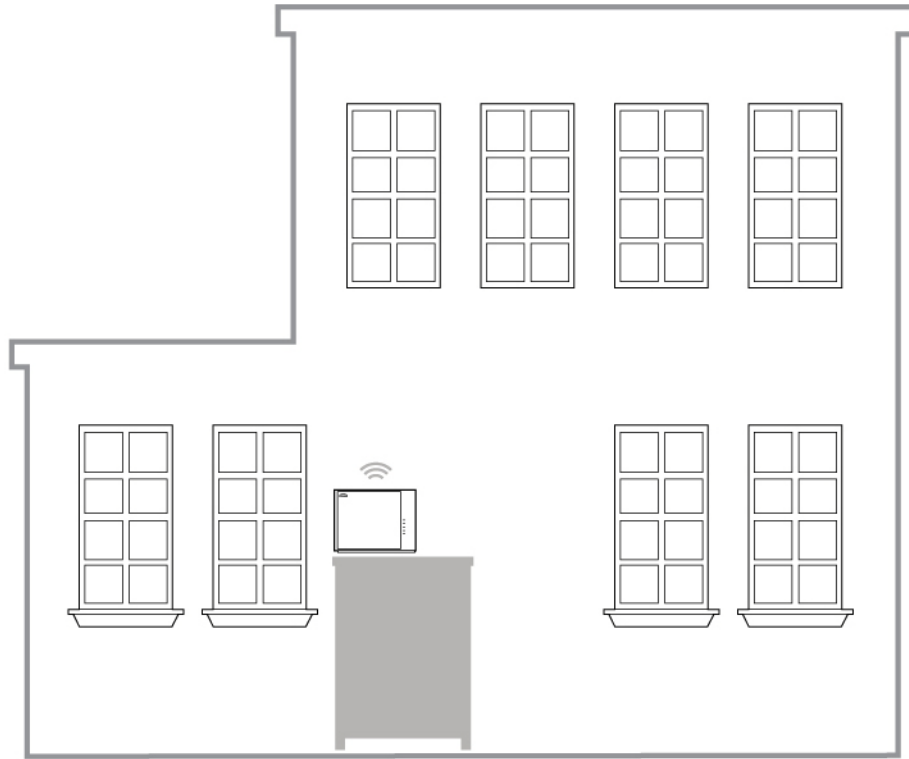
Setup at a glance

The following diagram shows a typical S1000 setup.



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Setting up your S1000

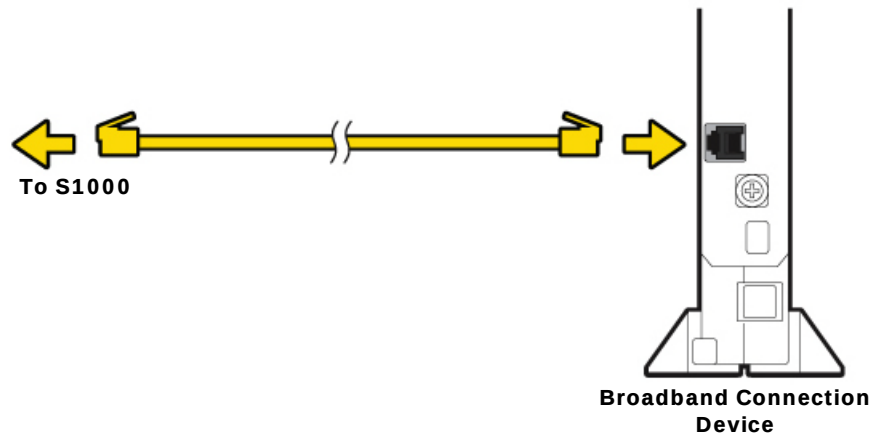


- 1 Disconnect the power from all devices on your network.
- 2 Place your S1000 in a central location. For best results, place the S1000 in an elevated location, such as the top of a bookshelf or tall cabinet.

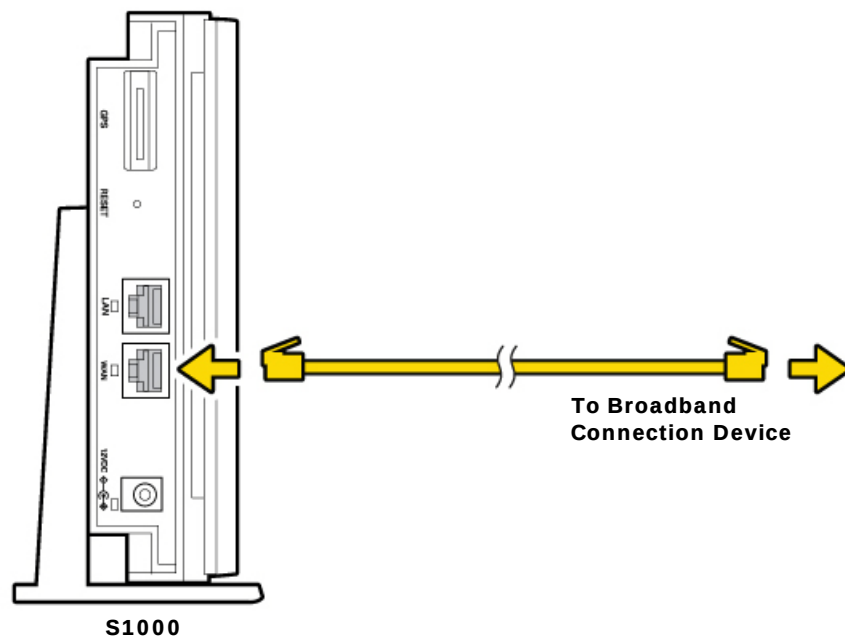
NOTE: If you have a wall mounted S1000, position the device on an interior wall or pole, allowing at least a 6 inch (15cm) clearance above and below the device.

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



- 4 Connect the other end of the yellow Ethernet cable to your S1000's WAN port.



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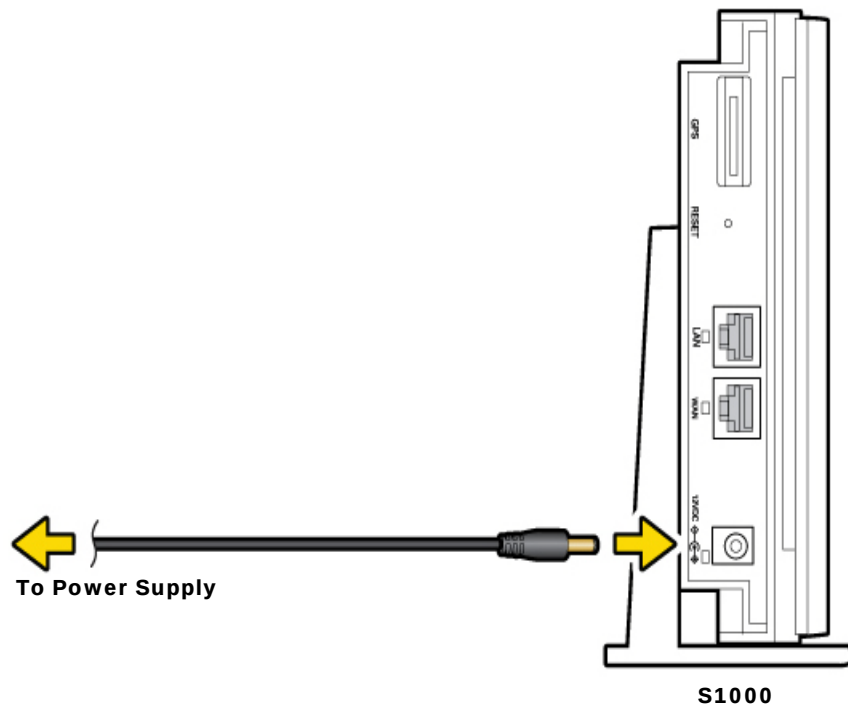
- 5 Turn on your broadband connection device.



NOTE

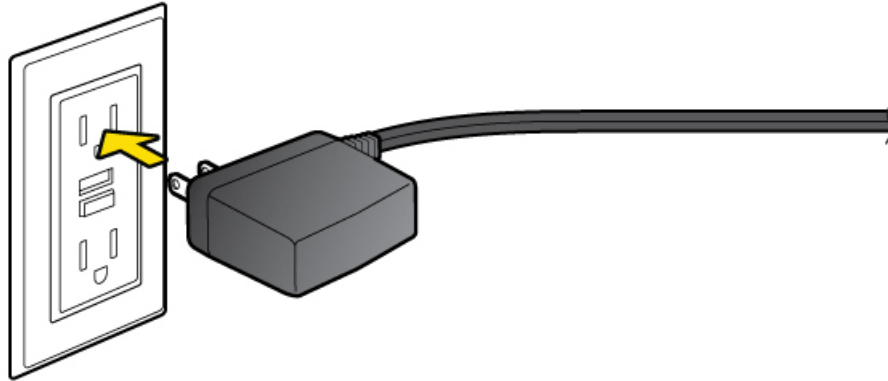
Wait a couple of minutes for the broadband device to fully initialize before continuing.

- 6 Plug the power supply connector into the black power port on your S1000.



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- 7 Plug the other end into an available electrical outlet. (We recommend a surge protected outlet.)



External GPS antenna setup

Use the external GPS antenna if your S1000's internal antenna 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.

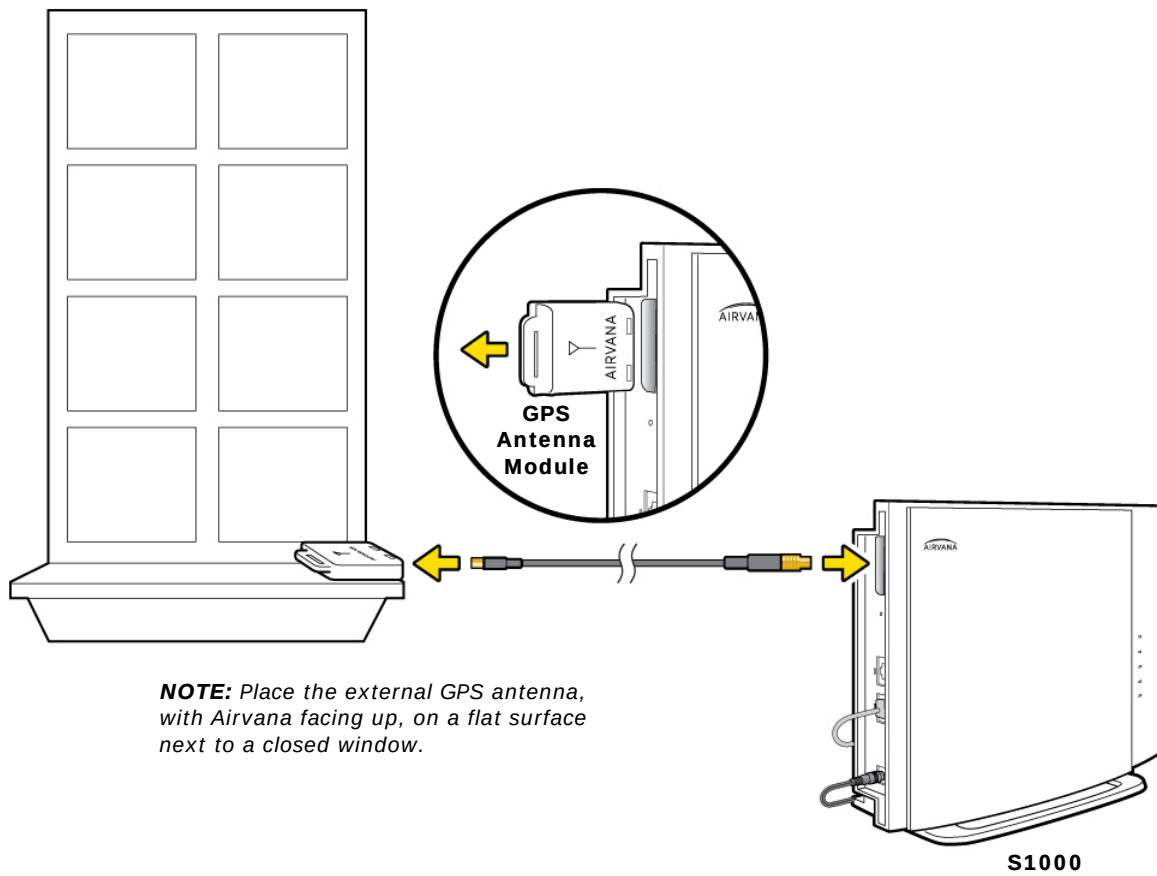


NOTE

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

- 1 Remove the GPS antenna module from the back of the S1000. (See inset in drawing). Connect the GPS cable to the antenna module and the S1000.
- 2 Place the external GPS antenna, with Airvana facing up, horizontally on a clean, flat surface, next to a closed window. The antenna works best in an open area where it can easily pick up signals.

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When is your S1000 ready to use?

After installing and turning on your S1000 for the first time, the S1000 goes through an automated setup sequence.

The table below shows the S1000 LED states during normal boot-up. Refer to [Table 1](#) for LED color codes.

Table 2. LED states during S1000 boot sequence

WAN	NET	GPS	LTE	WiFi	S1000 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.
					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 S1000 is ready for use.

**NOTE**

For a summary of LED status indicators, see [LED quick reference](#) on page 1-20.
For a complete description of LED states, see [Using LEDs](#) on page 1-21.

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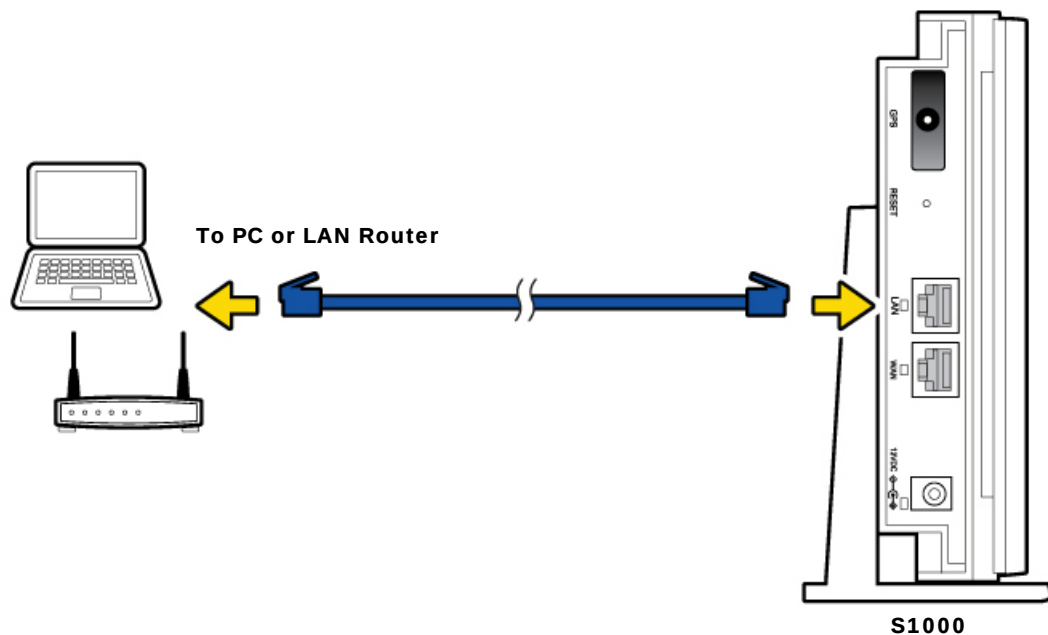
Setting up optional components

PC or LAN Router Setup

Connect a device that you have, such as a PC or a LAN router, to the S1000's LAN port.



To ensure the best service quality, always connect the LAN router to your S1000. Do not connect it to the broadband connection device.



Configuring the S1000 Router

Your S1000 contains a built-in router. Usually, you can plug your S1000 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.

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
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

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 Internet service provider (ISP) account user name and password so that the S1000 can connect to the Internet.

You will use the GUI of the S1000 internal router to configure this information.



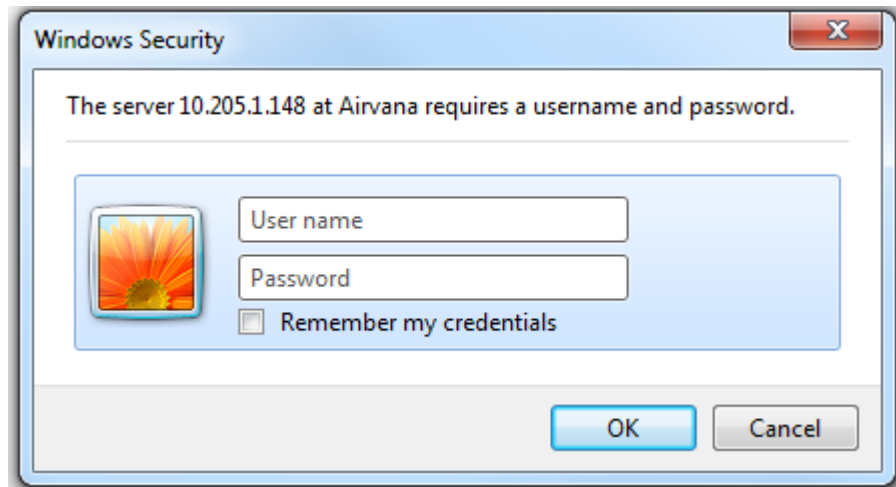
Before you begin, obtain your ISP user name and password. Contact your ISP if you do not have this information.

- 1 Open an IE, Chrome or Firefox Web browser.
- 2 Connect to the S1000 router GUI using the following URL:
http://<S1000 eth0.2 Ip address>:8888/



NOTE

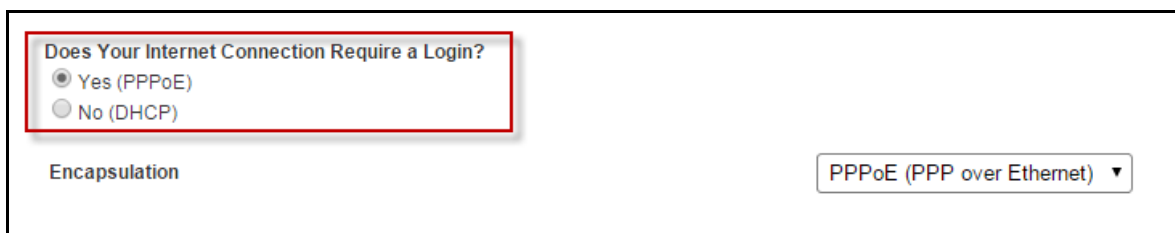
The login screen will differ depending on the browser you use. The following screen shows the login screen from an Internet Explorer browser.



- 3 Enter User name 'admin' and Password 'admin'. Click **OK**.
- 4 Click the Setup tab on the Router status page menu bar. Click **WAN Settings**.

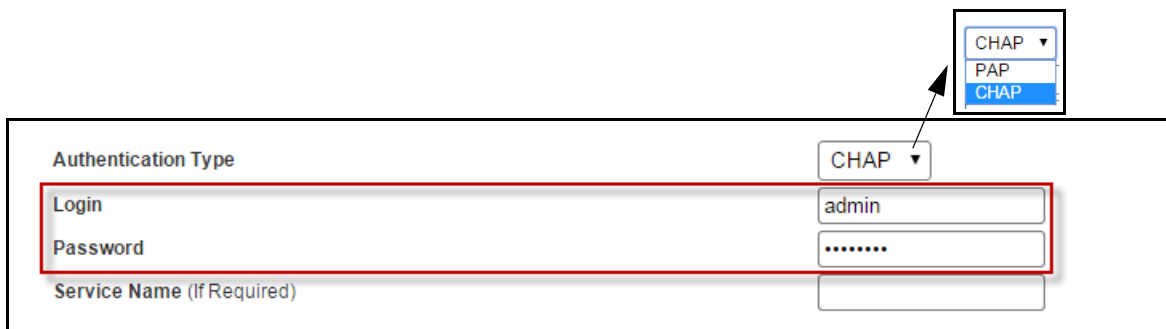


- 5 Ensure that **Yes (PPPoE)** is selected.



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- 6 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**.



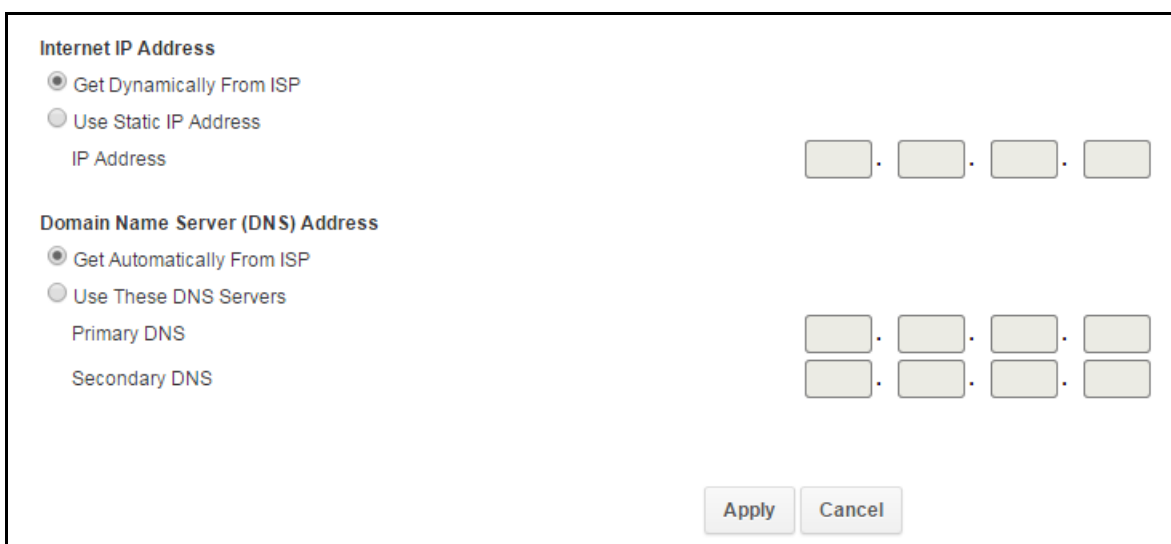
Authentication Type: CHAP

Login: admin

Password:

Service Name (If Required):

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



Internet IP Address

☒ Get Dynamically From ISP

☐ Use Static IP Address

IP Address: . . .

Domain Name Server (DNS) Address

☒ Get Automatically From ISP

☐ Use These DNS Servers

Primary DNS: . . .

Secondary DNS: . . .

Apply Cancel

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 setup, the LED turns solid green. If the LED remains solid red, contact your ISP.

[How long should they wait at solid red \(after 15 minutes\) before calling ISP?](#)

Using S1000

The S1000 is an indoor small cell intended for use by small to medium size businesses.

It 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 Wi-Fi to deliver high data rates and performance.

The Wi-Fi capabilities include automatic channel selection and Interference avoidance, and Band steering to 5GHz for supporting devices. Up to 5 SSIDs are supported, with transparent authentication of public SSID using the 802.1x protocol. The S1000 supports up to 50 Wi-Fi clients.

How the S1000 works

The S1000 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, such as mobile email devices, work faster.

Wi-Fi

The S1000 supports 2 Wi-Fi cards for 2.4G and 5G modes of operation. Each Wi-Fi card is configured to act as a Wi-Fi Access Point (AP). IP addresses for the Wi-Fi cards are obtained from a DHCP server, or can be statically configured.

The Wi-Fi options are configured from the S1000's internal router. For more information, see the *Airvana S1000 Router Guide* (913110).

Broadband

The S1000 connects to an Operator's network through a broadband Internet connection.

Connection speed

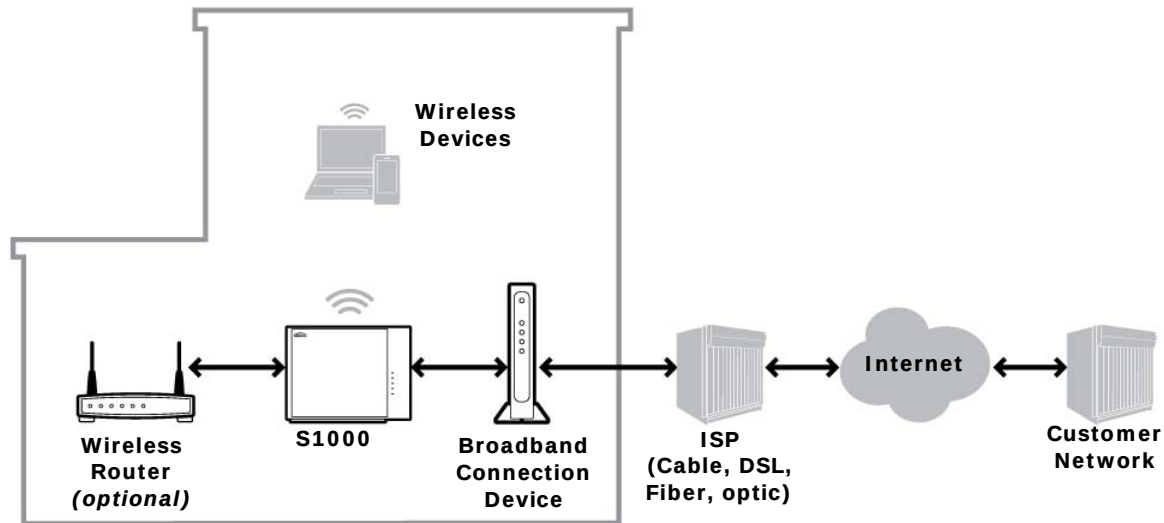
The S1000's actual transmission speed is only as fast as the maximum broadband connection speed. Internet congestion, the number of users on the provider's network, and other factors can decrease the actual broadband connection speed. Individual bandwidth needs vary per customer. Airvana recommends a 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

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How data goes over the Internet



Maintenance

With normal use, S1000 is maintenance-free. Follow the recommendations below to ensure that it runs optimally.

Ventilation

The S1000 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 S1000 occasionally to keep air vents clear of debris. Do not use liquid cleaners.

Troubleshooting

[Need this content...](#)

Troubleshooting installation problems

If your Broadband turns solid red after 15 minutes, reversing the order of turning on the S1000 and your cable or DSL modem 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 S1000](#) on page 1-4.



CAUTION

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

- 3 Plug the S1000 into an electrical outlet, preferably a surge protected outlet.
- 4 Wait 4 minutes.
- 5 Plug your cable or DSL modem into an electrical outlet.



You may want to consult your cable or DSL modem documentation for any special procedures for connecting a device directly to your cable or DSL modem.

If the WAN LED turns solid red after 15 minutes, call Customer Support as described in [Getting help](#) on page 1-27.

[Need this content...](#)

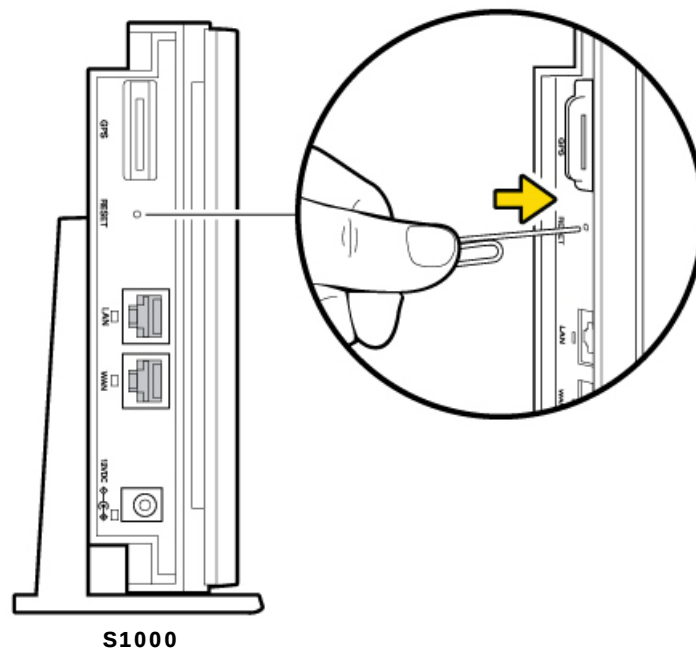
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Resetting the S1000

If your S1000 operates properly for an extended period and the WAN LED suddenly starts blinking red, the S1000 may have a problem requiring a reset. To reset the S1000, push the Reset button for at least 10 seconds (as shown in the drawing below).

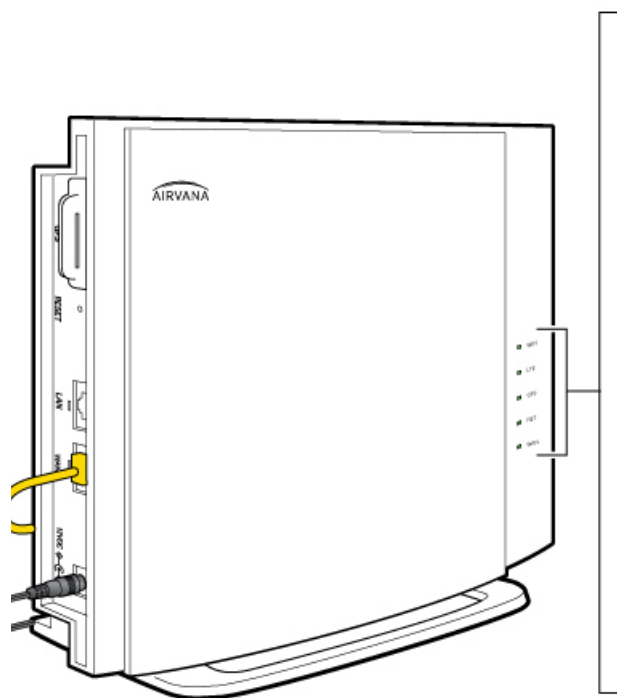
After resetting, your S1000 goes through an automated setup sequence. During this time, the device's green LEDs will be solid for a few seconds, and then all LEDs will turn off until the software loads. The reset process may take 30-45 minutes.

After resetting the S1000, if the failure persists, contact Customer Care. See [Getting help](#) on page 1-27.



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LED quick reference



 WIFI	Solid Green: WiFi service UP Solid Red: HW/WiFi service problem Blinking Red: Wifi service error Off: Wifi service or service disabled
 LTE	Solid Green: LTE service UP Solid Red: HW/LTE service problem Blinking Red: LTE service error Off: LTE service sector disabled
 GPS	Solid Green: GPS Time Fix available Solid Red: HW/GPS Time Fix problem Blinking Red: GPS Time Fix not available
 NET	Solid Green: Ready Solid Red: HW/connection problem Blinking Red: IPSec tunnel error
 WAN	Solid Green: Ready Solid Red: HW/connection problem Blinking Red: Service error

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Using LEDs

Use the LEDs to troubleshoot your device. Refer to [Table 1](#) for LED color codes.

Table 3. LED usage and description

LED	Display Pattern	S1000 State	Description
WAN		WAN port connected	WAN port is connected to a peer and has obtained an IP address over the local network.
		WAN port not connected -or- hardware error	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	WAN port is not connected to a peer, or has not obtained an IP address (15 minutes or less)
NET		IPSec tunnel is established	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	IPSec tunnel to the core Network has gone down or had not come up since boot-up. (15 minutes or less)

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Table 3. 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. Note: In poor GPS reception conditions, the device can go into GPS Holdover. This forces the GPS led to blink red even though service is still available.
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.

Table 3. 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 been able to 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 turned 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 LEDs to diagnose Errors and Faults

The following table shows some of the general errors and fault conditions that you may encounter with the S1000. Use the table to help diagnose and resolve potential problems with your device setup.

Refer to [Table 1](#) for LED color codes.

Table 4. LED error and fault conditions

WAN	NET	GPS	LTE	WiFi	S1000 Error / Fault
					HW error detected

Table 4. LED error and fault conditions (continued)

WAN	NET	GPS	LTE	WiFi	S1000 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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FAQs

Why does the S1000 need a GPS antenna?

The S1000 has a GPS antenna so that it can:

- Synchronize properly with the rest of Sprint's network.
- Determine and select the correct radio frequencies available in your area so that the S1000 uses the correct ones.

Why does the S1000 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 S1000 lock on to the greatest number of satellites.

What happens to the S1000 if there is a power outage or if you lose Internet access?

The S1000 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 S1000 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.

I have a DSL modem and cannot connect to the Internet

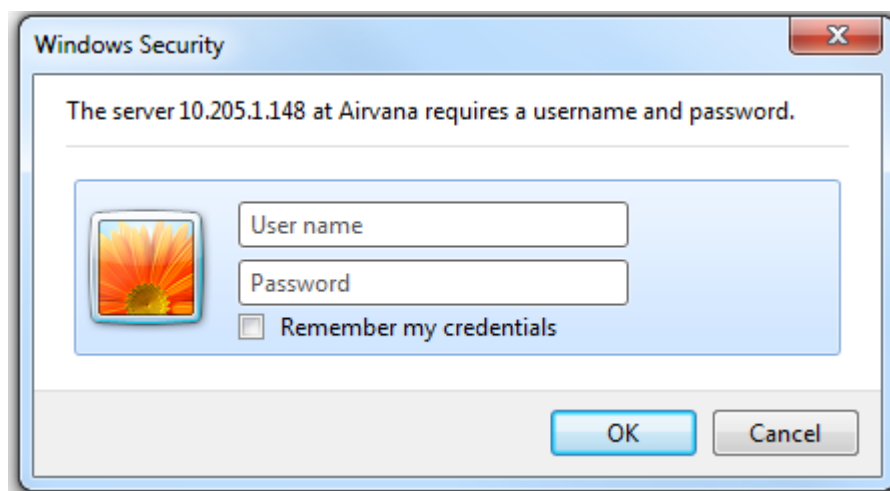
If you are using a DSL modem and your S1000 cannot connect to the Internet, you may need to enter your Internet service provider (ISP) account user name and password so that the device can connect to the Internet. See [Adding your ISP User Name and Password](#) on page 1-12.

My Internet connection is slow when my laptop is connected to the S1000

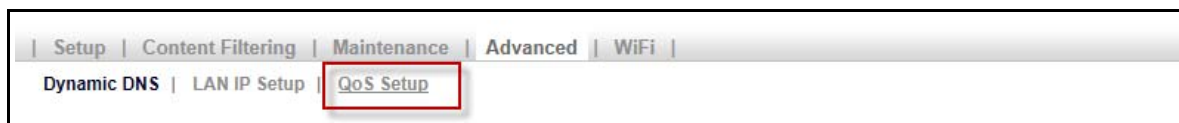
If you are experiencing slow Internet speeds when your laptop is connected to the LAN port of your S1000, you may need to change the bandwidth speed on your S1000.

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- 1 Connect your laptop to the LAN port of your AIRAVE 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:
http://<S1000 eth0.2 Ip address>:8888/



- 5 Enter User name 'admin' and Password 'admin'. Click **OK**.
- 6 In the Advanced tab, click **Qos Setup**.



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- 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.

[Is this correct? Please provide the correct test/procedure here.](#)

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 S1000, contact Customer Care.

- Online (www.airvana.com/support)
- Call your Internet Service Provider for technical support.

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Safety information

General precautions

- Dust the S1000 occasionally to keep air vents clear of debris. Do not wash it.
- The S1000 has ventilation slots that work best if you don't block them. Keep the S1000 at least 2 inches (5 cm) from walls and other surfaces to ensure proper air flow.
- Do not operate the S1000 in an extremely dusty or humid environment.
- Avoid placing the S1000 near radiators or other heating sources.
- Avoid locating the S1000 where it could be exposed to direct sunlight for prolonged periods.
- Do not connect the S1000 to a power strip containing an excessive number of other devices.
- Although your S1000 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 S1000 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 S1000. They could hurt themselves and others or damage the device.



NOTE

For the best care of your S1000, only Airvana-authorized personnel should service your device and accessories. Failure to do so may be dangerous and void your warranty.

FCC information

FCC ID: QHY-S1000-RP

! FCC radiation exposure statement



WARNING

Changes or modifications not expressly approved by Airvana 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 S1000 and other device receivers.
- Connect the S1000 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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Airvana
250 Apollo Drive
Chelmsford, MA 01824, USA

Phone:

North America +1 (877) 855-4092 (toll free)

International: +1 (978) 250-3100

Fax: +1 (978) 250-3910

Web: www.airvana.com