

USB4 2.0 ENGINEERING CHANGE NOTICE FORM

Title: DP Clock Sync Window Count ppm
Applied to: USB4 Specification Version 2.0

Brief description of the functional changes:

Add a maximum variation requirement to the Window Count field inside the DP Clock Sync Packet. The Window Count Shouldn't change by more than 10 ppm in 100ms measurement window. Added a requirement in ALPM to send the first DP Clock Sync Packet within 4.3ms from its wake packet. This time allows the PHY Establishment + the time to have 2 Measure Window events + some extra
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Benefits as a result of the changes:

The DP OUT Adapter clock reconstruction circuit has a better-defined noise definition it needs to solve.
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An assessment of the impact to the existing revision and systems that currently conform to the USB specification:
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Expect that current designs already meet the requirement.

An analysis of the hardware implications:
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Expect that current designs already meet the requirement.

An analysis of the software implications:
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None

An analysis of the compliance testing implications:
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A test will be added to verify the Window Count field. A test of ALPM will check the presence of DP Clock Sync packet before the require time.

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Actual Change

(a). 10.6.2.1 DP IN Adapter Requirements

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A DP IN Adapter shall:

- Implement a Lifetime Counter as described in Section 10.6.1.1.2.
- Implement the logic to perform the LC filtering.
- Update FLC upon an Update Counter Event.
- Upon the first Measure Window Event:
 - Capture the current FLC.
 - Store the current captured FLC to be used as previous captured FLC at the next Measure Window Event.
- Upon each subsequent Measure Window Event:
 - Capture the current FLC.
 - Compute the Window Count by calculating the current captured FLC minus the FLC that was captured at the previous Measure Event.
 - Construct a DP Clock Sync Packet and send it over the Main-Link Path within tDPClockSync after the Measure Window Event.
 - The maximum allowed deviation for the Window Count field is 10 ppm over a window of 100ms. The window terminates if the DisplayPort link goes to a low power state.
 - Store the current captured FLC to be used as previous captured FLC at the next Measure Window Event.



IMPLEMENTATION NOTE

To meet the Window Count maximum deviation requirement from the first DP Clock Sync Packet, the DP IN Adapter needs to ensure that the Lifetime Counter filter is not in its initial transient phase.

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(b). 10.5.7.3 Wake Sequence

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After a DP IN Adapter sends the DP Link Control Packet of type ALPM with the *S/W* bit set to 0b, it shall:

1. Before advancing to Step 2, ensure it has ended its PHY establishment and detected an ML_PHY_LOCK.
2. Enable its Clock Synchronization – Start advancing the Lifetime Counter and send DP Clock Sync Packets as defined in Section 10.6.
 - a. The first DP Clock Sync packet shall be sent within 4.3ms from the DP Link Control Packet of type ALPM with the *S/W* bit set to 0b.

Note: Clock Synchronization is restarted from the initial state after ALPM Wake. Therefore, the first Measure Window Event will not produce a DP Clock Sync packet as it might not be accurate, from 2nd Measure Window Event and on DP Clock Sync packet shall be produced as defined in Section 10.6.2.1.