USB 3.2 ENGINEERING CHANGE NOTICE

Title: Remove WiMax Friendly SSC
Applied to: USB 3.2 Revision 1.0

Brief description of the functional changes:
This ECN removes the radio friendly SSC -1700 to -5300ppm contents from the USB3.2 Specification. It is believed it is not used currently and Gen1x1 BLRs may not be able to lock to this SSC profile and/or perform clock switching and meet the tCDR_SLEW_MAX requirement. USB3.2 gen1x1 bit level retimers shall disable SSC while transmitting training ordered sets generated locally. The retimer counts on only 600ppm difference between local clock and recovered clock to facilitate fast and robust clock switching and to meet the tCDR_SLEW_MAX. If the radio friendly SSC of -1700ppm to -5300ppm is used, the frequency of the recovered clock never overlaps the local clock and the retimer may not be able to switch to the recovered clock while meeting tCDR_SLEW_MAX.

Benefits as a result of the changes:
Allow Gen1x1 retimers to switch from the local clock to recovered clock with low tCDR_SLEW_MAX by monitoring the frequency of the local and received clock and switching at the time of minimum offset.

An assessment of the impact to the existing revision and systems that currently conform to the USB specification:
If any Hosts, Hubs, or Devices shipped with “radio friendly” SCC they would not comply to the revised specification.

An analysis of the hardware implications:
Removes the option to ship Hosts and Devices supporting the “radio friendly” SSC profile.

An analysis of the software implications:
None

An analysis of the compliance testing implications:
Electrical Compliance Test Specification, SuperSpeed Universal Serial Bus, TD.1.4 6b should be removed as this applies only to “radio friendly” SSC profile.

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Actual Change

(a)Section 6.4.3

From Text:

The Enhanced SuperSpeed architecture supports a separate reference clock source on each side of the Enhanced SuperSpeed link. The accuracy of each reference clock is required to be within ± 300 ppm. This gives a maximum frequency difference between the two devices of the link of ± 600 ppm. In addition, SSC creates a frequency delta that has a maximum difference of 5000 ppm. The total magnitude of the frequency delta can range from −5300 to +300 ppm (−5300 to −1700 in "radio friendly" clock mode – see Table 6-17 and Table 6-18 for specific requirements). This frequency delta is managed by an elasticity buffer that consumes or inserts SKP ordered sets.

To Text:

The Enhanced SuperSpeed architecture supports a separate reference clock source on each side of the Enhanced SuperSpeed link. The accuracy of each reference clock is required to be within ± 300 ppm. This gives a maximum frequency difference between the two devices of the link of ± 600 ppm. In addition, SSC creates a frequency delta that has a maximum difference of 5000 ppm. The total magnitude of the frequency delta can range from −5300 to +300 ppm. This frequency delta is managed by an elasticity buffer that consumes or inserts SKP ordered sets.

(b)Section 6.5.3, Table 6-17

From Text:

Table 6-17. SSC Parameters

Symbol	Description	Limits		Units	Note
		Min	Max		
$t_{SSC-MOD-RATE}$	Modulation Rate	30	33	kHz	
$t_{SSC-FREQ-DEVIATION}$	SSC deviation	+0/-4000 +0/-2000	+0/-5000 +0/-3000	ppm	1, 2, 3 4

Note:

1. The data rate is modulated from 0 ppm to -5000 ppm of the nominal data rate frequency and scales with data rate.
2. This is measured below 2 MHz only.
3. Receiver compliance testing is done under the maximum spread condition.
4. Alternate limits apply to "radio friendly" clocking mode which employs a clock whose center frequency is downshifted by 2000ppm.

To Text:

Table 6-17. SSC Parameters

Symbol	Description	Limits		Units	Note
		Min	Max		
$t_{SSC-MOD-RATE}$	Modulation Rate	30	33	kHz	
$t_{SSC-FREQ-DEVIATION}$	SSC deviation	+0/-4000	+0/-5000	ppm	1, 2

Note:

1. The data rate is modulated from 0 ppm to -5000 ppm of the nominal data rate frequency and scales with data rate.
2. This is measured below 2 MHz only.

(c) Section 6.5.3, Figure 6-16

From Text:

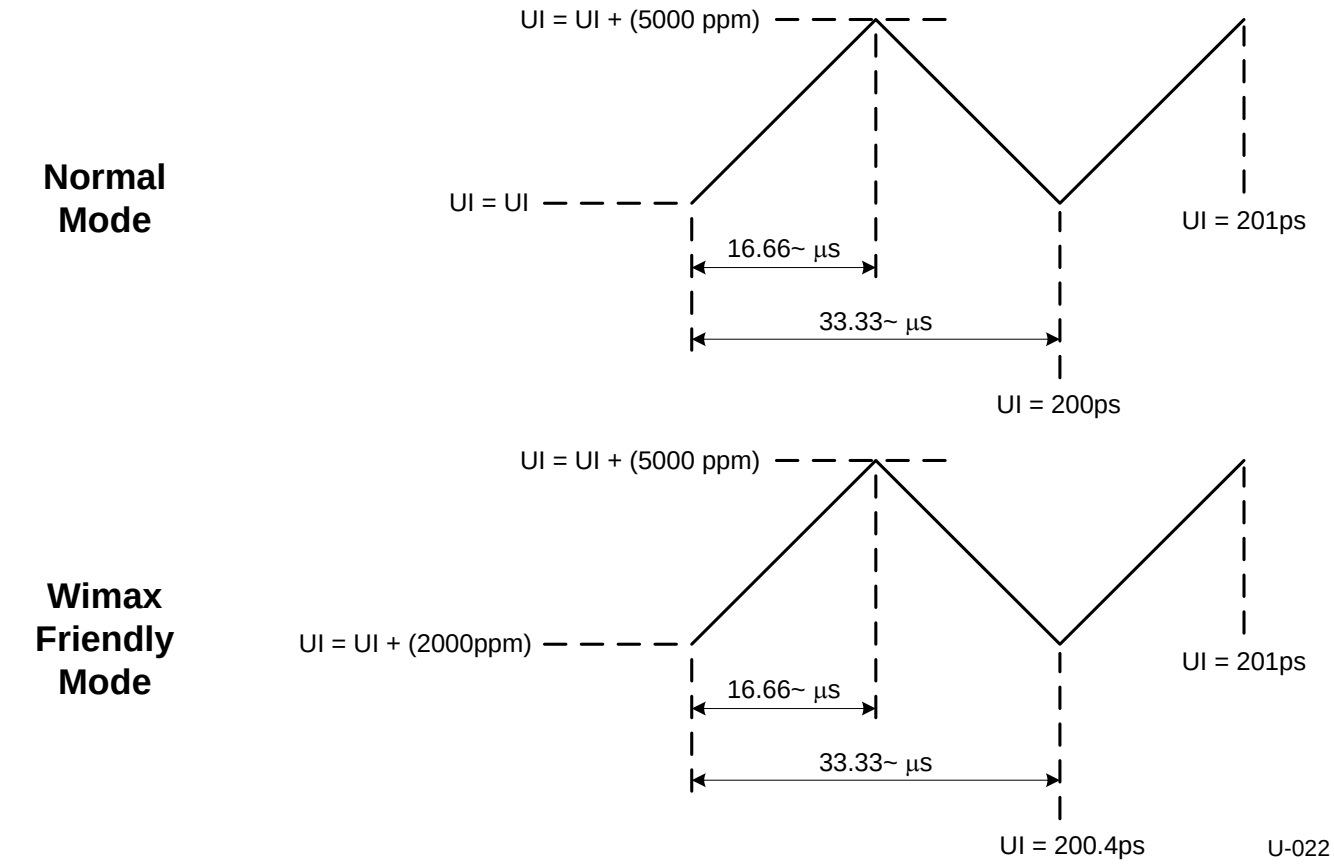

Figure 6-10. Period Modulation from Triangular SSC

To Text:

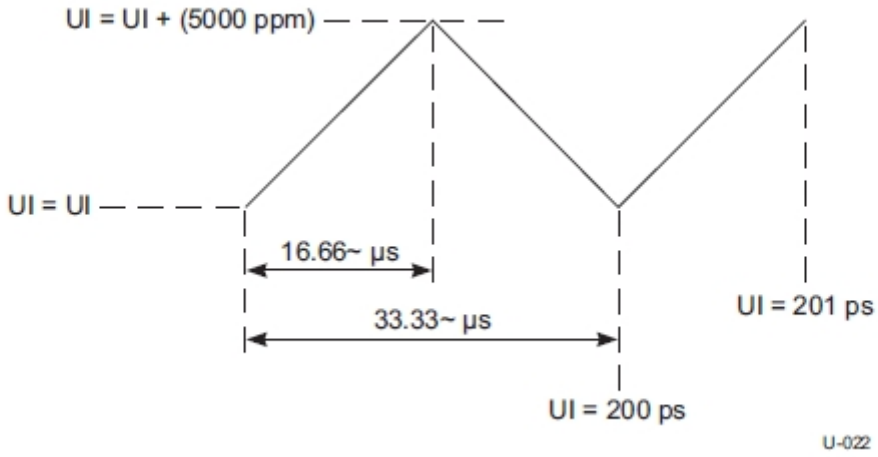

Figure 6-16. Period Modulation from Triangular SSC

(d)Section 6.7.1, Table 6-18

From Text:

Table 6-18. Transmitter Normative Electrical Parameters

Symbol	Parameter	5.0 GT/s	Units	Comments
UI	Unit Interval	199.94 (min) 200.06 (max) 200.34 (min) 200.46 (max)	ps	The specified UI is equivalent to a tolerance of ±300 ppm for each device. Period does not account for SSC induced variations. Alternate limits apply to “radio friendly” clocking mode which employs a clock whose center frequency is downshifted by 2000ppm. This mode is to be used with a +0/-3000ppm spread.

To Text:

Table 6-18. Transmitter Normative Electrical Parameters

Symbol	Parameter	5.0 GT/s	Units	Comments
UI	Unit Interval	199.94 (min) 200.06 (max)	ps	The specified UI is equivalent to a tolerance of ±300 ppm for each device. Period does not account for SSC induced variations.

(e) Section 6.8.3, Table 6-22

From Text:

Table 6-22. Receiver Normative Electrical Parameters

Symbol	Parameter	5.0 GT/s	Units	Comments
UI	Unit Interval	199.94 (min) 200.06 (max) 200.34 (min) 200.46 (max)	ps	UI does not account for SSC caused variations. Alternate limits apply to “radio friendly” clocking mode which employs a clock whose center frequency is downshifted by 2000ppm. This mode is to be used with a +0/-3000ppm spread.

To Text:

Table 6-22. Receiver Normative Electrical Parameters

Symbol	Parameter	5.0 GT/s	Units	Comments
UI	Unit Interval	199.94 (min) 200.06 (max)	ps	UI does not account for SSC caused variations.