USB4 1.0 ENGINEERING CHANGE NOTICE FORM

Title: Transmitter Preset14 EQ Setting Modification
Applied to: USB4 Specification Version 1.0

Brief description of the functional changes:
Modify the transmitter Preset14 EQ setting for being optimized for common cases of interconnects employing Linear-Redriver (LRD) cables, which are going to be added to USB Type-C standard. Preset14 new setting: Pre-shoot=3.6dB +/-1dB De-Emphasis=0dB +/-1dB Informative filter coefficients: C_{-1}=-0.17, C_0=0.83, C_1=0

Benefits as a result of the changes:
Benefit is enhanced electrical performance in many cases of interconnects employing the newly defined LRD cables, which typically require significant pre-cursor equalization without applying post-cursor equalization. This is needed in order to avoid potential over-equalization scenarios that might lead to interoperability issues.

An assessment of the impact to the existing revision and systems that currently conform to the USB specification:
Changing preset14 might impact receivers that currently use the existing preset14 in a non-LRD interconnects.

An analysis of the hardware implications:
Modify the digital configuration associated with the transmitter EQ Preset14 setting (through NVM or HW update).

An analysis of the software implications:
NA

An analysis of the compliance testing implications:
The transmitter preset14 testing shall be updated with the above pre-shoot and de-emphasis targets.

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Actual Change

(a). Section 3.4.1.4

Table 3-5. Transmit Equalization Presets

Preset Number	Pre-shoot [dB]	De-emphasis [dB]	Informative Filter Coefficients		
			C_{-1}	C_0	C_1
0	0	0	0	1	0
1	0	−1.9	0	0.90	−0.10
2	0	−3.6	0	0.83	−0.17
3	0	−5.0	0	0.78	−0.22
4	0	−8.4	0	0.69	−0.31
5	0.9	0	−0.05	0.95	0
6	1.1	−1.9	−0.05	0.86	−0.09
7	1.4	−3.8	−0.05	0.79	−0.16
8	1.7	−5.8	−0.05	0.73	−0.22
9	2.1	−8.0	−0.05	0.68	−0.27
10	1.7	0	−0.09	0.91	0
11	2.2	−2.2	−0.09	0.82	−0.09
12	2.5	−3.6	−0.09	0.77	−0.14
13	3.4	−6.7	−0.09	0.69	−0.22
14	~~3.8~~3.6	~~−3.8~~0	−0.~~13~~17	0.~~74~~83	~~−0.13~~0
15	1.7	−1.7	−0.05	0.55	−0.05

Notes:

1. The coefficients are normalized such that $|C_{-1}| + C_0 + |C_1|$ corresponds to full output swing. Preset configuration 15 represents operation mode with lower transmitter swing.
2. Preshoot and de-emphasis are calculated as following:

$$Preshoot = 20 \cdot \log 10\left(\frac{-C_{-1}+C_0+C_1}{C_{-1}+C_0+C_1}\right) \qquad De-emphasis = 20 \cdot \log 10\left(\frac{C_{-1}+C_0+C_1}{C_{-1}+C_0-C_1}\right)$$

Figure 3-13. Transmitter Equalization Frequency Response for Gen 2 Systems

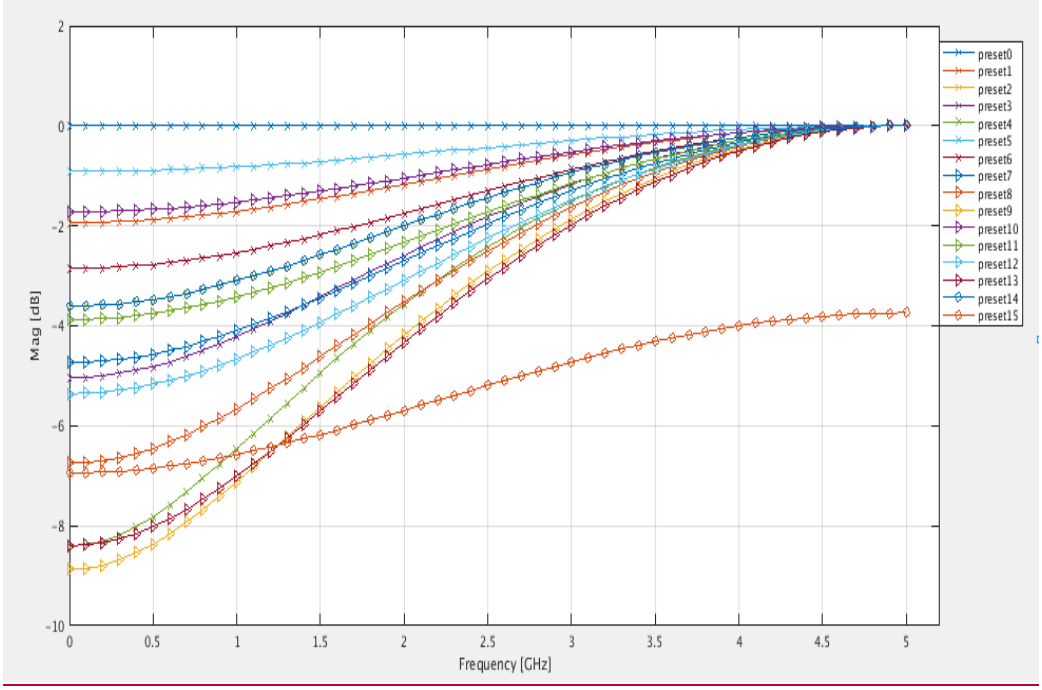

Figure 3-14. Transmitter Equalization Frequency Response for Gen 3 Systems