

USB Type-C ENGINEERING CHANGE REQUEST FORM

Title: Section 4.5.2.4 Updates

Applied to: USB Type-C Specification Release 2.4, Oct 2024

Brief description of the functional changes proposed:
ECR cleans up Section 4.5.2.4 to now include addressing eMarker behavior for when the eMarker is self-powered as in some direct connect device (e.g., device with captive cable) implementations. The ECR also includes removal of an unnecessary requirement that explicitly disallowed SOP' responses during the Cable Power On State since a Source can't readily determine that the eMarker is actually in this state and nor does it matter.

Benefits as a result of the proposed changes:
Clarifying eMarker behavior requirements to align with now requiring that direct connect devices that implement an eMarker having to implement Ra, even if the eMarker doesn't require VCONN power to function.

An assessment of the impact on the existing revision and systems that currently conform to the USB specification:
No impact expected.

An analysis of the hardware implications:
None.

An analysis of the software implications:
None.

An analysis of the compliance testing implications:
Not expecting any specific changes as the requirement being removed wasn't testable.

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Actual Change Requested

(a). Section 4.5.2.4

Note: Section 1.5 in the existing spec defines “direct connect device” as “A device with either a captive cable or just a USB Type-C plug (e.g., thumb drive).”

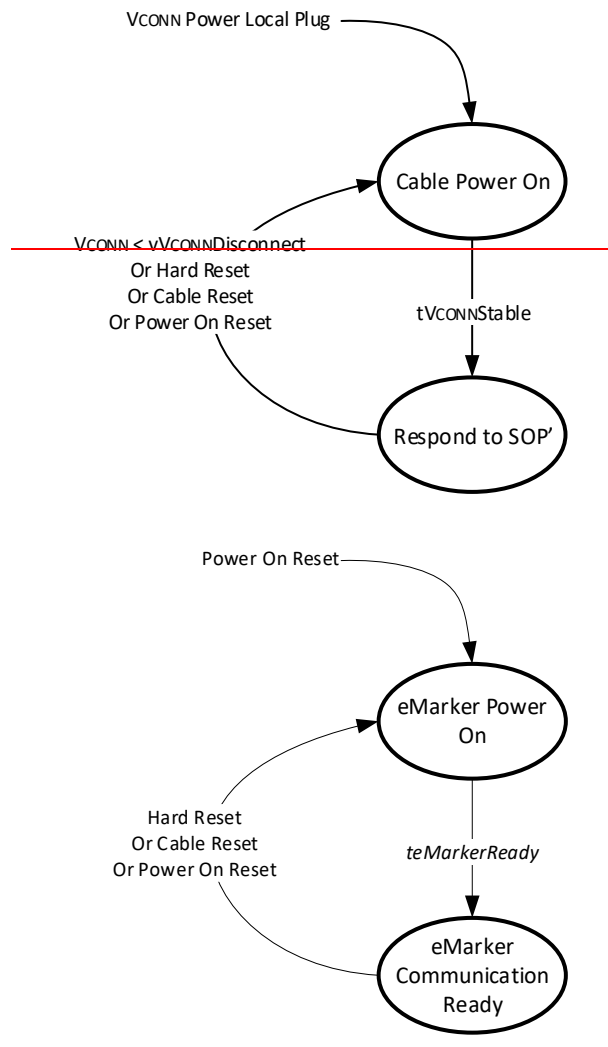
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4.5.2.4 Cable eMarker State Machine Requirements

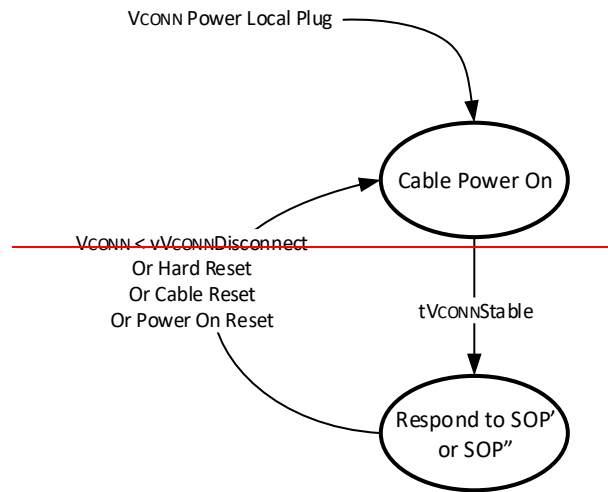
Figure 4-20 and Figure 4-21 illustrates the cable eMarker connection state diagrams for passive and active cables, respectively. The requirements in this section also apply to an eMarker that is in a direct connect device.

Figure 4-20 ~~Passive~~ Cable eMarker State Diagram



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Figure 4-21 Active Cable eMarker State Diagram



4.5.2.4.1 **CableeMarker** Power On State

This state appears in Figure 4-20. This is the initial power on state for each eMarker ~~in the cable~~ when VCONN or VBUS is applied.

Note: For USB Type-C detachable cables, VCONN **shall** be used for powering its eMarker(s). For a direct connect device that includes an eMarker, its eMarker **may** be powered by either VCONN, VBUS, or another source of local power.

4.5.2.4.1.1 **CableeMarker** Power On State Requirements

Each eMarker ~~in the cable~~ **shall** initialize when power on is applied.

~~The cable **shall not** respond to SOP' and SOP'' commands in this state.~~

4.5.2.4.1.2 Exiting from **CableeMarker** Power On State

Each eMarker ~~in a passive or active cable~~ **shall** transition to Assign Cable SOP* the eMarker Communication Ready State when it has completed its boot process. Each eMarker **shall** transition to Assign Cable SOP* the eMarker Communication Ready State within ~~tVCONN Stable~~ teMarkerReady.

Note: For a direct connect device that includes an eMarker, if the local power used for the eMarker is not VCONN or VBUS, the eMarker **shall** still meet the ~~teMarkerReady~~ timing requirement.

4.5.2.4.2 **Respond to SOP'/SOP'' eMarker Communication Ready** State

This state appears in Figure 4-20 ~~and Figure 4-21.~~

~~A passive cable has only one eMarker powered at a time. This cable eMarker in a passive cable **shall** respond to SOP' in this state.~~

~~Each cable eMarker in an active cable **shall** respond to a pre-set SOP' or SOP''. If only one eMarker exists in the cable, it **shall** only respond to SOP'.~~

Cable designers **shall** ensure that the eMarker works correctly in the presence of the maximum allowable cable IR drop for ground (see Section 4.4.1) and VCONN maximum IR drop.

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4.5.2.4.2.1 ~~Respond to SOP'/SOP''~~ eMarker Communication Ready State Requirements

Each eMarker ~~in the passive or active cable~~ **shall** be able to respond as appropriate to ~~any USB PD~~ communications sent to its ~~pre-set SOP' or SOP''~~.

For a passive cable, only one eMarker **should** be powered at a time and **shall** respond to SOP' only. If two eMarkers exist in a ~~passive or active~~ cable and are powered at the same time, then only one **shall** respond to SOP' and the other **shall** respond to SOP''. The assignment of SOP' and SOP'' is fixed for each eMarker in a cable and **shall not** be dynamically set when power is applied to VCONN.

A direct connect device **shall** contain at most one eMarker. Any eMarker in a direct connect device **shall** only respond to SOP'.

4.5.2.4.2.2 Exiting from ~~Respond to SOP'/SOP''~~ eMarker Communication Ready State

Each eMarker in the cable **shall** transition to ~~Cable the eMarker~~ Power On State upon a Power On Reset event. ~~s A Power On Reset event in a cable **shall** be triggered by sensing VCONN less than vVCONNDisconnect or upon a Power On Reset event.~~

The eMarker in a direct connect device **shall** transition to the eMarker Power On State upon a Power On Reset event. A Power On Reset event in a direct connect device **shall** be triggered by either:

- sensing VCONN less than vVCONNDisconnect, or
- transitioning from any attached state to any unattached state.

Each eMarker ~~in the cable~~ **shall** transition to ~~Cable the eMarker~~ Power On State upon sensing a Hard Reset or Cable Reset.

(b). Section 4.9.1, Table 4-24

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4.9.1 Parameter Values

Table 4-24 provides the power on timing requirements for ~~the an~~ eMarker ~~SOP' and SOP''~~ to be ready to communicate (See Section 4.5.2.4).

Table 4-24 ~~SOP' and SOP''~~ eMarker Ready Timing

	Maximum	Description
tVCONNStable teMarkerReady	50 ms	The time between the application of VCONN <u>or VBUS, whichever is later</u> , until SOP' and SOP'' an eMarker shall be ready for communication.

(c). Section 4.4.3, Table 4-6

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Table Error! No text of specified style in document.-2 Cable VCONN Sink Characteristics

	Minimum	Maximum	Notes
<i>tVCONNSwitch</i>		<i>tVCONNStable</i> <i>teMarkerReady</i>	Cables that <i>optionally</i> use V _{BUS} <i>shall</i> power from VCONN within <i>tVCONNStable</i> <i>teMarkerReady</i> .