USB 3.2 ENGINEERING CHANGE NOTICE

Title: Gen 1x2 SKP OS Correction
Applied to: USB 3.2_r1.0 Sep. 22, 2017

Brief description of the functional changes:
This ECN is addressing the typos in the Spec for the Gen1 SKP insertion for x2 operation. This is also giving some flexibility to the MAC to relax the insertion of SKP OS for Gen1.

Benefits as a result of the changes:
This will avoid confusion and wrong implementation for the Gen 1x2 SKP insertion. This will also ease the MAC IP implementation without sacrificing the clock compensation requirement for Gen1.

An assessment of the impact to the existing revision and systems that currently conform to the USB specification:
1. No impact to USB3.0 and USB3.1 ecosystem 2. USB3.2 Gen 1x2 would follow the SKP insertion rule defined in this ECN

An analysis of the hardware implications:
Any new USB3.2 controller needs to comply

An analysis of the software implications:
None

An analysis of the compliance testing implications:
Compliance test should verify SKP insertion based on the rule defined in this ECN

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Actual Change

(a) From Text: Section 6.4.3.1 SKP Rules (Host/Device/Hub) for Gen 1x1 Operation

- Unless otherwise specified, a transmitter shall insert the integer result of Y/354 calculation Ordered sets immediately after each transmitted TS1, TS2 Ordered Set, LMP, TP Data Packet Payload, or Logical idle. During training only, a transmitter is allowed the option of waiting to insert 2 SKP ordered sets when the integer result of Y/354 reaches 2. A transmitter shall not transmit SKP Ordered Sets at any other time.

(a) To Text: Section 6.4.3.1 SKP Rules (Host/Device/Hub) for Gen 1x1 Operation

- Unless otherwise specified, a transmitter shall insert the integer result of Y/354 calculation Ordered sets immediately after each transmitted TS1, TS2 Ordered Set, HP, Data Packet, Link Command, or idle symbol. During training only, a transmitter is allowed the option of waiting to insert 2 SKP ordered sets when the integer result of Y/354 reaches 2. A transmitter shall not transmit SKP Ordered Sets at any other time.
- A transmitter may pad up to 8 idle symbols before the scheduled SKP Ordered Set to accommodate for implementation consistency with Gen 1x2 operation relating to lane alignment.

(b) From Text: Section 6.4.3.2 SKP Rules (Host/Device/Hub) for Gen 1x2 Operation

- In Gen 1x2 operation, the transmitter shall insert the integer result of Y/354 multiplied by the number of re-timers detected during re-timer presence announcement as specific in Section E.3.4.2.1.
- Note: The non-integer remainder of the Y/354 SKP calculation shall not be discarded and shall be used in the calculation to schedule the next SKP Ordered Set.

(b) To Text: Section 6.4.3.2 SKP Rules (Host/Device/Hub) for Gen 1x2 Operation

- In Gen 1x2 operation, the transmitter shall insert the integer result of Y/354 multiplied by one plus the number of re-timers detected during re-timer presence announcement as specific in Section E.3.4.2.1.
- Note: The non-integer remainder of the Y/354 SKP calculation shall not be discarded and shall be used in the calculation to schedule the next SKP Ordered Set.
- Transmitter shall insert the SKP Ordered Set on both lanes simultaneously. If transmitting an odd number of a Data Packet payload, it would finish the data transmission on one lane ahead of another. In that case, transmitter shall pad idle symbols to keep SKP Ordered Set insertion aligned on both lanes. Additionally transmitter may add up to 8 idle symbols on each lane as specified in Section 6.4.3.2

(c) From Text: Section E.3.4.2.1

The re-timer presence announcement applies to x2 operation only. The purpose of the re-timer presence announcement is for a port to determine the number of re-timers between the DFP and UFP such that a port may adaptively determine the number of SKP OS to be inserted in Gen 2x2 operation.

(c) To Text: Section E.3.4.2.1

The re-timer presence announcement applies to x2 operation only. The purpose of the re-timer presence announcement is for a port to determine the number of re-timers between the DFP and UFP such that a port adaptively determines the number of SKP OS to be inserted in Gen 1x2 operation.