USB Type-C ENGINEERING CHANGE NOTICE

Title: Minimum Functional Cable Voltage Clarification
Applied to: USB Type-C Specification Release 2.1, May 2021

Brief description of the functional changes proposed:
Clarifies the minimum functional cable voltage requirement for an EPR cable – what is in the spec today is incorrect as it was based on preliminary information from the USB PD spec that changed when the final USB PD R3.1 spec was published.

Benefits as a result of the proposed changes:
Corrects the spec value.

An assessment of the impact to the existing revision and systems that currently conform to the USB specification:
Eases the voltage requirement from being overstated at 53.65V to 50.9V.

An analysis of the hardware implications:
No impact except to likely provide more margin with regard to component voltage tolerances.

An analysis of the software implications:
No impact to SW.

An analysis of the compliance testing implications:
No compliance testing impact.

USB Type-C ENGINEERING CHANGE NOTICE

Actual Change Requested
Changes using modified text

(a) Section 3.11.1

From Text:

3.11.1 Electrical Requirements

Extended Power Range cables have additional requirements to assure that these cables can deliver the full defined voltage and current range for *USB PD* EPR operation.

EPR cables shall functionally support a reported 50 V and 5 A operation. The minimum functional voltage that a cable shall support is 53.65 V. The electrical components potentially in the path of VBUS in an EPR cable, e.g. bypass capacitors, should be minimally rated for 63 V.

To control the impact of inductive kickback and ringing that can increase the chance of arcing between a USB Type-C plug and receptacle when a cable is removed while power is still applied, an EPR cable may include a snubber capacitor within the plug at each end of the cable. See Appendix H for more information.

To Text:

3.11.1 Electrical Requirements

Extended Power Range cables have additional requirements to assure that these cables can deliver the full defined voltage and current range for *USB PD* EPR operation.

EPR cables shall functionally support a reported 50 V and 5 A operation. The minimum functional voltage that a cable shall support is ~~53.65~~50.9 V. The electrical components potentially in the path of VBUS in an EPR cable, e.g. bypass capacitors, should be minimally rated for 63 V.

To control the impact of inductive kickback and ringing that can increase the chance of arcing between a USB Type-C plug and receptacle when a cable is removed while power is still applied, an EPR cable may include a snubber capacitor within the plug at each end of the cable. See Appendix H for more information.

From Text:

4.6.2 VBUS Power Provided Over a USB Type-C Cable

The minimum requirement for VBUS power supplied over the USB Type-C cable assembly matches the existing requirement for VBUS supplied over existing legacy USB cable assemblies.

USB Power Delivery in Standard Power Range (SPR) operation is intended to work over un-modified USB Type-C to USB Type-C cables, therefore any USB Type-C cable assembly that incorporates electrical components or electronics shall ensure that it tolerate, or be protected from, a VBUS voltage of 21 V.

USB Power Delivery in Extended Power Range (EPR) operation requires EPR-compatible USB Type-C to USB Type-C cables. Any USB Type-C cable assembly that incorporates electrical components or electronics that may be powered by VBUS shall ensure that it can functionally tolerate, or be protected from, a VBUS voltage of up to 53.65 V (51 V + 5% + 100 mV).

To Text:

4.6.2 VBUS Power Provided Over a USB Type-C Cable

The minimum requirement for VBUS power supplied over the USB Type-C cable assembly matches the existing requirement for VBUS supplied over existing legacy USB cable assemblies.

USB Power Delivery in Standard Power Range (SPR) operation is intended to work over un-modified USB Type-C to USB Type-C cables, therefore any USB Type-C cable assembly that incorporates electrical components or electronics shall ensure that it tolerate, or be protected from, a VBUS voltage of 21 V.

USB Power Delivery in Extended Power Range (EPR) operation requires EPR-compatible USB Type-C to USB Type-C cables. Any USB Type-C cable assembly that incorporates electrical components or electronics that may be powered by VBUS shall ensure that it can functionally tolerate, or be protected from, a VBUS voltage of up to ~~53.65~~50.9 V (~~51~~ 48 V + 5% + ~~100~~ 500 mV).