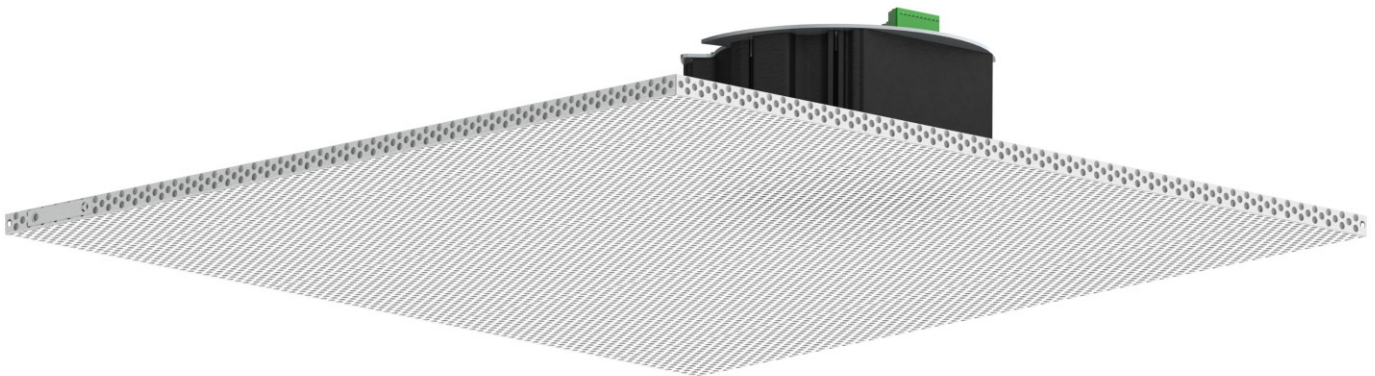




wahsega

2x2 Ceiling IP Speaker with InformaCast®

User's Guide



Getting Started

This step by step guide will help you setup and install your Wahsega 2x2 Ceiling IP Speaker with InformaCast®.

Important Notice

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Patent

Wahsega Labs 2x2 Ceiling IP Speaker with InformaCast

United States patent pending.

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The Wahsega product line offers the highest quality two-way audio and durability in the industry today. Each and every Wahsega product is designed, developed and manufactured in the USA, ensuring a superior product at the best price available in the market.

Speaker Functionality

The initial functions of the Wahsega speaker with InformaCast® include:

Dual registration

- Simultaneous support for SIP PBX and InformaCast registration
- Access for both from a single IP endpoint

InformaCast enabled

- Ability to receive live & pre-recorded audio from InformaCast system
- Automatic registration on the InformaCast server

SIP intercom

- IP paging speaker
- Crystal clear audio
 - Multiple audio codecs, including G.722, G.711, G.729, DVI4, Speex, SILK, PCM and iLBC
 - Environmental noise suppression
- Extensive interoperability with most SIP servers and PBXs
- Peer-to-peer (P2P) mode available for decentralized communication

Web-based configuration

- All configuration options accessible through an easy-to-use HTTP Web interface
- Mic and speaker volume control within configuration webpages
- Remote firmware upgradeable

Primary inputs

- Built-in microphone
 - Available push-button override for sound reinforcement
- Two onboard relays for door control
 - Control two door locks **or**
 - Power and control one door lock

Secondary inputs

- Second RJ45 connector for easy installation and expansion
 - Able to drive second, auxiliary Wahsega speaker up to 20m away via Cat5e or Cat6 cable
- Compatible with standard panic buttons
 - Advanced panic button functionality, designed to reduce false alarm triggers (short press vs. long press)
- Classroom sound reinforcement through optional audio input wallplate
 - Audio input
 - Volume control
 - Activation button
 - LED indicator
 - Line-in microphone

Simple installation

- Power-over-Ethernet
 - PoE 802.3af powered
- QR code label for easy MAC address identification
- Simple surface mount wall installation

Indoor temperature range (-40°C to +60°C)

Industry-leading standby power of < 2W

Integrated status LED

Quality Standards

- Wahsega products achieve the highest standards of performance in the market by utilizing our complete quality assurance program encompassing software testing, product design and a multistage automated factory test program.
- Wahsega's ultimate goal is to provide a solution that is both cost effective and unsurpassed in quality. By leveraging existing relationships with suppliers to guarantee premium components at the lowest possible prices, we are able to ensure Wahsega products are the finest quality in the market while still offered at highly competitive prices directly to installers.
- In order to achieve the greatest possible voice clarity, all voice and related algorithms have been individually tested to ensure the highest potential MOS score. The accumulated error syndrome, which can cause poor voice quality, is mitigated through this testing process.
- Wahsega's engineering team utilizes a wide array of dedicated test servers to pull and build the various software projects multiple times per day. Each automatic build is then run through an extensive set of automated test cases to ensure the highest performance of each and every firmware version released. This test case coverage is expanded on a continual basis.
- All Wahsega products are 100% factory tested at the board level through a bed of nails full functional test, not just an "is it close enough?" flying probe test. Every finished product is 100% tested again after the final assembly via an automated test station to ensure the highest production quality product for installers.
- To assure the highest quality standards, all Wahsega products are designed, developed and manufactured in the USA.

Chapter 2

User Experience

The Wahsega 2x2 Ceiling Speaker with InformaCast may look like a standard 2x2 ceiling tile speaker, but it can receive audio from both the InformaCast Advanced Notification System and a SIP PBX, acting as an intercom for two-way conversations with the help of its built-in microphone.

Featuring dual registration with both InformaCast and SIP servers, the speaker is able to receive InformaCast pages in high- or low-quality audio—both live and pre-recorded—while also supporting normal SIP intercom calls.

The speaker may also be connected to a panic button to make emergency SIP calls and/or a remote wall panel to access classroom sound reinforcement functions. Its two onboard relays can be controlled by the InformaCast server to operate door locks for up to two doors per classroom.

In addition, a second, auxiliary speaker may be connected up to 20 meters away via Ethernet cable. Two different Wahsega auxiliary speaker models can be used, depending on the application. The auxiliary speaker—which is powered by the primary speaker—can be either in the same room as the Wahsega Surface Mount Wall Speaker or in a separate room.

In a single-room application, the Wahsega Extension Speaker (WL-SPKR-SMT-A or WL-SPKR-22-A) acts as a companion to the primary speaker. This auxiliary speaker's volume can be adjusted independently, but it will always broadcast the same audio as the main speaker. In this application, only the primary speaker supports features such as door locks, microphone, panic button and sound reinforcement.

In a two-room application, the Wahsega Second Room Speaker (WL-SPKR-SMT-2R or WL-SPKR-22-2R) has its own SIP account and InformaCast instance, enabling it to send and receive audio independent of the primary speaker. While it receives its power and data from the primary speaker, it functions separately—with the ability to control door locks, microphone, panic button, and sound reinforcement on its own. To an end user, the Second Room Speaker appears to be completely autonomous; it is simply powered by the primary speaker.

Once your speaker is installed and configured, you will be able to receive SIP calls and InformaCast broadcasts with no additional in-room setup. Two-way communication is clear and simple with a built-in microphone which transmits audio from the classroom to the caller.

If a panic button is connected to the speaker, it will make an emergency call to a preset SIP number on the PBX. To reduce the incidence of false panic calls, the panic button has two call modes: short press and long press. The short press call—which is a call placed after the button is depressed for any length of time *less than two seconds*—calls a first, preconfigured number, such as a front office. The long press call—a call placed after the button is depressed for *two or more seconds*—calls a second, preconfigured emergency number, such as 911.

If the installation includes a sound reinforcement wall panel, the panel will have an audio input, volume control, activate button and LED indicator light.

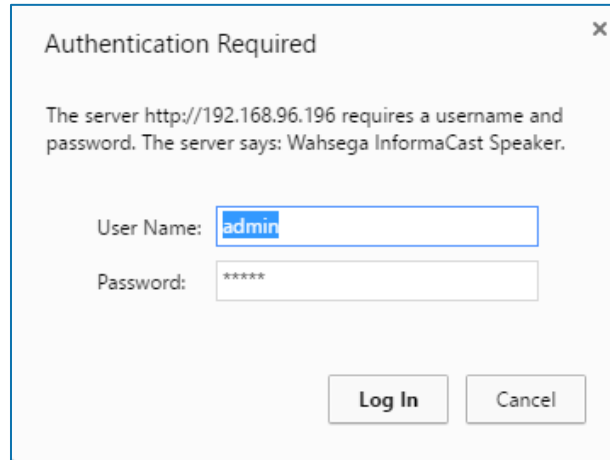
Software Capabilities

The speaker's configuration is accessible using an HTTP Web interface, viewable from any Web browser on the same LAN. This allows access to various settings such as network/IP address, SIP account and InformaCast instance configuration, intercom/speaker behavior, panic button call numbers, and administrative functions such as firmware upgrade and configuration backup/restore. The configuration is stored in a .JSON file, which is human readable and can be edited by site administrators.

Getting Started

1. Connect the speaker's main Ethernet port—labeled *POE*—to a network using a Power-over-Ethernet (PoE) Ethernet connection. When connected, it will power on immediately, and the *LINK/ACTV* LED on the Ethernet port will begin to blink.
2. Locate and note your speaker's MAC address. It is printed as a QR code on a white sticker on the front of the speaker. Simply scan the QR code with a smartphone or tablet QR reader app, and it will give you the MAC address for that speaker.
3. Your speaker will automatically recognize and register with the InformaCast server when you power up and connect to the network via PoE. Use the InformaCast server interface to discover your speaker's IP address. Look for the device matching the MAC address you just noted.
4. When you first connect your speaker's Ethernet cable, the status LED on the face of the speaker will blink slowly, indicating that it is trying to discover its IP address. Once its IP address has been established, it will blink faster, indicating that it is trying to register with InformaCast. It will maintain a solid green state once it has successfully registered with the InformaCast server. (See **Figure 1** on page 24 for LED location.)
5. Once you determine the speaker's IP address, navigate to that IP address in your Web browser (for example, <http://123.456.78.9>).

- When you access the webpages, the speaker will ask for a username and password. The default username and password are *admin* and *admin*.



Authentication Required

The server http://192.168.96.196 requires a username and password. The server says: Wahsega InformaCast Speaker.

User Name:

Password:

- On the right side of the page is the Status bar. It shows the current SIP account status (default status is unconfigured and unregistered), the registration status and Ethernet MAC address of the InformaCast instance, and the speaker's system information (current IP address, Ethernet MAC address and system time).
- To change the IP address settings, go to the *Network* page and modify settings in the *WAN* section. To set the network for DHCP, click the *Dynamic IP* radio button. For static IP addressing, click the *Static IP* radio button and fill in the relevant IP address fields with values from your network administrator.

9. To change the SIP account settings, go to the *Accounts* page and modify settings in the account. Most users will only need to set *Username/Number* (the phone number or extension assigned to this speaker) and *Domain* (the hostname or IP address of your SIP server). You may also provide an *Account Name*, which is used only for logging purposes, and a *Display Name*, which may be used by your SIP server depending on its configuration.

If a password is required for your SIP server or proxy server, provide it in the *Password* field. If your SIP server or proxy server requires an authentication username that is different from the name entered in *Username/Number*, enter it under the *Advanced* tab in the *Auth Username* field.

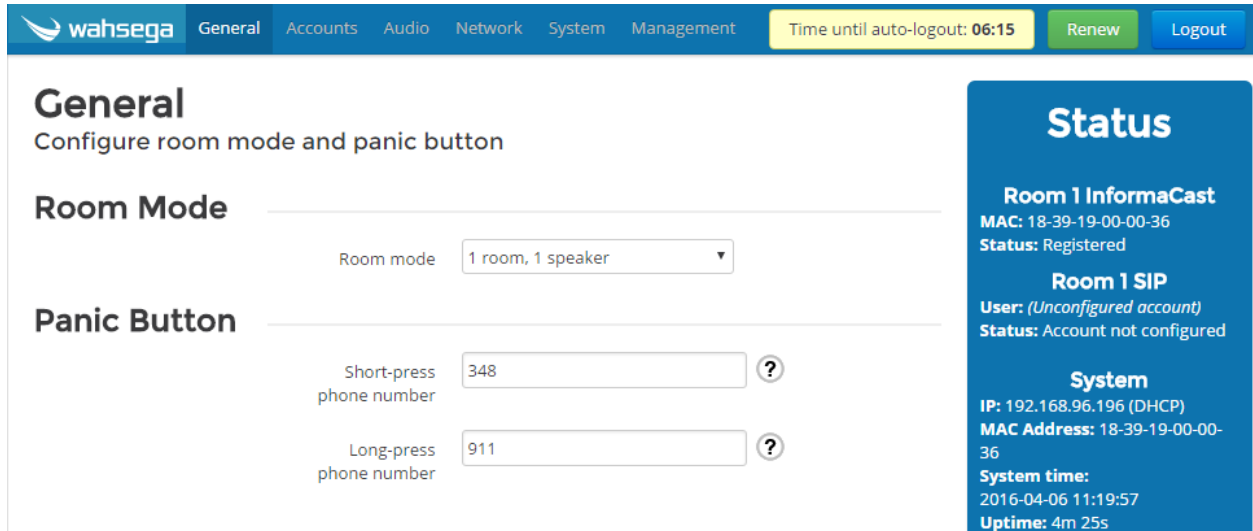
10. After configuring the network and SIP settings for your speaker, use the configuration settings described in the next sections to customize the speaker, intercom, panic button and InformaCast functionality.
11. Be sure to set up your speaker(s) and relays (if applicable) in the InformaCast programming utility. For setup assistance, visit <https://www.singlewire.com/academy>.

Chapter 3

Configuration and Web Interface

The Web interface is a set of webpages used to configure the various settings available on the InformaCast speaker. It allows the speaker to be configured from any computer or device with a Web browser on the same network.

General Settings



The **General** page configures settings for Room Mode and Panic Button.

Room Mode

- **Room Mode** – Configure the number of rooms and/or speakers controlled by this primary speaker.
 - **1 room, 1 speaker** – Single room, single speaker setup.
 - **1 room, 2 speakers** – Single room, two speaker setup. Second speaker will be model WL-SPKR-xx-A.
 - **2 rooms (1 speaker each)** – Two room configuration. InformaCast, SIP, and audio settings will be independently configured for each room on Accounts and Audio webpages. Second speaker will be model WL-SPKR-xx-2R.

Panic Button

- **Short-press phone number** – The number or extension to call when the panic button is pressed for *less than two (2) seconds*.
- **Long-press phone number** – The number or extension to call when the panic button is pressed for *2 seconds or longer*.

Account Settings

wahsega
Time until auto-logout: 01:50
Renew
Logout

Accounts

Configure VoIP account(s) for SIP or IP-PBX servers

Room 1 InformaCast

General

Account name ?

Audio Mixing: Maximum number of audio broadcasts to play simultaneously:
 ?

Room 1 SIP

General

Topology

QoS

Advanced

Account name ?

Display name ?

Username/Number ?

Domain ?

Register with domain ?

Password ?

Status

Room 1 InformaCast

MAC: 18-39-19-00-00-36
Status: Registered

Room 1 SIP

User: 347@sip.wahsega.com
Status: Registered

System

IP: 192.168.96.196 (DHCP)
MAC Address: 18-39-19-00-00-36
System time:
2016-04-06 12:54:26
Uptime: 20m 55s

The **Accounts** page configures settings for InformaCast and SIP accounts for the primary speaker (Room 1) and second room speaker (Room 2, if applicable).

Room 1 InformaCast

- **Account name** – The name to use to identify this InformaCast account. It will only be shown on this page and in the system logs.
- **Audio Mixing** – Maximum number of InformaCast audio broadcasts to play simultaneously on this channel. [Note 1](#)
 - To disable audio mixing, choose **1**.

Room 1 SIP

- **Account name** – The name to use to identify this account. It will only be shown on this page and in the system logs.
- **Display name** – The name to report to the SIP server, which may be shown to other callers (depending on the SIP server's configuration).
- **Username/Number** – The phone number or extension this speaker is configured with on the SIP server.
- **Domain** – The hostname or domain name of the SIP server. Not used in peer-to-peer (P2P) mode.
- **Register with domain** – If checked, operates in normal SIP mode. If unchecked, operates in P2P mode.
- **Password** – If the SIP server requires a password to authenticate, enter it here.

Room 2 InformaCast

- **See settings above if applicable.**

Room 2 SIP

- **See settings above if applicable.**

Note 1: While each channel is capable of playing up to three (3) audio broadcasts at once, the maximum number of simultaneous *high-quality* (44.1 kHz) audio broadcasts is two (2) per device.

Audio Settings

wahsega
Time until auto-logout: 08:34
Renew
Logout

Audio

Configure audio settings and preferred codecs

Audio Settings

Configure Speaker and Microphone Volume

Speaker volume	0 dB (default) ?
Microphone volume	+15 dB (default) ?
Microphone high-pass filter	DC blocker only (60 Hz) ?
Noise suppression	<input checked="" type="checkbox"/> ?

Status

Room 1 InformaCast
MAC: 18-39-19-00-00-36
Status: Registered

Room 1 SIP
User: (Unconfigured account)
Status: Account not configured

System
IP: 192.168.100.75 (Static)
MAC Address: 18-39-19-00-00-36
System time:
2016-06-17 10:57:00
Uptime: 26m 23s

SIP

Choose preferred codecs for SIP audio.

Available	Preferred
<ul style="list-style-type: none"> G.711 uLaw G.711 aLaw G.726 (16kbps) G.726 (24kbps) G.726 fixed payload G.726 (40kbps) G.722 HD DVI4 Narrowband DVI4 HD DVI4 Ultra HD Linear PCM Linear PCM HD Linear PCM Ultra HD Linear PCM (little endian) Linear PCM HD (little endian) 	<ul style="list-style-type: none"> G.722 HD DVI4 HD G.726 fixed payload DVI4 Narrowband G.711 uLaw G.711 aLaw
Enable >>	<< Disable
	Move Up Move Down

The **Audio** page configures settings for speaker and microphone audio as well as codec selection.

Audio Settings

- **Speaker volume** – Increase or decrease decibel level of speaker output. Default level is 0 dB, or no change.
- **Microphone volume** – Increase or decrease decibel level of microphone input. Default level is +15 dB.
- **Microphone high-pass filter** – Eliminates low-frequency noise that can make speech difficult to understand.
 - **DC blocker only** – Eliminates hum from power lines while leaving other low-frequency sounds intact.
 - **High-pass mode** – Eliminates most noise below standard telephone frequencies.
- **Noise suppression** – This option reduces background noise such as fans and hums. It has no effect locally; it is only audible to the party on the other end of a call from the intercom.

SIP

- **Choose preferred codecs** – These settings enable/disable audio codecs and set their order of use for SIP calls. The system tries codecs at the top of the *Preferred* list before trying codecs at the bottom of the list.
 - To select your preferred codec(s), highlight the *Available* codec(s) you would like to use and click *Enable*. This will add the selected codec(s) to the *Preferred* list on the right.
 - To change the priority level of a preferred codec, simply highlight it in the *Preferred* list and click *Move Up* or *Move Down*.

Network Configuration

Time until auto-logout: 06:15

Network

Configure network settings

WAN

Outgoing Network Settings

General

Host

Domain

Connection type
 Dynamic IP (DHCP)
 Static IP

Static IP Address

Address

Mask

Default router

DNS primary

DNS secondary

DNS tertiary

IPv6 is enabled!

Additional Settings

Enable IGMPv3 (advanced) ?

MTU size (advanced)

STUN

Global STUN Server Settings

Server

Port

RTP

Configure Port Range

Port range start to

SNMP

Enabled ?

Port ?

Read-only community string ?

Read-write community string ?

Status

⚠ After completing all changes to the configuration you must save your settings:

Save changes

Revert changes

Room 1 InformaCast
 MAC: 18-39-19-00-00-36
 Status: Registered

Room 1 SIP
 User: (Unconfigured account)
 Status: Account not configured

System
 IP: 192.168.96.69 (DHCP)
 MAC Address: 18-39-19-00-00-36
 System time: 2016-06-17 11:39:42
 Uptime: 4m 1s

The **Network** page configures settings for TCP/IP networking.

WAN

- **Connection Type**

- **Dynamic IP** – Choose this to use DHCP to assign an address automatically. Note that when using DHCP, you will have to determine the IP address assigned to the speaker using your DHCP server or through some other method in order to access the configuration webpages in the future.
- **Static IP** – Choose this to enter IP address settings manually.
 - *Warning: If you enter a configuration that is not accessible from your network, you may be unable to communicate with the speaker! Double-check that the settings you enter are correct before rebooting the speaker to apply them.*

Additional Settings (advanced)

- **Enable IGMPv3** – Check to enable IGMP version 3 on your speaker. If unchecked, IGMP version 2 (IGMPv2) will be used. Default setting is *disabled*. If you know that your routers have IGMPv3 enabled, you can safely enable this setting. *If unsure, leave disabled* to ensure support with routers that only use IGMPv2.
- **MTU size** – Maximum transmission unit allowed on the Ethernet connection. The standard for Ethernet networks is 1500, and you *should not change this value* unless directed by your network administrator.

STUN

- **Server/Port** – Enter your STUN server here if applicable. STUN servers may be required to operate with a public SIP server from behind a NAT or router.

RTP

- **Port Range** – Select the UDP port range to use for sending RTP audio network traffic during a call.

SNMP

- **SNMP Enabled** – SNMP is required for the InformaCast server to control relays in the speaker. *The speaker's relays cannot be used while SNMP is disabled*, so be sure to check this box if you may be using relays with InformaCast.
- **Port** – The port number used for SNMP.
- **Read-only community string** – The community string that will allow read-only access to SNMP variables on this device. SNMP community strings are sent in plain-text, so *do not re-use a password that's used for any secure logins or devices!*
- **Read-write community string** – The community string that will allow read-write devices to access the SNMP variables on this device. SNMP community strings are sent in plain-text, so *do not re-use a password that's used for any secure logins or devices!*

General System Configuration

System

Configure additional system-specific settings

Authentication

Administrative User Account

Username ?

[Change Password](#)

Syslog

System Logging Configuration

Report to server

Server

Port

Date & Time

System Date and Time Configuration (Time Server / NTP)

Enabled

Server

Daylight saving time Currently in effect

Time zone

[Set date & time](#)

System description

System description

System contact ?

System name ?

System location ?

Status

Room 1 InformaCast

MAC: 18-39-19-00-00-36
Status: Registered

Room 1 SIP

User: 347@sip.wahsega.com
Status: Registered

System

IP: 192.168.96.196 (DHCP)
MAC Address: 18-39-19-00-00-36
System time: 2016-04-06 13:11:39
Uptime: 38m 8s

The **System** page configures settings for the speaker's operating system and other administrative functions.

Authentication

Username – Set the username and password used on the configuration webpages and Telnet shell. Default is *admin*.

Syslog (optional)

Report to server - Configures a syslog server that can receive system logs from the speaker. This requires a PC or server running a syslog server to receive and store the logs.

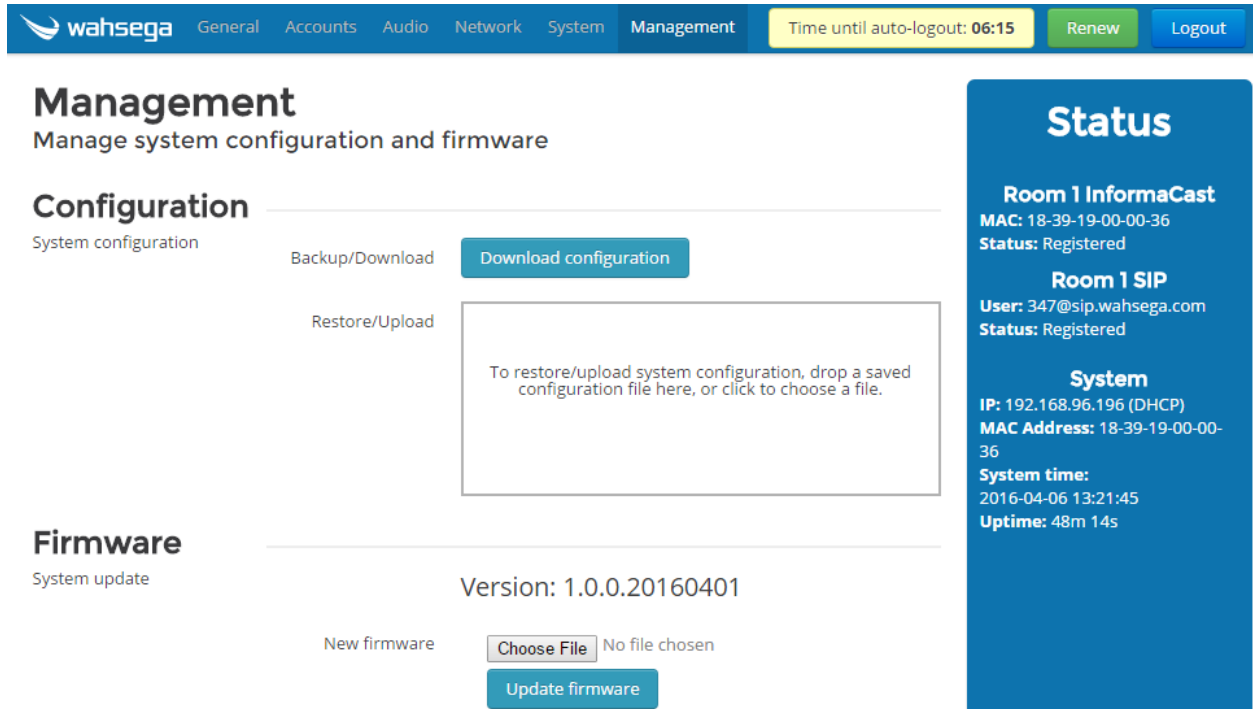
Date & Time

- **NTP Enabled** – Automatically determines the time of day using an NTP server. This is recommended, as the speaker does not have a battery-backed clock.
- **Daylight saving time** – Select this only if daylight saving time is currently in effect in your location. (For more information about DST rules and dates, see <http://www.nist.gov/pml/div688/dst.cfm>.)
- **Time zone** – Select the region that most closely matches your time zone. (Note that daylight saving time is *not* automatically applied based on region.)

System Description (optional)

- **System contact** – Identification and contact information for this device's administrator (usually an IT person).
- **System name** – Administratively-assigned name for this device. By SNMP convention, this is the device's fully-qualified domain name. Also available through SNMP as `sysname` (1.3.6.1.2.1.1.1.5), as defined by RFC 1213.
- **System location** – The physical location of this device (e.g., "3rd floor telephone closet"). Also available through SNMP as `sysLocation` (1.3.6.1.2.1.1.6), as defined by RFC 1213.

Firmware Management



The **Management** page has functions for managing the speaker's configuration and firmware.

Configuration

- **Backup/Download** – Use this to retrieve a copy of the speaker's current configuration and save to disk.
- **Restore/Upload** – Use this to upload a valid configuration file that was retrieved and saved from a speaker. *Note that a reboot will be required before the settings take effect.*

Firmware

- Use this to upload new firmware.
DO NOT UNPLUG THE SPEAKER OR INTERRUPT THE FIRMWARE UPGRADE PROCESS BEFORE IT COMPLETES, OR IT MAY BE RENDERED UNUSABLE.

Appendix A

Restoring Factory Settings

Software-based Factory Reset

If you need to erase the configuration settings in your 2x2 Ceiling Speaker with InformaCast and SIP, you can do so in one of two ways. **Option A** returns only IP settings to factory default, and **Option B** returns all of the speaker's settings to factory default.

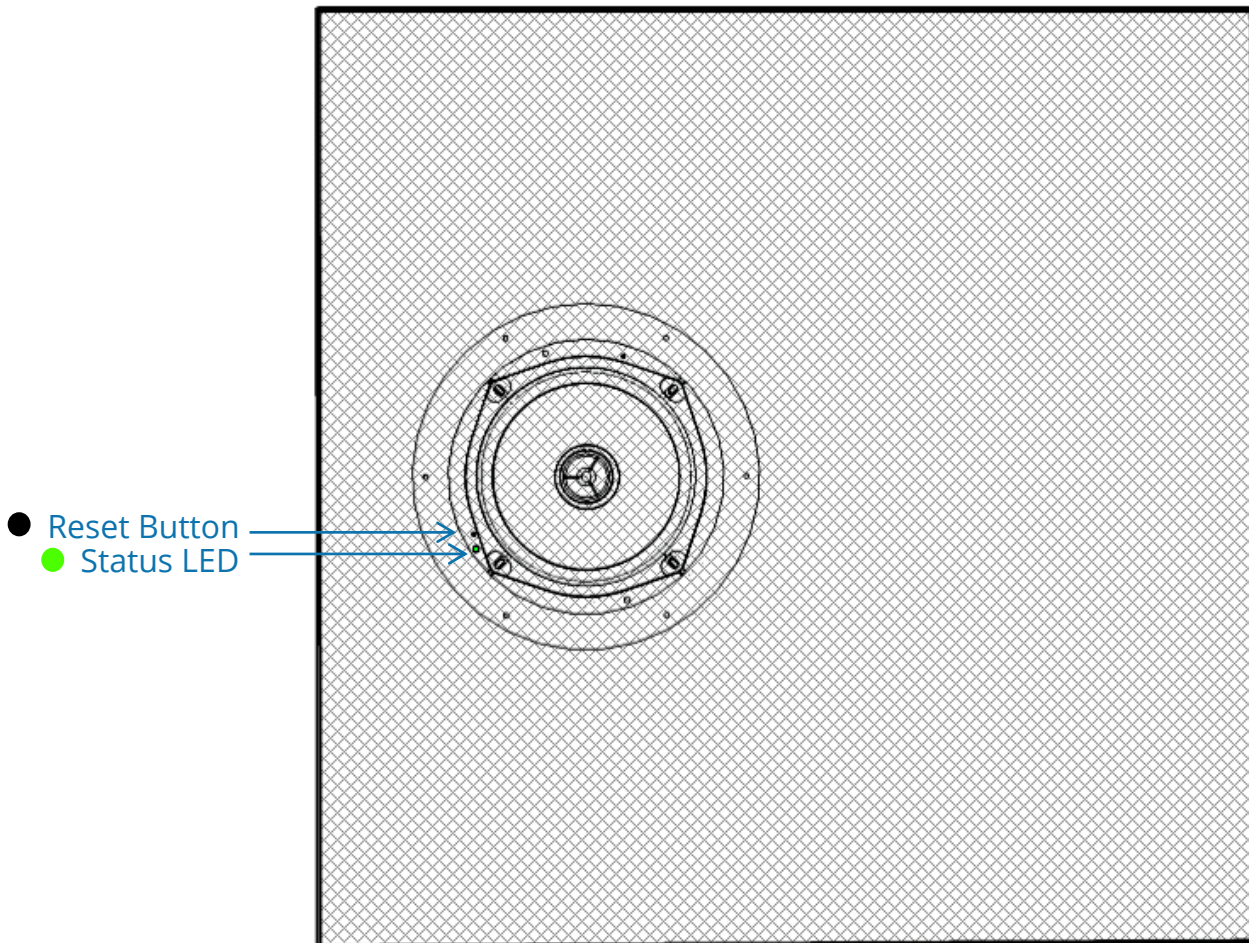


Figure 1

Option A – Steps for activating a partial factory reset:

1. Start with the PoE cable plugged in and the speaker powered **on**.
2. Find the green status LED on the face of the speaker. Next to the status LED, locate the small, black reset button.
3. Press and hold the reset button until the status LED begins to blink. (If the status light does not begin to blink, reposition and try again.)
4. Once the status light begins to blink, release the button, and the LED should return to a solid green.
5. You have successfully reset your ceiling speaker's IP address to its default DHCP address. You will need to use this new, dynamic IP address to access your speaker's configuration webpages again.

Option B – Steps for activating a full factory reset:

1. Start with the PoE cable unplugged and the speaker powered **off**.
2. Plug in the PoE cable and apply power to your ceiling speaker. As soon as power is applied, hold the reset button as the status light begins to blink.
3. Once the status light starts to blink, continue to hold the button for **at least five (5) seconds**.
4. After 5 seconds, the status light will flash more slowly, indicating that the file system has been reformatted and all data has been erased from the device.
5. Unplug and restart your speaker for the new settings to take effect.
6. If you have previously changed the IP address of your ceiling speaker to a static IP address, keep in mind that restoring factory default settings will return your speaker to dynamic IP (DHCP) mode. You will need to use the new, dynamic IP address to gain access to your speaker's configuration webpages once again.
7. You have successfully reset your configuration!

2x2 IP Ceiling Speaker with InformaCast®

WL-SPKR-22-INF

WL-SPKR-22-2R

WL-SPKR-22-A

Users Guide

Version 1.8.1-20190215