60802 Time Sync – External Clock
Normative Requirements

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Version 1
Background

- Following discussion during 60802 Comment Resolution on 12\textsuperscript{th} May 2023, it was agreed to cover in the Time Sync ad hoc group a question regarding normative requirements for Working Clock at Grandmaster when it is a “following machine”, matching a “leading machine”.
### Relevant Normative Requirements

<table>
<thead>
<tr>
<th>Topic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum fractional frequency offset relative to the TAI frequency for LocalClock used for timeReceiver</td>
<td>-50 ppm to +50 ppm</td>
</tr>
<tr>
<td>Maximum fractional frequency offset relative to the TAI frequency for LocalClock used for Grandmaster</td>
<td>-25 ppm to +25 ppm</td>
</tr>
<tr>
<td>Maximum fractional frequency offset relative to the TAI frequency for ClockTarget</td>
<td>-50 ppm to +50 ppm</td>
</tr>
<tr>
<td>Maximum absolute value of rate of change of fractional frequency offset for LocalClock</td>
<td>≤ 1.35 ppm/s</td>
</tr>
<tr>
<td>Maximum absolute value of rate of change of fractional frequency offset for ClockTarget</td>
<td>≤ 3 ppm/s</td>
</tr>
<tr>
<td>Total range of frequency adjustment for ClockTarget used for Global Time</td>
<td>+/-1000 ppm over any observation interval of 1 ms</td>
</tr>
<tr>
<td></td>
<td>(≤ 1 μs over an interval of 1 ms)</td>
</tr>
<tr>
<td>Total range of frequency adjustment for ClockTarget used for Working Clock</td>
<td>+/-250 ppm over any observation interval of 1 ms</td>
</tr>
<tr>
<td></td>
<td>(≤ 250 ns over an interval of 1 ms)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Clock, range of fractional frequency offset relative to the nominal frequency</td>
<td>-50 ppm to +50 ppm</td>
</tr>
<tr>
<td>Local Clock, range of rate of change of fractional frequency offset</td>
<td>-1.35 ppm/s to +2.12 ppm/s</td>
</tr>
<tr>
<td>Working Clock at Grandmaster PTP Instance (acting as ClockSource), range of fractional frequency offset relative to the nominal frequency</td>
<td>-50 ppm to +50 ppm</td>
</tr>
<tr>
<td>Working Clock at Grandmaster PTP Instance, range of rate of change of fractional frequency offset</td>
<td>-1.35 ppm/s to +2.12 ppm/s</td>
</tr>
<tr>
<td>Working Clock at PTP End Instance, maximum value of frequency adjustment</td>
<td>±250 ppm over any observation interval of 1 ms</td>
</tr>
<tr>
<td>Global Time at Grandmaster PTP Instance (acting as ClockSource), range of fractional frequency offset relative to the nominal frequency</td>
<td>-200 ppm to +200 ppm</td>
</tr>
<tr>
<td>Global Time at Grandmaster PTP Instance, range of rate of change of fractional frequency offset</td>
<td>-10 ppm/s to +10 ppm/s</td>
</tr>
<tr>
<td>Global Time at PTP End Instance, maximum value of frequency adjustment</td>
<td>±1000 ppm over any observation interval of 1 ms</td>
</tr>
</tbody>
</table>
Internal Working Clock @ GM

- Working Clock @ GM: ±50 ppm, -1.35 to +2.12 ppm/s
- Local Clock: ±50 ppm, -1.35 to +2.12 ppm/s
- Clock Time Receiver: ±250 ppm over 1ms interval

802.1AS

- PTP Relay 1: Local Clock
- PTP Relay 2: Local Clock
- PTP Relay 3: Local Clock
- End Station 4: Local Clock
External Working Clock @ GM

- Working Clock @ GM
- ±50 ppm
- -1.35 to +2.12 ppm/s

802.1AS

- ±50 ppm
- -1.35 to +2.12 ppm/s

- ±250 ppm over 1ms interval

ClockTimeTransmitter

Local Clock

GM

0

PTP Relay

1

PTP Relay

2

PTP Relay

3

End Station

4
External Working Clock @ GM

- Working Clock @ GM
- ±50 ppm
- -1.35 to +2.12 ppm/s
- ±250 ppm over 1ms interval
- ±250 ppm over 1ms interval + ?

802.1AS

- Working Clock over 1ms interval

- Local Clock
- ClockTimeTransmitter
- ClockTimeReceiver

- End Station
- PTP Relay
- GM
External Working Clock @ GM

- Working Clock @ End Station
- Local Clock
- ClockTimeReceiver
- ClockTimeTransmitter
- End Station
- PTP Relay
- 802.1AS
- ±250 ppm over 1ms interval
- ±50 ppm -1.35 to +2.12 ppm/s
- ±50 ppm over 1ms interval + ???
Thank you!