USB Type-C ENGINEERING CHANGE NOTICE

Title: Alt Mode Noise
Applied to: USB Type-C Specification Release 1.1, April 3, 2015

Brief description of the functional changes:

The SBU to CC noise ingression level is changed.
The SBU to CC noise ingression levels during BMC active and BMC idle are defined separately.
The SBU to USB2 noise levels were also verified. No change is suggested.

Benefits as a result of the changes:

The original SBU to CC noise ingression level was possibly defined based on DisplayPort Auxiliary signaling at 700mV swing. The new noise level is defined based on SBU signaling with 3.3V+ 10% swing and 2.5ns minimum rise time in the worst full-featured cable that is compliant to coupling requirement in Figure 3-53 of USB Type C Spec 1.1.

Due to BMC buffer impedance difference between BMC active and idle modes, the noise ingression levels from any aggressor to CC are different, and thus shall be defined separately. This new definition is consistent with vNoiseActive and vNoiseIdle in USB PD Spec, Section 5.8.6 Table 5-19.

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

No impact since the noise regression spec is proposed to be relaxed.

An analysis of the hardware implications:

No impact to cable design. A Full-featured cable compliant to USB Type C spec Rev 1.1 Section 3.7.3.3 Low Speed Signal Requirements is expected to meet this new noise ingression level.

No impact to BMC silicon design. The BMC receiver noise tolerance levels, vNoiseActive and vNoiseIdle, in USB PD Spec Section 5.8.6 Table 5-19, were defined based on the worst USB 2.0 Type-C cable. After increasing Alternate Mode noise level, the total AC noise from VBUS, USB2 and SBU to CC in a full-featured cable does not exceed the BMC Vnoise spec.

An analysis of the software implications:

No software implications.

An analysis of the compliance testing implications:

No compliance test requirement for Vnoise spec in Table 5-3.

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Actual Change

(a). From, Section 5.1.3, Table 5-3, Page 168

Table 5-3 Alternate Mode Signal Noise Ingression Requirements

	Limit	Bandwidth
Vnoise on BMC	10 mV	100 ns time constant filter
Vnoise on D+/D- (Single-ended)	40 mV	500 MHz
Vnoise on D+/D- (Differential)	10 mV	500 MHz

Note: Each Vnoise parameter is the max noise ingression level allowed onto the respective interface that is due to all aggressors from the Alternate Mode signaling, under respective worse case scenarios. Aggressors include Alternate Mode interface signals on the SBU wires that couple within USB Type-C cable to the respective victim interface, according to USB Type C cable specification Section 3.7.3.3.

(a). To, Section 5.1.3, Table 5-3, Page 168

	Limit	Bandwidth
Vnoise on BMC during BMC Active	30 mV	100 ns time constant filter
Vnoise on BMC during BMC Idle	100 mV	100 ns time constant filter
Vnoise on D+/D- (Single-ended)	40 mV	500 MHz
Vnoise on D+/D- (Differential)	10 mV	500 MHz

Note: Each Vnoise parameter is the max noise ingression level allowed onto the respective interface that is due to two SBU aggressors from the Alternate Mode signaling, under respective worse case scenarios. The coupling between SBU_A/SBU_B and CC within a USB Type-C cable shall meet the requirement described in Section 3.7.3.3.4. The coupling between SBU_A/SBU_B and USB D+/D- within a USB Type-C cable shall meet the requirement described in Section 3.7.3.3.5.