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Listen EVERYWHERE Troubleshooting Guide

Contents

Overview:

The purpose of this tech note is to provide a troubleshooting guide for the Listen EVERYWHERE (LE) server. Most of the issues outlined are usually encountered when initially installing the LE server or after altering a pre-existing installation of the LE server in a significant way (i.e., installing into a different location, changing networking or audio equipment, etc.). There may be issues or resolutions that extend beyond this document. If so, please do not hesitate to contact Listen Technical Support using the contact information located at the end of this document.

Unable to Perform a Successful Venue Scan:

If you are reviewing this section, you are not able to connect to the Listen EVERYWHERE server through the Listen EVERYWHERE app using the Venue Scan option. The user will witness a 30-second countdown timer and/or an error message. To preface, the user must be physically present in the venue location where Listen EVERYWHERE is installed and must be connected to the same network. The server is not designed to stream over the internet or traverse networks. The Venue Scan feature also requires the allowance of particular ports and services mentioned later in this section. If this is not desired or possible in the venue, please consult the Mobile App Connection Methods tech note for alternative connection methods.

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*Note: The first time the app is opened on devices running iOS 14 or higher, you will see the prompt "**Listen EVERYWHERE would like to find and connect to devices on your local network. This app will be able to discover and connect to devices on the networks you use**", press "**OK**". This can be changed at any time in **Settings** > **Privacy** > **Local Network** on the iOS platform.*

Front Power LED is Solid

This section will provide solutions in a situation where a Venue Scan will fail while the front power LED on the LE server is solid.

- **Enable Multicast UDP / Multicast DNS (mDNS) on the network.** This is a common problem on guest networks or networks with high levels of security because this feature may be disabled. Multicast DNS (mDNS) is used in the discovery process for the app and the server to connect via a network scan. This then allows automatic connection when the app is opened. To enable mDNS, perform the following:
  - o Add the following services to the allowed list in the Gateway/WAP mDNS settings:
    - _ExXothermic._tcp
    - _AsClient_ExXothermic._tcp
  - o Open **Port 5353**.
  - o Add the mDNS IP address to the allowed subnets list. **224.0.0.251** is the most common mDNS IP address, but it could be any of the **224.0.0.0/24** range.
- **Whitelist the LE server on the network.** On guest networks and VLANs, it's possible that client isolation is enabled. Client isolation prevents connected wireless devices from communicating with other devices on the network (such as iOS/Android devices communicating with the LE server) and disables mDNS. In conjunction with enabling mDNS on the network (see previous bullet point), the IP address or MAC address must be added to the allowed address list (Whitelist) for the Guest

Figure 1: Ports and services used by Listen EVERYWHERE

Network/VLAN in the Router and/or WAP configuration.

- **Expand the allocation of IP addresses.** The network may be limited by the number of host devices that can acquire an IP address (i.e., connect to the network). This will be evident when the LE server is successfully connected to the network but only some users cannot successfully connect to the network and therefore, are unable to successfully perform a Venue Scan in the LE app. In that case, the subnet mask may need to be expanded to include more hosts. A calculator can be found [here](). For networks with a single Listen EVERYWHERE server, it is recommended to set the subnet mask to at least 255.255.252.0/22 to accommodate the 1000 user specification of the server. This may vary based on the network infrastructure needs. Class B (default subnet mask of 255.255.0.0) is best for medium to large venues.

- **Consider IP address lease time.** Lease time refers to how long a device will reserve an IP address on a network before it is renewed and re-added to the IP address pool availability. Similar to expanding the IP address allocation, the IP address lease time may also be adjusted based on the needs of the venue. It's recommended to place a Listen EVERYWHERE server on a network with a 24-hour lease time so that devices do not encounter any disruption while streaming audio through the Listen EVERYWHERE app. However, a venue may want to consider lowering the lease time in high traffic environments or for applications that required a user to be connected for a predetermined finite amount of time (e.g., a guided tour).

- **Ensure that users are connected to the correct network and are not using mobile data.** As mentioned previously, make sure that users are connected to the same network as the LE server. To help verify, it may be beneficial to perform a network scan from a mobile device using a network analyzer app. Usually, the LE server should appear with the Server ID (e.g., AEL6-XXXX-XXXX-XXX) as the name and "WIBRAIN" as the manufacturer. If using the LE server on a network without internet connection, some devices may have trouble connecting. Below are a few tips to help connect to these networks:
    - When first connecting to the network, you may see a prompt to stay connected even if the network does not have internet. Select **Yes** or **Keep Trying Wi-Fi**. Do not manually switch to mobile or cellular data.
    - Forget the network and reconnect. This may elicit a prompt to stay connected even if the network does not have internet. Select **Yes** or **Keep Trying Wi-Fi**. Do not manually switch to mobile or cellular data.
    - Turn off Mobile / Cellular Data and connect to the network.
    - Turn on Airplane Mode and connect to the network.

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Front Power LED is Blinking Steadily (1 Blink Per Second)

This section will provide solutions in a situation where a Venue Scan will fail while the front power LED on the LE server is blinking once per second.

By default, the Listen EVERYWHERE server is designed to acquire an IP address automatically from a DHCP server. This is typically the router. While acquiring the IP address from the network, the user will see the power LED blink once per second for roughly 30 seconds. If the blinking pattern persists beyond that, an IP address isn't properly being assigned to the server or the internal components are not functioning properly.

- **Verify that a DHCP server / router is properly setup and installed.** Follow the steps provided by the manufacturer of the networking hardware to set up and prepare the network for use. Sometimes, these devices may fail over time. Performing a factory reset on the networking equipment and following the setup procedures may resolve the issue.
- **Check the network cable and Ethernet port.** The network cable may be faulty, disconnected, or connected into the wrong Ethernet port on the network switch or router. The Ethernet LAN port may also be faulty, disabled, or configured incorrectly.
- **Check the Power supply.** A faulty or incorrect power supply will cause internal components of the Listen EVERYWHERE server to function incorrectly. The LE server uses a 5V / 6.0A / 30W power supply.

Front Power LED is Blinking Rapidly (2 Blinks Per Second)

This section will provide solutions in a situation where a Venue Scan will fail while the front power LED on the LE server is blinking twice per second.

- **Verify that the network settings placed on the Listen EVERYWHERE server are correct.** Network settings can be adjusted on the LE server through the Server Admin interface. Some errors, such as IP address conflicts on the network, will occur after the configuration is saved and the server is rebooted. When errors like this are encountered, the front panel LED status will flash in panic mode (2 blinks per second) indicating the server has an improper network configuration and cannot communicate on the network. When this happens, the server will revert to a known working DHCP configuration after 5 minutes.

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Server is Unable to Connect to Cloud Services:

If you are reviewing this section, you are able to successfully connect to the Listen EVERYWHERE server through the Listen EVERYWHERE app. However, the Listen EVERYWHERE server is not able to communicate with Cloud Services and appears to be offline.

- **Ensure that the router is connected to the wide area network (WAN).** Routers will typically have a physical WAN or Internet Ethernet port. Make sure that an Ethernet cable is properly connected from the WAN port of the router to the internet source. This will commonly be the case if other connected devices are also not able to get internet access.
- **Enable ports and services**. This will likely be necessary if the network has a high level of security or firewall in place. Cloud Services communicates via HTTP with the LE server through ***.exxothermic.com** over **port 1025**, with updates communicating over **port 80**. Refer to Figure 1 on Page 2.

High Latency, Noise, Crackling, or Dropouts in Audio:

If you are reviewing this section, you are able to successfully connect to the Listen EVERYWHERE server through the Listen EVERYWHERE app. However, the latency of the audio stream through the app seems excessively high or the audio stream has excessive noise, crackling, or dropouts. These audio effects may be heard immediately, occasionally, or infrequently. An example can be heard here. The average latency on the Listen EVERYWHERE server is 60ms but can vary by network and device.

- **Upgrade the networking equipment**. Older and/or low-cost networking equipment may result in unreliable and slower packet delivery, especially when many users are connected to a single network. It is highly recommended to use high-end consumer-grade networking equipment or enterprise-grade networking equipment to improve packet reliability and speed. More information and recommended networking equipment can be found in our Wireless Access Point Optimization for Listen EVERYWHERE tech note.

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- **Do not use a mesh network**. A mesh network is comprised of multiple nodes that communicate with each other to provide wireless access to a single network. These nodes may also be called points or extenders. You may also think of these nodes as being wirelessly daisy-chained to one another. Mesh networks have a high likelihood of causing excessive latency, dropouts, and unwanted noise because it extends the pathway from the user device to the Listen EVERYWHERE server. Refer to Figure 2 on the right.
- **Use an open network (no encryption).** Using encryption can lower the number of users that can connect to the WAP and add latency to the LE system. TKIP encryption should not be used.
- **Enable Quality of Service (QoS) for the LE server on the network**. By default, the LE server uses the 0xB8 Type of Service/Differentiated Services (ToS/DS) tag so that audio data can be prioritized over other data traffic on the network. This priority allows the latency and dropouts to be as low and infrequent as possible while travelling over the network. The QoS setting may still need to be enabled on the managed network, especially if there are many other connected devices or there are existing QoS prioritizations on other connected devices.

Figure 2: Example of a mesh network

- **Ensure that there is adequate Wi-Fi coverage.** If latency improves as a user moves closer to the wireless access point or when there are less users connected to the network, the venue may need to consider adding additional wireless access points for adequate coverage and bandwidth allocation. Network speeds can also be tested using third-party apps. Refer to our Wireless Access Point Optimization for Listen EVERYWHERE tech note for more details.
- **Consider network frequency**. Typically, users will receive better performance on the 5GHz frequency versus a 2.4GHz frequency. The 2.4GHz frequency can usually be turned off through your network's admin interface. However, 2.4GHz frequencies will work more efficiently as the user moves further away from the access point. Both may be considered depending on your wireless access point placement.
- **Check your mobile device.** Some third-party, low-cost and/or older mobile devices may not have high computing power or strong Wi-Fi antennas. Test with multiple mobile devices to isolate the problem. If the problem exists on one or few devices, it may be necessary to use an alternate mobile device to stream audio.
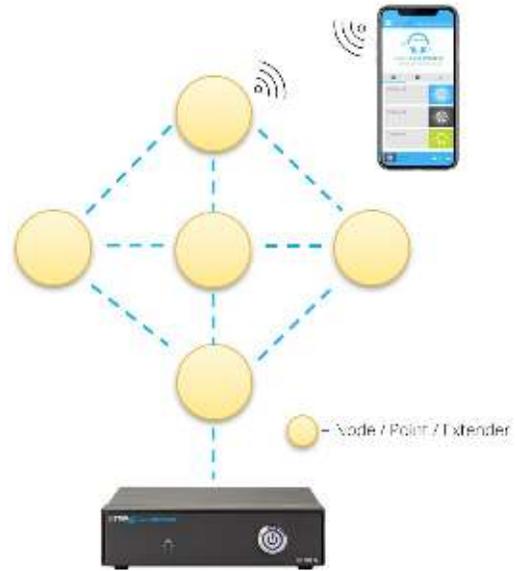
- **Set a static channel on the wireless access point(s)**. Many WAPs can automatically change channels to try and find one with the least interference. This feature can cause audio dropouts each time the channel changes, as often as every 20 seconds. If it does not settle on a channel after 30-60 minutes, it may be best to choose a channel manually.
- **Check your Bluetooth device (if applicable)**. Bluetooth speakers and headphones can potentially cause an additional 200-700ms in latency. The amount of latency can vary between Bluetooth devices. Utilizing devices with Bluetooth 5.0 or higher and Bluetooth Low Energy (BLE) can help reduce latency. If using a hearing aid or cochlear implant with Bluetooth technology, try toggling between listening modes to reduce latency. Bluetooth devices are also susceptible to interference from Wi-Fi signals. Try moving closer to the wireless access point.
- **Be mindful of cable runs**. Cable runs from the audio source to the Listen EVERYWHERE server should be balanced to avoid introducing interference or noise. If an unbalanced cable is used, you can reduce noise by improving cable shielding, avoiding long cable runs (usually over 15ft), and by avoiding objects that can be picked up by the ground wire.
- **Avoid ground loops**. A ground loop is characterized by the introduction of a humming noise in the audio and can occur when multiple devices are interconnected through a shared ground reference. Grounding is needed for both power and audio connections, so it's important to not allow these ground references to create a loop within the device setup. When it comes to Listen EVERYWHERE, it may occur when the source audio, other audio devices, and LE server are connected to the same ground reference, usually in the form of a shared power strip or electrical outlets with interconnected ground references. In order to combat a ground loop occurrence, the equipment's circuitry will need to be separated or a ground loop isolator can be installed.

No Audio or Partial Audio:

If you are reviewing this section, you are able to successfully connect to the Listen EVERYWHERE server through the Listen EVERYWHERE app. However, no audio or partial audio is heard on the channel after channel selection within the app. The LE server contains green LEDs on the front of the unit that will illuminate when audio is present and at an adequate level. This may help determine if the issue is audio-based or network-based and can be troubleshot accordingly.

- **Correctly connect audio to the Listen EVERYWHERE server**. If the server is set up for mono, connect to a single terminal block input, or connect to one vertical pair of red and white RCA connections (LW-100P only). If the server is set up for stereo, connect to a pair of terminal block inputs, or connect to one RCA input on the left and one RCA

input on the right (LW-100P only). The LW-150 Dante connection handles both mono and stereo with the same connection. Refer to Figure 3 below.

Figure 3: *Listen EVERYWHERE audio input connections*

- **Verify that audio cables being used are working properly or have been properly assembled**. This can be tested by using a different cable. If a custom-made cable is being used, some wiring diagrams are available on our Audio Input Connection for Listen EVERYWHERE tech note to ensure that it had been made properly. A multimeter may also be used to check for continuity between the two connectors of the cable.
- **Verify that headphones are working properly**. This can be tested by using a different pair of headphones and/or confirming that the audio can be heard through the speaker of the smartphone or tablet used for streaming.
- **Audio input should be line level.** Mic level audio sources are not meant to be used on the Listen EVERYWHERE server. Doing so may result in low level audio and pitch where no audio or only partial audio may be heard.
- **Ensure that traffic is enabled on port 16384.** The LE Server sends RTP packets via UDP to the app over a range of ports, including dynamic ephemeral ports. The mobile app listens via UDP over port 16384. If these ports are not enabled, no audio will stream through the app. See Figure 1 on Page 2. It also may be necessary to perform a

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network scan or capture (e.g., through Wireshark) to identify which ports the network is utilizing. See example below.

- **Do not attempt to stream audio across different networks.** Attempting to stream across different networks will likely end up producing no audio within the Listen EVERYWHERE app.

Should you have any further questions or concerns, please contact Listen Technologies' Technical Services team at 1-800-330-0891 or support@listentech.com for assistance.