

USB Type-C ENGINEERING CHANGE NOTICE

Title: Enter USB Cable Info Clarification

Applied to: USB Type-C Specification Release 2.3, Oct 2023

Brief description of the functional changes proposed:
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This ECN intends to clarify how the cable info portion of the USB PD Enter USB message should be determined. Section 5.4.3.3 is already quite clear regarding this with the possible exception of the use of TBT3 cables for USB4.
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Benefits as a result of the proposed changes:
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Clarifies the spec with regard to what to include in the Enter USB cable information to eliminate the potential for multiple spec interpretations.
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An assessment of the impact to the existing revision and systems that currently conform to the USB specification:
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None

An analysis of the hardware implications:
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None

An analysis of the software implications:
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None

An analysis of the compliance testing implications:
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None.

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Actual Change Requested

(a). Section 5.4.3.2, Table 5-1

To Text:

Table 5-1 Certified Cables Where **USB4**-compatible Operation is Expected

	Cable Signaling	USB4 Operation	Notes
USB Type-C Full-Featured Cables (Passive)	USB 3.2 Gen 1	20 Gbps	This cable will indicate support for USB 3.2 Gen1 (001b) in the USB Signaling field of its Passive Cable VDO response. Note: even though this cable isn't explicitly tested, certified or logo'ed for USB 3.2 Gen2 operation, USB4 Gen2 operation will generally work.
	USB 3.2 Gen 2 (USB4 Gen2)	20 Gbps	This cable will indicate support for USB 3.2 Gen2 (010b) in the USB Signaling field of its Passive Cable VDO response.
	USB4 Gen4 (USB4 Gen3)	80 Gbps	This cable will indicate support for USB4 Gen3 (011b) or USB4 Gen4 (100b) in the USB Signaling field of its Passive Cable VDO response.
Thunderbolt™ 3 Cables (Passive)	TBT3 Gen2 (USB 3.2 Gen 1 or USB4 Gen2)	20 Gbps	This cable will indicate support for USB 3.2 Gen1 (001b) or USB 3.2 Gen2 (010b) in the USB Signaling field of its Passive Cable VDO response.
	TBT3 Gen3 (USB4 Gen4)	80 Gbps	In addition to indicating support for USB 3.2 Gen2 (010b) in the USB Signaling field of its Passive Cable VDO response, this cable will indicate that it supports TBT3 Gen3 in the Cable Speed parameter and Passive Cable in the Active_Passive parameter of the Discover Mode VDO response. ²
Thunderbolt™ 3 Cables (Active Linear Re-driver)	TBT3 Gen3 (USB4 Gen3)	40 Gbps	In addition to indicating support for USB 3.2 Gen2 (010b) in the USB Signaling field of its Passive Cable VDO response, this cable will indicate that it supports TBT3 Gen3 in the Cable Speed parameter and Active Cable in the Active_Passive parameter of the Discover Mode VDO response. ²
USB Type-C Full-Featured Cables (Active) ¹	USB4 Gen2	20 Gbps	This cable will indicate support for USB4 Gen2 (010b) in the USB Signaling field of its Active Cable VDO response.
	USB4 Gen3	40 Gbps	This cable will indicate support for USB4 Gen3 (011b) in the USB Signaling field of its Active Cable VDO response.
	USB4 Gen4	80 Gbps	This cable will indicate support for USB4 Gen4 (100b) in the USB Signaling field of its Active Cable VDO response.
<p>Note 1: SuperSpeed USB active cables do not support USB4-compatible operation.</p> <p>Note 2: See Appendix F.2.6 and Table F-11.</p> <p>Note 3: For the Cable Speed and Cable Type fields of the Enter_USB Message, the DFP should use the TBT3 Discover Mode VDO response values instead of the values in the Passive Cable VDO response. See Section 5.4.3.3</p>			

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(b). Section 5.4.3.3

To Text:

5.4.3.3 *USB4* Operational Entry

USB4 operational entry **shall** occur only after having established that the attached cable, if present, and the port partner are *USB4*-capable.

USB4 operational entry involves the use of the *USB PD Enter_USB* Message process between the DFP and both the attached *USB4*-compatible cable and the *USB4*-capable port partner – sending this message is order specific: SOP' first, SOP" second if present, and SOP third. Sending the *USB PD Enter_USB* Message to SOP' and SOP" is not needed for passive cables.

When using the *USB PD Enter_USB* Message for enabling *USB4* operation, the DFP **shall** indicate 010b (*USB4*) in the USB Mode field of the *USB PD Enter_USB* Data Object.

Cable Speed and Cable Type fields in the *USB PD Enter_USB* Data Object (EUDO) are determined as follows:

- For the Cable Speed field of the EUDO, the value **shall** be the same as returned in Cable Speed field of either a Passive Cable VDO or an Active Cable VDO 1 of USB Type-C Full Featured cable response.
- For the Cable Type field of the EUDO, the type **shall** be based on the USB Type-C Full Featured cable response, either a Passive Cable VDO (Cable Type = Passive) or an Active Cable VDO 2 (Cable Type = Active Re-timer, Active Re-driver or Optically Isolated based on the Physical connection and Active element fields).
- The only exception is for those cables that are identified using *Thunderbolt 3* cable discovery (see Section F.2.6 and the *USB 3.2* Gen 2 branch of Figure 5-1). In these cases, the Cable Speed and Cable Type fields of the EUDO **shall** be based on the Cable Speed, Active Passive, Re-timer and Cable Type fields as returned by the *TBT3* Discover Mode VDO response.

The remaining fields of the EUDO **shall** be set appropriately by the DFP based on the capabilities of the DFP and attached cable.