USB Type-C ENGINEERING CHANGE NOTICE

Title: USB Type-C Digital Audio Appendix
Applied to: USB Type-C Specification Release 1.2

Brief description of the functional changes proposed:

This ECN adds technical definition to the USB Type-C spec that covers requirements and guidelines for USB Type-C Digital Audio. The ECN provides the content for Appendix C of the 1.2 release. An important aspect of this technical definition are requirements around the method for powering USB Type-C Digital Audio devices involving both V_{BUS} and V_{CONN} support on the device side – this being something that differs significantly from traditional USB devices.

Benefits as a result of the proposed changes:

USB Type-C Digital Audio is intended to help promote the shift from analog audio solutions to digital audio solutions, most specifically as they can be broadly associated with the USB Type-C connector.

An assessment of the impact to the existing revision and systems that currently conform to the USB specification:

Adds clarity to what is expected for USB Type-C implementations of digital audio – intends to build on the latest release of the USB Audio Device Class specification and provide additional definition regarding general audio device interoperability and powering such devices.

An analysis of the hardware implications:

Will not impact existing products. While not a requirement, this specification will promote use of new audio device silicon based on the new USB Audio Device Class 3.0 specification. Existing device silicon based on the USB Audio Device Class 2.0 will also be acceptable.

An analysis of the software implications:

Will not impact existing products. While not a requirement this specification will promote use of new audio device class software based on the new USB Audio Device Class 3.0 specification.

An analysis of the compliance testing implications:

Will define new requirements specifically to address the new product category of USB Type-C Digital Audio peripherals.

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Actual Change Requested

The following is proposed changes to Appendix A of the USB Type-C spec.

A Audio Adapter Accessory Mode

A.4. Overview

Analog audio headsets are supported by multiplexing four analog audio signals onto pins on the USB Type-C™ connector when in the Audio Adapter Accessory Mode. The four analog audio signals are the same as those used by a traditional 3.5 mm headset jack. This makes it possible to use existing analog headsets with a 3.5 mm to USB Type-C adapter. The audio adapter architecture allows for an audio peripheral to provide up to 500 mA back to the system for charging.

An analog audio adapter could be a very basic USB Type-C adapter that only has a 3.5 mm jack or it could be an analog audio adapter with a 3.5 mm jack and a USB Type-C receptacle to enable charge-through. The analog audio headset shall not use a USB Type-C plug to replace the 3.5 mm plug.

A USB host that implements support for USB Type-C Analog Audio Adapter Accessory mode shall also support USB Type-C Digital Audio (TCDA) with nominally equivalent functionality and performance. A USB device that implements support for USB Type-C Analog Audio Adapter Accessory mode should also support TCDA with nominally equivalent audio functionality and performance.

The following is the content for the USB Type-C spec … Appendix C.

C USB Type-C Digital Audio

This appendix is covers requirements and guidelines for USB Type-C based Digital Audio support.

C.1. Overview

One of the goals of USB Type-C™ is to help reduce the number of I/O connectors on a host platform. One connector type that could be eliminated is the legacy 3.5 mm audio device jack. While USB Type-C does include definition of an analog audio adapter accessory (see Appendix A), that solution requires a separate adapter that can be readily lost and the host implementation in support of analog audio is technically challenging. To best serve the user experience, a simplified USB Type-C digital audio solution based on native USB protocol is simpler/more interoperable with both the host platform and audio device being connected directly without the need for adapters and operates seamlessly through existing USB topologies (e.g. through hubs and docks).

This appendix is for the optional normative definition of digital audio support on USB Type-C-based products, both from the perspective of a host system, typically an audio source, and an audio device, typically an audio sink.

C.2. USB Type-C Digital Audio Specifications

USB Type-C Digital Audio (TCDA), when implemented per this specification, shall be compliant with either the USB Audio Device Class 1.0, 2.0 or 3.0 specifications as listed below. While allowed, basing a TCDA on USB Audio Device Class 1.0 is not recommended. Given the number of benefits in

terms of audio profile support, simplified enumeration and configuration, and improved low-power operation, use of the USB Audio Device Class 3.0 is *strongly recommended*.

USB Audio Device Class 1.0 including:

- USB Device Class Definition for Audio Devices, Release 1.0
- USB Device Class Definition for Audio Data Formats, Release 1.0
- USB Device Class Definition for Audio Terminal Types, Release 1.0

USB Audio Device Class 2.0 including:

- USB Device Class Definition for Audio Devices, Release 2.0
- USB Device Class Definition for Audio Data Formats, Release 2.0
- USB Device Class Definition for Audio Terminal Types, Release 2.0

USB Audio Device Class 3.0 including:

- USB Device Class Definition for Audio Devices, Release 3.0
- USB Device Class Definition for Audio Data Formats, Release 3.0
- USB Device Class Definition for Audio Terminal Types, Release 3.0
- USB Device Class Definition for Basic Audio Functions, Release 3.0

USB Audio Device Class 3.0 specifications now include the definition of basic audio function profiles (Basic Audio Device Definition, BADD). TCDA devices based on USB Audio Device Class 3.0 will implement one of the defined profiles. TCDA-capable hosts based on USB Audio Device Class 3.0 will recognize and typically implement all of the profiles that are relevant to the capabilities and usage models for the host.

TCDA devices shall fall into one of the following two configurations:

- A traditional VBUS-powered USB device that has a USB Type-C receptacle for use with a standard USB Type-C cable,

- A VCONN-Powered USB Device (VPD) that has a captive cable with a USB Type-C plug (including thumb drive style products).

TCDA devices shall not be implemented as a variant of the USB Type-C Analog Audio Adapter Accessory (Appendix A).