

# USB4 Re-timer 0.96 ENGINEERING CHANGE NOTICE FORM

**Title: LFPS Response Timing Requirement**

**Applied to: USB4 Re-timer Specification Version 0.96**

**Brief description of the functional changes:**

Adds a timing requirement for the LFPS response when exiting CL1 and CL2.

**Benefits as a result of the changes:**

Limiting CL1/2 exit latency.

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

None

**An analysis of the hardware implications:**

None

**An analysis of the software implications:**

None

**An analysis of the compliance testing implications:**

Add a timing requirement for LFPS response

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## Actual Change

### (a). 4.2.4.3.1 CL0s Exit, Page 39

#### To Text:

When a Re-timer detects an LFPS burst on one of its receivers, the Re-timer shall:

1. Send a Low Frequency Periodic Signaling (LFPS) burst from the Corresponding Transmitter. The duration of the LFPS burst shall be at least 16 LFPS cycles and no more than  $t_{LFPSDuration}$ . A Cable Re-timer shall send the first LFPS within  $t_{LFPSResponse}$  from receiving LFPS. It is recommended that an On-board Re-timer will send the first LFPS within  $t_{LFPSResponse}$  from receiving LFPS.

### (b). 4.2.4.3.2.1 CL1/CL2 Exit – Phase 1, Page 40

#### To Text:

When a Re-timer detects an LFPS burst of 2 cycles on one of its Lane Adapters, it shall do the following:

1. Send LFPS as follows:
  - The Lane Adapter that detected the LFPS shall send LFPS for at least 5 LFPS cycles and no more than  $t_{LFPSDuration}$ . A Cable Re-timer shall send the first LFPS within  $t_{LFPSResponse}$  from receiving LFPS. When exiting CL1, an On-board Re-timer shall send the first LFPS within  $t_{WarmUpCL1}$  from receiving LFPS. When exiting CL2, an On-board Re-timer shall send the first LFPS within  $t_{WarmUpCL2}$  from receiving LFPS.
  - The Corresponding Adapter shall send LFPS until it detects LFPS. A Cable Re-timer shall send the first LFPS within  $t_{LFPSResponse}$  from receiving LFPS. It is recommended that an On-board Re-timer will send the first LFPS within  $t_{LFPSResponse}$  from receiving LFPS.



#### IMPLEMENTATION NOTE

*A Router Assembly that uses On-board Re-timers that forward LFPS after more than  $t_{LFPSResponse}$  should compensate on the Re-timer forwarding time or consider the extended exit latency from CL0s/1.*

### (c). Table 4-6 Re-timer Timing Parameters, Page 41

#### To Text:

$t_{LFPSResponse}$	The time to response for LFPS detection.	--	1	$\mu s$
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Note:  $t_{WarmUpCL1}$ ,  $t_{WarmUpCL2}$ ,  $t_{LFPSDuration}$  and  $t_{EnterLFPS1}$  are defined in the USB4 Specification.