

# USB Type-C ENGINEERING CHANGE NOTICE

## Title: BC 1.2 Clarification

Applied to: USB Type-C Specification Release 1.2, March, 2017

### Brief description of the functional changes proposed:

Currently, the USB Type-C spec does not mandate a source with a type-c receptacle support BC1.2. This can cause two potential problems and/or some loss of performance:

- 1) If a Source with a Type-C receptacle is connected to a legacy Sink through a Type-C to micro-B cable, then the legacy sink will run BC1.2. Since the legacy sink does not have a CC pin, BC1.2 is the only method it has for detecting the charger type and capability. If D+ and D- are floating, the sink will detect either an SDP or a non-compliant floating BC1.2 charger which has no specific current draw requirement. The proposal mandates source with a Type-C receptacle to support BC1.2 so this situation does not happen.
- 2) For captive Type-C sources such as charge-through VPDs, charge-through Analog Audio Accessories, and non-BC1.2 captive charging sources, an attached sink may not draw more than 500mA since these sources do not support BC1.2. The proposal adds clarification to the spec, noting that if BC1.2 is not supported by the captive source or the D+/D- lines are floating with a Rp standard current advertisement on the CC pin, the sink shall not draw more than 500mA.

### Benefits as a result of the proposed changes:

- 1) Legacy sinks can draw more than 500mA from legacy sources with a type-c receptacle and a current capability of 500mA to 1.5A. This will lead to better charging performance when micro-USB sinks are connected to non-captive type-c charging sources
- 2) Remove ambiguity by clarifying that sinks shall not draw more than 500mA when Rp standard is detected and BC1.2 detects the D+ and D- lines floating or not in a BC1.2 compliant configuration.

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

We should test in compliance that sinks only draw 500mA when Rp standard is connected and D+ and D- are floating. This is allowed for captive chargers.

### An analysis of the hardware implications:

For DCPs, D+ and D- should be shorted together with  $\leq 200\Omega$  compared to floating. For SDPs, D+ and D- should be independently terminated to ground with a resistance between 14.25k $\Omega$  and 24.8k $\Omega$

### An analysis of the software implications:

Software will be simpler because it won't have to decide how to deal with the floating charger case

### An analysis of the compliance testing implications:

If we agree that BC1.2 is mandatory for non-captive sources with a Type-C receptacle, then this will need to be tested in compliance. Additionally, sinks should be tested to ensure they don't draw more than the standard USB current from a source only advertising Rp standard with D+ and D- floating (the captive source case).

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## Actual Change Requested

### (a). Section 4.8.1.1, Page 171

#### From Text:

- A USB-based charger with a USB Type-C receptacle (Source) shall only apply power to VBUS when it detects a Sink is attached and shall remove power from VBUS when it detects the Sink is detached (**vOPEN**).
- A USB-based charger with a USB Type-C receptacle shall not advertise current exceeding 3.0 A except when it uses the **USB-PD** Discover Identity mechanism to determine the cable's actual current carrying capability and then it shall limit the advertised current accordingly.

#### To Text:

- A USB-based charger with a USB Type-C receptacle (Source) shall only apply power to VBUS when it detects a Sink is attached and shall remove power from VBUS when it detects the Sink is detached (**vOPEN**).
- A USB-based charger with a USB Type-C receptacle shall not advertise current exceeding 3.0 A except when it uses the **USB-PD** Discover Identity mechanism to determine the cable's actual current carrying capability and then it shall limit the advertised current accordingly.
- A USB-based charger with a USB Type-C receptacle (Source) which is not capable of data communication shall advertise Type-C current of at least 1.5A and shall short D+ and D- together with a resistance less than 200ohms. This will ensure backwards compatibility with legacy sinks which may use BC1.2 for charger detection.

### (b). Section 4.8.1.2, Page 172

#### From Text:

- A USB-based charger with a USB Type-C captive cable shall limit its current advertisement so as not to exceed the current capability of the cable (up to 5 A).

#### To Text:

- A USB-based charger with a USB Type-C captive cable shall limit its current advertisement so as not to exceed the current capability of the cable (up to 5 A).
- A USB-based charger with a USB Type-C captive cable which is not capable of data communication shall advertise Type-C current of at least 1.5A. It is recommended that such a charger short D+ and D- together with a resistance less than 200ohms.

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## (c). Section 4.6.2.2a, “BC1.2 Sink Behavior” Page 169

### Text:

If a sink supports BC 1.2 detection, detects Rp Default and does not discover a BC 1.2-compliant source, then it shall limit its maximum current consumption to the standard USB levels based on Table xxx. This will ensure maximum current limits are not exceeded when connected to a source which does not support BC1.2.