



LG Innotek USB Transmitter

Windows 7, iOS, Android Operating Systems

BASIC STARTUP & DEMO GUIDE

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Typographical Conventions

Bold text in the body of the document refers to information silkscreened on the relevant circuit board.

Bold text in the gray frames indicates commands of particular relevance to the example console commands/output.

Document Revision History

Date	Revision	Description
7/2015	1.0	Initial version
3/2016	1.1	Update operating instructions, added diagrams.

Technical Terms

Acronym/Term	Description
Rx	Receive/Receiver
Tx	Transmit/Transmitter
USB Tx	LG Innotek USB Transmitter

ESD Precautions



Observe all ESD safety precautions when handling the Summit Wireless Rx Module and amplifier boards. Failure to follow ESD safety precautions could result in damage to the Summit Rx Module and amplifier components.

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Declaration of conformity

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OPERATING FREQUENCY:

- 5 180 MHz ~ 5 320 MHz
- 5 500 MHz ~ 5 700 MHz
- 5 745 MHz ~ 5 825 MHz

RF OUTPUT POWER:

- 10.14 dBm(5 180 MHz ~ 5 320 MHz)
- 10.46 dBm(5 500 MHz ~ 5 700 MHz)
- 14.63 dBm(5 745 MHz ~ 5 825 MHz)

1 Introduction

The LG Innotek USB Tx implements a complete Summit Wireless audio network transmitter in a small, inexpensive form factor. This guide discusses the required equipment, software and application specific configurations to operate the USB Tx using: Windows OS, Mac OSX, iOS and Android devices. By using this guide, you should be able to properly connect the module to your chosen demonstration platform, enumerate the USB Tx to the host system, create a Summit audio network and play content wirelessly to any attached speakers.

2 Equipment

To operate a Summit network utilizing the LG Innotek USB Tx you will need the following:

- LG Innotek USB Tx
- 1 or more Summit Rx enabled speakers, up to 32 speakers maximum
- Windows PC (Win 7) or Apple Mac (OSX10.10) or iOS device or Android device (Lollipop)
- Powered USB Hub with USB Type A male to USB Type B male (optional depending on USB hub)
- USB OTG Cable (Android)



- Apple Lightning to Camera USB Cable (Lightning equipped iOS device) or Apple Camera Kit (30pin iOS device)

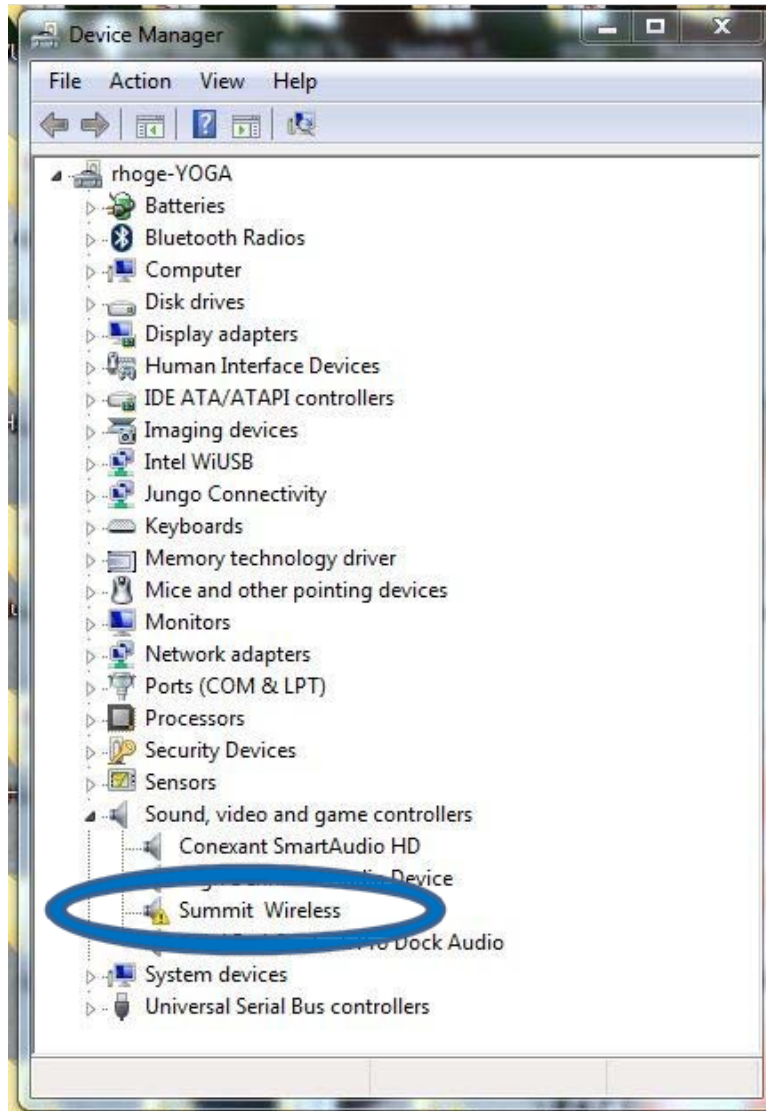


3 Windows 7

When using the USB Tx under the Windows 7 OS, a device driver must be installed. Summit has provided a sample driver from TheSycon. This driver will operate normally for 1 hour, after which it will issue a tone every 5 minutes in the audio stream.

3.1 Installing TUSB Windows Driver

It is recommended that you install the device driver prior to plugging in the USB Tx. If you plug in the USB Tx prior to installing the device driver, you will see the following if you open up your computers Device Manager.



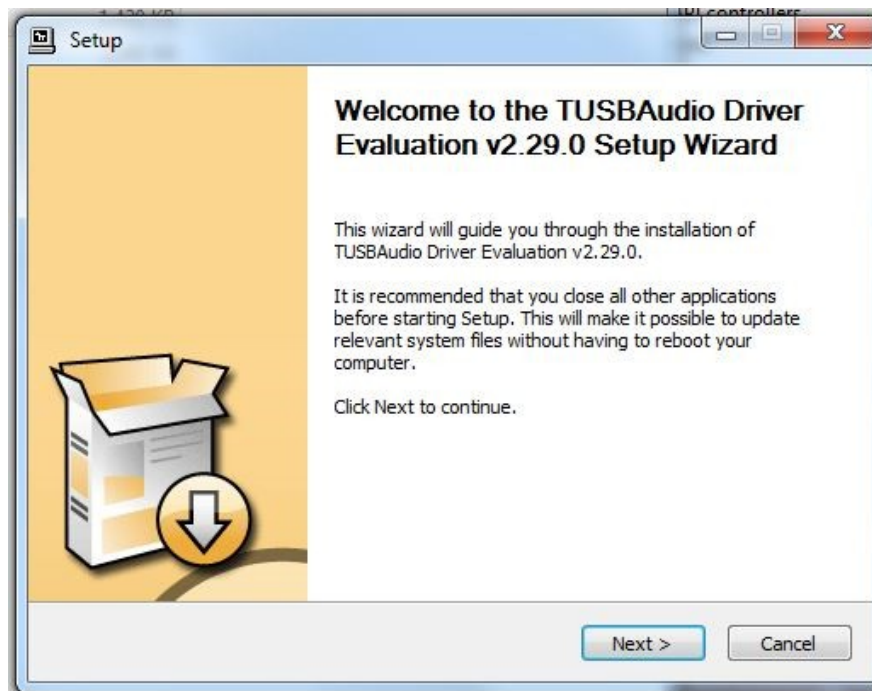
The LG Innotek USB Tx requires a device driver to operate under Windows OS. As part of the release package for the USB Tx, Summit includes a demonstration USB driver created by Thesycon. The driver is part of the executable TUSBAudio_v2.29.0_eval_Summit_2015_04_15.exe. This file is an executable archive, which you will need to expand to your system. Once you do this, navigate to the following location:

<installed_location>\TUSBAudio_v2.29.0_eval_Summit_2015_04_15\EvaluationKit\DriverPackages.

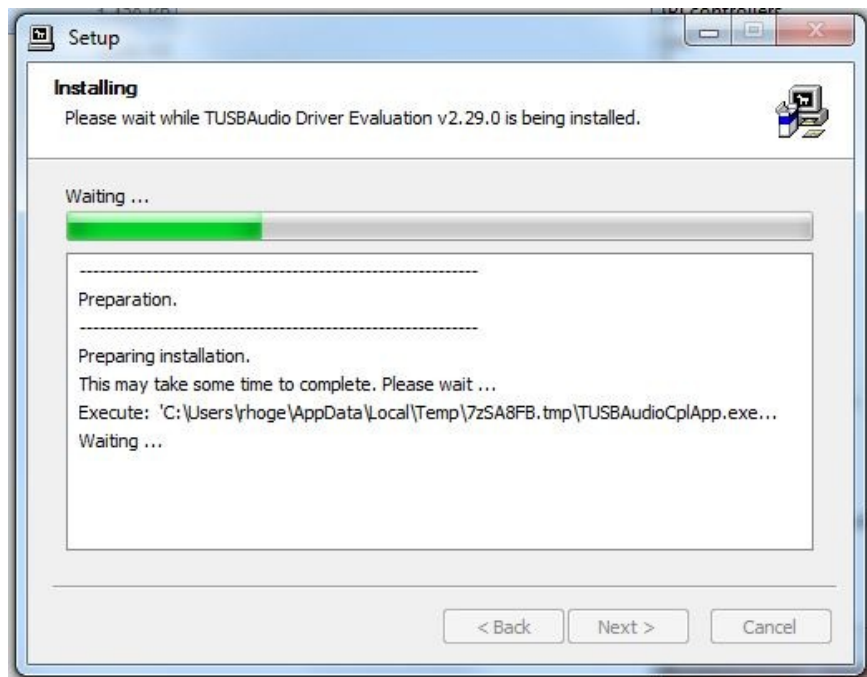
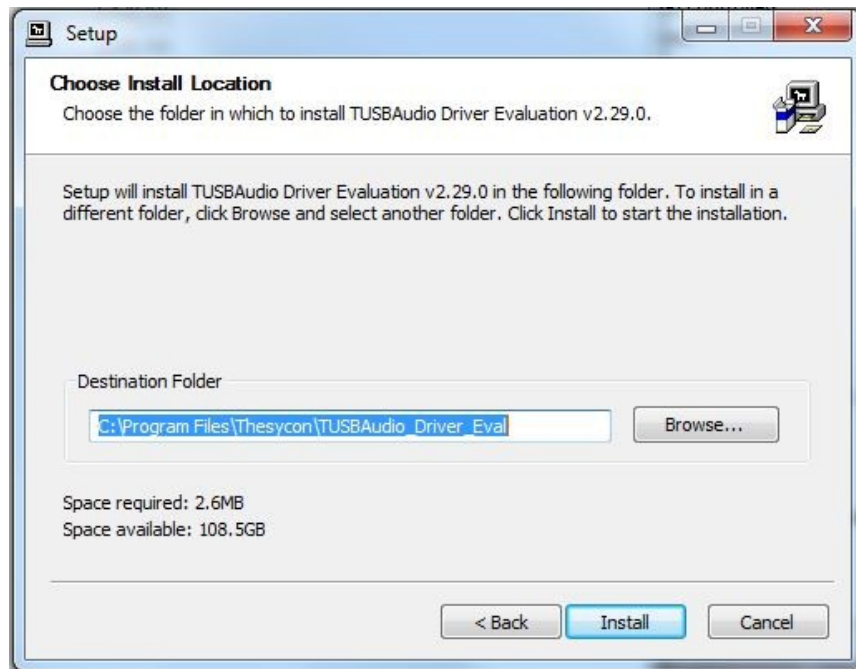
In this directory, you will find an executable for installing the device driver. As shown below, double click on the following file: Summit_eval_DriverSetup_v2.29.0.exe.



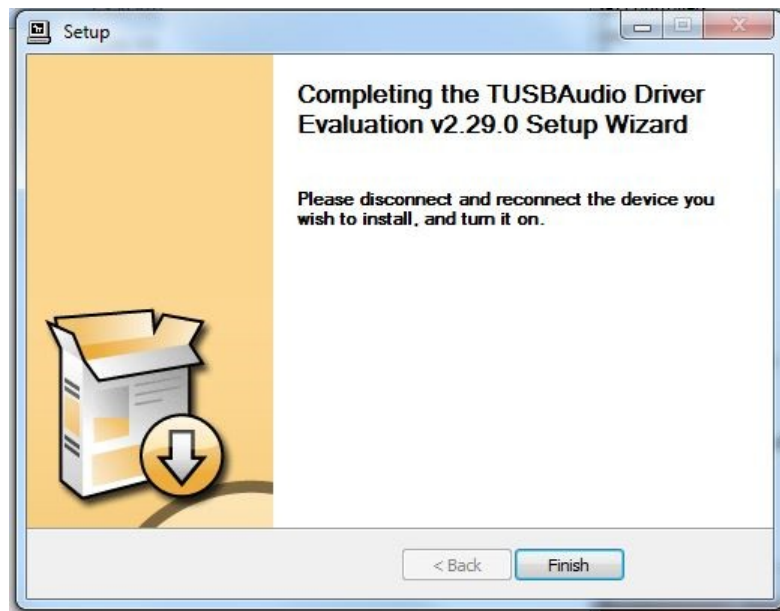
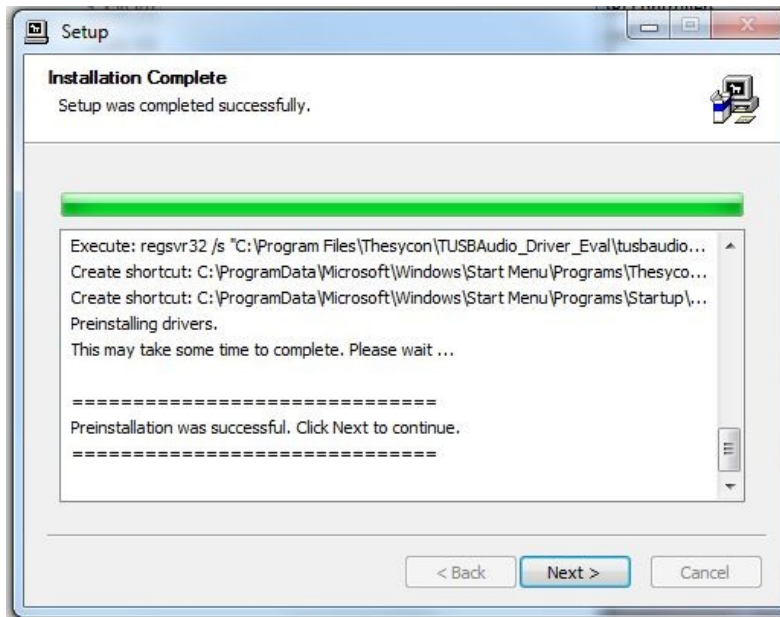
This will launch the device driver installer. The following pictures show the various screens as you progress through the installation.



The installation tool provides the ability to set the install location of the driver. We strongly recommend that you install the device driver in the default location as shown below.



The program will install a number of files, and when this is complete, you will see the screen show the installation was successful.

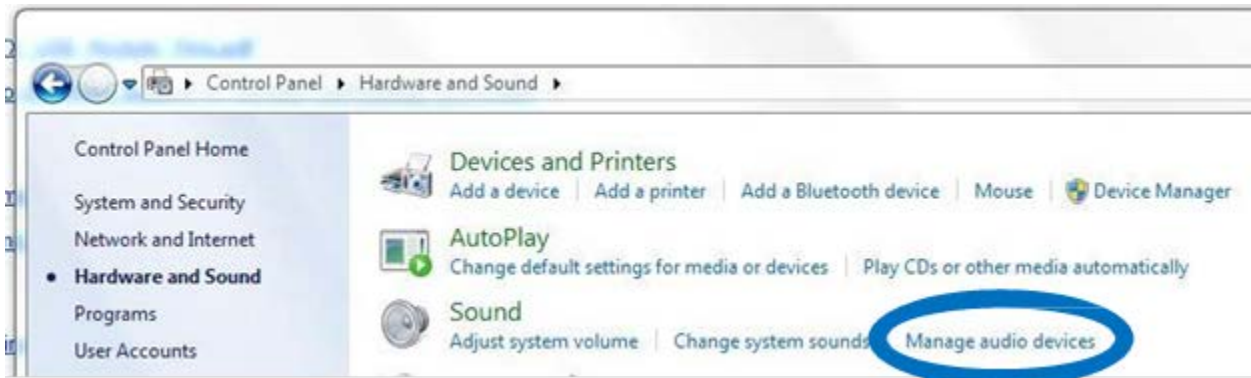


Once the installation is complete, you can then plug the module into the system.

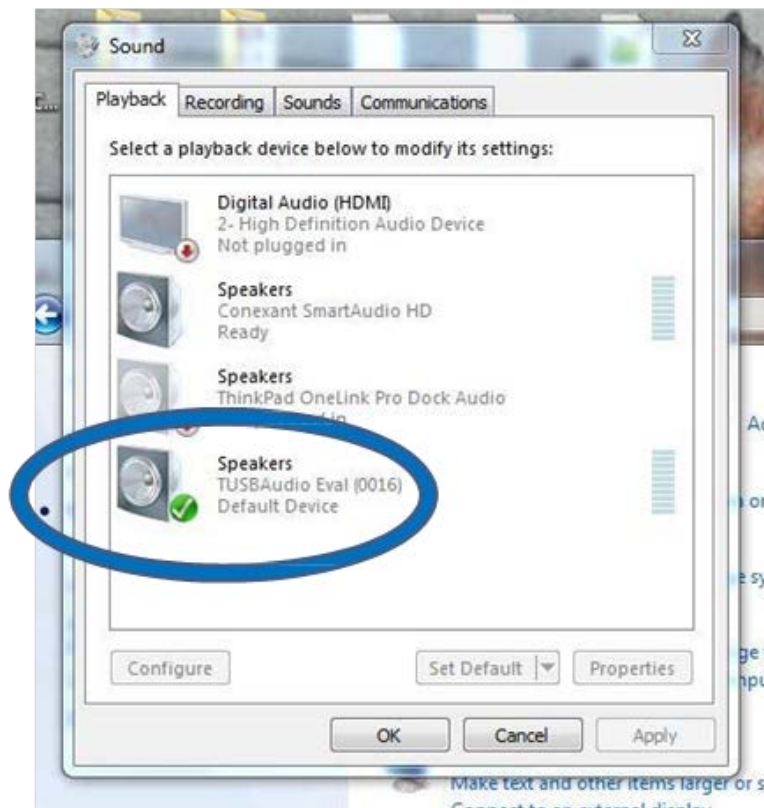
3.2 Windows Setting for the LG Innotek USB Tx

The Windows operating system provides several different controls for setting the behavior of the USB Tx. These settings include: volume, number of attached speakers and audio source sample rate. The following screen shots show the various settings and how to access them.

To set the PC correctly for the number of attached speakers, you will need to enter the Sound Configuration tool. This is accomplished one of two ways. The first is to use the following click sequence with your mouse: Start -> Control Panel -> Hardware and Sound -> Manage Audio Device.

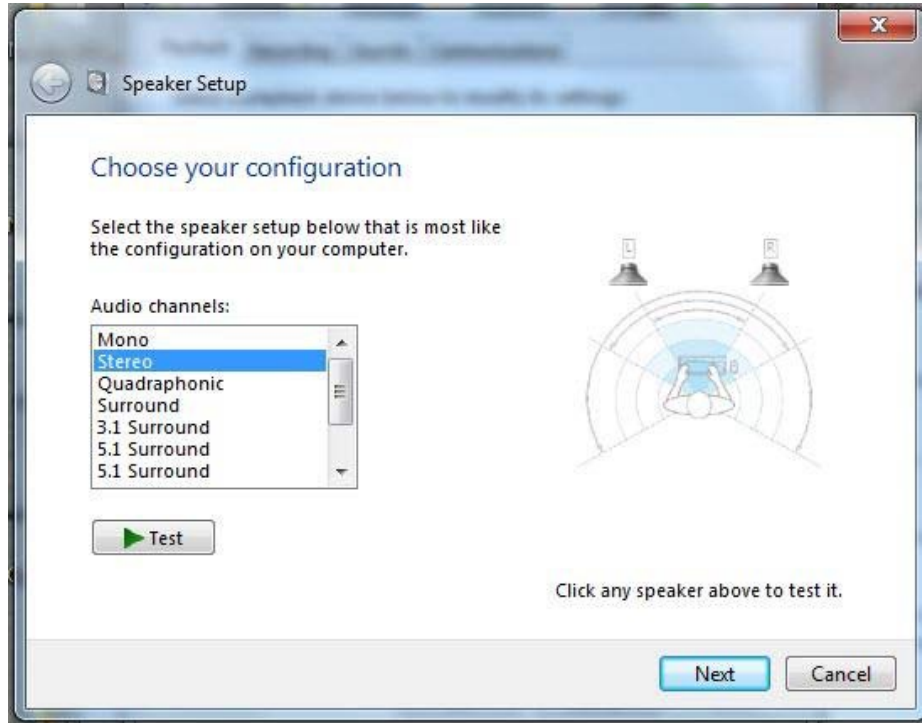


You can also access this screen by right clicking the volume icon in your system tray and selecting Playback Devices from the popup menu. The Audio configuration screen is shown below. The Summit enabled USB device is listed as the TUSBAudio Eval (0016) device.

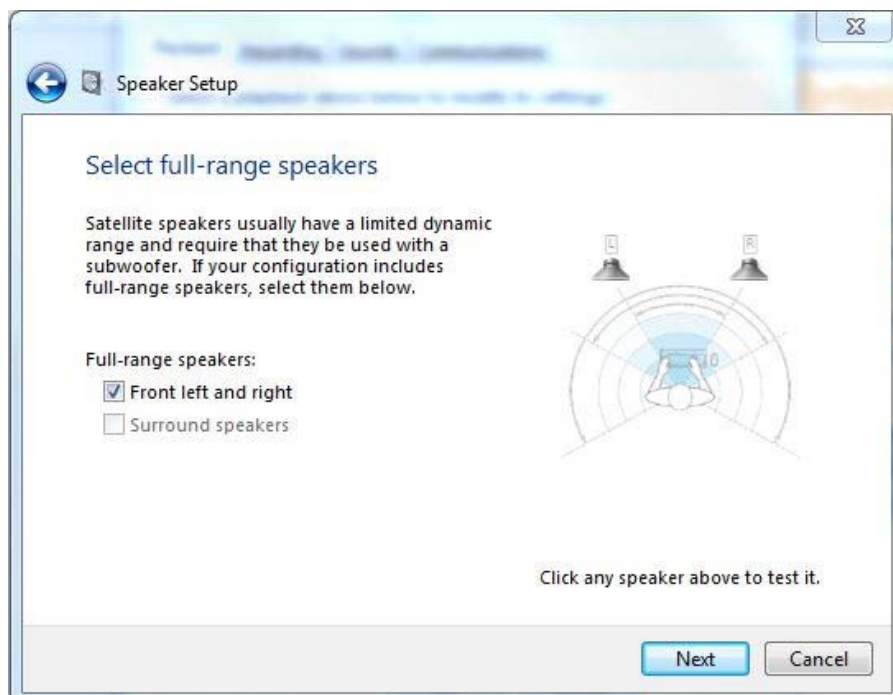


At this point, you can set the USB Tx as your default audio device if you choose.

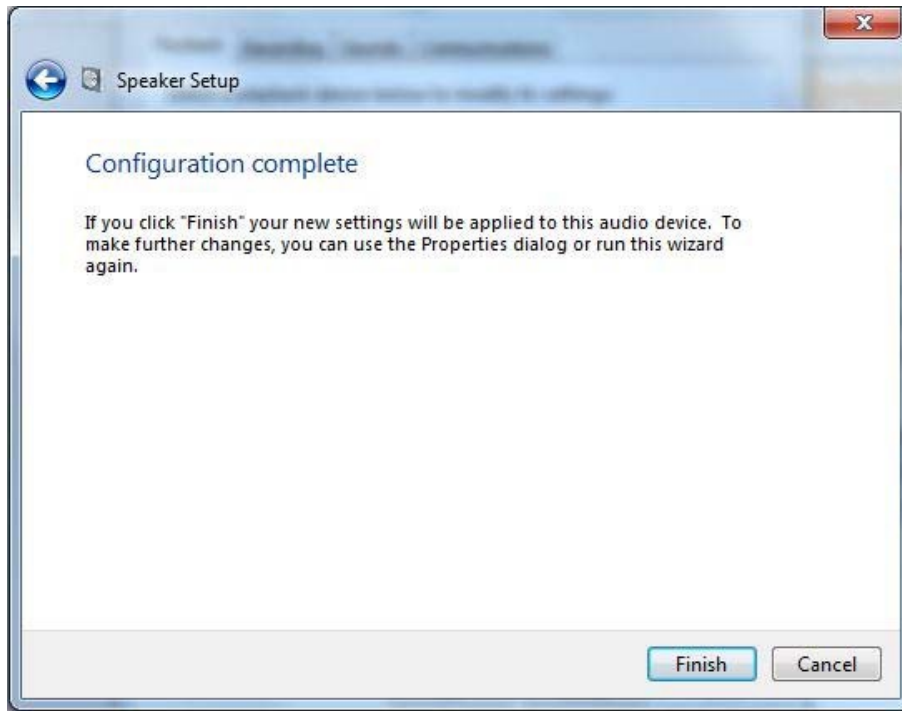
By clicking on the Configure button, you will enter the Speaker Setup screen. This screen allows you to choose options such as Mono, Stereo and various multi-channel options. When you select an audio channel / speaker setup, the screen also gives you the option of sending a test tone to each speaker you have. It will play a chime around to the various speaker / audio slots for you to confirm that all of your speakers are correctly connected.



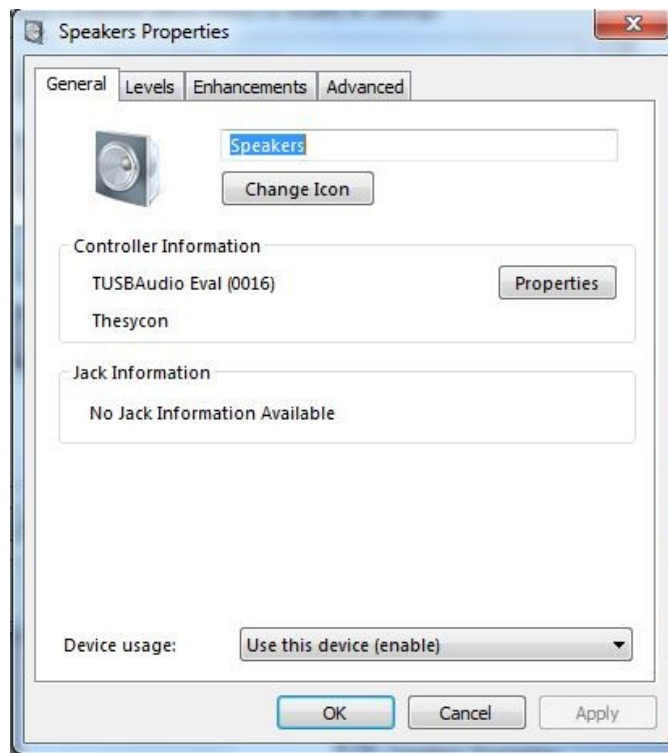
Clicking Next allows you to set the system for your mix of full range / satellite speakers, as shown in the figure on the next page.



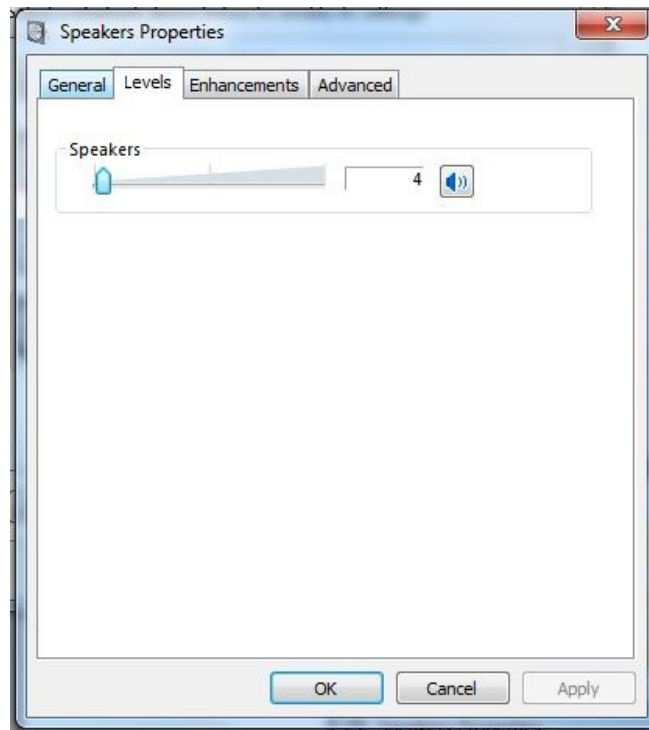
Clicking Next will save the configuration. The following screen is displayed. Click Finish on the following screen to exit the Speaker Setup tool.



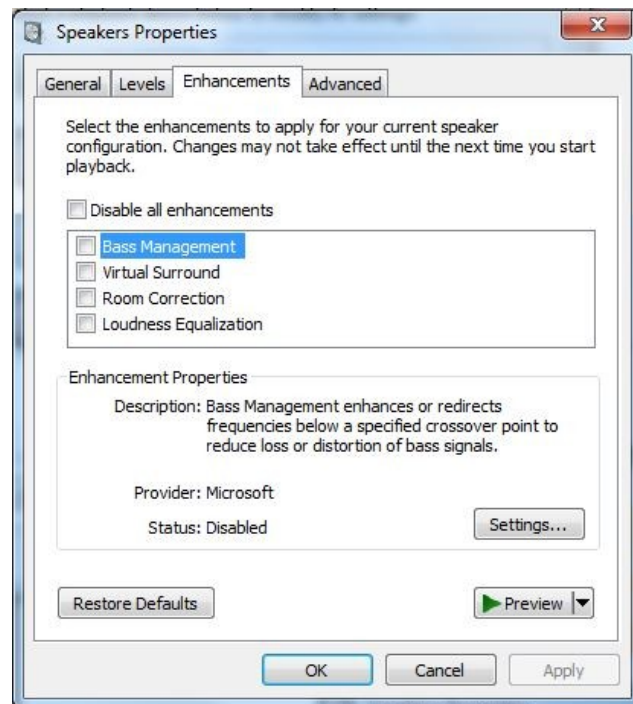
Clicking Properties on the Sound screen will allow you make changes to the name of the USB Tx.



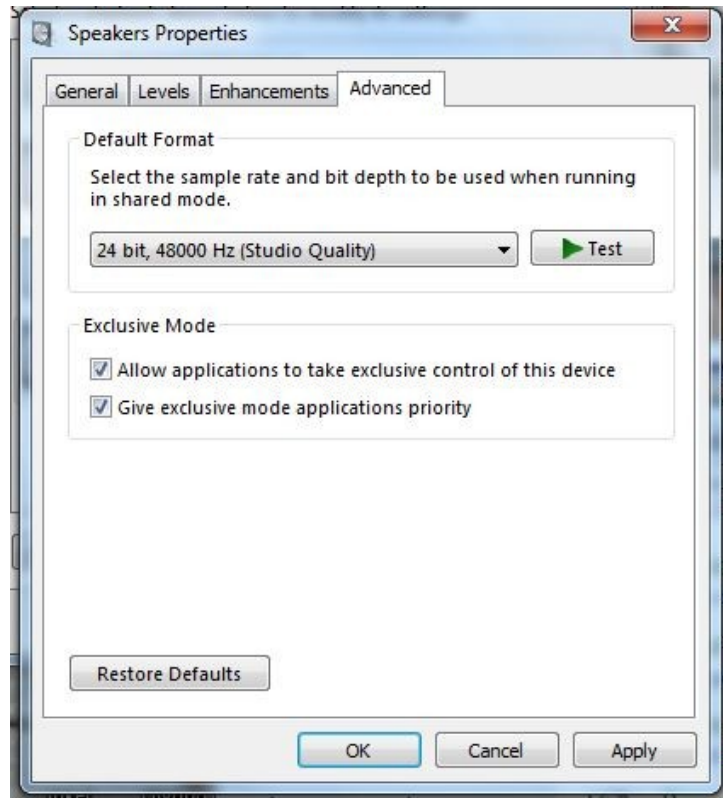
Clicking on the Levels tab will allow you to modify the system volume.



The enhancement tab allows access to certain audio functions (such as Bass Management and Sound Correction) that have been embedded in Windows OS. These are not managing Summit features such as MyZone. It is not recommended to make changes on this screen.

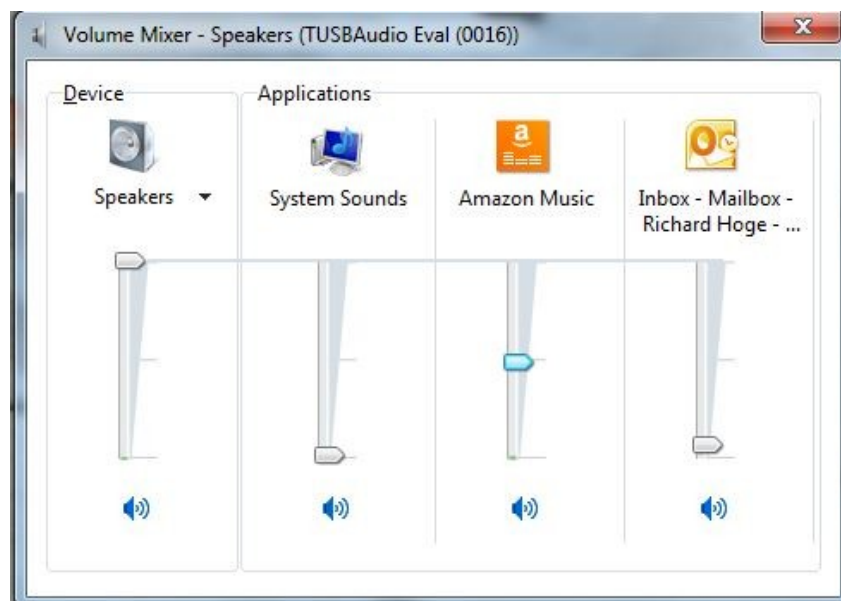


The audio source sample rate can be changed by clicking on the Advanced tab. Windows will source material over the USB port at 48kHz, 96kHz and intermediate values. It will support bit depth on audio from 16 to 24 bits.



Clicking Okay will return you to the Sound screen.

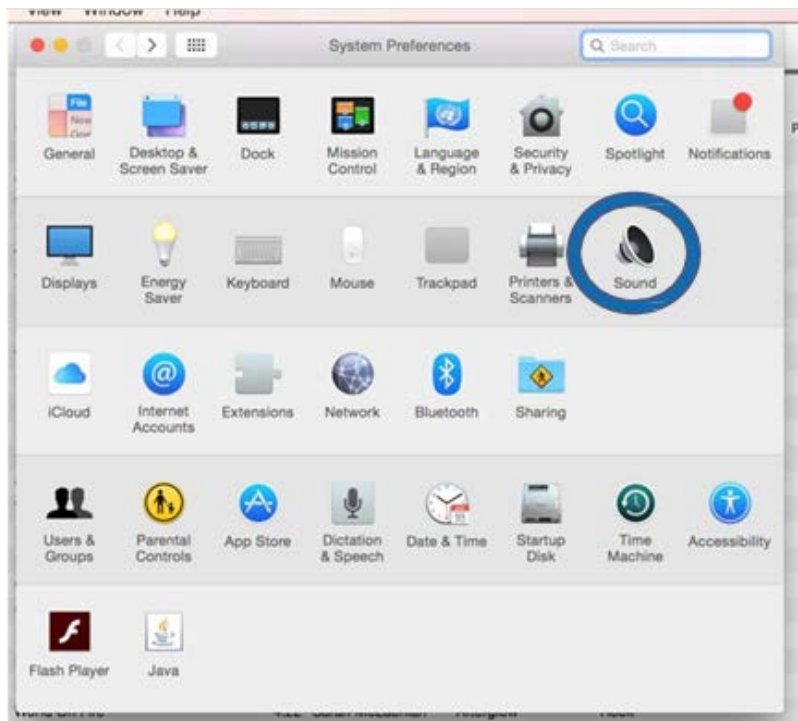
To change volume on a Windows OS system, there are several methods and controls available. Each individual audio application typically has a volume control embedded. There is the Levels tab as shown above in the Speaker Properties screens and the ability to use the Thesycon mixer control (installed with the driver) from the System Tray. You can access this mixer by right clicking on the volume icon in the System Tray and selecting Open Mixer Volume from the popup menu. This mixer control allows you to select the overall Summit volume (far left slider), as well as application and systems sounds from the sliders to the right.



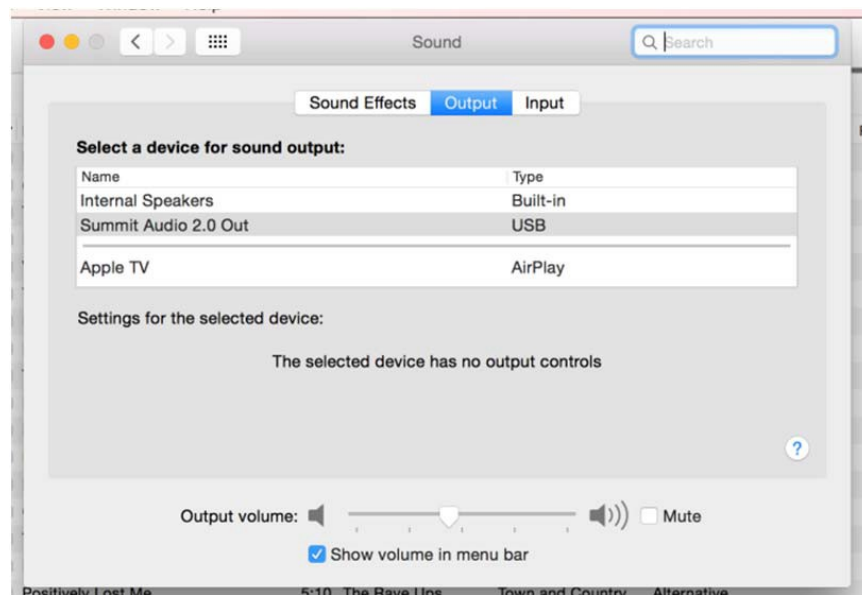
It is recommended to take care when selecting the volume. Small changes in the volume slider can result in large changes to perceived volume.

4 Mac OSX Operation

The Summit enabled USB Tx does not require any new drivers to be installed in OSX (Version 10.10). OSX contains native drivers that will allow basic control of the USB Tx including speaker source assignment and volume. When the USB Tx is plugged into the Mac, you can confirm the USB Tx was correctly recognized in the Sound screen of System Preferences.



When you open the sounds screen, select the Output tab, and you will see an entry for Summit Audio 2.0 Out with type USB.



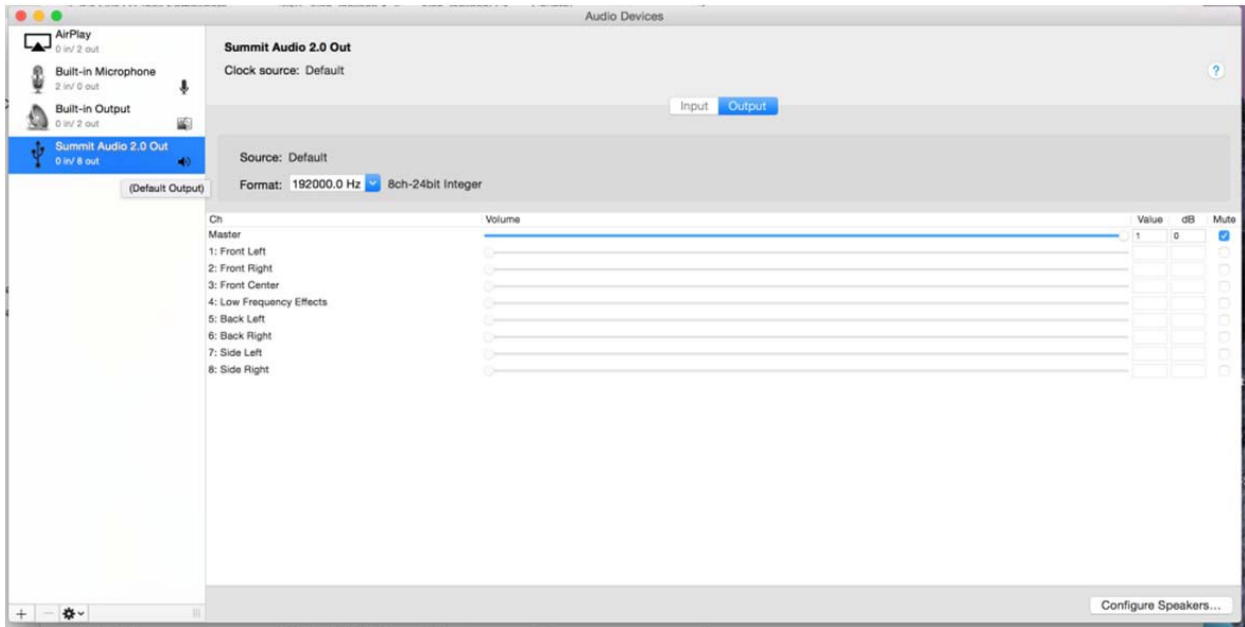
This screen will also allow you to control the master volume to the Summit enabled USB Tx.

4.1 OSX Setting for the LG Innotek USB Tx

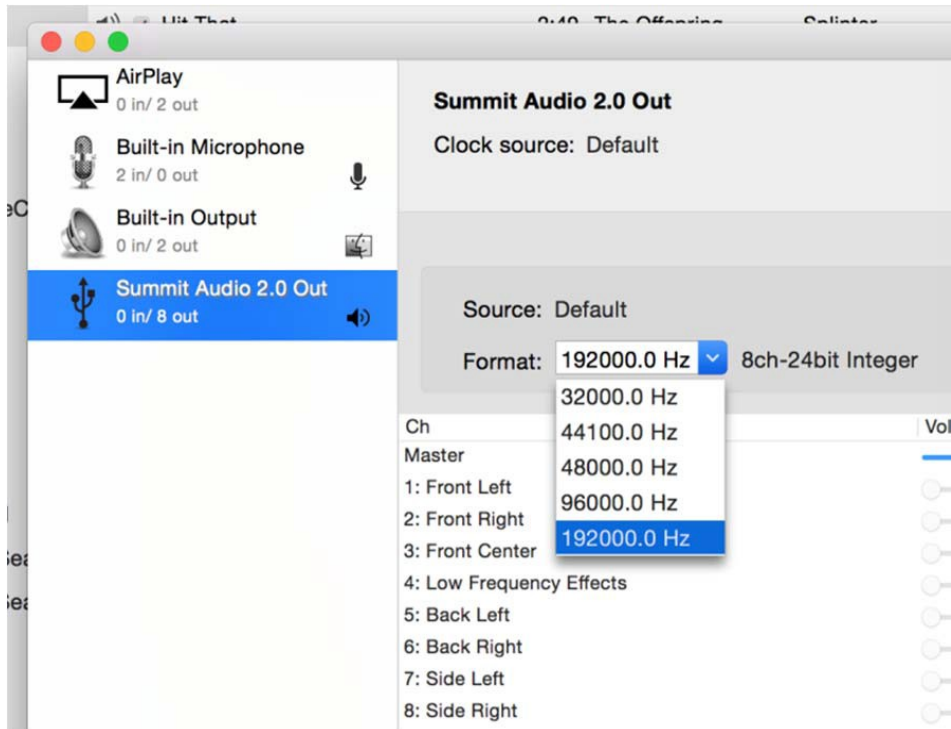
To control the USB Tx in OSX, you must use the Audio/MIDI Setup program. This can be found under Launchpad -> Others.



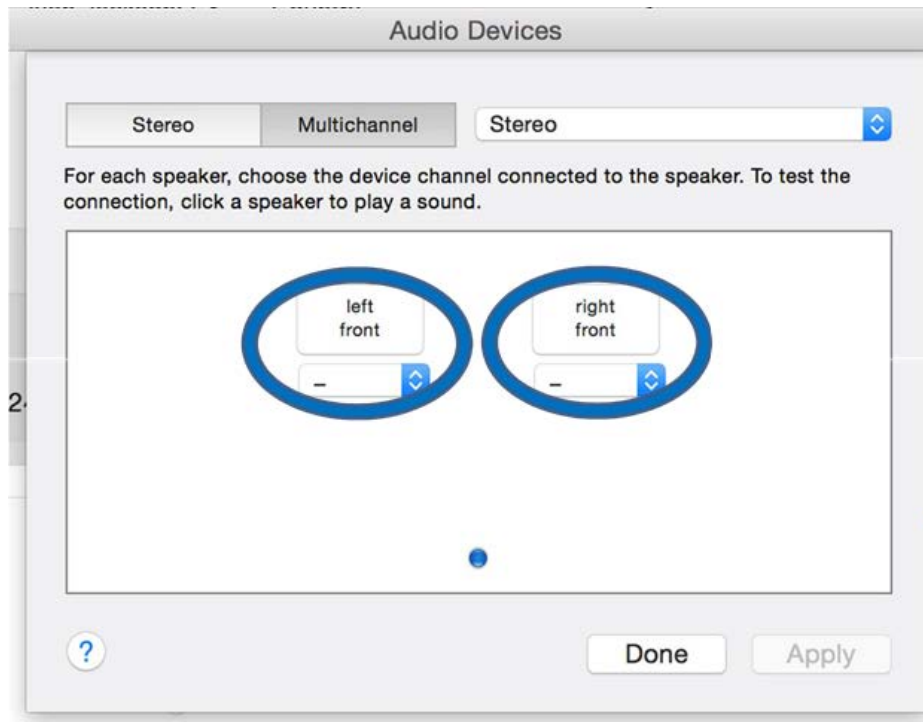
Once you have opened the Audio/MIDI program, you will need to select the Summit Audio 2.0 Out device from the list on the left hand side. This will bring up the available controls on the right hand side of the program.



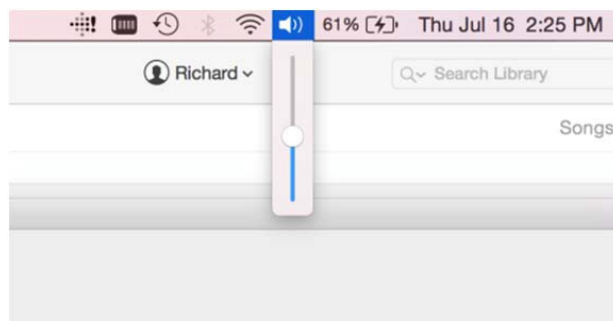
You must select the Output tab in configuration frame. This will provide access to select audio sample rate and control the main volume to the USB Tx.



Clicking on the Configure Speakers button will allow you to set audio slot to speaker position. This screen allows for multichannel or stereo setups. In stereo mode, the default is left to slot 1, and right to slot 2. Clicking Apply will save any changes and Done will exit the speaker configuration screen.



Volume may be controlled from the Sound screen in System preferences, the Audio/MIDI program screen or using the Volume slider on the menu bar (if enabled).

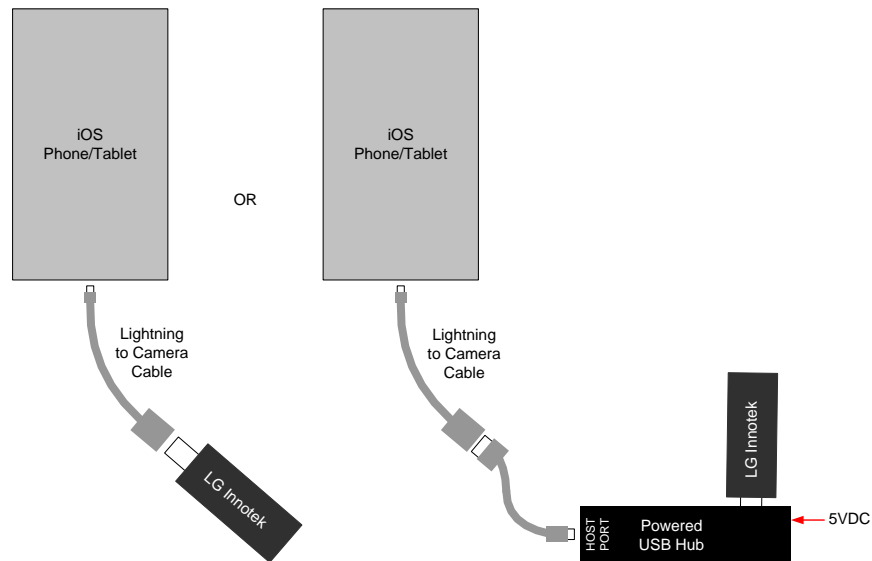


It is recommended to take care when selecting the volume. Small changes in the volume slider can result in large changes to perceived volume.

5 iOS Operation

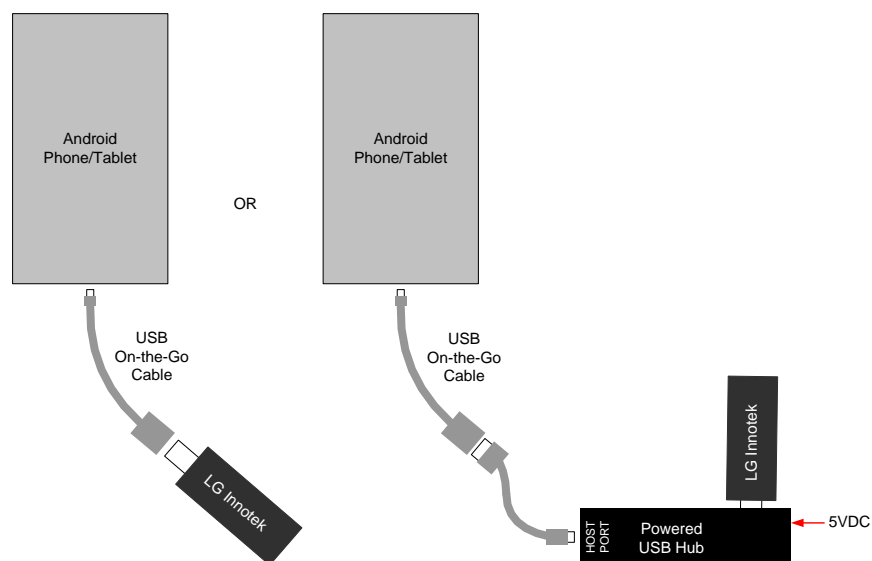
Using the USB Tx with an iOS device requires the use of a special cable. For Lightning connector equipped devices, you will need a Lightning to USB Camera cable. For 30 pin connector devices, a 30 pin to USB Camera cable is required. These cables allow the iOS device to become a USB host for the Summit enabled USB Tx. The USB cable from the iOS device should be connected to a powered USB hub in the host connector. The Summit enabled USB Tx should be plugged into one of the endpoint slots on the hub.

Once the system is properly cabled and powered, you can launch the Music player application to send audio to the USB Tx.

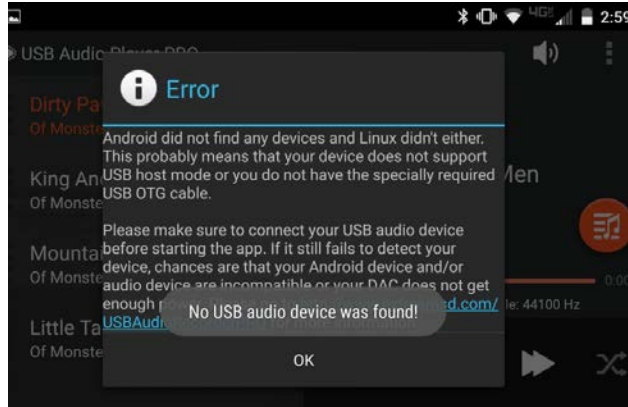


6 Android 5.0 Operation

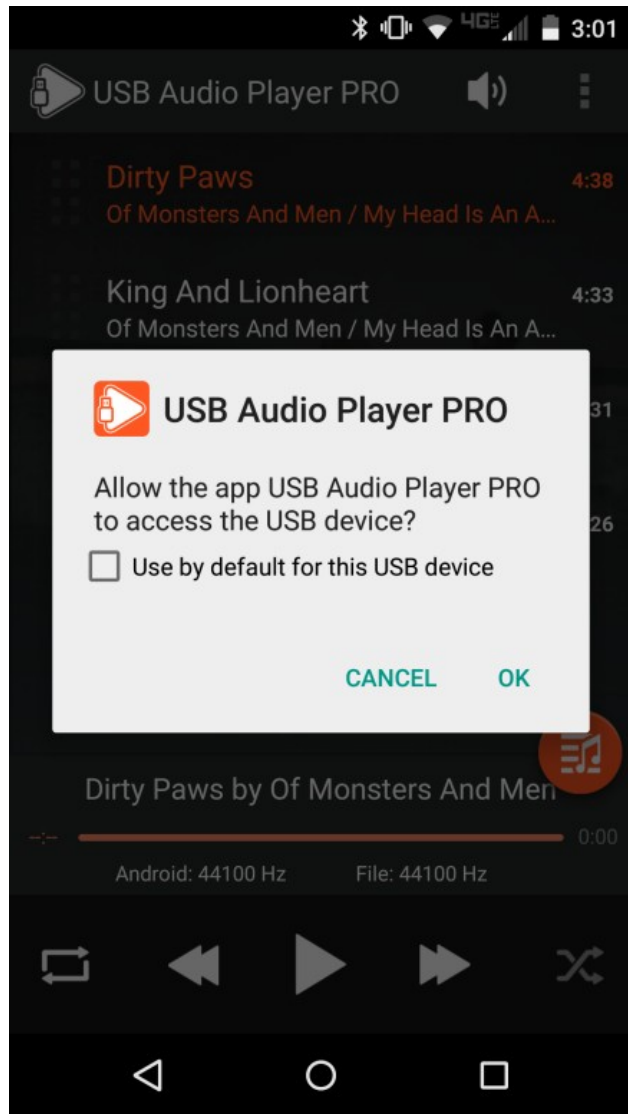
As with an IOS device, using the LG Innotek USB Tx with an Android 5.x (Lollipop) or 6.x (Marshmallow) device requires the use of a special cable. A USB On The Go (OTG) cable allows the Android device to operate as the USB host device. The USB Tx should be plugged into a powered USB hub, as the USB port on the Android device may not be able to supply sufficient power to the USB Tx. When using an Android device, we recommend that you use USB Audio Player Pro, which is available for purchase on the Google Play store.



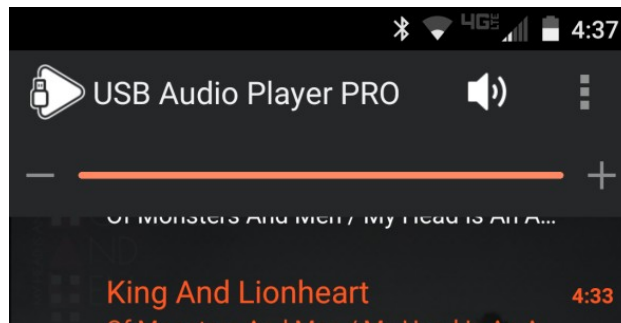
When using on an Android system with USB Audio Player Pro, you should ensure that the USB Tx is attached to the Android device prior to opening the application. If your USB Tx is unrecognized due to insufficient power, incorrect cabling, or other failure, you will see the following screen when you open Audio Player Pro. Newer version of the application will automatically launch when the USB Tx is recognized by your Android device if you have checked the "Use by default for this USB device" checkbox shown in the second image below.



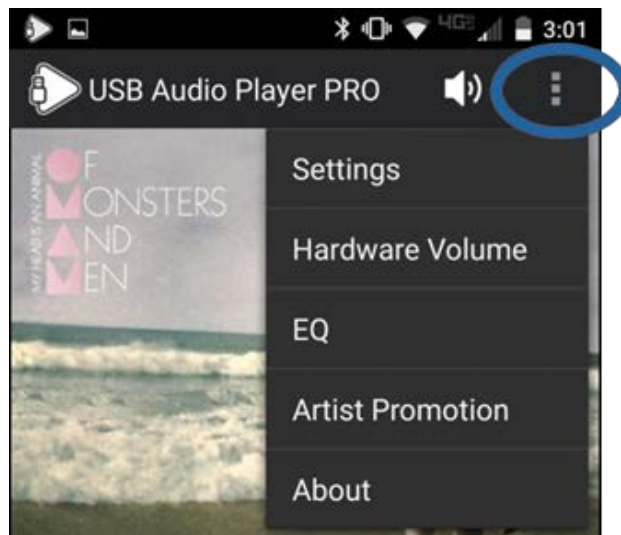
When the device is sufficiently powered and there are no other install issues, you will see the following screen when you open USB Audio Player Pro.



Once the USB Tx is recognized, you should set the player's application volume to max volume.

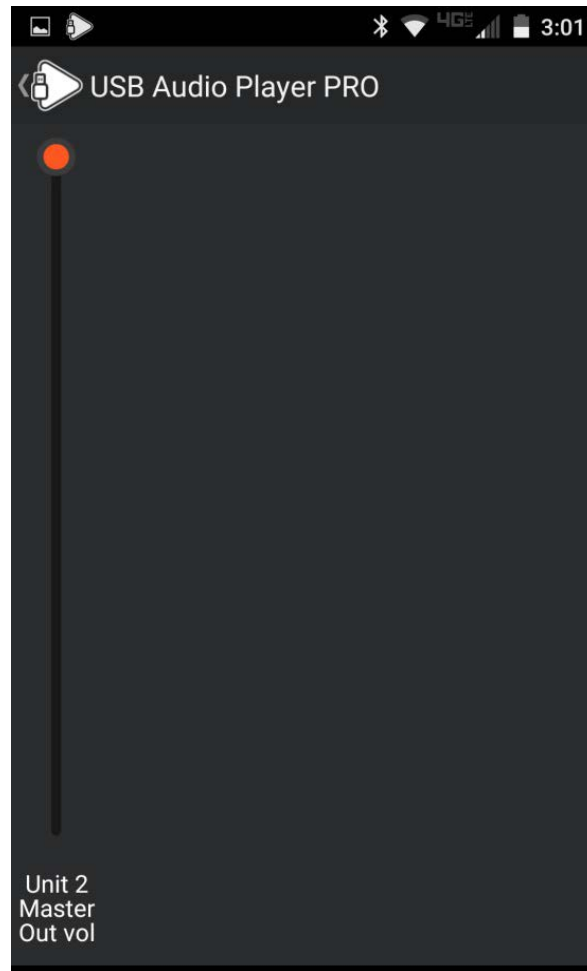


Under the settings drop down menu (3 dots in the upper right corner), you will find a menu item labeled Hardware Volume. Select this to control the Summit network volume.



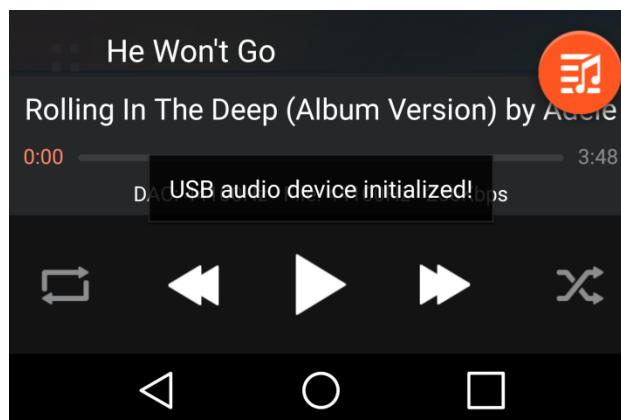
The Hardware Volume item will bring up the following screen for controlling the USB Audio Hardware Volume. You may need to adjust the volume slightly to start the audio playback over the Summit network.

USB Audio Player Pro may start the Hardware Volume at the maximum level. It is recommended that you pull the volume all the way down before beginning playback, and then adjust the Hardware Volume up to a safe level.



It is recommended to take care when selecting the volume. Small changes in the volume slider can result in large changes to perceived volume.

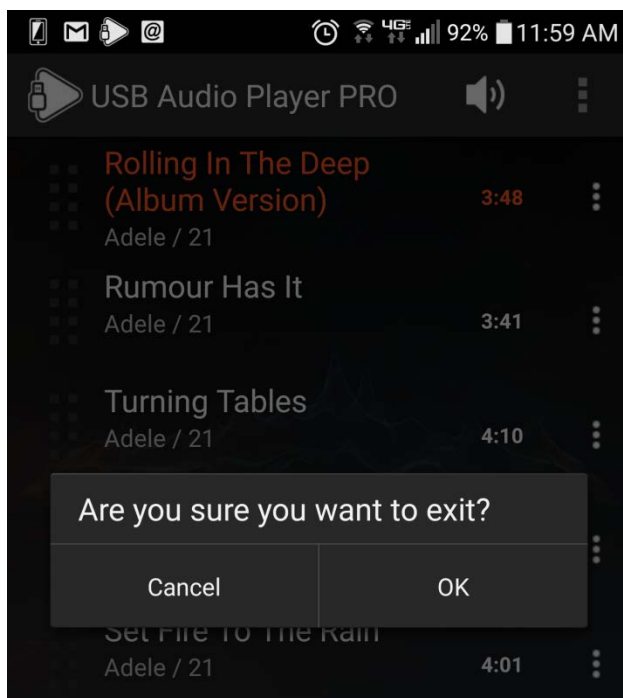
Subsequent connections of the USB Tx to the Android device can automatically launch the USB Audio Player Pro application if you have checked the "Use by default for this USB device" checkbox. In that case, the application will launch and display a notifier that the Android device has initialized properly.



6.1 Stopping USB Audio Player Pro

Newer versions of the USB Audio Player Pro (2.4.7+) close cleanly. It is highly recommended you update your application if it is an older revision than listed above.

To exit, press the back arrow to get the exit prompt shown below and press OK.



7 USB Tx Operation

The USB Tx is equipped with 1 pushbutton for control and 2 LEDs to indicate the state of the USB Tx and the network. The basic operations of adding speakers, saving the network configuration and resetting the USB Tx to a factory reset condition can all be accomplished with these elements. Additional controls could be accessed via an application utilizing Summit API calls over the USB interface.

7.1 Factory Reset

When the device is initially power up for the first time, the USB Tx will be in factory reset. A blue LED will blink at the "fast" rate of approximately 1 second on, 1 second off to indicate the system is in a reset state. The user can place the USB Tx into a factory reset state at any time by connecting the USB Tx to a USB power source and then pressing and holding the button on the USB Tx for approximately 5 seconds.

7.2 Adding Speakers

When the USB Tx is in factory reset mode, a short press and release on the button will initiate a speaker discovery process. If speakers are found, the blue LED goes from a fast blink to a much slower blink rate of approximately 3 seconds on, 3 seconds off. If the speakers have static speaker assignments, the USB Tx will be ready to play sound at this point. If the speakers have @Rx control, you should set the individual speaker positions for each speaker with their respective @Rx control at this time. If no speaker type is set using the @RX control, that speaker will not be saved

7.3 Saving Network Configuration

Once you have discovered speakers, and the blue LED is in the slow blink mode, a short press on the USB Tx button saves the current configuration. When this completes, the blue LED will stop blinking and remain on.

7.4 Adding Speakers to a Saved Configuration

Adding speaker to a previously saved configuration is just like adding speakers from a reset condition: A quick press of the button starts the discovery process, and the blue LED begins the “Fast Blink” state. When the discover process completes, the blue LED returns to the slow blinking blue condition. Another button press saves the new configuration.

7.5 Error Conditions

If a speaker is lost from the network (not visible to the USB Tx) or other system level errors occur, a red LED will light on the system. In the case of a missing speaker, typically the speaker will be returned automatically to the network by Summit’s SpeakerKeeper™ technology (provided the speaker is powered on); no user interaction is required to clear the fault. In this scenario the red LED will be lit only momentarily before the speaker is returned to the network by SpeakerKeeper. In other cases, the fault may require user interaction with the Summit system to identify the issue (such as an un-powered speaker) and correct the problem.

7.6 Conditions Indicated by LED State

SPEAKER STATE	BLINK STATE AND COLOR						
	FAST BLUE	SLOW BLUE	SOLID BLUE	SLOW RED	FAST BLUE/RED	SOLID RED	SLOW BLUE/RED
No speakers discovered (reset)	X						
Adding to Saved	X						
Discovered, not saved		X					
Saved cfg			X				
Spkrs Discovered, not saved, Missing				X (Missing won’t be saved)			
Adding with Missing					X (Can’t ADD)		
Saved cfg with Missing						X (Can’t ADD)	
Added, not saved, previously saved spkr Missing							X (Can’t save until Missing spkr restored)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment 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 equipment 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 equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on,

the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warning & Caution:

Any changes or modifications to the equipment not expressly approved by the party responsible for compliance could void user's authority to operate the equipment. Antenna shall be mounted in such a manner to minimize the potential for human contact during normal operation. The antenna should not be contacted during operation to avoid the possibility of exceeding the FCC radio frequency exposure limit. A minimum separation distance of 20 cm must be maintained between the antenna and the person for this appliance to satisfy the RF exposure requirement.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to The following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme avec Industrie Canada RSS standard exempts de licence(s), Son utilisation est soumise Les deux conditions suivantes:

- (1) cet appareil ne peut pas provoquer d'interférences et
- (2) cet appareil doit accepter Toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement du dispositif.

※ This device is going to be operated in 5 150 MHz ~ 5 250 MHz frequency range, it is restricted in indoor environment only.