

1 Introduction

This document describes the release contents, features, and limitations of the Maestro Audio Framework 1.2 for the MCUXpresso 2.11.0 release.

Maestro is an audio processing software framework for MCUs that provides audio device connectivity and playback functionality for many diverse media devices.

The framework contains various modules that abstract functionality and provides a standard programming interface for the application developer to use. Maestro provides functionality for common audio use cases and includes configuration options providing the flexibility required for customizing applications. The main supported features are:

- Full audio framework with a streamer that supports playback control and streaming or decoding of audio.
- Decoding of various audio formats supported for audio files stored on FAT32 formatted media.
- Various utilities to aid in debugging and profiling the system.

The platform uses the NXP OS abstraction (OSA) layer which allows it to run on any OS that supports the NXP OSA. Currently, the OSA contains abstraction for FreeRTOS.

2 Development tools

The Maestro audio framework libraries are compiled and tested with the following development tools.

- MCUXpresso IDE, version 11.5.0
- IAR Embedded Workbench for Arm® version 9.20.1
- GNU Arm Embedded Toolchain 10.3-2021.07

3 Release contents

[Table 1](#) lists the release contents for the IMXRT1060-EVKB board.

Table 1. Release contents

Deliverable	Location
Maestro libraries	middleware/maestro/libs/...
Header files for API usage	middleware/maestro/inc/... middleware/maestro/streamer/inc/...
Documentation	middleware/maestro/docs/...

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Table 1. Release contents (continued)

Deliverable	Location
Demo applications	boards/evkbmimxrt1060/audio_examples/ maestro_playback/... boards/evkbmimxrt1060/audio_examples/ maestro_playback_8ch_96kHz/... boards/evkmimxrt1060/audio_examples/maestro_record/... boards/evkmimxrt1060/audio_examples/maestro_usb_mic/... boards/evkmimxrt1060/audio_examples/ maestro_usb_speaker/...

4 Maestro audio framework release overview

The Maestro audio framework together with MCUXpresso SDK forms a framework for the development of audio processing software for NXP devices. The currently supported platform are: IMXRT1050-EVKB, IMXRT1060-EVK, IMXRT1060-EVKB, IMXRT1064-EVK, IMXRT1160-EVK, IMXRT1170-EVK, and LPC55S69

- Maestro audio framework libraries for Arm® Cortex®-M7, Arm®Cortex®-M33.
- Demo applications to show how to use different Maestro features.
- Getting started document showing how to integrate and start using Maestro audio framework.
- API Reference manual with detailed architectural information and APIs.

4.1 Maestro libraries

Maestro libraries are pre-compiled source code libraries that in conjunction, provide all the features described in this document. This framework is divided into multiple libraries to allow adding or removing specific functions to make a customized version of the Maestro audio framework for each application.

4.2 Demo applications

maestro_demo: A shell-based application that allows reading a file (mp3 or ogg opus) from SD card, audio file decode (if enabled, EAP post processing), and playback through line-out (speaker or headphones). It is located at: *<MCUXpressoSDK_install_dir>/boards/<board_name>/audio_examples/maestro_playback*.

maestro_playback_8ch_96kHz: A shell-based application that allows reading a raw pcm file from SD card, (if enabled, EAP post processing) and playback through line-out (speaker or headphones). It is located at: *<MCUXpressoSDK_install_dir>/boards/<board_name>/audio_examples/maestro_playback_8ch_96kHz*.

maestro_record: A shell-based application that allows audio recording from an on-board microphone. There are three possibilities how to process the audio stream:

- playback through a line-out (headphones or speaker)
- store samples to a file on sd card
- perform voice recognition (VIT - wake word and voice command) - available on following platforms:
 - IMXRT1060-EVK
 - IMXRT1060-EVKB
 - IMXRT1160-EVK
 - IMXRT1170-EVK

It is located at: `<MCUXpressoSDK_install_dir>/boards/<board_name>/audio_examples/maestro_record`.

maestro_usb_mic: A shell-based application that allows recording audio data from the microphone and playback to the USB port as an audio 2.0 microphone device. It is located at: `<MCUXpressoSDK_install_dir>/boards/<board_name>/audio_examples/maestro_usb_mic`.

maestro_usb_speaker: A shell-based application that allows playing data from the USB port as an audio 2.0 speaker device. It is located at: `<MCUXpressoSDK_install_dir>/boards/<board_name>/audio_examples/maestro_usb_speaker`.

4.3 Getting started with Maestro

This document shows how to start using the framework. It gives detailed information on how to use the libraries and include files and how to create a first project to use this solution based on the reference demo application.

4.4 API Reference Manual

The Maestro audio framework API Reference Manual is a comprehensive document explaining the framework architecture and provides details of the functionality. It is delivered in form of an HTML page with cross-reference and search engine.

5 Known issues and limitations

5.1 Limitations

- Only the FAT file system is supported. When connecting an SD card formatted as NTFS, it cannot be used for playback.
- Maestro audio framework performance is degraded when enabling debug logging. Debug logging stores all messages created by the platform, while calling all the different routines. Therefore, the system may have slow responses to commands, and audio may sound choppy when the debug log is enabled.

6 Revision history

This table summarizes revisions to this document.

Table 2. Revision history

Revision Number	Date	Substantive changes
0	22 December 2020	Initial release
1	22 December 2021	Updated for Maestro 1.2

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