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Xilinx ZCU102 with Renesas ClockMatrix, ITU-T G.8261

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## 1. Results Summary

| Standard | Test Case                                                   | Results                |
|----------|-------------------------------------------------------------|------------------------|
| G.8261   | Noise Generation                                            | Pass                   |
| G.8261   | Holdover                                                    | Pass                   |
| G.8261   | Test Case 12 (SyncE Assist)                                 | Pass                   |
| G.8261   | Test Case 13 Network Traffic Model 2 (SyncE Assist)         | Pass                   |
| G.8261   | Test Case 14 Network Traffic Model 2 (SyncE Assist)         | Pass                   |
| G.8261   | Test Case 15 Network Traffic Model 2 (SyncE Assist)         | Pass                   |
| G.8261   | Test Case 16 Network Traffic Model 2 (SyncE Assist)         | Pass                   |
| G.8261   | Test Case 17 (10μs) Network Traffic Model 2 (SyncE Assist)  | Pass                   |
| G.8261   | Test Case 17 (200μs) Network Traffic Model 2 (SyncE Assist) | Pass                   |
| G.8261   | Test Case 12                                                | Pass                   |
| G.8261   | Test Case 13 Network Traffic Model 2                        | Pass                   |
| G.8261   | Test Case 14 Network Traffic Model 2                        | Pass                   |
| G.8261   | Test Case 15 Network Traffic Model 2                        | Pass                   |
| G.8261   | Test Case 16 Network Traffic Model 2                        | Pass                   |
| G.8261   | Test Case 17 (10μs) Network Traffic Model 2                 | Pass                   |
| G.8261   | Test Case 17 (200μs) Network Traffic Model 2                | Pass                   |
| G.8261   | Test Case12 Network Traffic Model 2 (SinglePath)            | Pass                   |
| G.8261   | Test Case13 Network Traffic Model 2 (SinglePath)            | <b>Fail</b> (expected) |
| G.8261   | Test Case14 Network Traffic Model 2 (SinglePath)            | <b>Fail</b> (expected) |
| G.8261   | Test Case15 Network Traffic Model 2 (SinglePath)            | Pass                   |
| G.8261   | Test Case16 Network Traffic Model 2 (SinglePath)            | Pass                   |
| G.8261   | Test Case17b (10μs) Network Traffic Model 2 (SinglePath)    | Fail (expected)        |
| G.8261   | Test Case17b (200μs) Network Traffic Model 2 (SinglePath)   | <b>Fail</b> (expected) |

### 1.1 Notes on Testing with SyncE Assistance

SyncE from the Calnex measurement equipment (Paragon Neo and Paragon X) is used as the physical layer assistance for each test in this report. The quality level of the SyncE level is manually set greater than or equal to the quality level threshold in the PCM4L Json configuration file.

```
"physicalPllClockCategory": 1,
"physicalPllClockCategoryThreshold": 1,
```

The SyncE recovered clock is an input to a DPLL channel running in DPLL Mode with the G.8262 EEC1 preset. The output from this DPLL is filtered (3mHz filter bandwidth) and used as a combo source for the PTP DPLL.

## 1.2 Notes on Testing with a Physical Layer Clock

FTS and PTS with SyncE Assistance test both use a SyncE clock from the test equipment as an additional clock source. In both cases, a DPLL (configured for ITU-T G.8262 EEC1) is locked to the SyncE source and is connected to the PTP DPLL via the combo bus. For FTS there is no filter on the combo bus connection. For PTS with SyncE Assistance there is a 3mHz filter on the combo bus connection.

Synced software is used to manage the SyncE clock based on the QL level from the test equipment for tests required a physical layer clock. A category 1 (QL-PRTC) SyncE source from the test equipment is connected to the SyncE input on Clock Matrix and is qualified before PTP (PCM4L/PTP4I) is started.

## 1.3 Notes on Single Path Operation

When operating in single path mode, only the Sync packets from the master are used for timing. This results in an unknown floor delay. A floor delay is manually entered by the user in the PCM4L Json file:

```
"floorDelayEstimateSeconds": 0.000008800,
```

The test description contains the floor delay estimate used in each case. The floor delay estimate changes depending on the PDV pattern being tested as well as the inherent delay in the measurement device.

## 2. Test Configuration

Table 1. Test Configuration 1

|                                   |                     |
|-----------------------------------|---------------------|
| Device Under Test                 | Xilinx + CM         |
| Oscillator                        | Rakon M6141 TCXO    |
| 1pps Source                       | Symmetricom TP5000  |
| Instrument                        | Paragon Neo         |
| Instrument Serial Number          | 36081               |
| Ethernet Interface                | Optical             |
| CAT Version                       | 27.0.21154.2116 [S] |
| Sections using this Configuration | 3, 4, 13, 19, 25    |

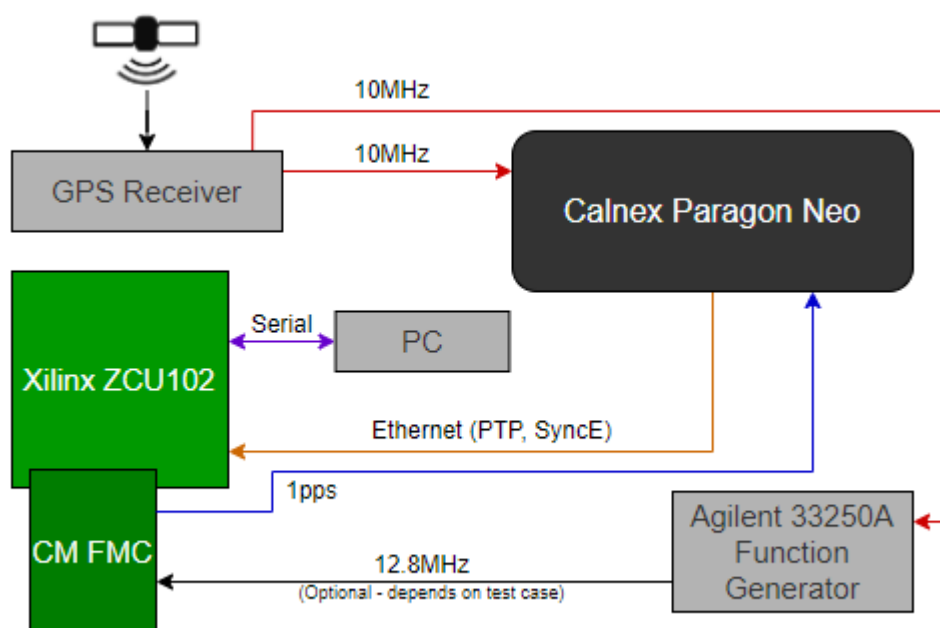


Figure 1. Equipment Configuration 1

Table 2. Test Configuration 2

|                                   |                     |
|-----------------------------------|---------------------|
| Device Under Test                 | Xilinx + CM         |
| Oscillator                        | Rakon M6141 TCXO    |
| 1pps Source                       | Symmetricom TP5000  |
| Instrument                        | Paragon X           |
| Instrument Serial Number          | 25060               |
| Ethernet Interface                | Optical             |
| CAT Version                       | 27.0.21154.2116 [S] |
| Sections using this Configuration | 5–11, 14, 20–24     |

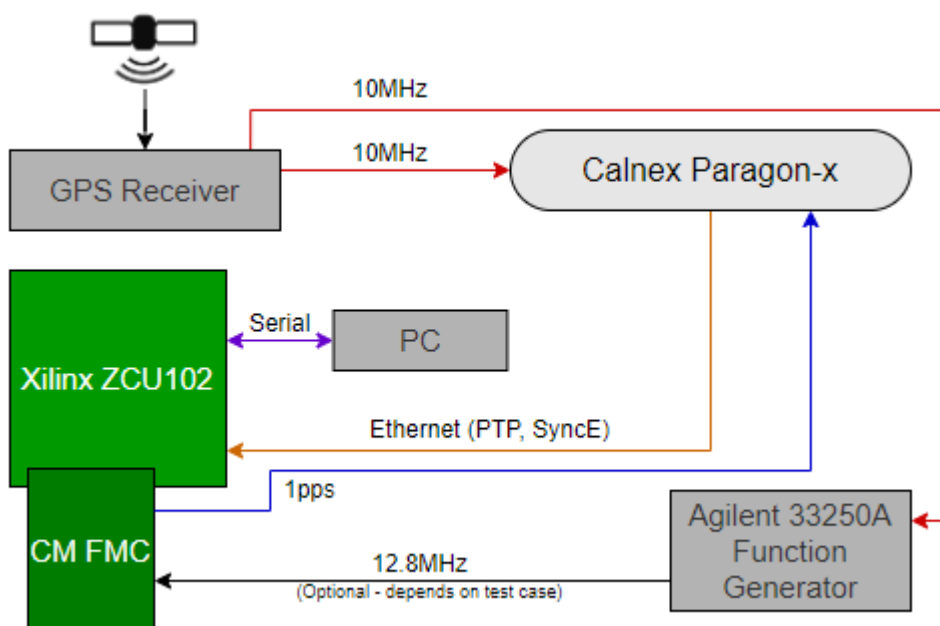


Figure 2. Equipment Configuration 2

Table 3. Test Configuration 3

|                                   |                          |
|-----------------------------------|--------------------------|
| Device Under Test                 | Xilinx + CM              |
| 1pps Source                       | Symmetricom TP5000       |
| Software Version                  | 4.2.1-rc7                |
| Instrument                        | Paragon X                |
| Instrument Serial Number          | 25060                    |
| Ethernet Interface                | Optical                  |
| CAT Version                       | 28.10.22111.2025 [S] (C) |
| Sections using this Configuration | 12, 15                   |

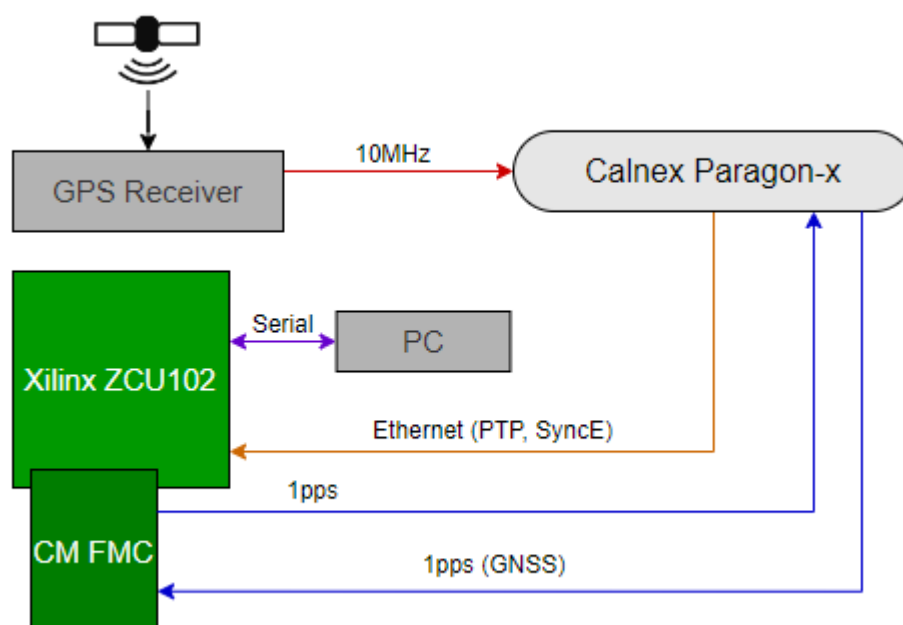


Figure 3. Equipment Configuration 3



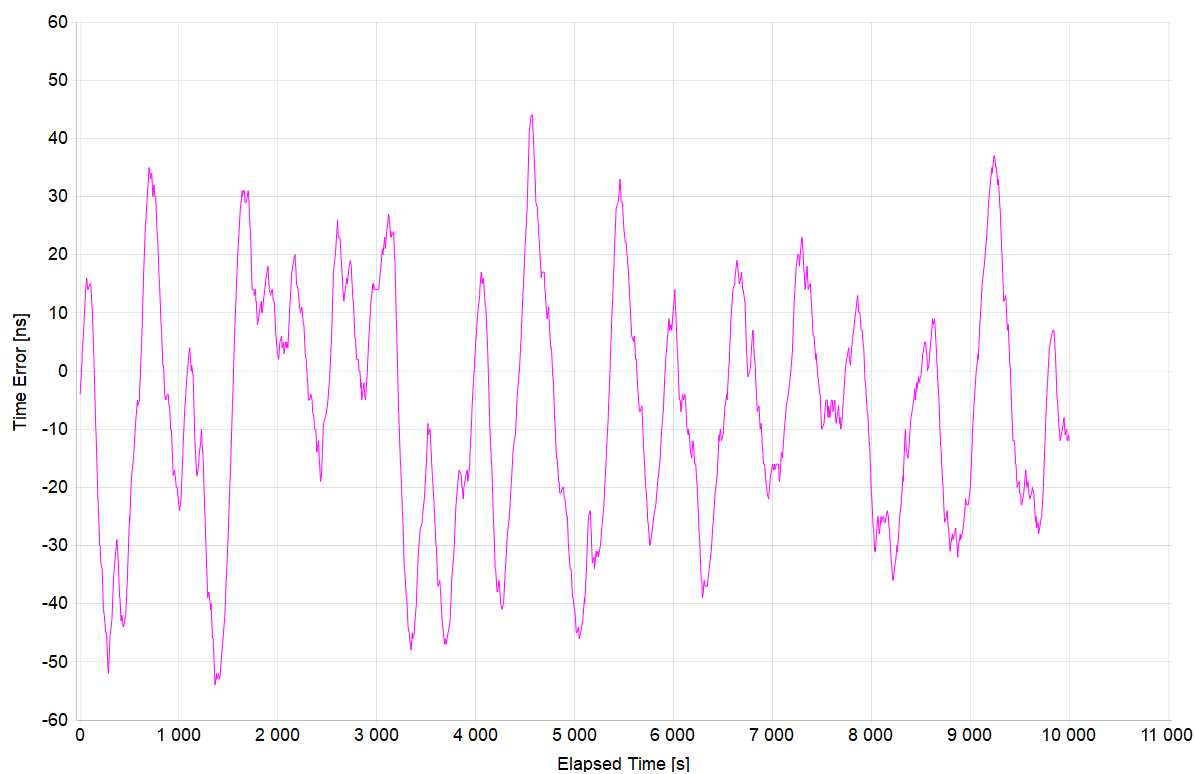
### 3. G.8261: Noise Generation

|                        |                       |
|------------------------|-----------------------|
| Test Description       | Noise Generation      |
| Report Date            | 22-04-27_15-55-48     |
| Packet Rate (pkt/s)    | 16                    |
| Beginning of Test      | 2022-04-05 8:50:09 PM |
| Test Duration          | 02:46:40              |
| Test Configuration     | 1                     |
| Time to Phase Lock (s) | 61                    |

|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Pass                           |
| Mask ONEPPS        |                                |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Pass                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Pass                           |

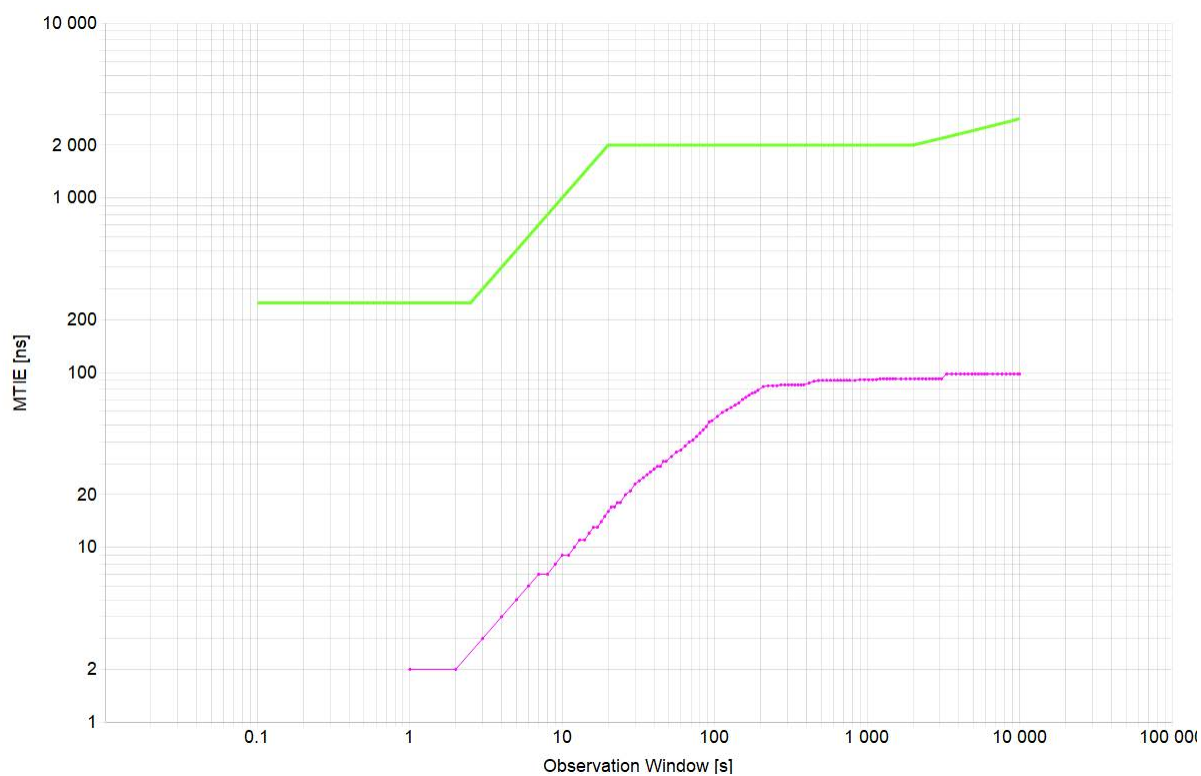
### 3.1 ONEPPS Analysis

|                        |      |
|------------------------|------|
| Offset Removal Applied | On   |
| Zero Offset            | -4ns |



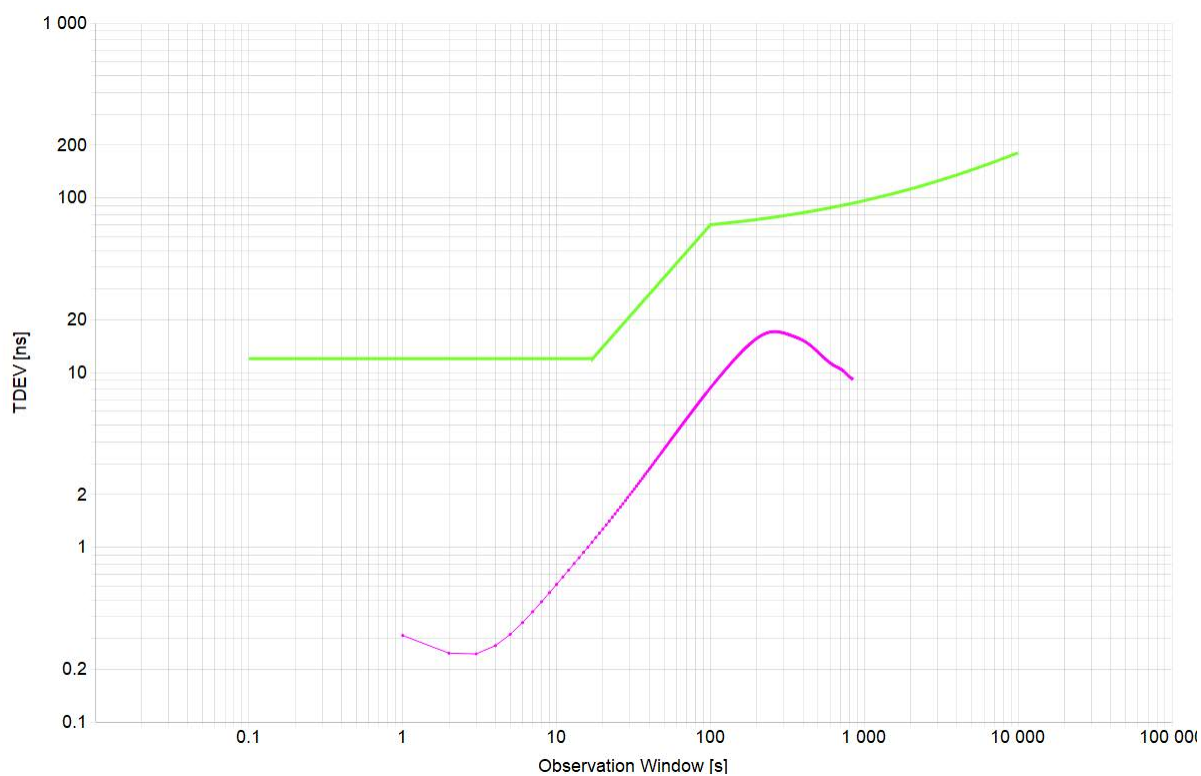
|              |       |
|--------------|-------|
| Mean [ns]    | -6.92 |
| Min [ns]     | -54   |
| Max [ns]     | 44    |
| Max-Min [ns] | 98    |

## 3.2 MTIE Analysis



|              |    |
|--------------|----|
| Min [ns]     | 2  |
| Max [ns]     | 98 |
| Max-Min [ns] | 96 |

### 3.3 TDEV Analysis



|              |        |
|--------------|--------|
| Min [ns]     | 0.245  |
| Max [ns]     | 17.127 |
| Max-Min [ns] | 16.882 |

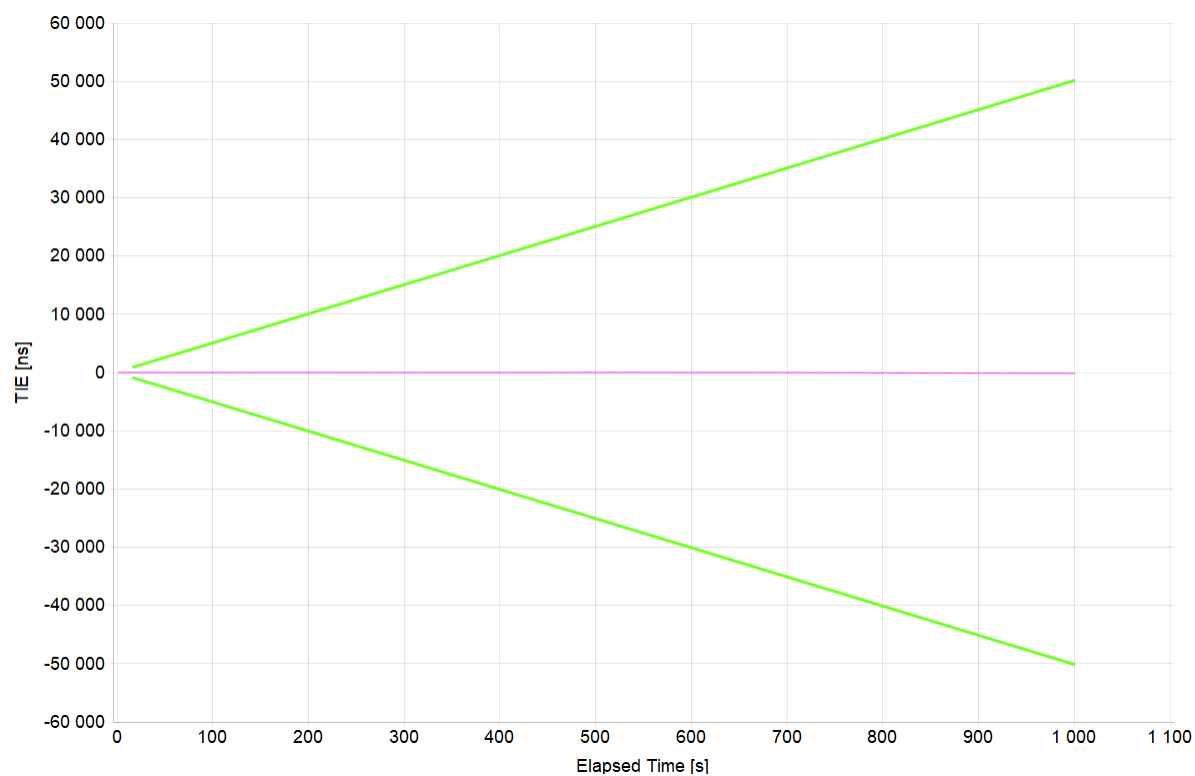
## 4. G.8261: Holdover

|                        |                       |
|------------------------|-----------------------|
| Test Description       | Holdover              |
| Report Date            | 22-04-27_15-55-48     |
| Packet Rate (pkt/s)    | 16                    |
| Beginning of Test      | 2022-04-05 8:50:09 PM |
| Test Duration          | 00:16:40              |
| Test Configuration     | 1                     |
| Time to Phase Lock (s) | N/A                   |

|                  |                                                      |
|------------------|------------------------------------------------------|
| All Mask Results | Pass                                                 |
| Mask TIE         | G.8262 EEC Opt. 1 Long-Term Holdover<br>Const. Temp. |
| Mask TIE Result  | Pass                                                 |

1. This test is a continuation of the previous Noise Generation test. This allows for an appropriate amount of settling time before collecting holdover data (10 000s). The results are split because holdover requires a different mask than noise generation.

## 4.1 TIE Analysis



|              |         |
|--------------|---------|
| Mean [ns]    | -36.272 |
| Min [ns]     | -155    |
| Max [ns]     | 2       |
| Max-Min [ns] | 157     |

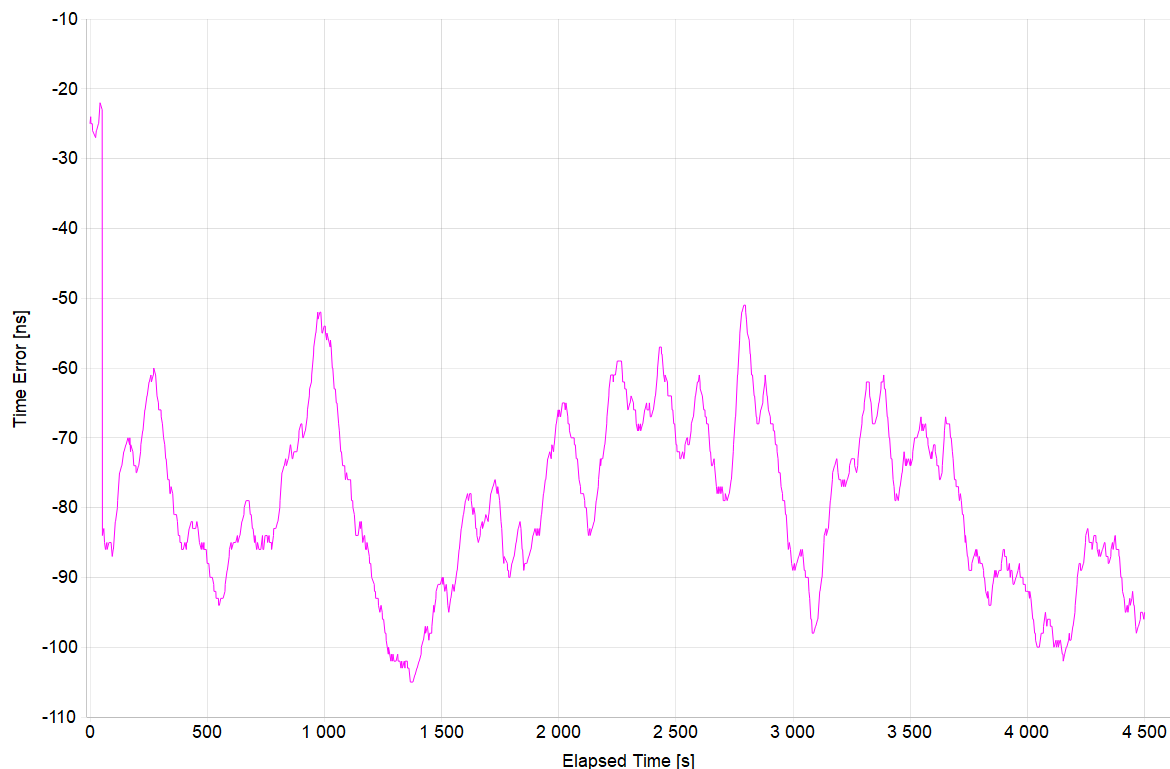
## 5. G.8261: Test Case 12 (SyncE Assist)

|                        |                   |
|------------------------|-------------------|
| Test Description       | Test Case 12      |
| Report Date            | 22-04-27_17-35-10 |
| Packet Rate (pkt/s)    | 16                |
| Test Duration          | 01:15:00          |
| Time to Phase Lock (s) | 378               |

|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Pass                           |
| Mask ONEPPS        | -                              |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Pass                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Pass                           |

## 5.1 ONEPPS Analysis

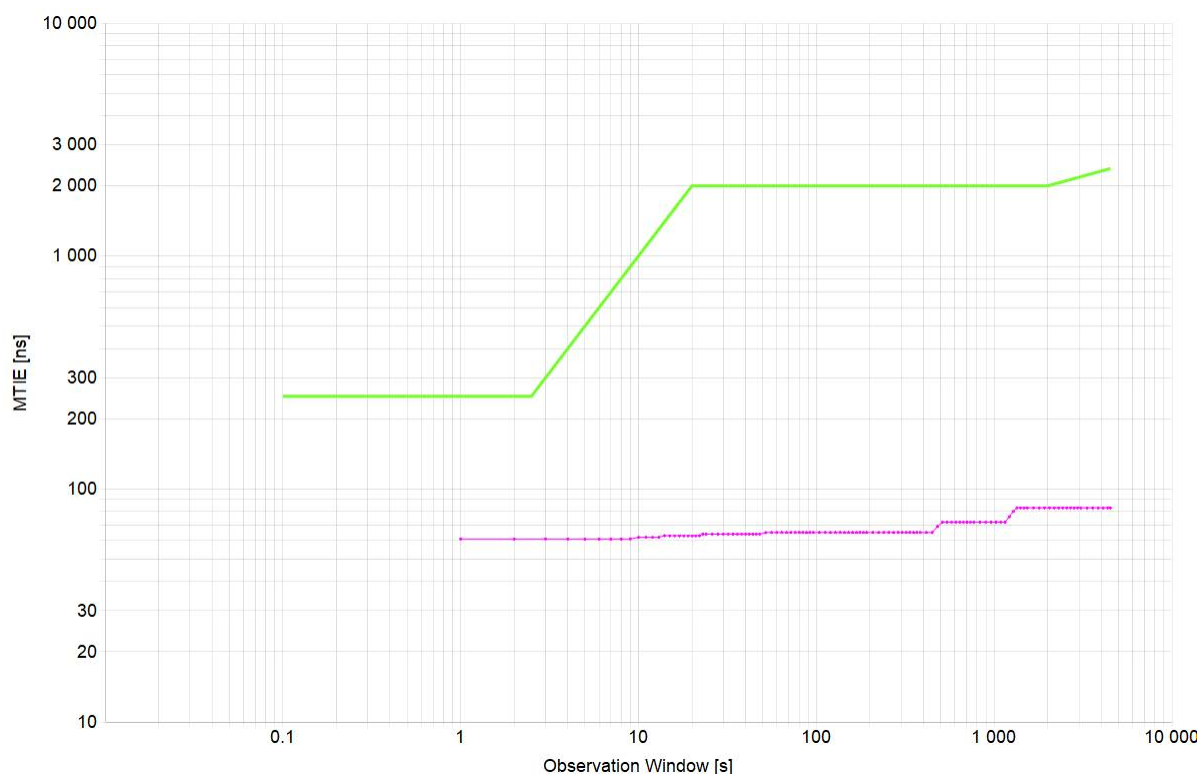
|                        |       |
|------------------------|-------|
| Offset Removal Applied | Off   |
| Zero Offset            | -25ns |



|              |         |
|--------------|---------|
| Mean [ns]    | -78.845 |
| Min [ns]     | -105    |
| Max [ns]     | -22     |
| Max-Min [ns] | 83      |

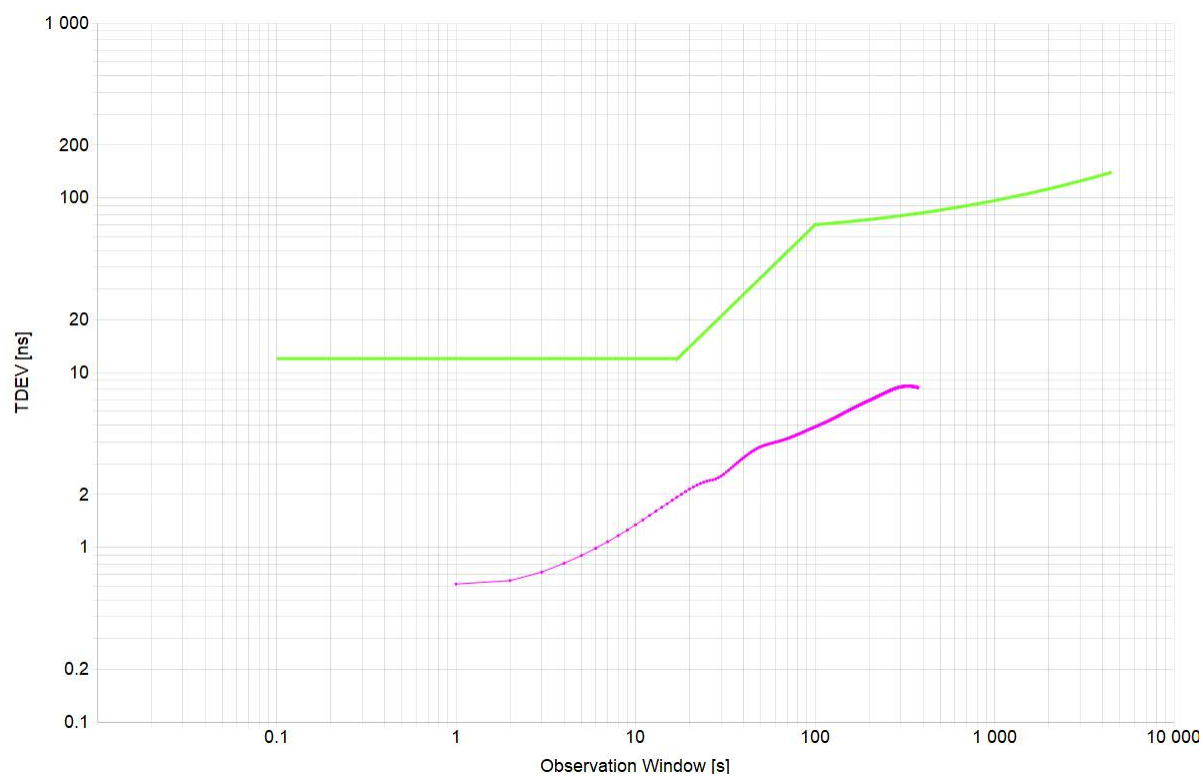


## 5.2 MTIE Analysis



|              |    |
|--------------|----|
| Min [ns]     | 61 |
| Max [ns]     | 83 |
| Max-Min [ns] | 22 |

### 5.3 TDEV Analysis



|              |       |
|--------------|-------|
| Min [ns]     | 0.616 |
| Max [ns]     | 8.357 |
| Max-Min [ns] | 7.741 |

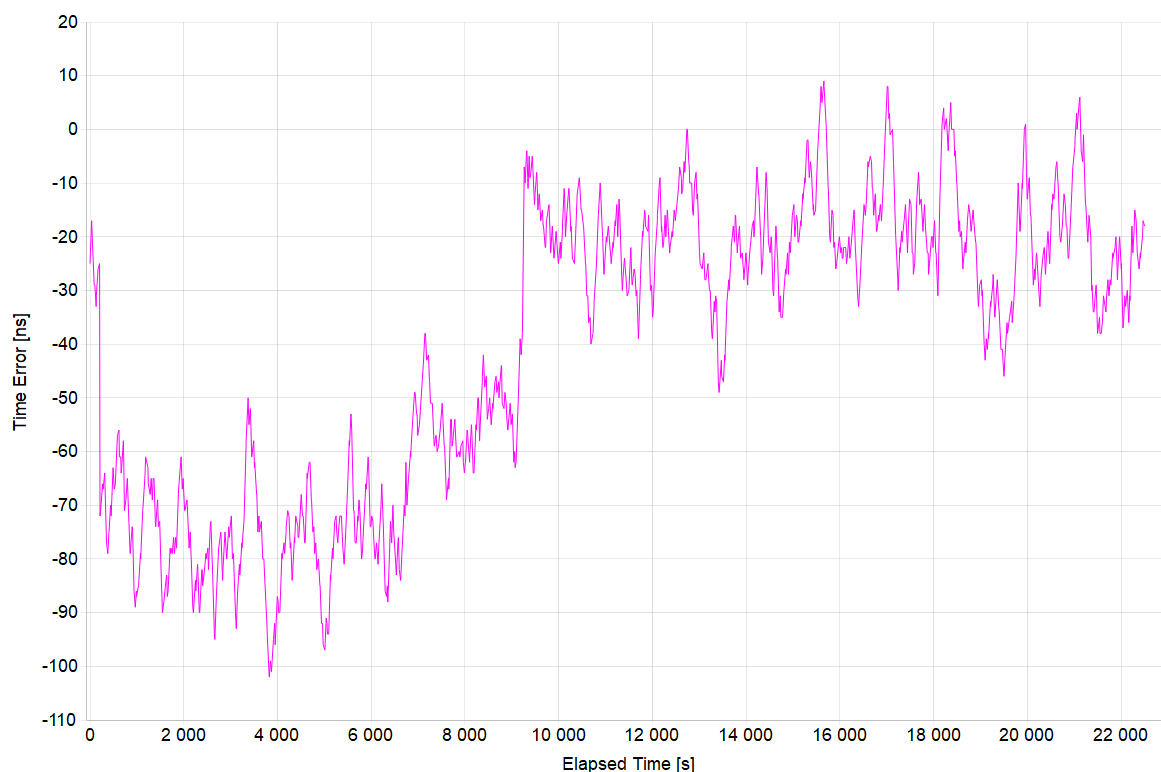
## 6. G.8261: Test Case 13b (SyncE Assist)

|                        |                   |
|------------------------|-------------------|
| Test Description       | Test Case 13b     |
| Report Date            | 22-04-27_17-35-10 |
| Packet Rate (pkt/s)    | 16                |
| Test Duration          | 06:15:00          |
| Time to Phase Lock (s) | 377               |

|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Pass                           |
| Mask ONEPPS        | -                              |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Pass                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Pass                           |

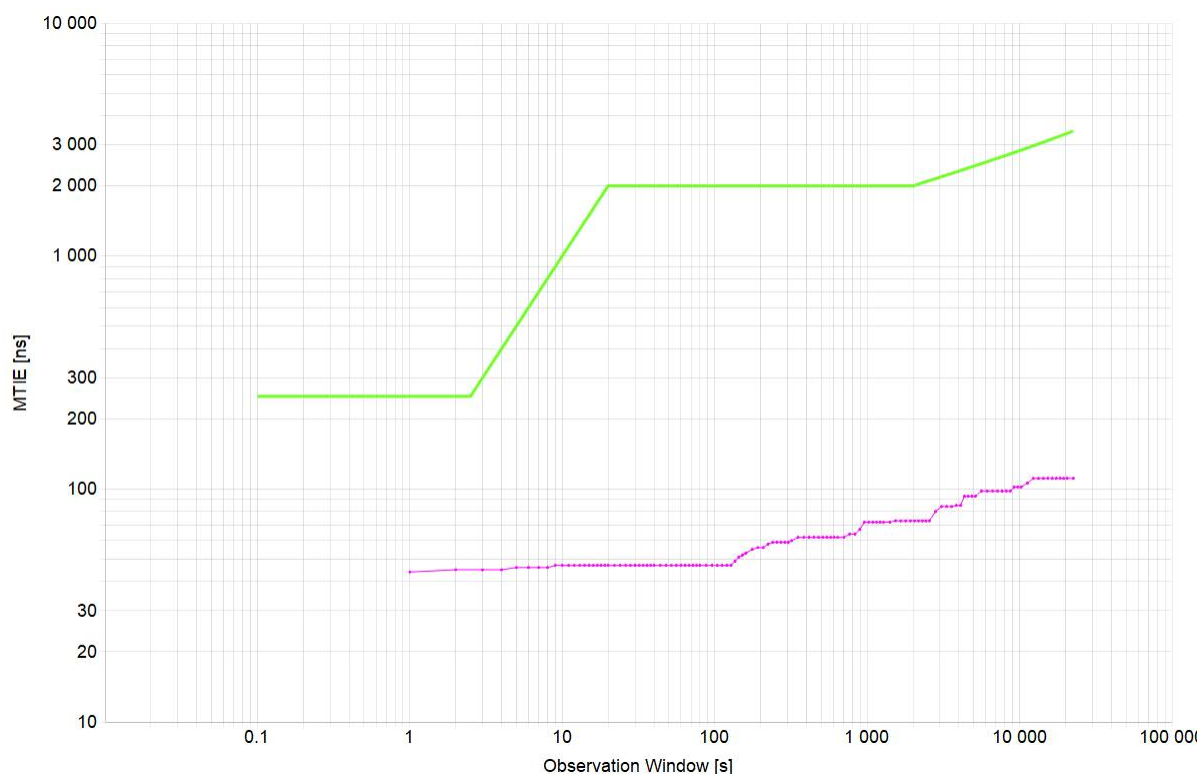
## 6.1 ONEPPS Analysis

|                        |       |
|------------------------|-------|
| Offset Removal Applied | Off   |
| Zero Offset            | -25ns |



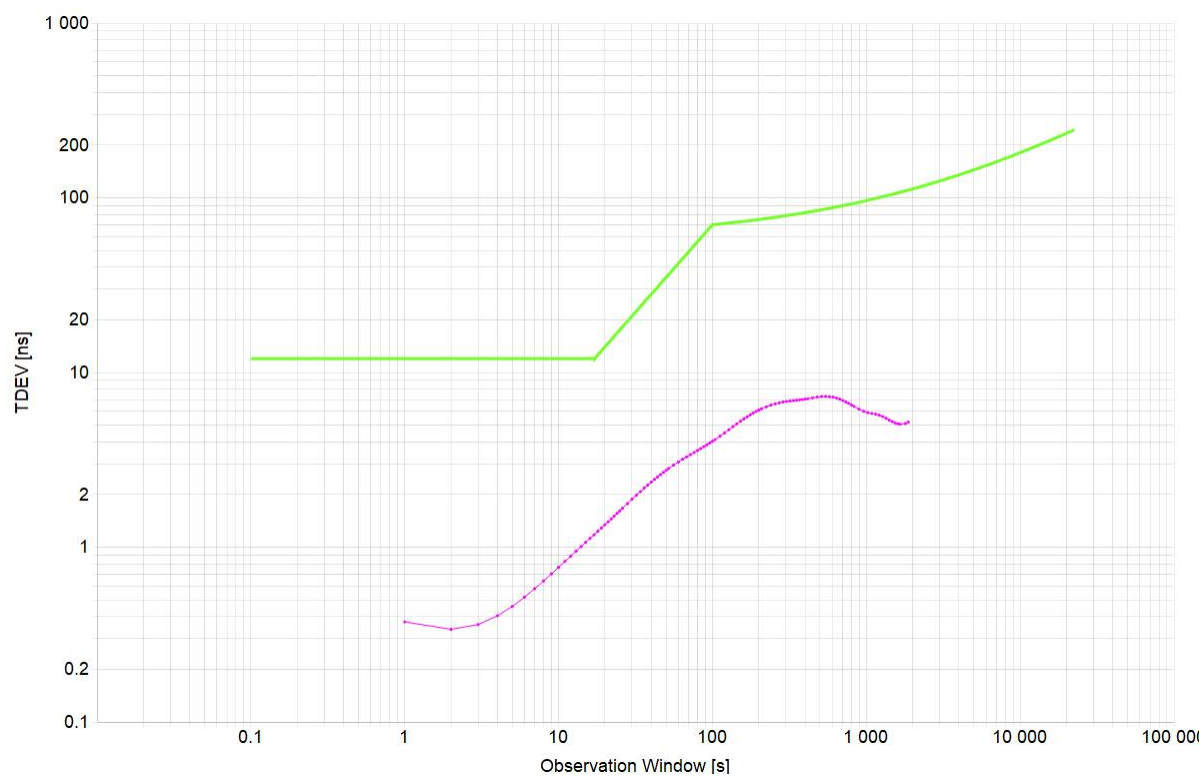
|              |         |
|--------------|---------|
| Mean [ns]    | -39.958 |
| Min [ns]     | -102    |
| Max [ns]     | 9       |
| Max-Min [ns] | 111     |

## 6.2 MTIE Analysis



|              |     |
|--------------|-----|
| Min [ns]     | 44  |
| Max [ns]     | 111 |
| Max-Min [ns] | 67  |

## 6.3 TDEV Analysis



|              |       |
|--------------|-------|
| Min [ns]     | 0.339 |
| Max [ns]     | 7.289 |
| Max-Min [ns] | 6.95  |

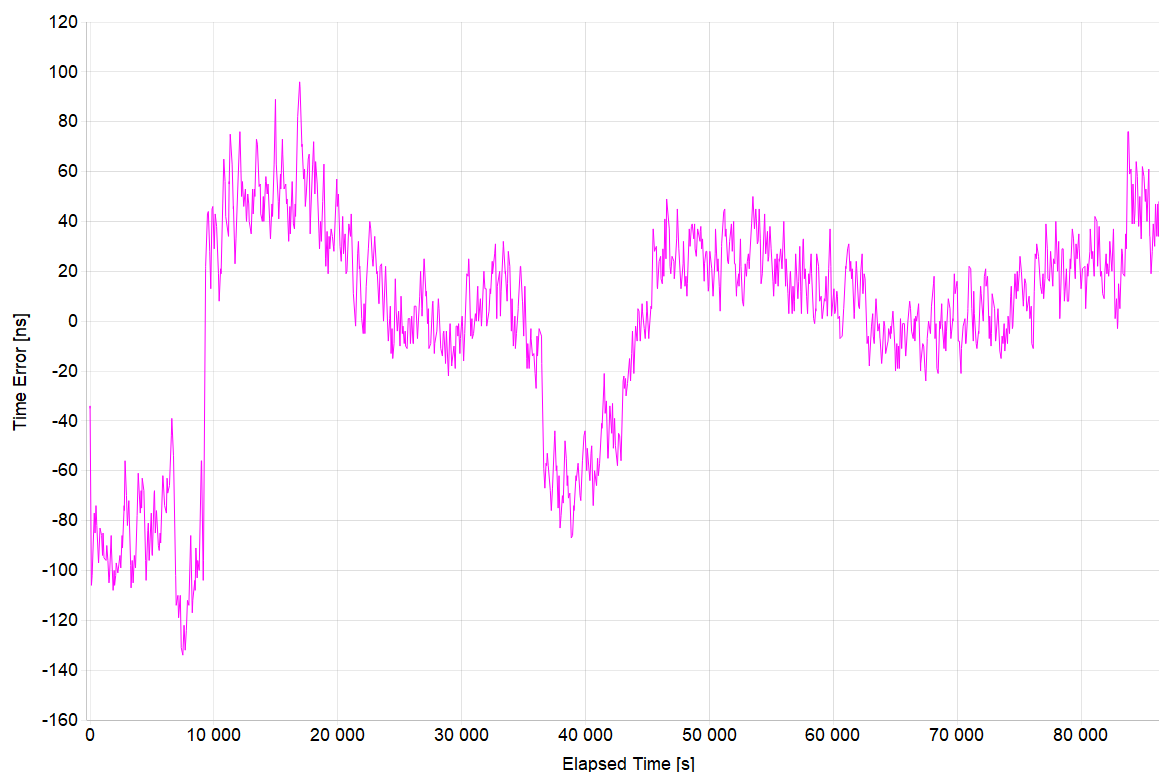
## 7. G.8261: Test Case 14b (SyncE Assist)

|                        |                   |
|------------------------|-------------------|
| Test Description       | Test Case 14b     |
| Report Date            | 22-04-27_17-35-10 |
| Packet Rate (pkt/s)    | 16                |
| Test Duration          | 24:00:01          |
| Time to Phase Lock (s) | 379               |

|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Pass                           |
| Mask ONEPPS        | -                              |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Pass                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Pass                           |

## 7.1 ONEPPS Analysis

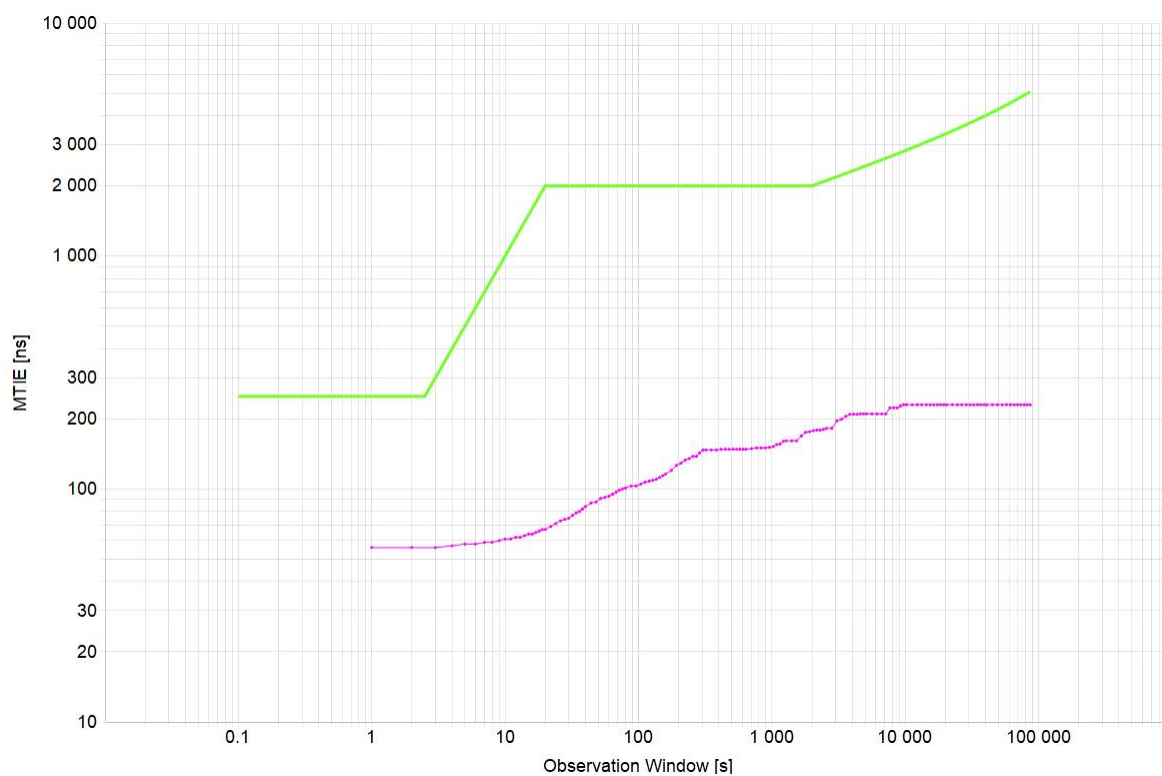
|                        |       |
|------------------------|-------|
| Offset Removal Applied | Off   |
| Zero Offset            | -35ns |



|              |       |
|--------------|-------|
| Mean [ns]    | 0.536 |
| Min [ns]     | -134  |
| Max [ns]     | 96    |
| Max-Min [ns] | 230   |

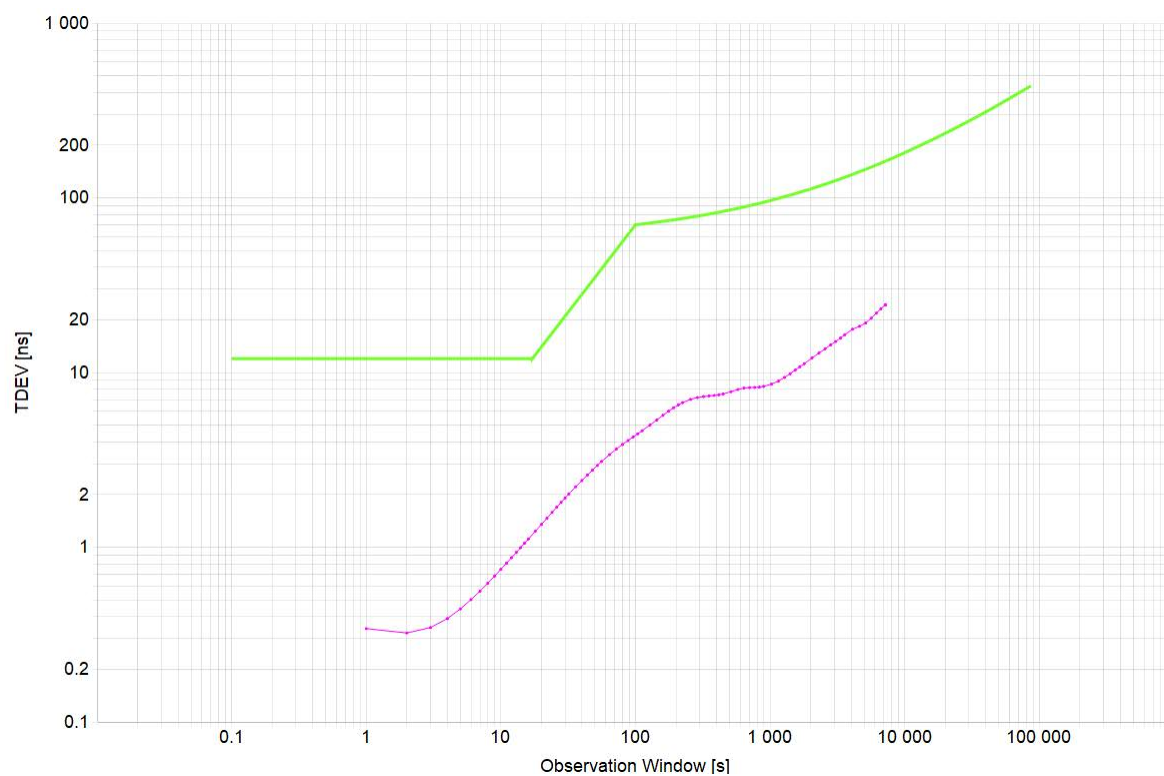


## 7.2 MTIE Analysis



|              |     |
|--------------|-----|
| Min [ns]     | 56  |
| Max [ns]     | 230 |
| Max-Min [ns] | 174 |

## 7.3 TDEV Analysis



|              |        |
|--------------|--------|
| Min [ns]     | 0.323  |
| Max [ns]     | 24.415 |
| Max-Min [ns] | 24.092 |

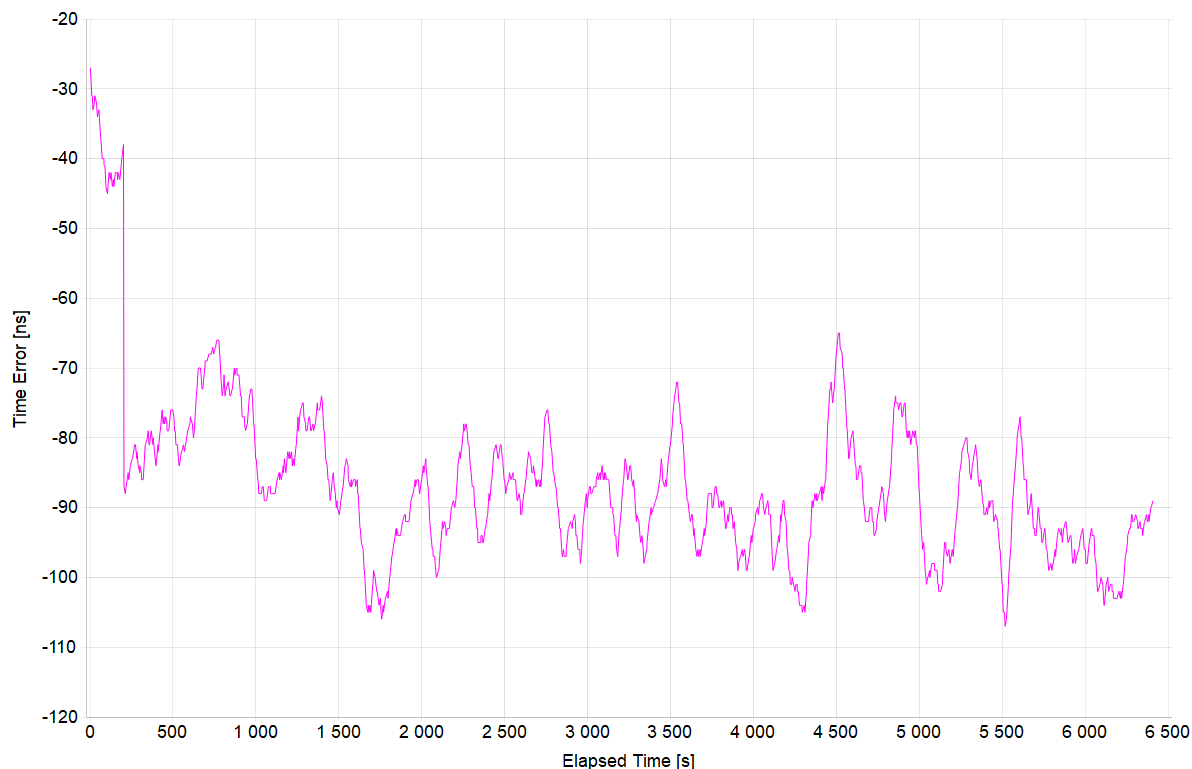
## 8. G.8261: Test Case 15b (SyncE Assist)

|                        |                   |
|------------------------|-------------------|
| Test Description       | Test Case 15b     |
| Report Date            | 22-04-27_17-35-10 |
| Packet Rate (pkt/s)    | 16                |
| Test Duration          | 01:46:50          |
| Time to Phase Lock (s) | 389               |

|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Pass                           |
| Mask ONEPPS        | -                              |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Pass                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Pass                           |

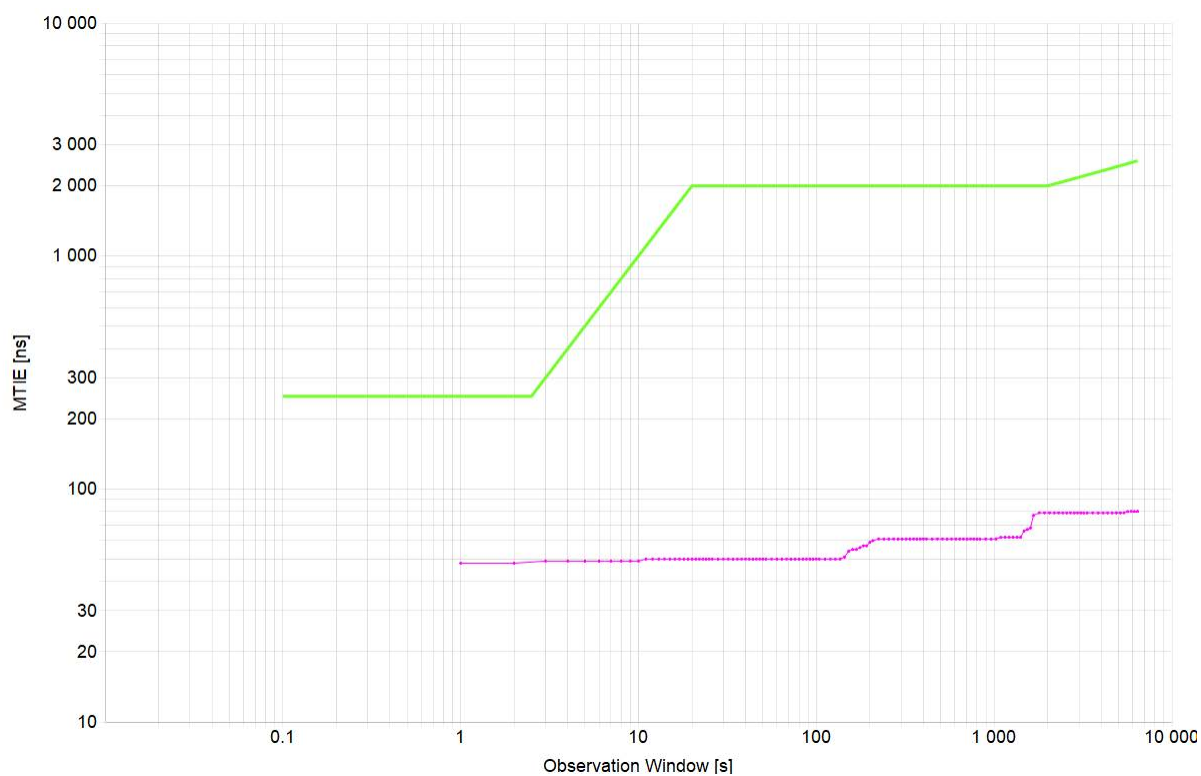
## 8.1 ONEPPS Analysis

|                        |       |
|------------------------|-------|
| Offset Removal Applied | Off   |
| Zero Offset            | -27ns |



|              |         |
|--------------|---------|
| Mean [ns]    | -86.473 |
| Min [ns]     | -107    |
| Max [ns]     | -27     |
| Max-Min [ns] | 80      |

## 8.2 MTIE Analysis



|              |    |
|--------------|----|
| Min [ns]     | 48 |
| Max [ns]     | 80 |
| Max-Min [ns] | 32 |

## 8.3 TDEV Analysis

|              |       |
|--------------|-------|
| Min [ns]     | 0.462 |
| Max [ns]     | 5.596 |
| Max-Min [ns] | 5.135 |

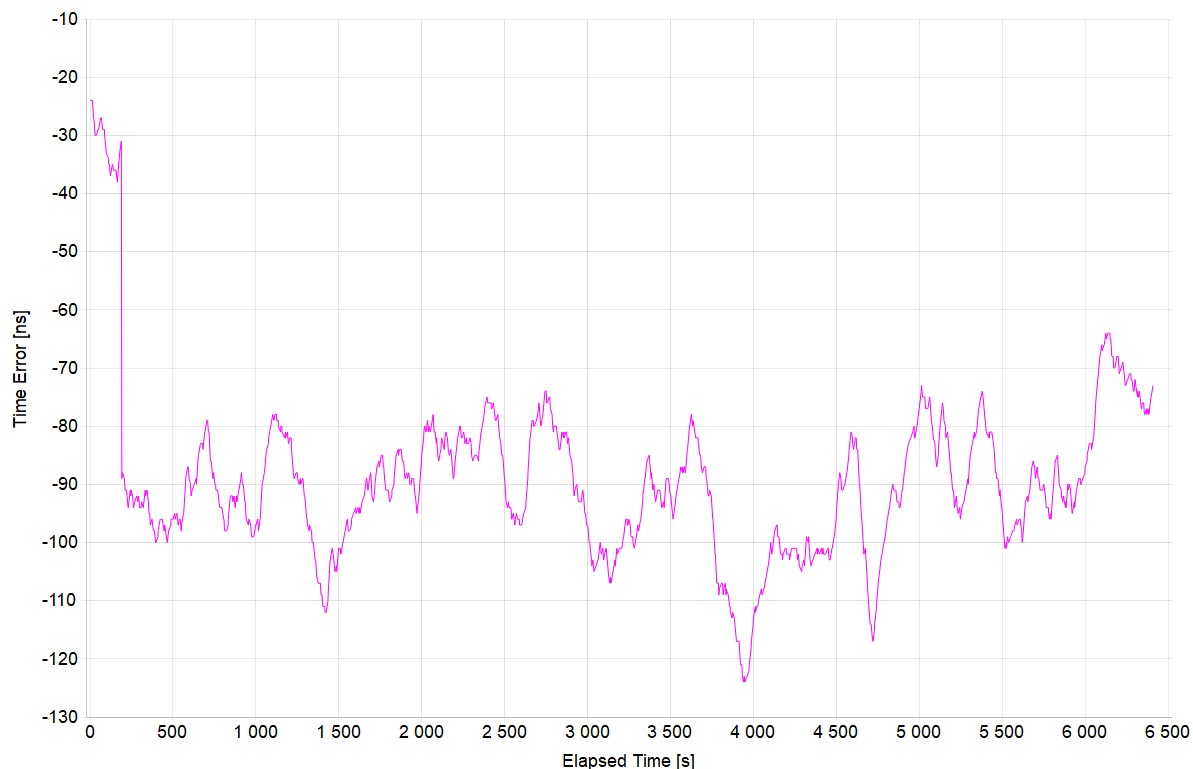
## 9. G.8261: Test Case 16b (SyncE Assist)

|                        |                   |
|------------------------|-------------------|
| Test Description       | Test Case 16b     |
| Report Date            | 22-04-27_17-35-10 |
| Packet Rate (pkt/s)    | 16                |
| Test Duration          | 01:46:50          |
| Time to Phase Lock (s) | 378               |

|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Pass                           |
| Mask ONEPPS        | -                              |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Pass                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Pass                           |

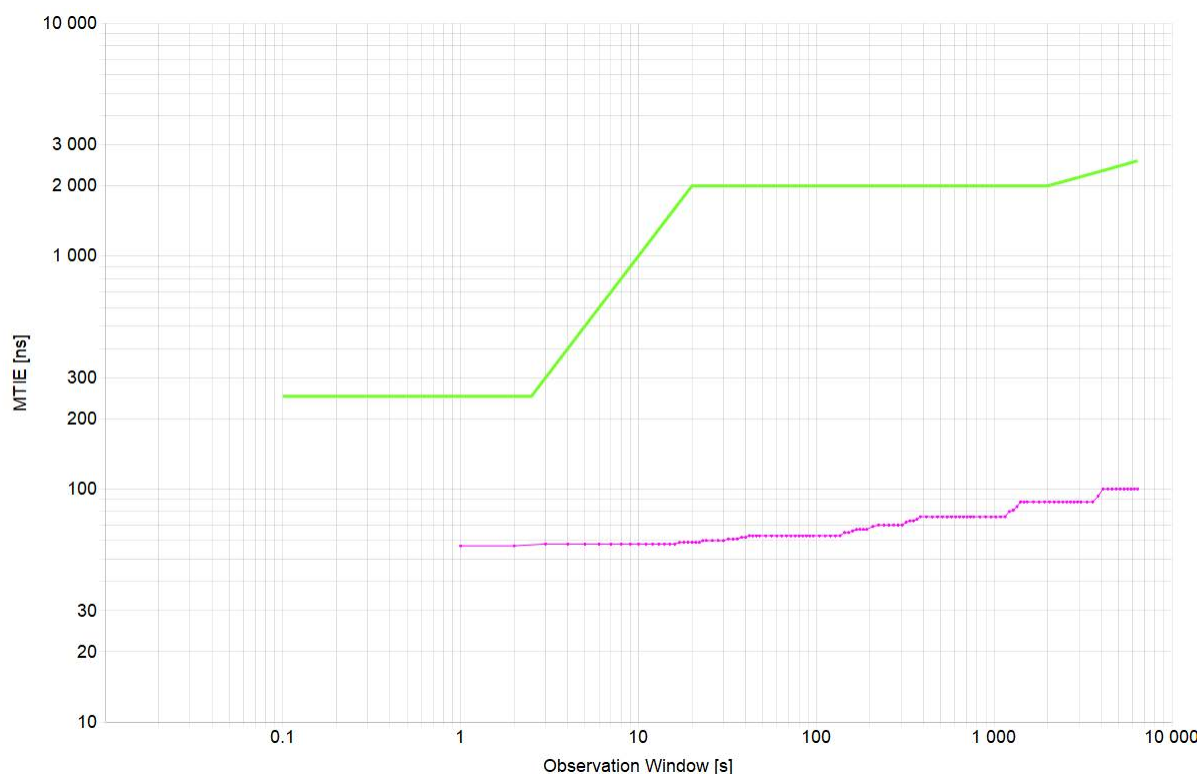
## 9.1 ONEPPS Analysis

|                        |       |
|------------------------|-------|
| Offset Removal Applied | Off   |
| Zero Offset            | -24ns |



|              |         |
|--------------|---------|
| Mean [ns]    | -89.238 |
| Min [ns]     | -124    |
| Max [ns]     | -24     |
| Max-Min [ns] | 100     |

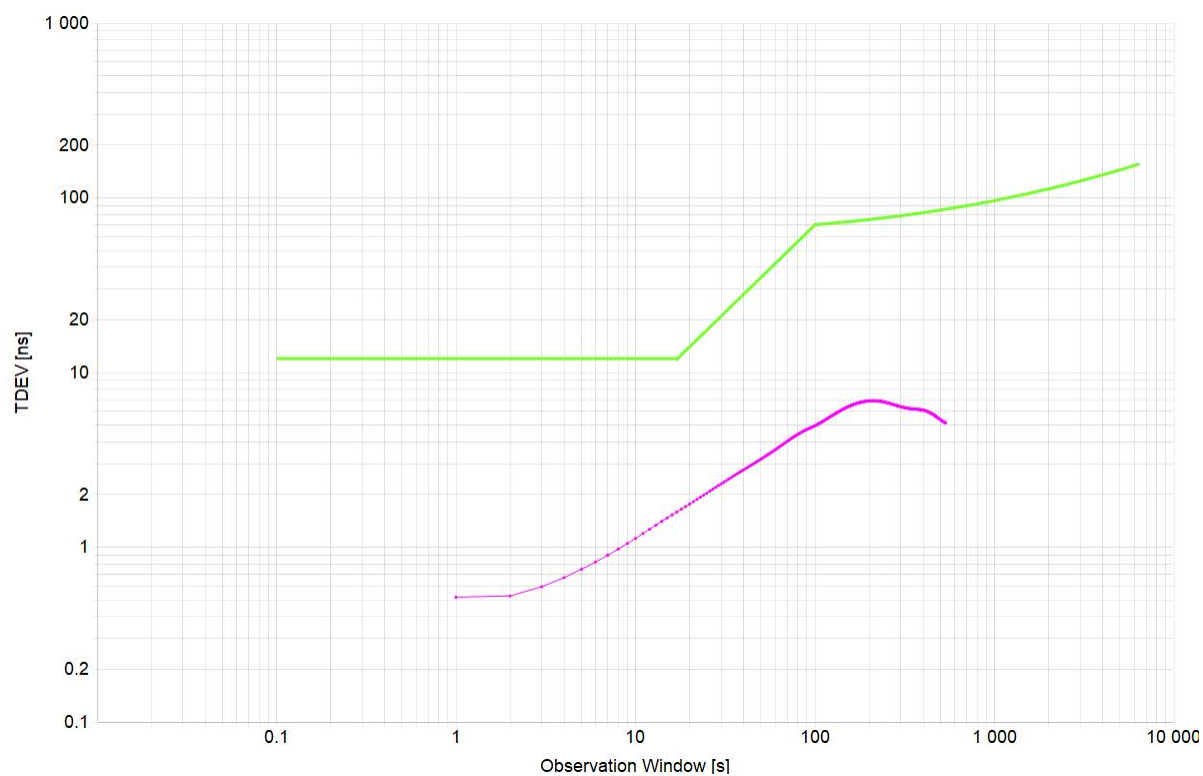
## 9.2 MTIE Analysis



|              |     |
|--------------|-----|
| Min [ns]     | 57  |
| Max [ns]     | 100 |
| Max-Min [ns] | 43  |



### 9.3 TDEV Analysis



|              |       |
|--------------|-------|
| Min [ns]     | 0.517 |
| Max [ns]     | 6.887 |
| Max-Min [ns] | 6.37  |

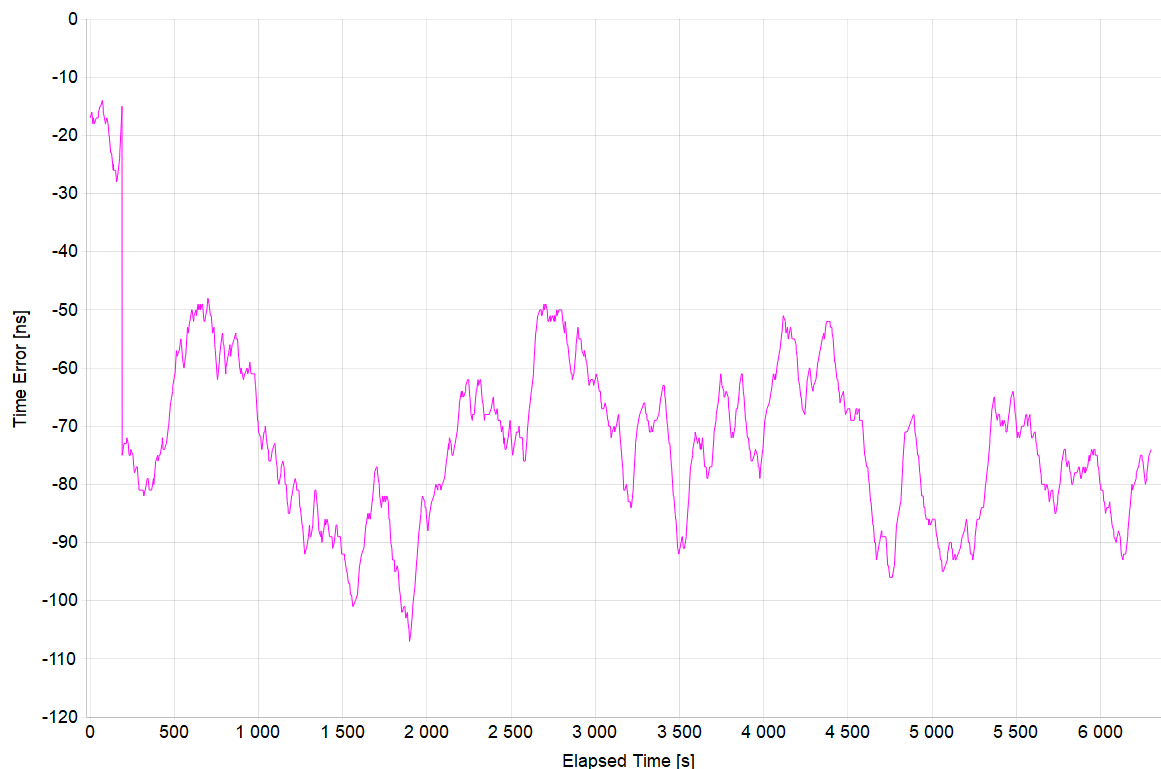
## 10. G.8261: Test Case 17b\_10us (SyncE Assist)

|                        |                    |
|------------------------|--------------------|
| Test Description       | Test Case 17b_10us |
| Report Date            | 22-04-27_17-35-10  |
| Packet Rate (pkt/s)    | 16                 |
| Test Duration          | 01:45:00           |
| Time to Phase Lock (s) | 374                |

|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Pass                           |
| Mask ONEPPS        | -                              |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Pass                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Pass                           |

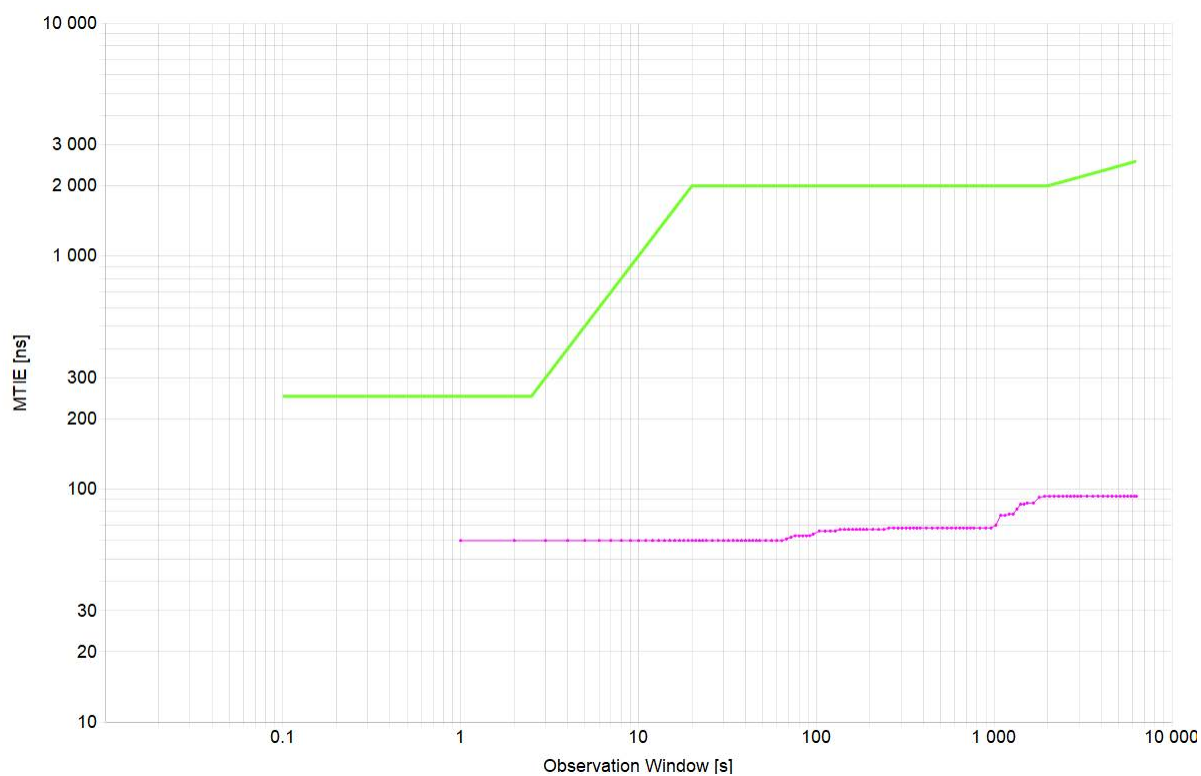
## 10.1 ONEPPS Analysis

|                        |       |
|------------------------|-------|
| Offset Removal Applied | Off   |
| Zero Offset            | -17ns |



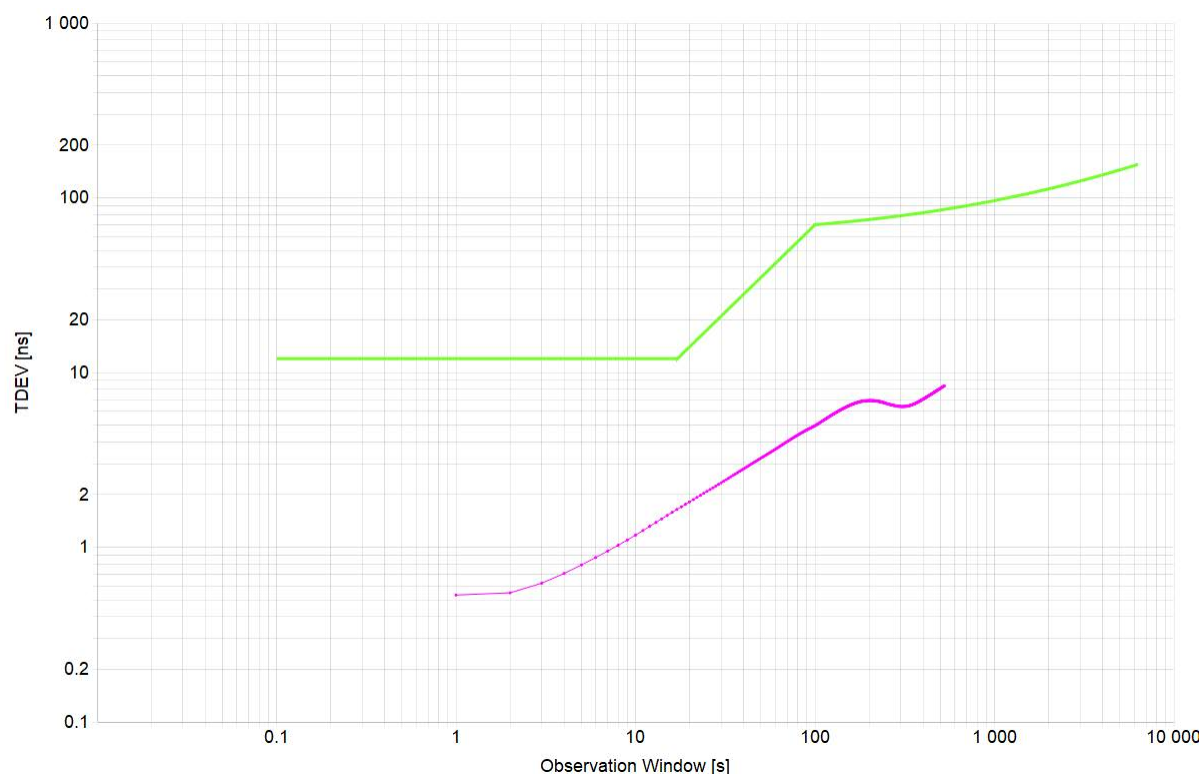
|              |         |
|--------------|---------|
| Mean [ns]    | -72.085 |
| Min [ns]     | -107    |
| Max [ns]     | -14     |
| Max-Min [ns] | 93      |

## 10.2 MTIE Analysis



|              |    |
|--------------|----|
| Min [ns]     | 60 |
| Max [ns]     | 93 |
| Max-Min [ns] | 33 |

## 10.3 TDEV Analysis



|              |       |
|--------------|-------|
| Min [ns]     | 0.532 |
| Max [ns]     | 8.382 |
| Max-Min [ns] | 7.849 |

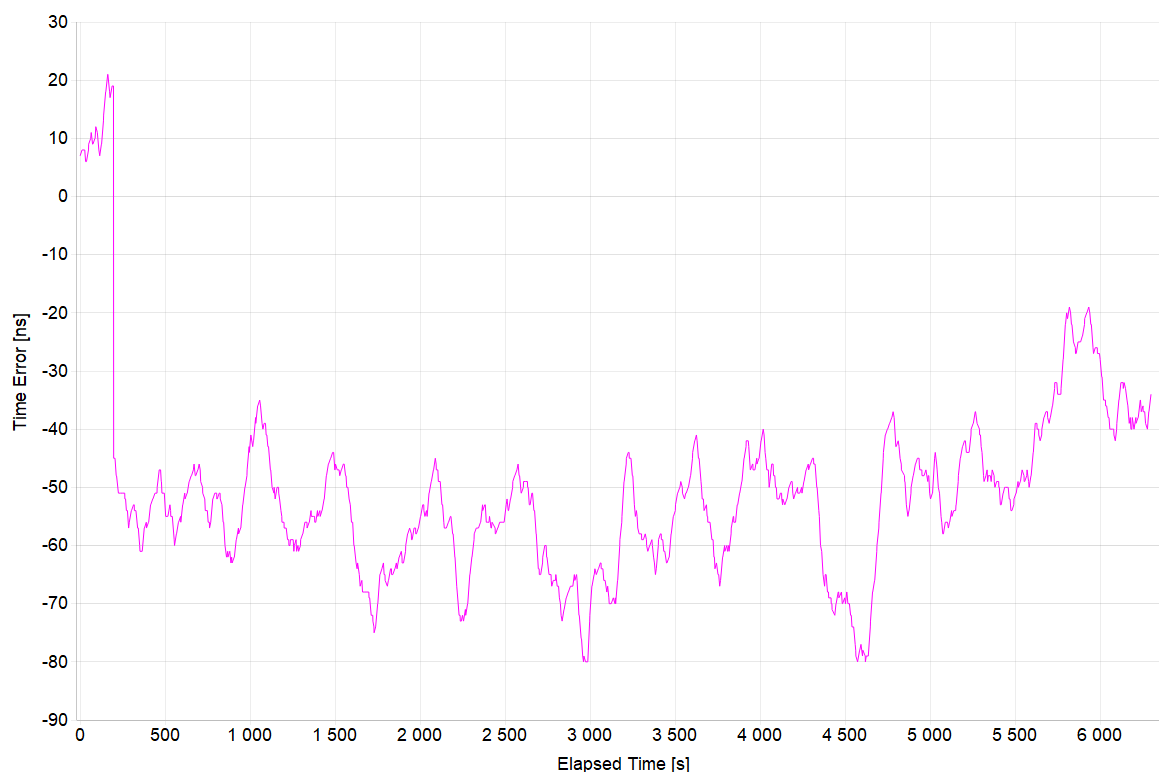
## 11. G.8261: Test Case 17b\_200us (SyncE Assist)

|                        |                     |
|------------------------|---------------------|
| Test Description       | Test Case 17b_200us |
| Report Date            | 22-04-27_17-35-10   |
| Packet Rate (pkt/s)    | 16                  |
| Test Duration          | 01:45:00            |
| Time to Phase Lock (s) | 373                 |

|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Pass                           |
| Mask ONEPPS        | -                              |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Pass                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Pass                           |

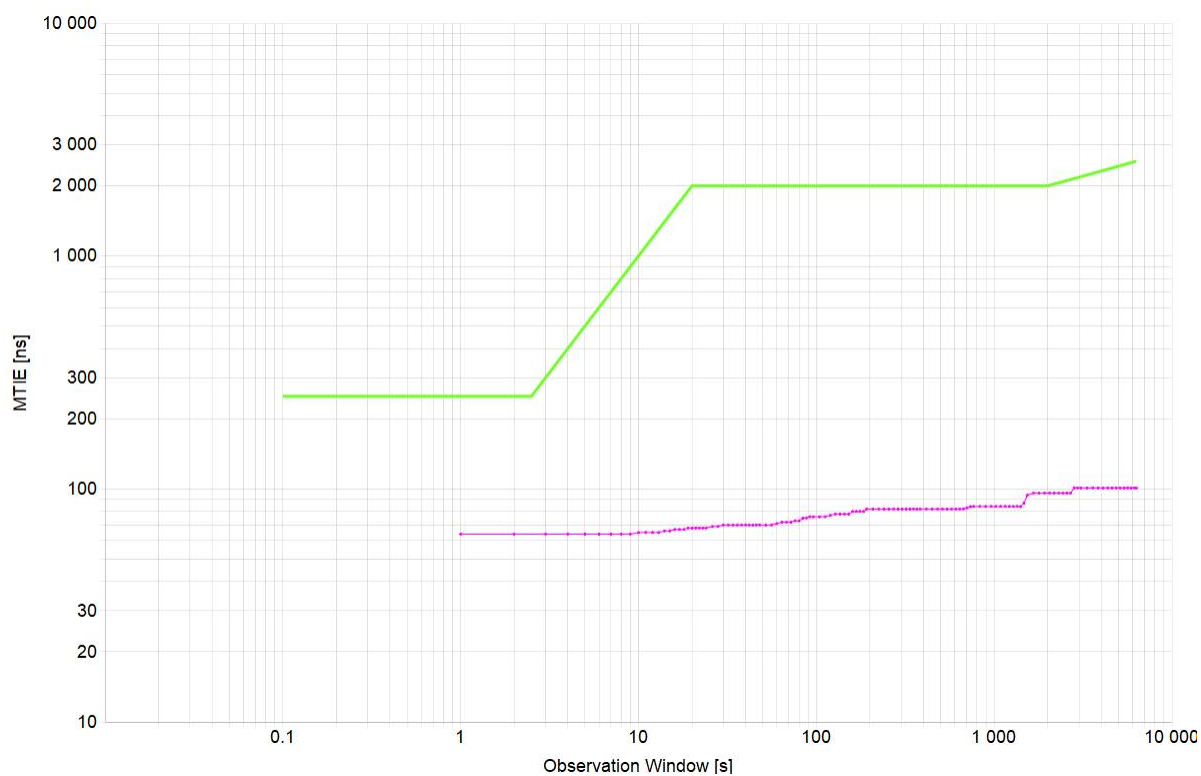
## 11.1 ONEPPS Analysis

|                        |     |
|------------------------|-----|
| Offset Removal Applied | Off |
| Zero Offset            | 7ns |



|              |         |
|--------------|---------|
| Mean [ns]    | -50.782 |
| Min [ns]     | -80     |
| Max [ns]     | 21      |
| Max-Min [ns] | 101     |

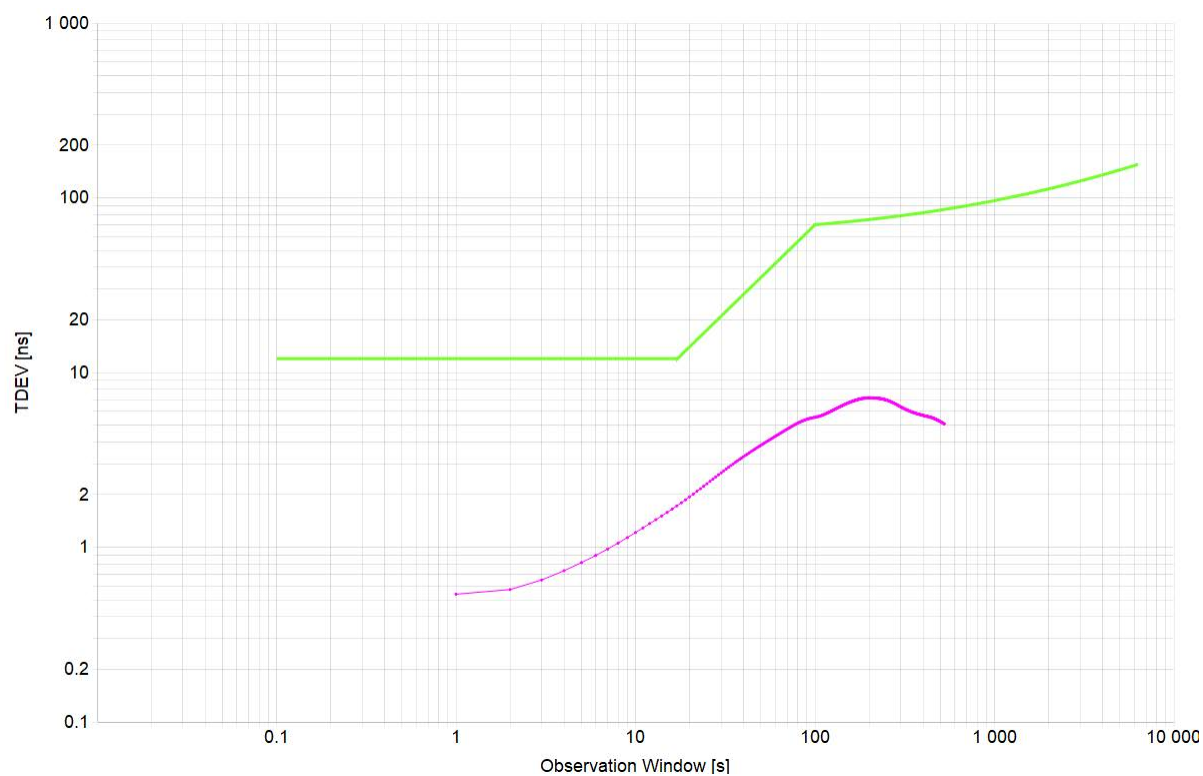
## 11.2 MTIE Analysis



|              |     |
|--------------|-----|
| Min [ns]     | 64  |
| Max [ns]     | 101 |
| Max-Min [ns] | 37  |



## 11.3 TDEV Analysis



|              |       |
|--------------|-------|
| Min [ns]     | 0.538 |
| Max [ns]     | 7.162 |
| Max-Min [ns] | 6.624 |

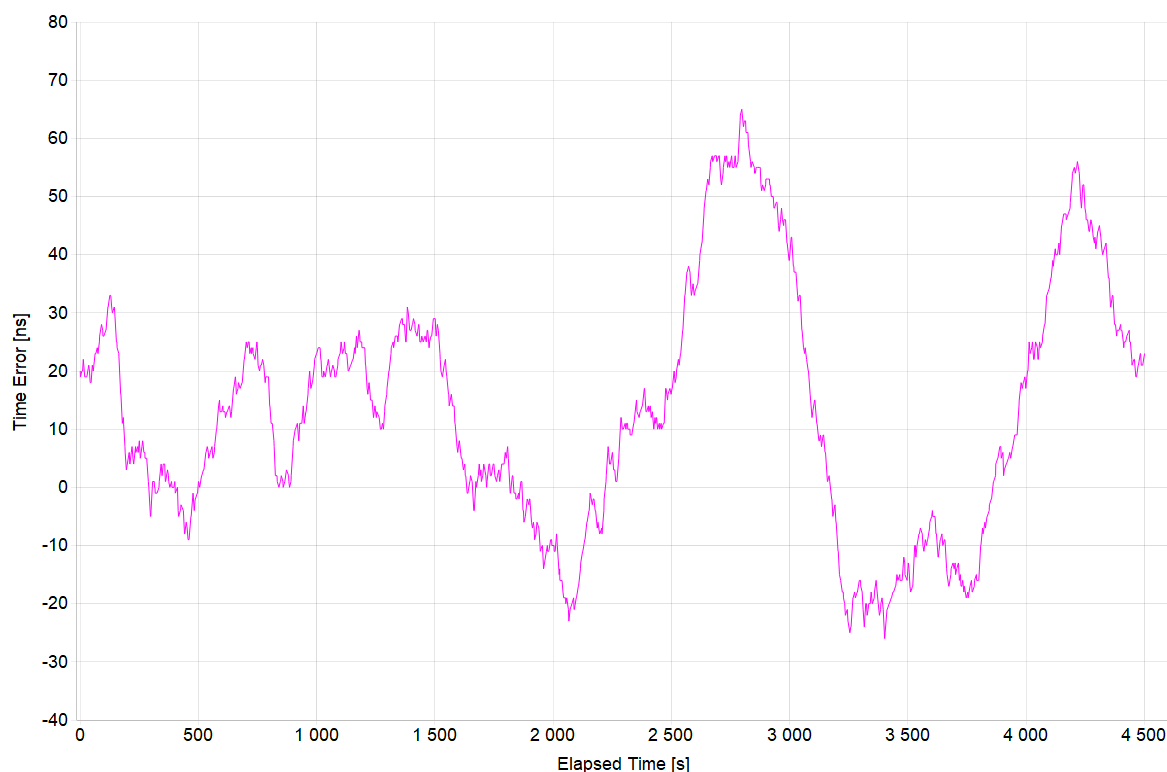
## 12. G.8261: Test Case 12

|                        |                      |
|------------------------|----------------------|
| Test Description       | Test Case 12         |
| Report Date            | 22-10-18_13-29-39    |
| Packet Rate (pkt/s)    | 16                   |
| Test Duration          | 01:15:00             |
| Test Configuration     | 2                    |
| Time to Phase Lock (s) | 372                  |
| Oscillator             | Rakon M6141 MiniOcxo |

|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Pass                           |
| Mask ONEPPS        | -                              |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Pass                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Pass                           |

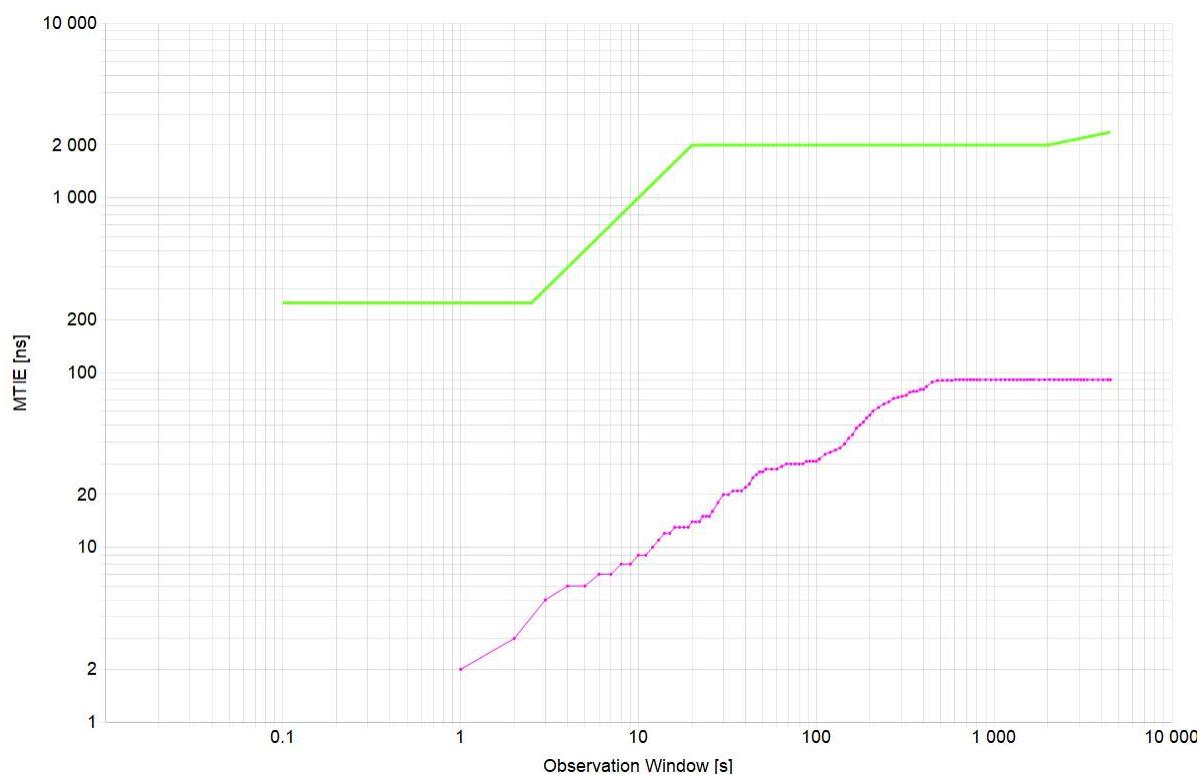
## 12.1 ONEPPS Analysis

|                        |      |
|------------------------|------|
| Offset Removal Applied | Off  |
| Zero Offset            | 20ns |



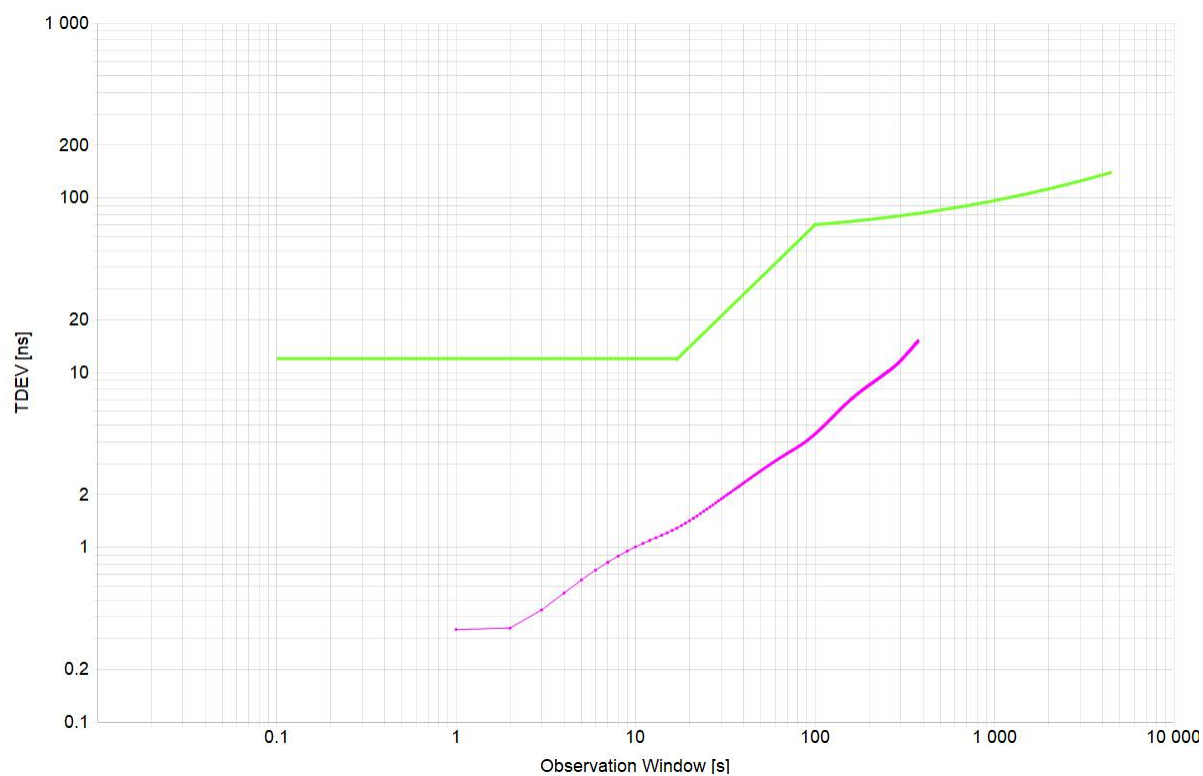
|              |        |
|--------------|--------|
| Mean [ns]    | 13.247 |
| Min [ns]     | -26    |
| Max [ns]     | 65     |
| Max-Min [ns] | 91     |

## 12.2 MTIE Analysis



|              |    |
|--------------|----|
| Min [ns]     | 2  |
| Max [ns]     | 91 |
| Max-Min [ns] | 89 |

## 12.3 TDEV Analysis



|              |        |
|--------------|--------|
| Min [ns]     | 0.338  |
| Max [ns]     | 15.117 |
| Max-Min [ns] | 14.779 |

## 13. G.8261: Test Case 13 Network Traffic Model 2

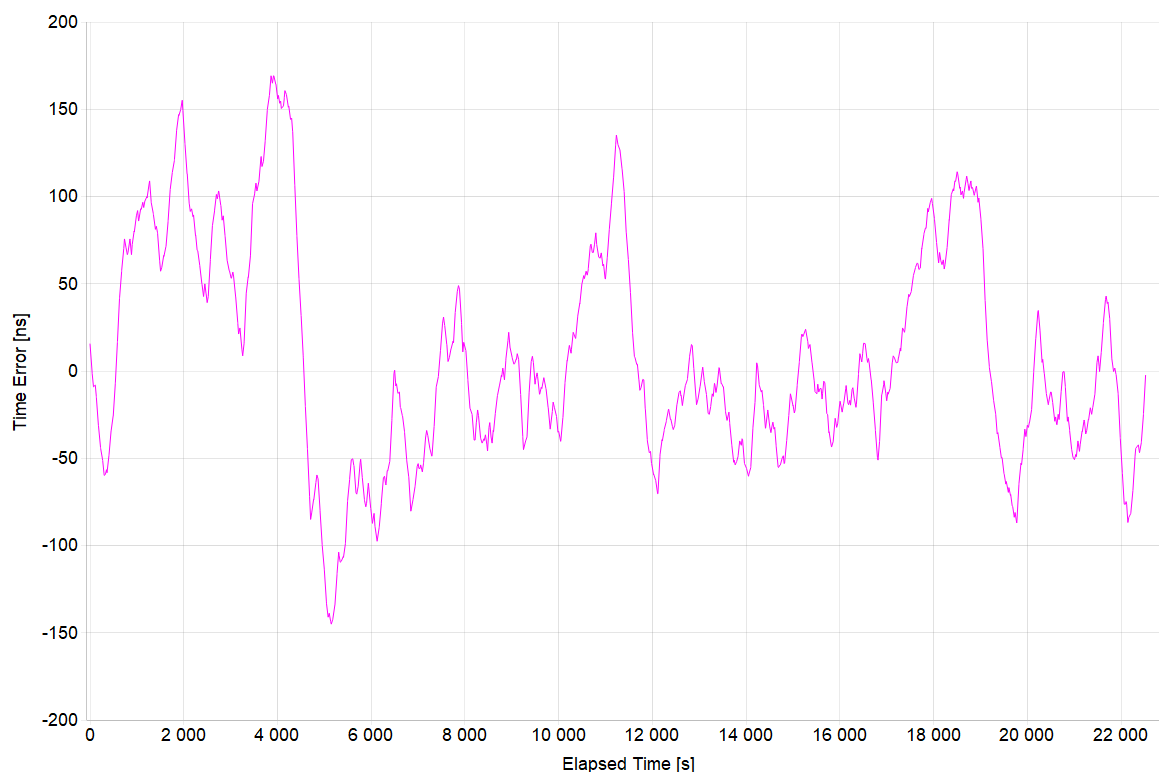
|                               |                                      |
|-------------------------------|--------------------------------------|
| <b>Test Description</b>       | Test Case 13 Network Traffic Model 2 |
| <b>Report Date</b>            | 22-04-27_15-55-48                    |
| <b>Packet Rate (pkt/s)</b>    | 16                                   |
| <b>Test Duration</b>          | 06:15:22                             |
| <b>Test Configuration</b>     | 1                                    |
| <b>Time to Phase Lock (s)</b> | 63                                   |

|                           |                                |
|---------------------------|--------------------------------|
| <b>All Mask Results</b>   | <b>Pass</b>                    |
| <b>Mask ONEPPS</b>        | -                              |
| <b>Mask ONEPPS Result</b> | No Mask                        |
| <b>Mask MTIE</b>          | G.8261 EEC Opt. 1 Wander Limit |
| <b>Mask MTIE Result</b>   | <b>Pass</b>                    |
| <b>Mask TDEV</b>          | G.8261 EEC Opt. 1 Wander Limit |
| <b>Mask TDEV Result</b>   | <b>Pass</b>                    |

1. Data presented in the images below was collected using the following procedure:
  - Start PTP
  - Stabilize for 600s
  - Start PDV
  - Start Data Capture
2. This results in a short time to phase lock (see above table). Lock time under PDV conditions was measured to be 372s. The following procedure was used for locking under PDV conditions:
  - Start PDV
  - Start PTP
  - Start Data Capture

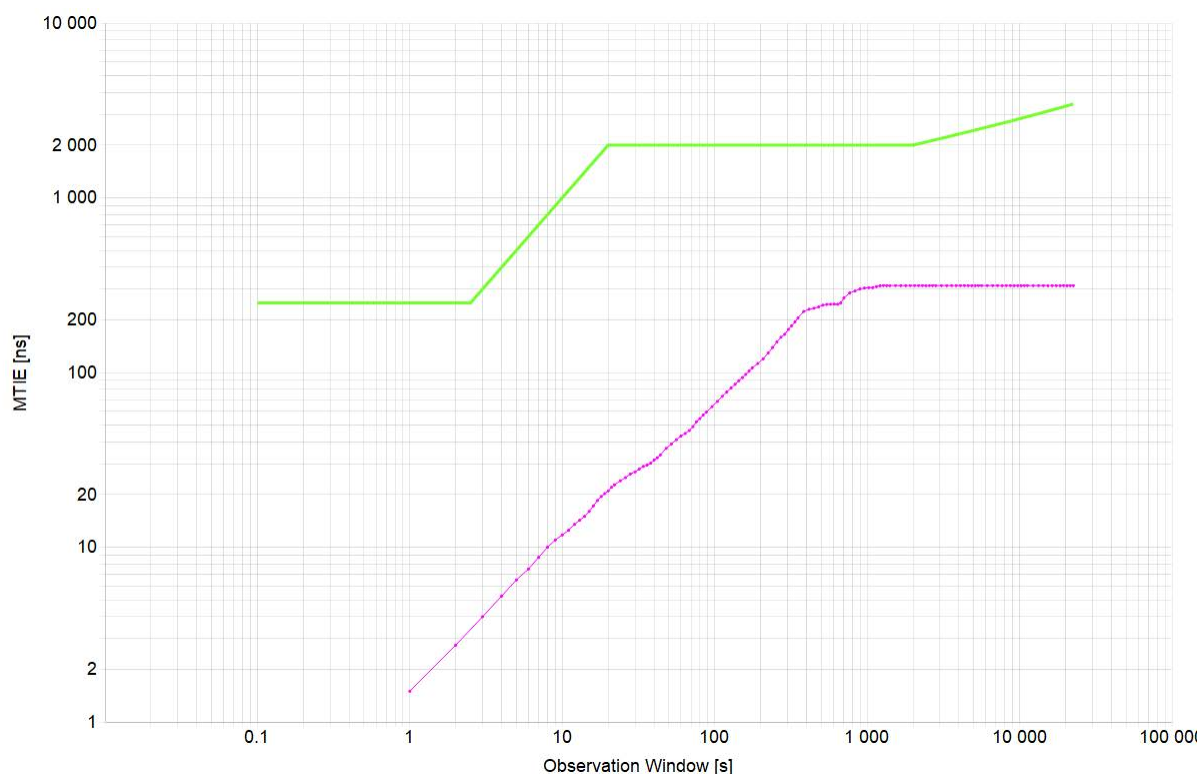
## 13.1 ONEPPS Analysis

|                        |          |
|------------------------|----------|
| Offset Removal Applied | Off      |
| Zero Offset            | 15.677ns |



|              |          |
|--------------|----------|
| Mean [ns]    | 7.238    |
| Min [ns]     | -145.073 |
| Max [ns]     | 169.177  |
| Max-Min [ns] | 314.25   |

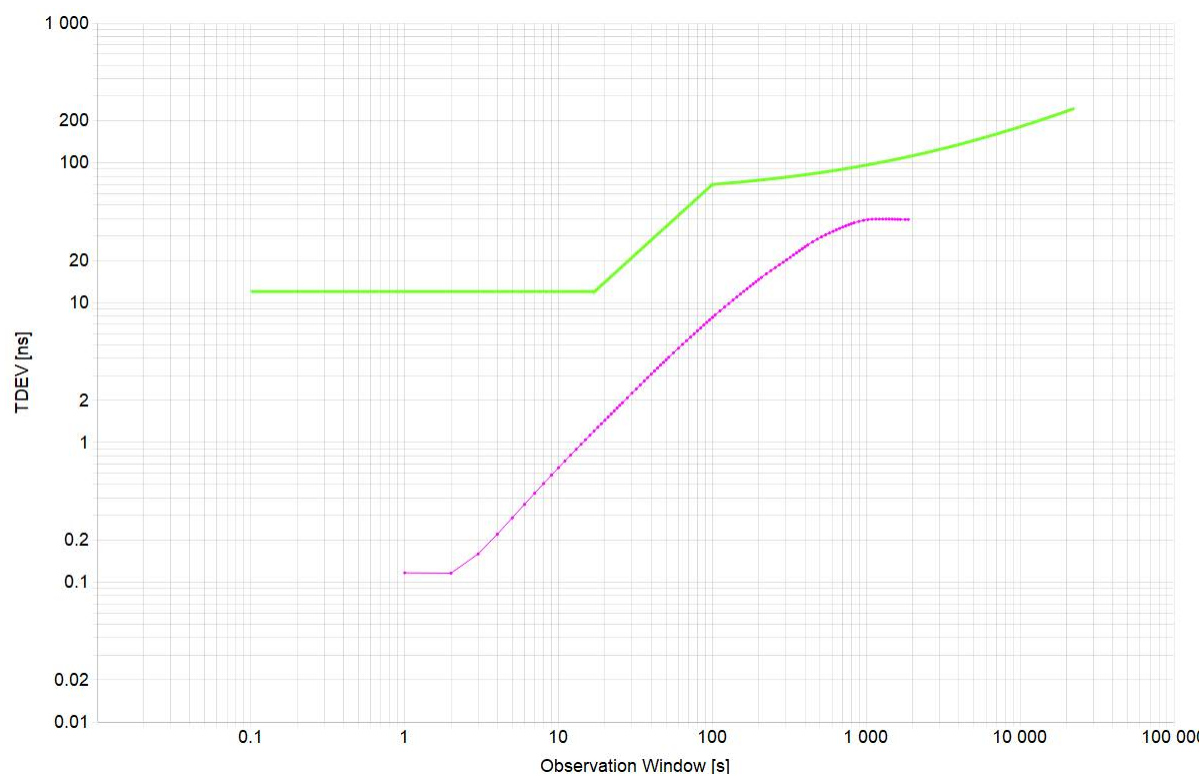
## 13.2 MTIE Analysis



|              |        |
|--------------|--------|
| Min [ns]     | 1.5    |
| Max [ns]     | 314.25 |
| Max-Min [ns] | 312.75 |



### 13.3 TDEV Analysis



|              |        |
|--------------|--------|
| Min [ns]     | 0.116  |
| Max [ns]     | 39.584 |
| Max-Min [ns] | 39.468 |

## 14. G.8261: Test Case 14 Network Traffic Model 2

|                               |                                      |
|-------------------------------|--------------------------------------|
| <b>Test Description</b>       | Test Case 14 Network Traffic Model 2 |
| <b>Report Date</b>            | 22-04-27_15-55-48                    |
| <b>Packet Rate (pkt/s)</b>    | 16                                   |
| <b>Test Duration</b>          | 24:00:01                             |
| <b>Test Configuration</b>     | 2                                    |
| <b>Time to Phase Lock (s)</b> | 62                                   |

|                           |                                |
|---------------------------|--------------------------------|
| <b>All Mask Results</b>   | <b>Pass</b>                    |
| <b>Mask ONEPPS</b>        | -                              |
| <b>Mask ONEPPS Result</b> | No Mask                        |
| <b>Mask MTIE</b>          | G.8261 EEC Opt. 1 Wander Limit |
| <b>Mask MTIE Result</b>   | <b>Pass</b>                    |
| <b>Mask TDEV</b>          | G.8261 EEC Opt. 1 Wander Limit |
| <b>Mask TDEV Result</b>   | <b>Pass</b>                    |

1. Data presented in the images below was collected using the following procedure:
  - Start PTP
  - Stabilize for 600s
  - Start PDV
  - Start Data Capture
2. This results in a short time to phase lock (see above table). Lock time under PDV conditions was measured to be 370s. The following procedure was used for locking under PDV conditions:
  - Start PDV
  - Start PTP
  - Start Data Capture

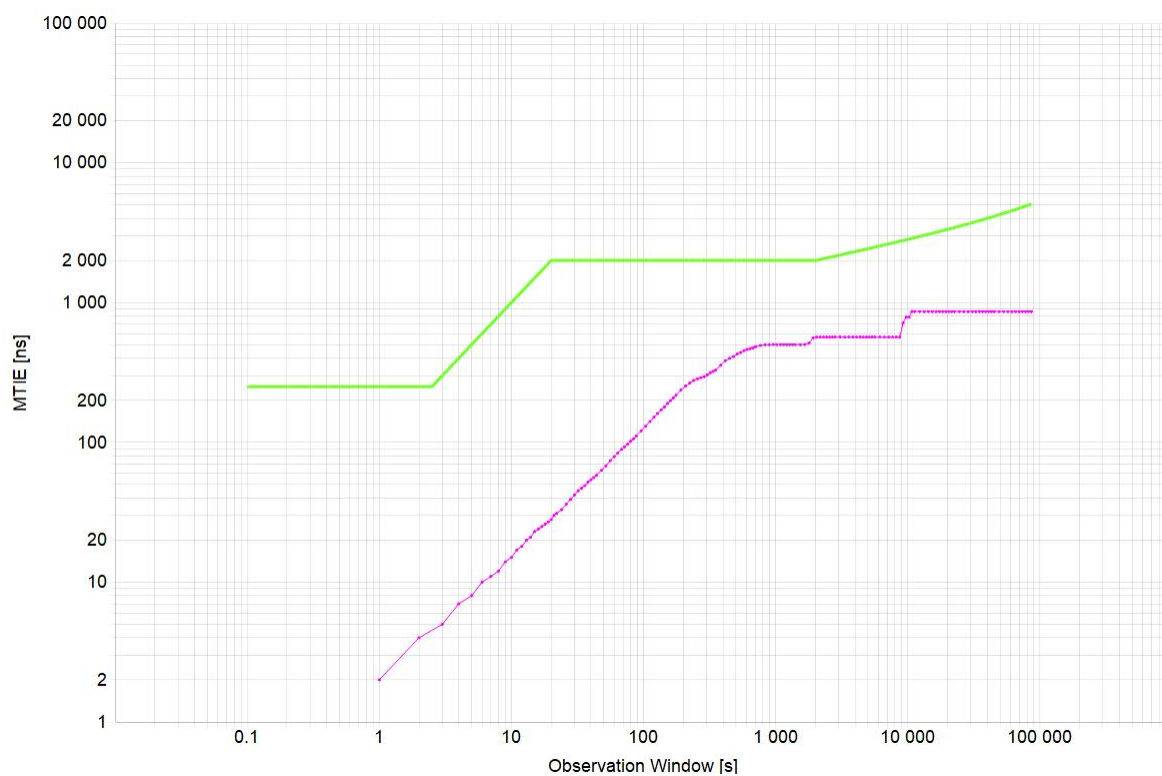
## 14.1 ONEPPS Analysis

|                        |       |
|------------------------|-------|
| Offset Removal Applied | Off   |
| Zero Offset            | -17ns |



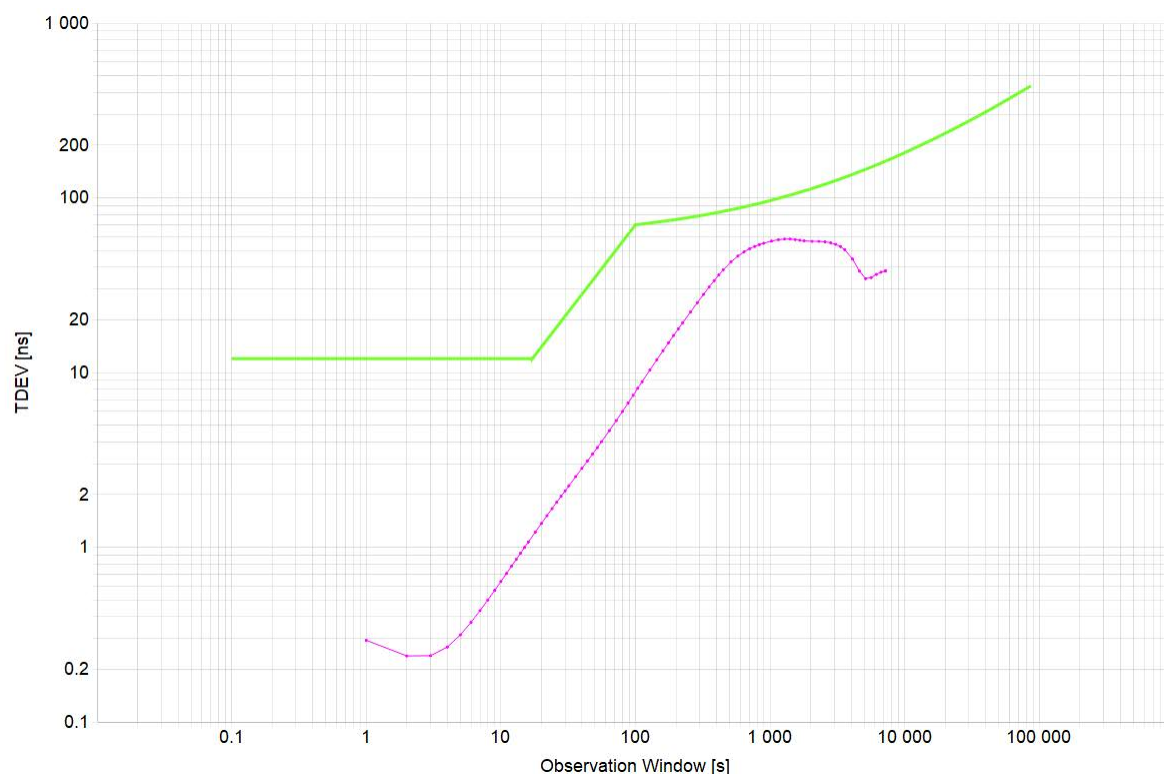
|              |       |
|--------------|-------|
| Mean [ns]    | 21.13 |
| Min [ns]     | -408  |
| Max [ns]     | 455   |
| Max-Min [ns] | 863   |

## 14.2 MTIE Analysis



|              |     |
|--------------|-----|
| Min [ns]     | 2   |
| Max [ns]     | 863 |
| Max-Min [ns] | 861 |

## 14.3 TDEV Analysis



|              |        |
|--------------|--------|
| Min [ns]     | 0.239  |
| Max [ns]     | 58.038 |
| Max-Min [ns] | 57.8   |

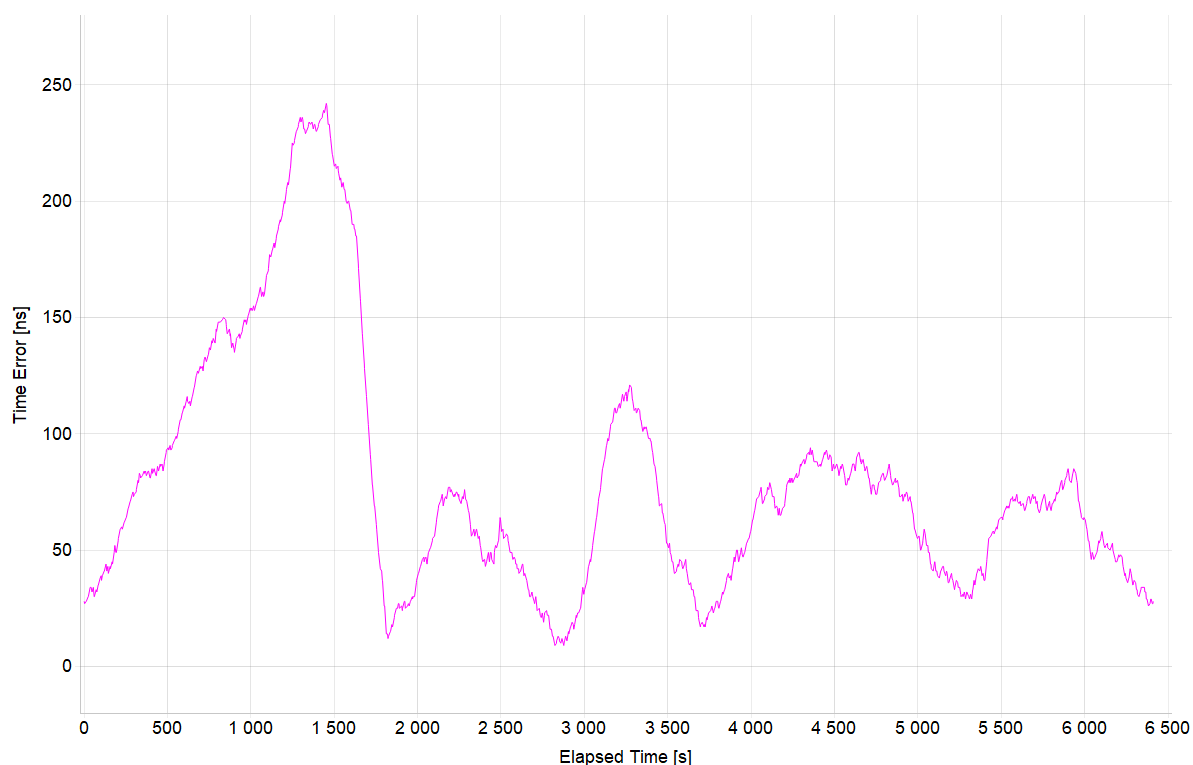
## 15. G.8261: Test Case 15b

|                        |                      |
|------------------------|----------------------|
| Test Description       | Test Case 15b        |
| Report Date            | 22-10-18_13-29-39    |
| Packet Rate (pkt/s)    | 16                   |
| Test Duration          | 01:46:50             |
| Test Configuration     | 2                    |
| Time to Phase Lock (s) | 372                  |
| Oscillator             | Rakon M6141 MiniOcxo |

|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Pass                           |
| Mask ONEPPS        | -                              |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Pass                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Pass                           |

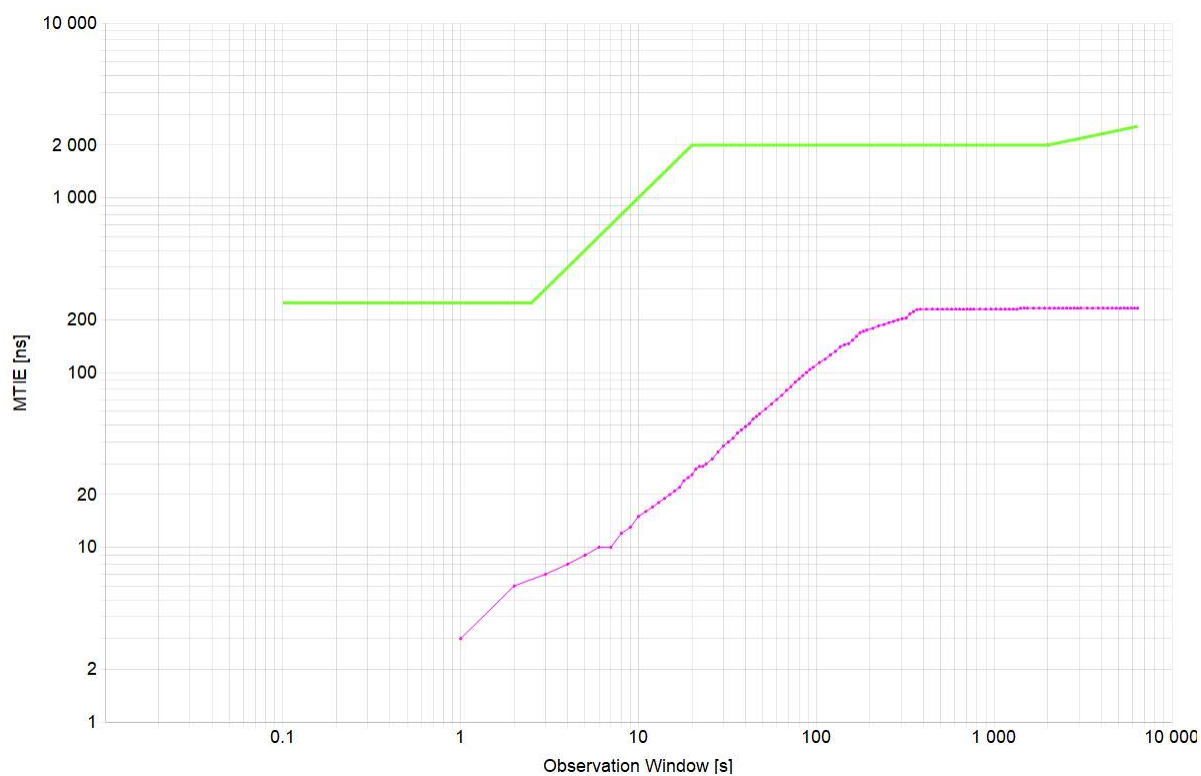
## 15.1 ONEPPS Analysis

|                        |      |
|------------------------|------|
| Offset Removal Applied | Off  |
| Zero Offset            | 28ns |



|              |       |
|--------------|-------|
| Mean [ns]    | 79.26 |
| Min [ns]     | 9     |
| Max [ns]     | 242   |
| Max-Min [ns] | 233   |

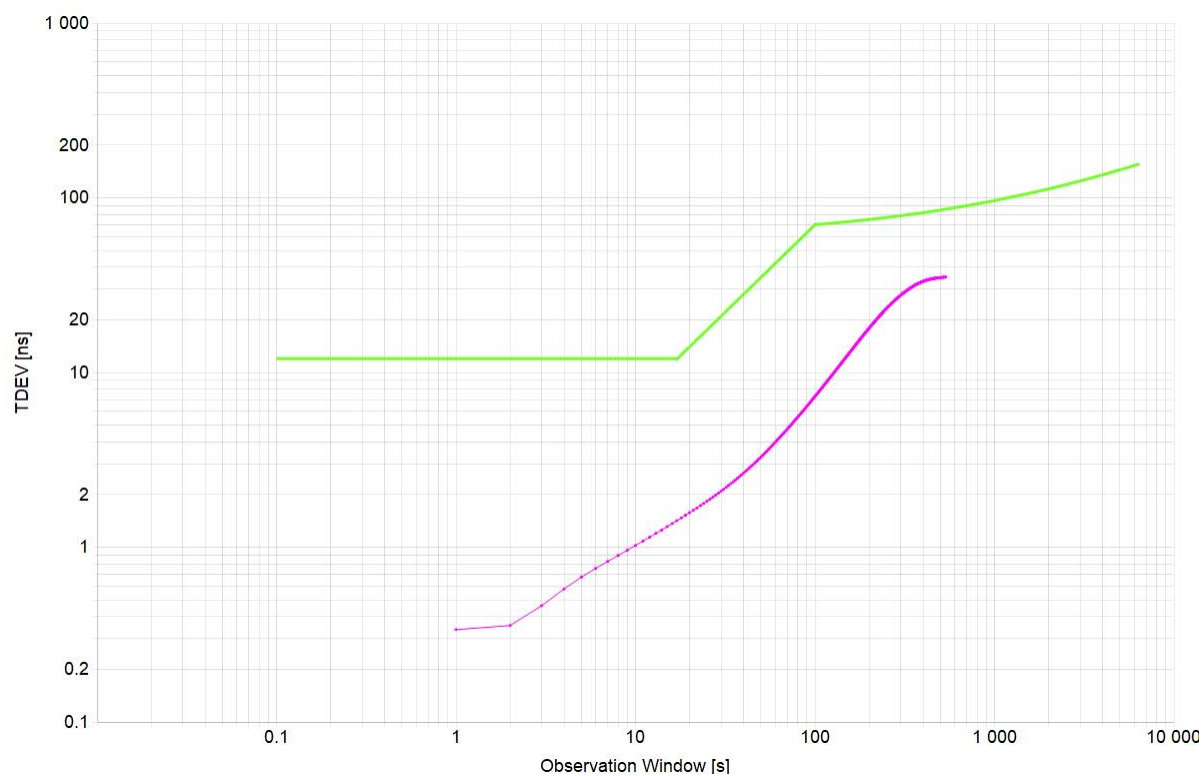
## 15.2 MTIE Analysis



|              |     |
|--------------|-----|
| Min [ns]     | 3   |
| Max [ns]     | 233 |
| Max-Min [ns] | 230 |



## 15.3 TDEV Analysis



|              |        |
|--------------|--------|
| Min [ns]     | 0.337  |
| Max [ns]     | 35.161 |
| Max-Min [ns] | 34.823 |

## 16. G.8261: Test Case 16 Network Traffic Model 2

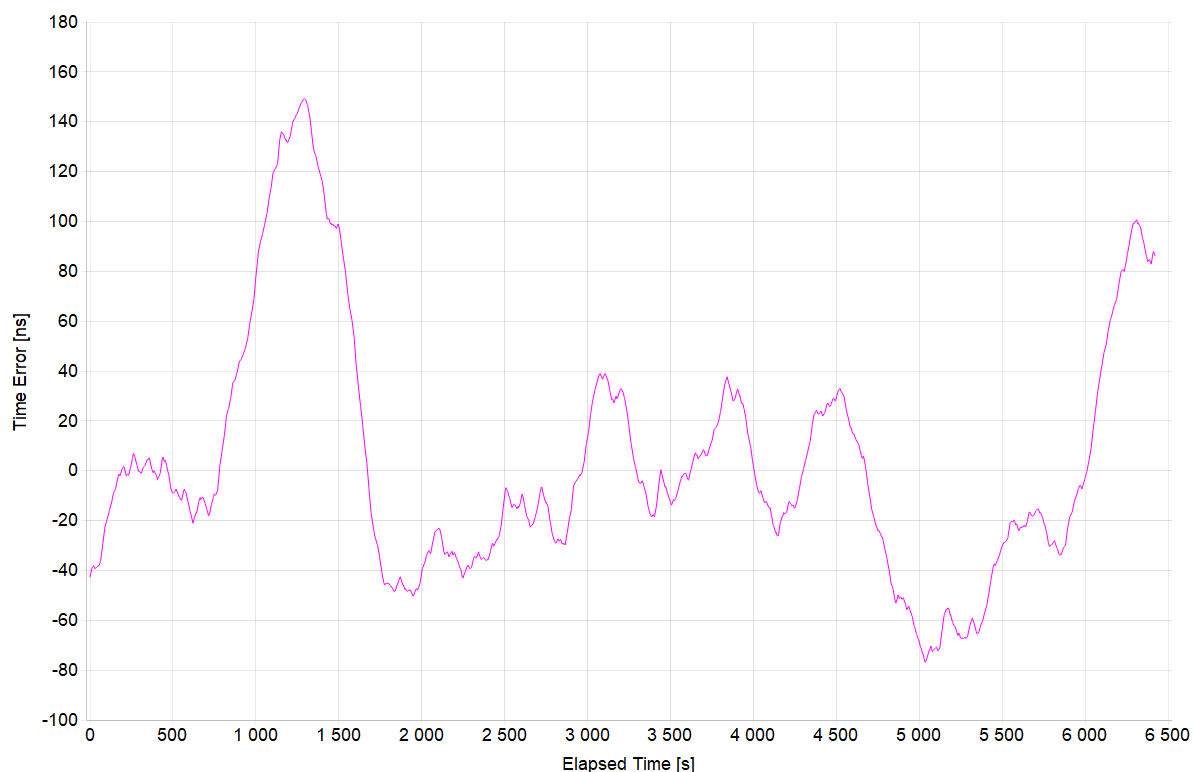
|                               |                                      |
|-------------------------------|--------------------------------------|
| <b>Test Description</b>       | Test Case 16 Network Traffic Model 2 |
| <b>Report Date</b>            | 22-04-27_15-55-48                    |
| <b>Packet Rate (pkt/s)</b>    | 16                                   |
| <b>Test Duration</b>          | 01:47:02                             |
| <b>Test Configuration</b>     | 1                                    |
| <b>Time to Phase Lock (s)</b> | 61                                   |

|                           |                                |
|---------------------------|--------------------------------|
| <b>All Mask Results</b>   | <b>Pass</b>                    |
| <b>Mask ONEPPS</b>        | -                              |
| <b>Mask ONEPPS Result</b> | No Mask                        |
| <b>Mask MTIE</b>          | G.8261 EEC Opt. 1 Wander Limit |
| <b>Mask MTIE Result</b>   | <b>Pass</b>                    |
| <b>Mask TDEV</b>          | G.8261 EEC Opt. 1 Wander Limit |
| <b>Mask TDEV Result</b>   | <b>Pass</b>                    |

1. Data presented in the images below was collected using the following procedure:
  - Start PTP
  - Stabilize for 600s
  - Start PDV
  - Start Data Capture
2. This results in a short time to phase lock (see above table). Lock time under PDV conditions was measured to be 372s. The following procedure was used for locking under PDV conditions:
  - Start PDV
  - Start PTP
  - Start Data Capture

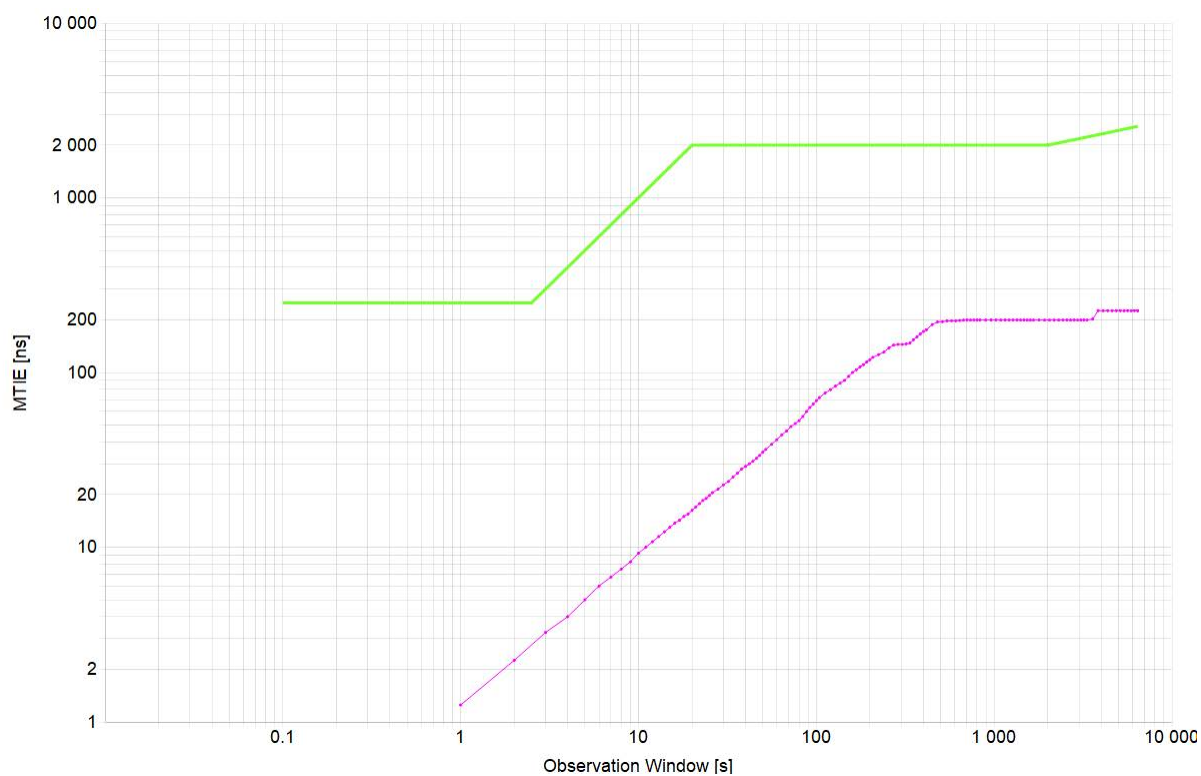
## 16.1 ONEPPS Analysis

|                        |           |
|------------------------|-----------|
| Offset Removal Applied | Off       |
| Zero Offset            | -42.823ns |



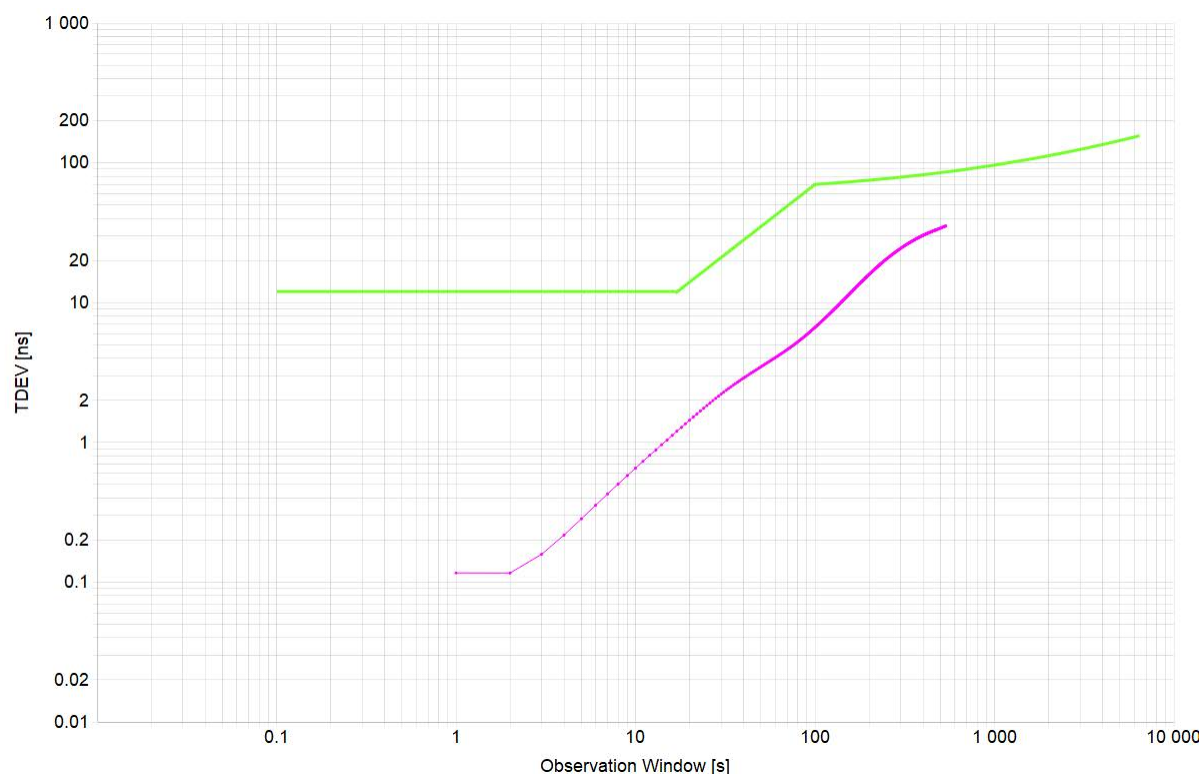
|              |         |
|--------------|---------|
| Mean [ns]    | 3.558   |
| Min [ns]     | -76.823 |
| Max [ns]     | 149.177 |
| Max-Min [ns] | 226     |

## 16.2 MTIE Analysis



|              |        |
|--------------|--------|
| Min [ns]     | 1.25   |
| Max [ns]     | 226    |
| Max-Min [ns] | 224.75 |

## 16.3 TDEV Analysis



|              |        |
|--------------|--------|
| Min [ns]     | 0.116  |
| Max [ns]     | 35.344 |
| Max-Min [ns] | 35.227 |

## 17. G.8261: Test Case 17 (10μs) Network Traffic Model 2

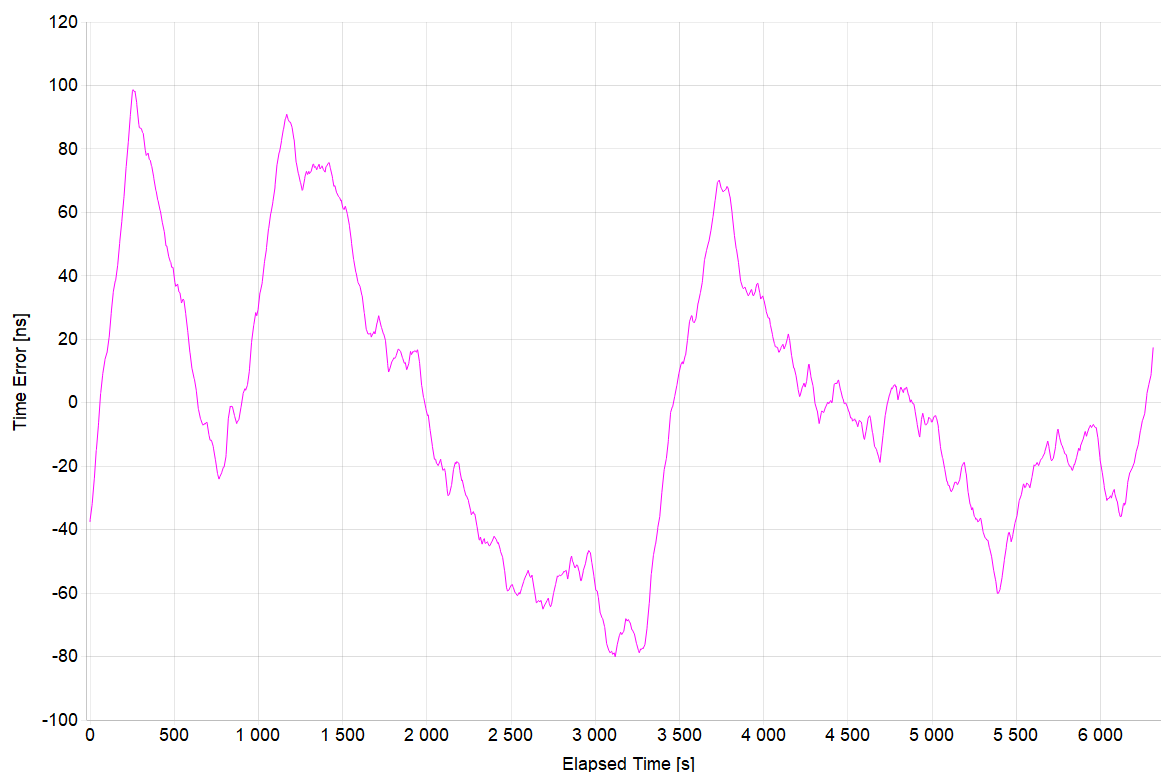
|                        |                                             |
|------------------------|---------------------------------------------|
| Test Description       | Test Case 17 (10μs) Network Traffic Model 2 |
| Report Date            | 22-04-27_15-55-48                           |
| Packet Rate (pkt/s)    | 16                                          |
| Test Duration          | 01:45:12                                    |
| Test Configuration     | 1                                           |
| Time to Phase Lock (s) | 63                                          |

|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Pass                           |
| Mask ONEPPS        | -                              |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Pass                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Pass                           |

1. Data presented in the images below was collected using the following procedure:
  - Start PTP
  - Stabilize for 600s
  - Start PDV
  - Start Data Capture
2. This results in a short time to phase lock (see above table). Lock time under PDV conditions was measured to be 558s. The following procedure was used for locking under PDV conditions:
  - Start PDV
  - Start PTP
  - Start Data Capture

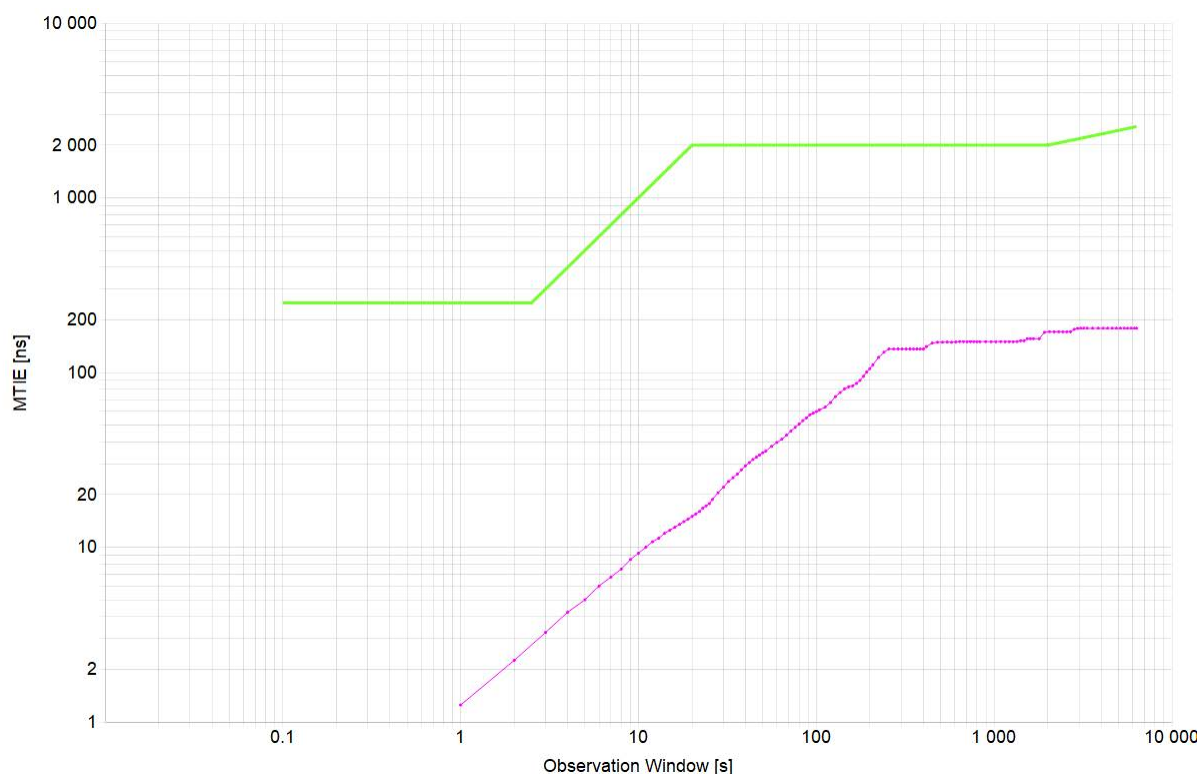
## 17.1 ONEPPS Analysis

|                        |           |
|------------------------|-----------|
| Offset Removal Applied | Off       |
| Zero Offset            | -37.573ns |



|              |         |
|--------------|---------|
| Mean [ns]    | -0.911  |
| Min [ns]     | -80.073 |
| Max [ns]     | 98.677  |
| Max-Min [ns] | 178.75  |

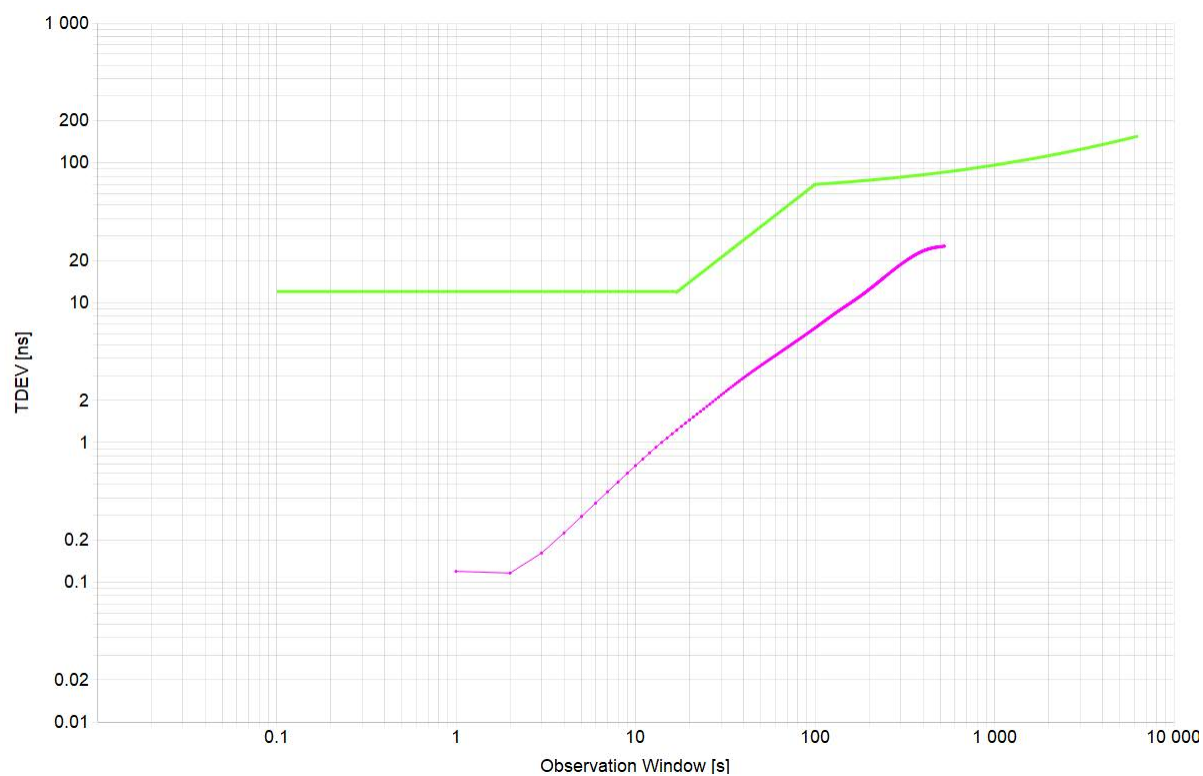
## 17.2 MTIE Analysis



|              |        |
|--------------|--------|
| Min [ns]     | 1.25   |
| Max [ns]     | 178.75 |
| Max-Min [ns] | 177.5  |



## 17.3 TDEV Analysis



|              |        |
|--------------|--------|
| Min [ns]     | 0.116  |
| Max [ns]     | 25.315 |
| Max-Min [ns] | 25.199 |

## 18. G.8261: Test Case 17 (200μs) Network Traffic Model 2

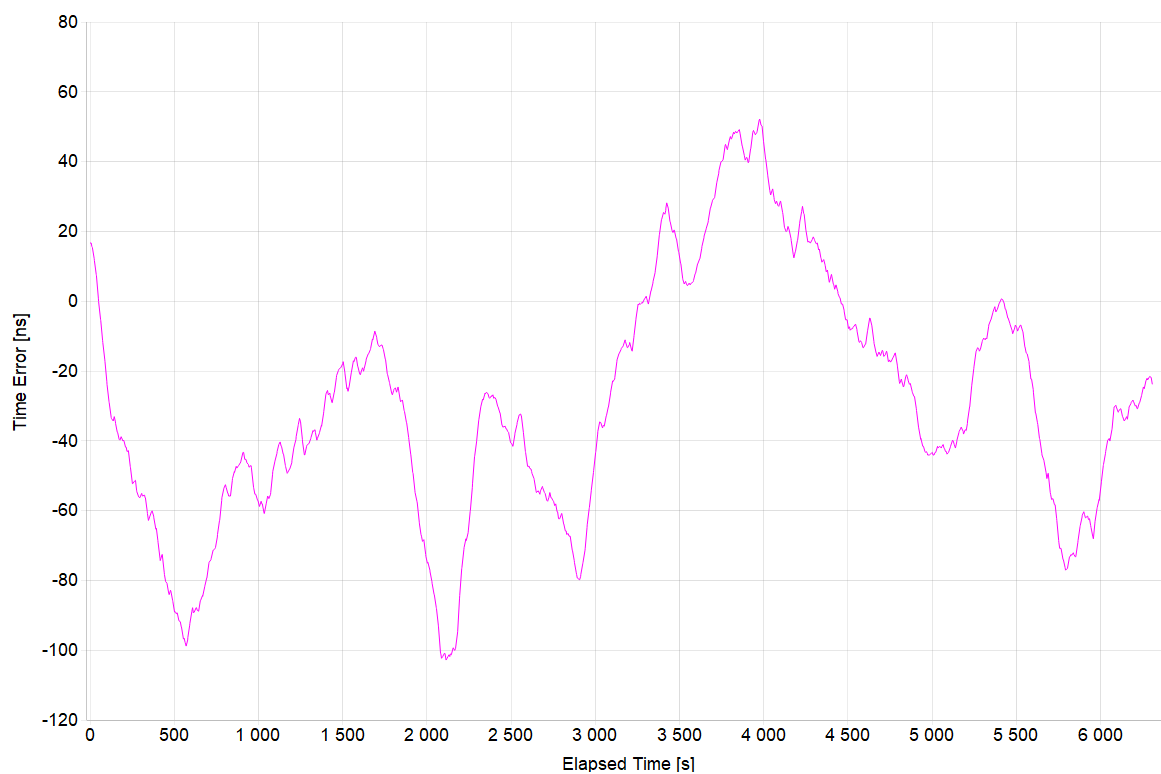
|                        |                                              |
|------------------------|----------------------------------------------|
| Test Description       | Test Case 17 (200μs) Network Traffic Model 2 |
| Report Date            | 22-04-27_15-55-48                            |
| Packet Rate (pkt/s)    | 16                                           |
| Test Duration          | 01:45:07                                     |
| Test Configuration     | 1                                            |
| Time to Phase Lock (s) | 56                                           |

|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Pass                           |
| Mask ONEPPS        | -                              |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Pass                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Pass                           |

1. Data presented in the images below was collected using the following procedure:
  - Start PTP
  - Stabilize for 600s
  - Start PDV
  - Start Data Capture
2. This results in a short time to phase lock (see above table). Lock time under PDV conditions was measured to be 374s. The following procedure was used for locking under PDV conditions:
  - Start PDV
  - Start PTP
  - Start Data Capture

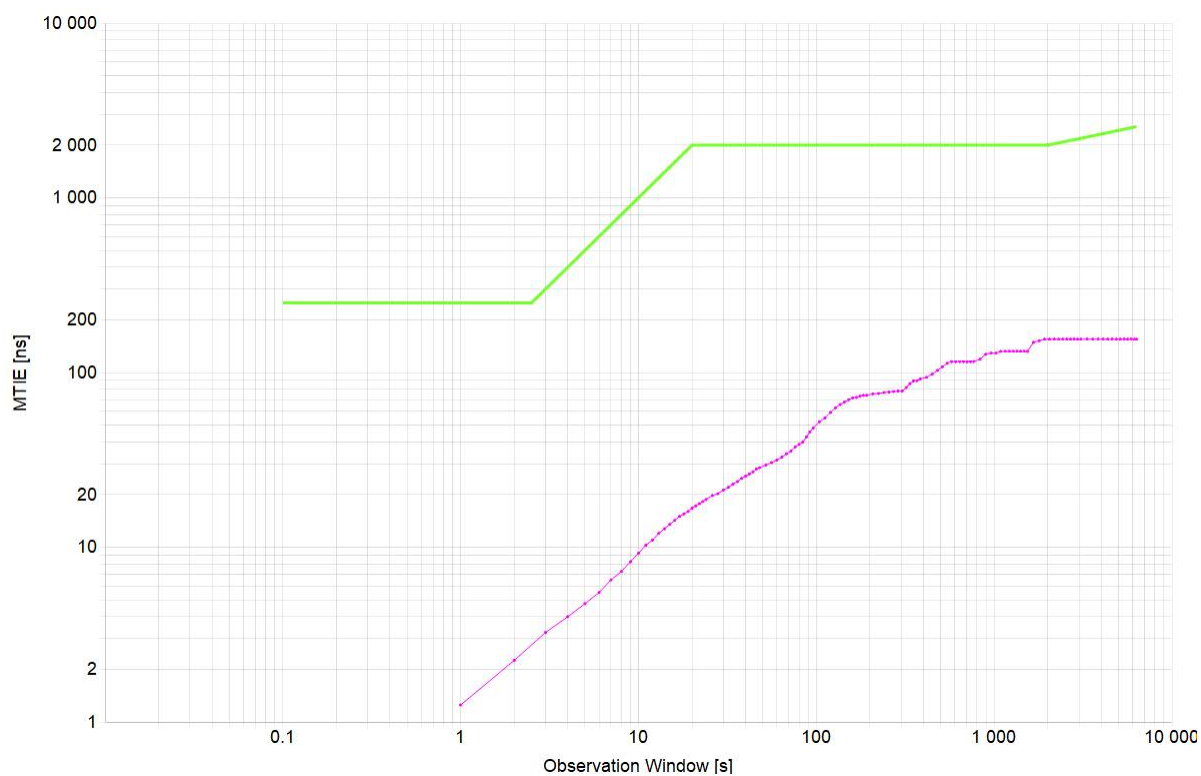
## 18.1 ONEPPS Analysis

|                        |          |
|------------------------|----------|
| Offset Removal Applied | Off      |
| Zero Offset            | 16.677ns |



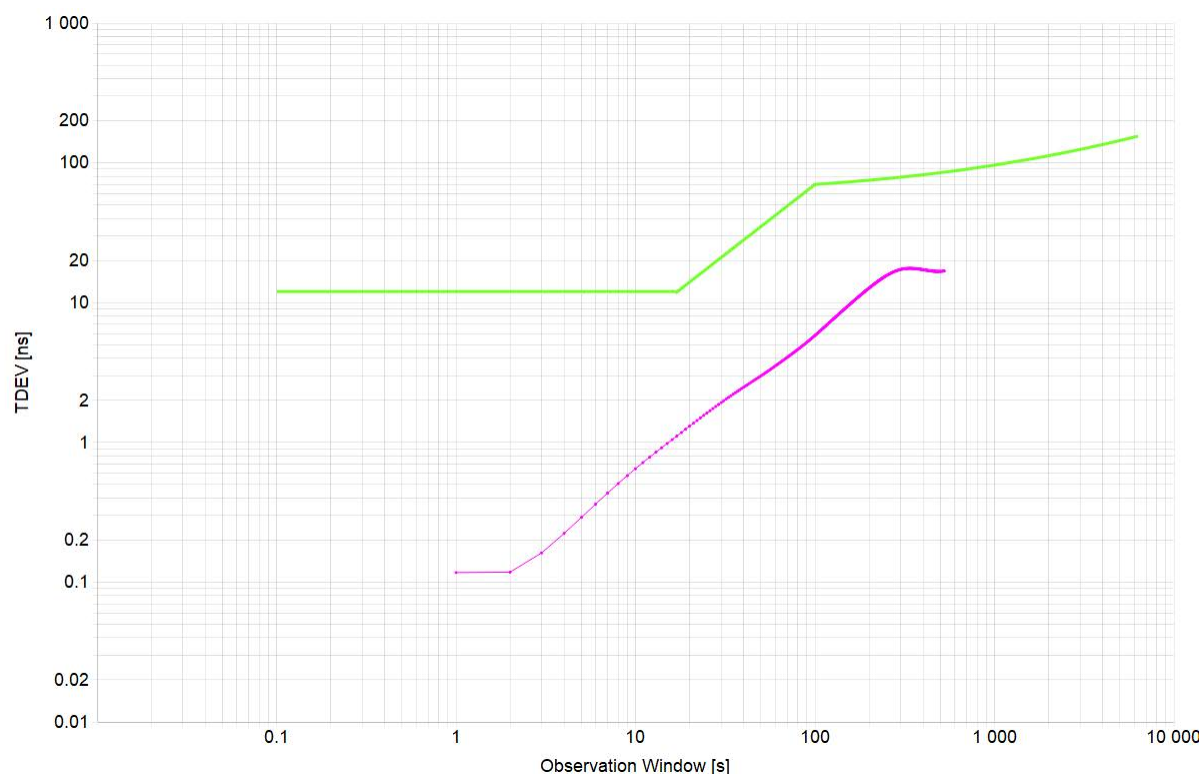
|              |          |
|--------------|----------|
| Mean [ns]    | -29.338  |
| Min [ns]     | -102.823 |
| Max [ns]     | 52.177   |
| Max-Min [ns] | 155      |

## 18.2 MTIE Analysis



|              |        |
|--------------|--------|
| Min [ns]     | 1.25   |
| Max [ns]     | 155    |
| Max-Min [ns] | 153.75 |

## 18.3 TDEV Analysis



|              |        |
|--------------|--------|
| Min [ns]     | 0.117  |
| Max [ns]     | 17.569 |
| Max-Min [ns] | 17.452 |

## 19. G.8261: Test Case 12 (SinglePath)

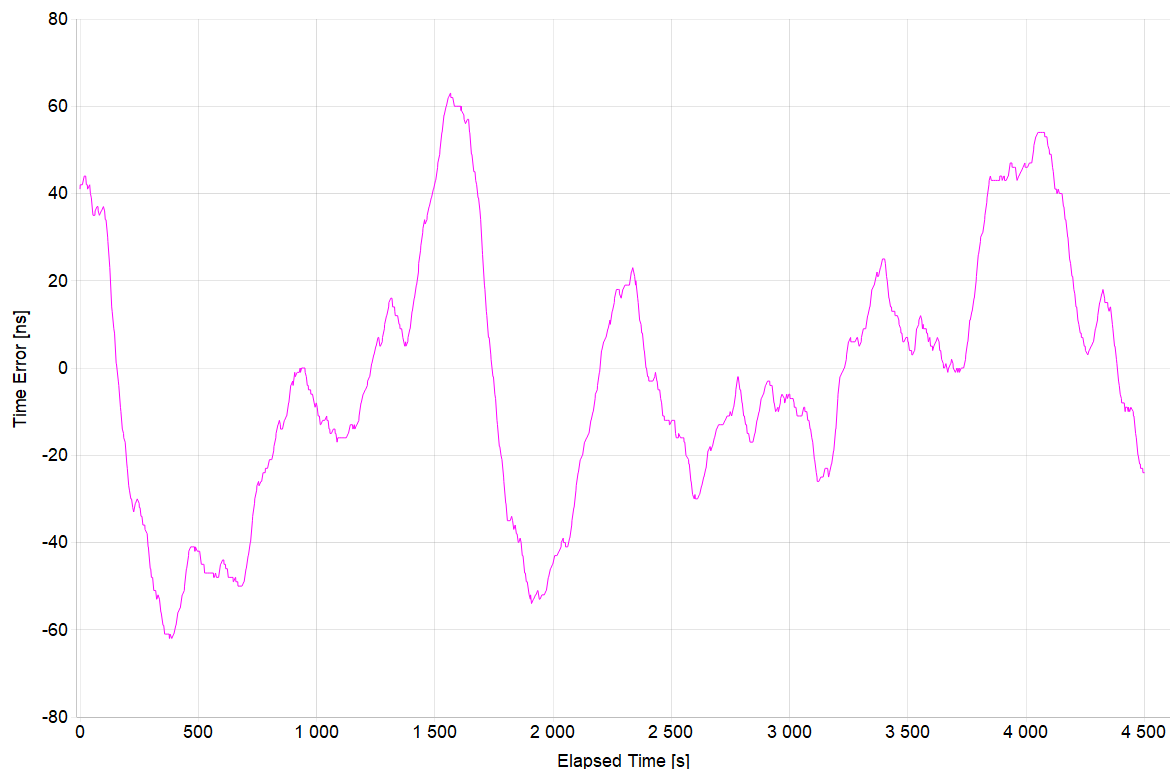
|                           |                   |
|---------------------------|-------------------|
| Test Description          | Test Case 12      |
| Report Date               | 22-04-27_17-14-34 |
| Packet Rate (pkt/s)       | 16                |
| Test Duration             | 01:15:01          |
| Test Configuration        | 1                 |
| Time to Phase Lock (s)    | 452               |
| Floor Delay Estimate (ns) | 8780              |

|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Pass                           |
| Mask ONEPPS        | -                              |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Pass                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Pass                           |

1. Test Case 12 delay request PDV was used on the sync packets for this test. The Test Case 12 sync packet PDV has a Gaussian distribution that cannot be tracked in Single Path mode.

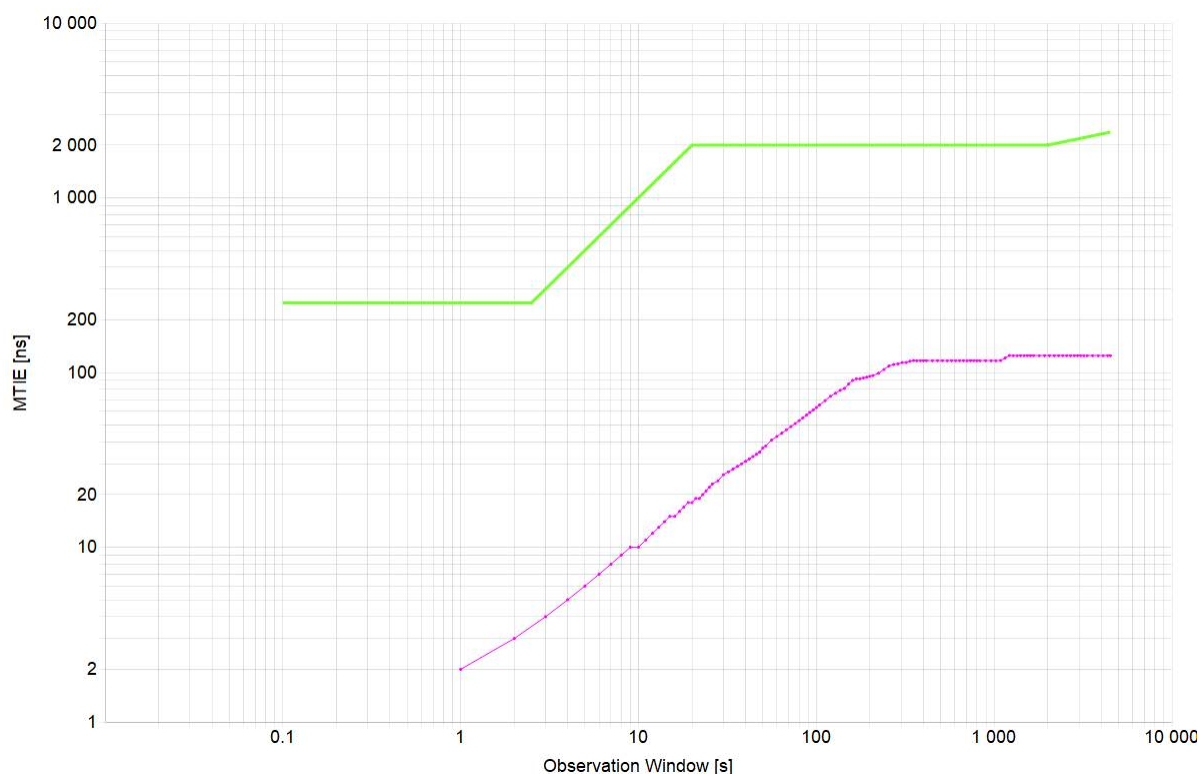
## 19.1 ONEPPS Analysis

|                        |      |
|------------------------|------|
| Offset Removal Applied | Off  |
| Zero Offset            | 41ns |



|              |        |
|--------------|--------|
| Mean [ns]    | -2.588 |
| Min [ns]     | -62    |
| Max [ns]     | 63     |
| Max-Min [ns] | 125    |

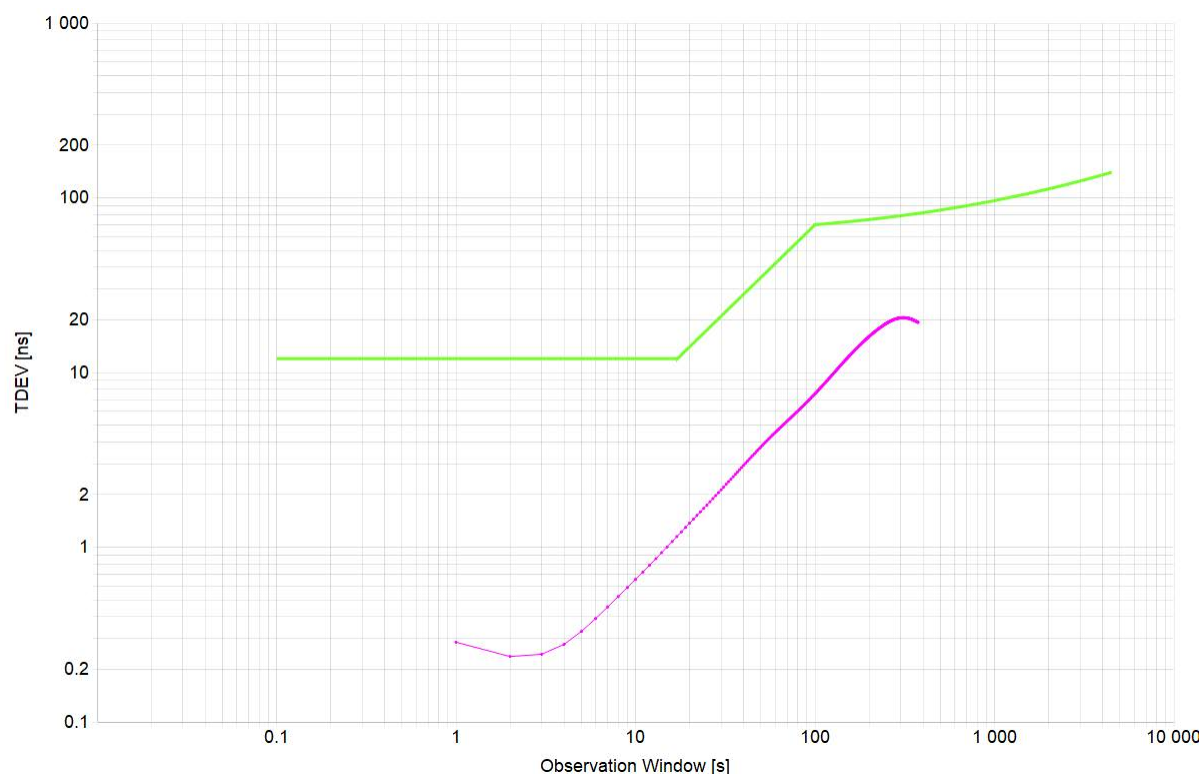
## 19.2 MTIE Analysis



|              |     |
|--------------|-----|
| Min [ns]     | 2   |
| Max [ns]     | 125 |
| Max-Min [ns] | 123 |



## 19.3 TDEV Analysis



|              |        |
|--------------|--------|
| Min [ns]     | 0.237  |
| Max [ns]     | 20.581 |
| Max-Min [ns] | 20.344 |

## 20. G.8261: Test Case 13b (SinglePath)

|                           |                                      |
|---------------------------|--------------------------------------|
| Test Description          | Test Case 13 Network Traffic Model 2 |
| Report Date               | 22-04-27_17-14-34                    |
| Packet Rate (pkt/s)       | 16                                   |
| Test Duration             | 06:15:01                             |
| Test Configuration        | 2                                    |
| Time to Phase Lock (s)    | 372                                  |
| Floor Delay Estimate (ns) | 6730                                 |

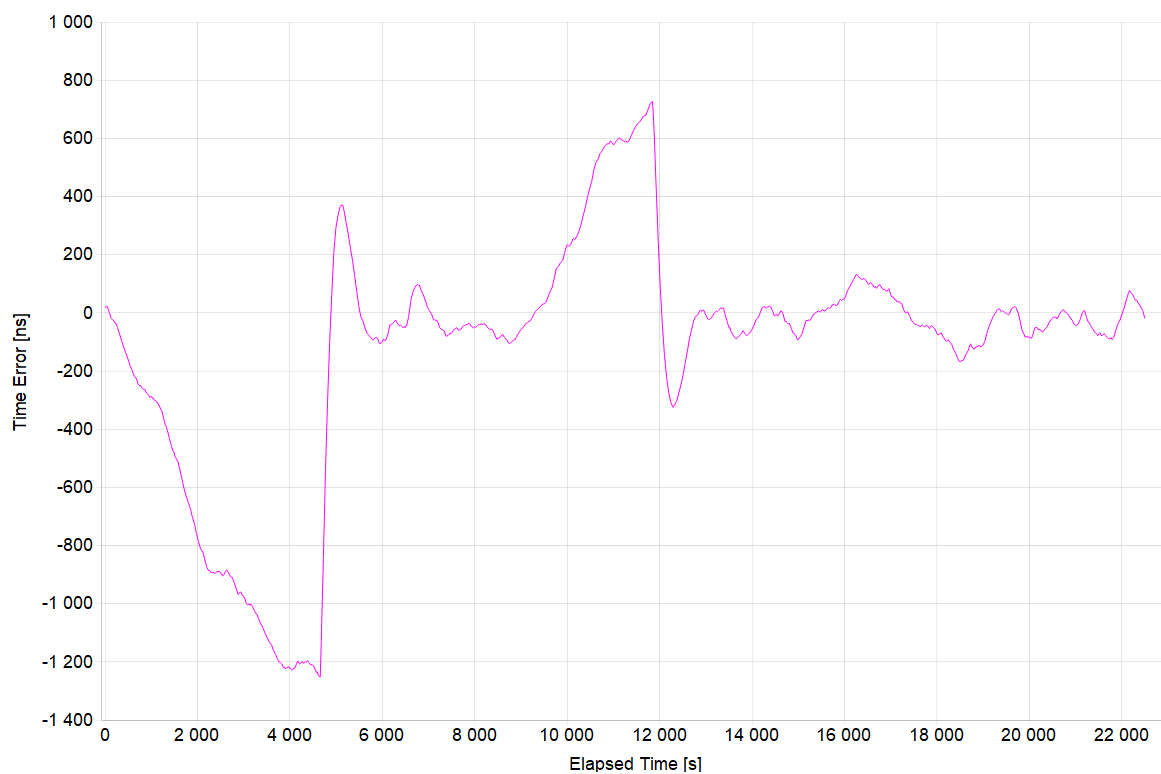
|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Fail                           |
| Mask ONEPPS        | -                              |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Pass                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Fail                           |

1. This test is expected to fail the G.8261 EEC Option 1 masks.

The PDV pattern does not have a solid noise floor during the first 3600s (the PDV follows a Gaussian distribution). When there is a solid noise floor after the first 3600s, the performance returns to normal. At 7200 the noise distribution returns to Gaussian and the change in performance can be seen in the Time Error plot. At 14400, the distribution is again Gaussian, but at this point the servo has had enough time to collect information on the PDV and maintain good performance throughout the Gaussian noise distribution portion from 14400 to 18000s.

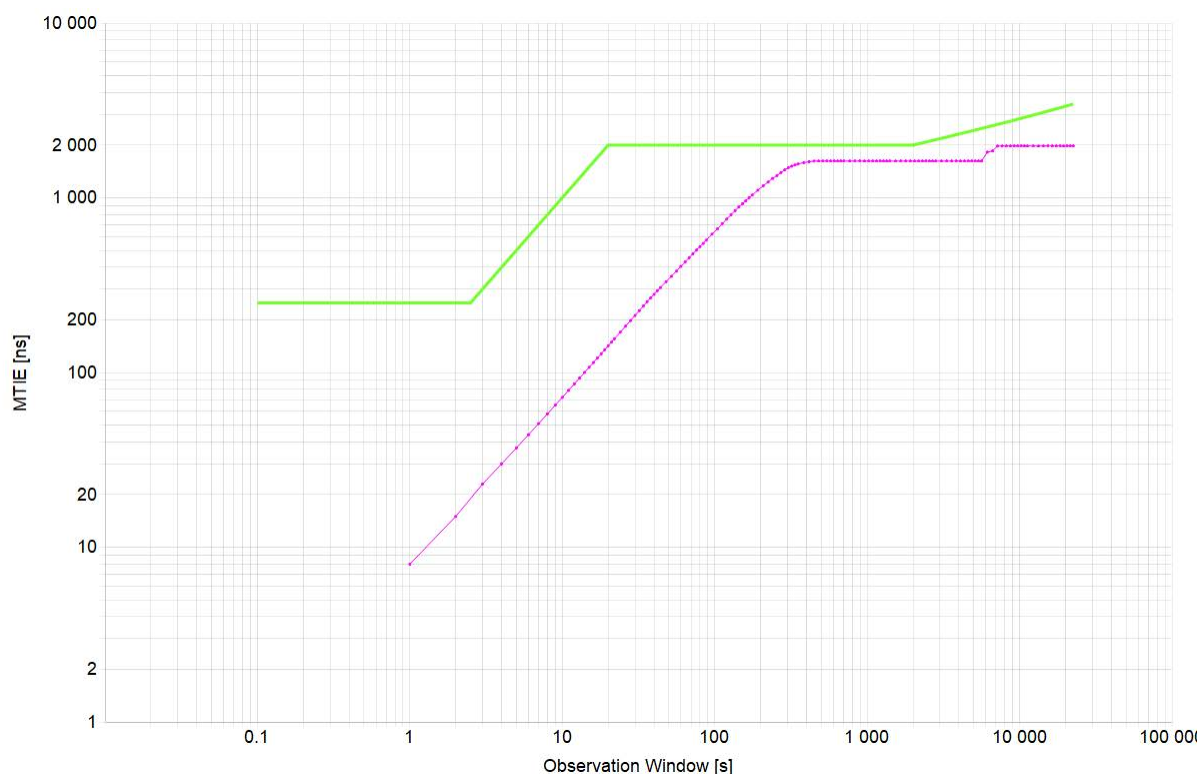
## 20.1 ONEPPS Analysis

|                        |      |
|------------------------|------|
| Offset Removal Applied | Off  |
| Zero Offset            | 19ns |



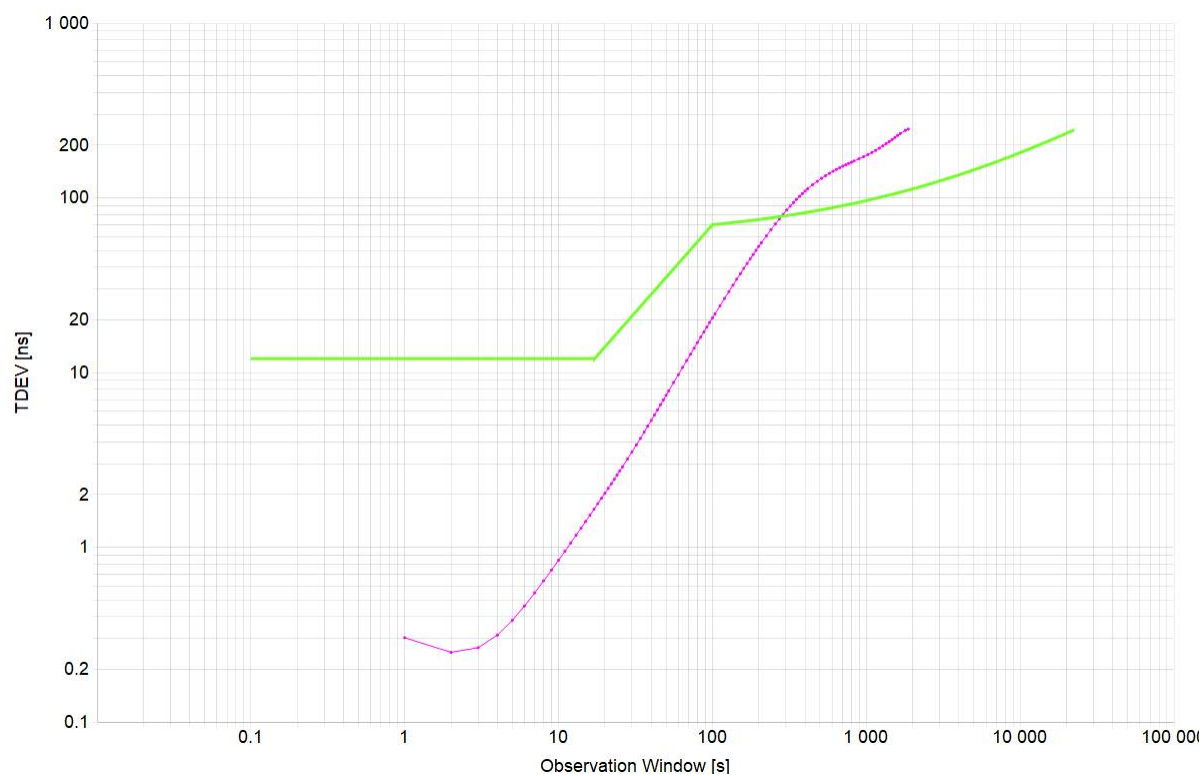
|              |          |
|--------------|----------|
| Mean [ns]    | -125.643 |
| Min [ns]     | -1252    |
| Max [ns]     | 726      |
| Max-Min [ns] | 1978     |

## 20.2 MTIE Analysis



|              |      |
|--------------|------|
| Min [ns]     | 8    |
| Max [ns]     | 1978 |
| Max-Min [ns] | 1970 |

## 20.3 TDEV Analysis



|              |         |
|--------------|---------|
| Min [ns]     | 0.25    |
| Max [ns]     | 247.036 |
| Max-Min [ns] | 246.786 |

## 21. G.8261: Test Case 14b (SinglePath)

|                           |                                      |
|---------------------------|--------------------------------------|
| Test Description          | Test Case 14 Network Traffic Model 2 |
| Report Date               | 22-04-27_17-14-34                    |
| Packet Rate (pkt/s)       | 16                                   |
| Test Duration             | 24:00:01                             |
| Test Configuration        | 2                                    |
| Time to Phase Lock (s)    | 372                                  |
| Floor Delay Estimate (ns) | 6730                                 |

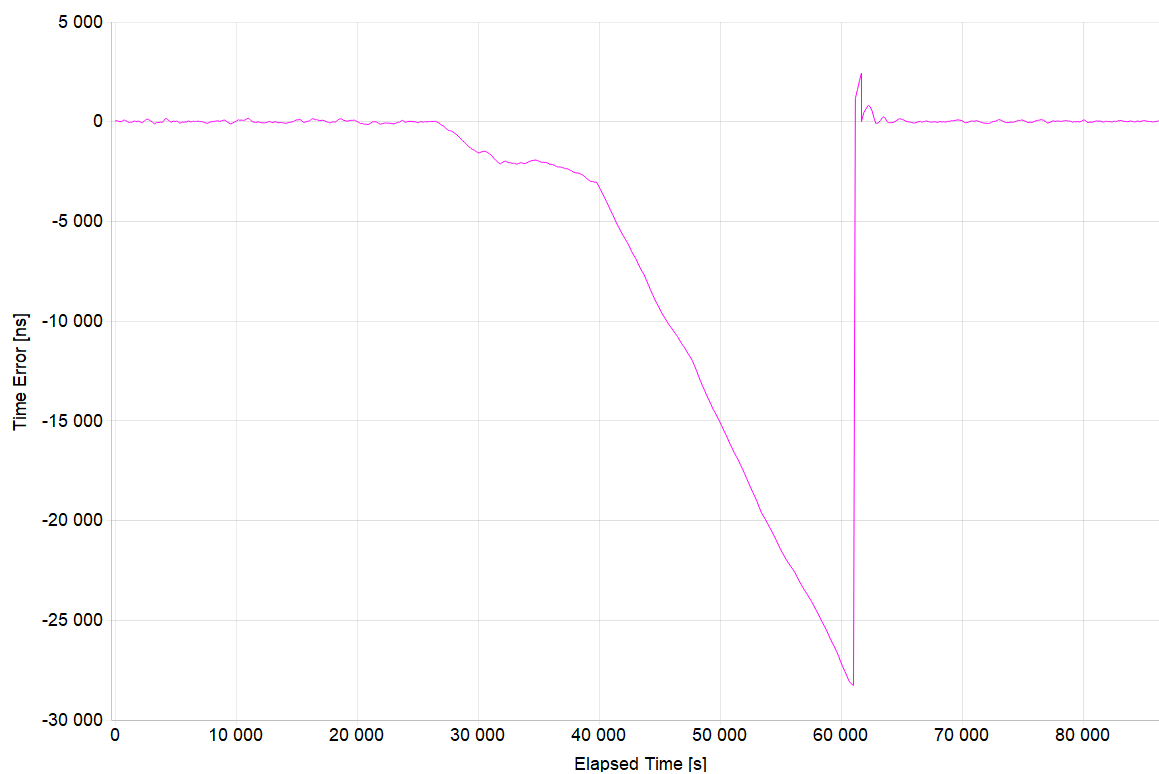
|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Fail                           |
| Mask ONEPPS        | -                              |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Fail                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Fail                           |

1. This test is expected to fail the G.8261 EEC Option 1 masks.

In this PDV pattern, the noise floor gradually increases for 12 hours and then decreases for 12 hours. At Approximately 26000, lock is lost because of the change in PDV noise floor. When the PDV pattern noise floor decreases to the previous level at around 62000, time lock is restored.

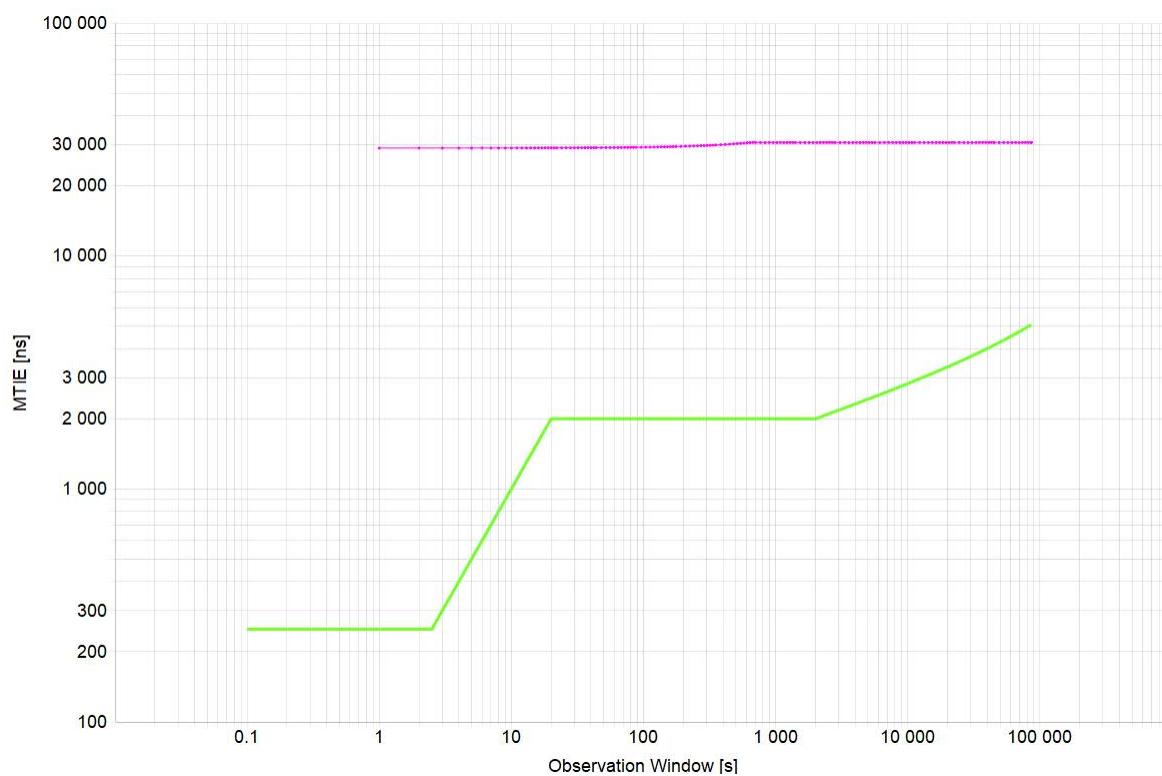
## 21.1 ONEPPS Analysis

|                        |      |
|------------------------|------|
| Offset Removal Applied | Off  |
| Zero Offset            | 52ns |



|              |           |
|--------------|-----------|
| Mean [ns]    | -4102.269 |
| Min [ns]     | -28266    |
| Max [ns]     | 2442      |
| Max-Min [ns] | 30708     |

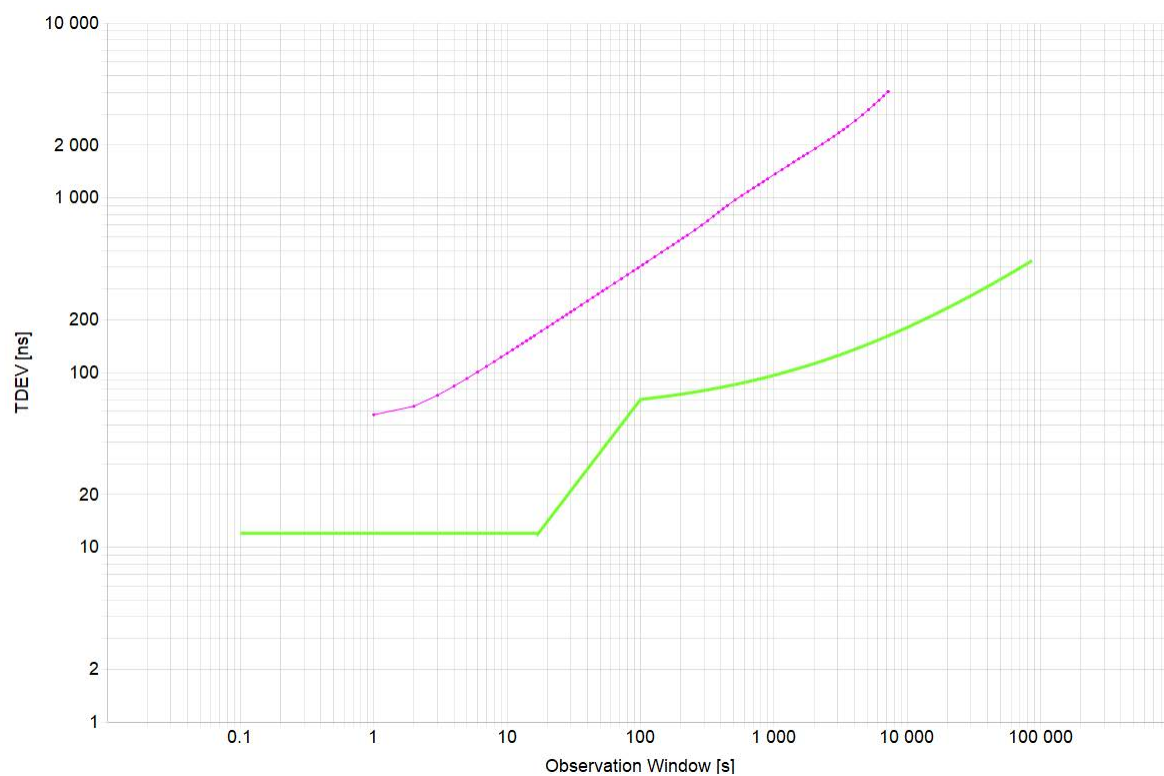
## 21.2 MTIE Analysis



|              |       |
|--------------|-------|
| Min [ns]     | 29056 |
| Max [ns]     | 30708 |
| Max-Min [ns] | 1652  |



## 21.3 TDEV Analysis



|              |          |
|--------------|----------|
| Min [ns]     | 57.272   |
| Max [ns]     | 4053.098 |
| Max-Min [ns] | 3995.826 |

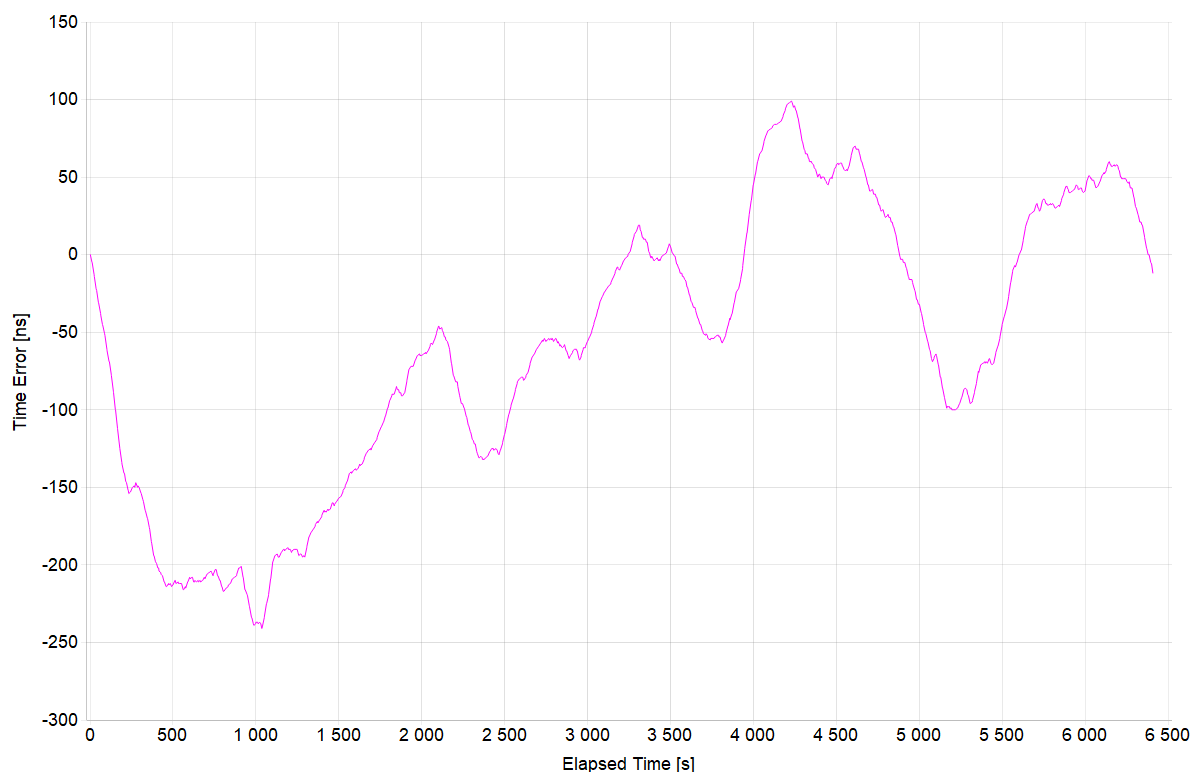
## 22. G.8261: Test Case 15b (SinglePath)

|                           |                                      |
|---------------------------|--------------------------------------|
| Test Description          | Test Case 15 Network Traffic Model 2 |
| Report Date               | 22-04-27_17-14-34                    |
| Packet Rate (pkt/s)       | 16                                   |
| Test Duration             | 01:46:50                             |
| Test Configuration        | 2                                    |
| Time to Phase Lock (s)    | 373                                  |
| Floor Delay Estimate (ns) | 6730                                 |

|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Pass                           |
| Mask ONEPPS        |                                |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Pass                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Pass                           |

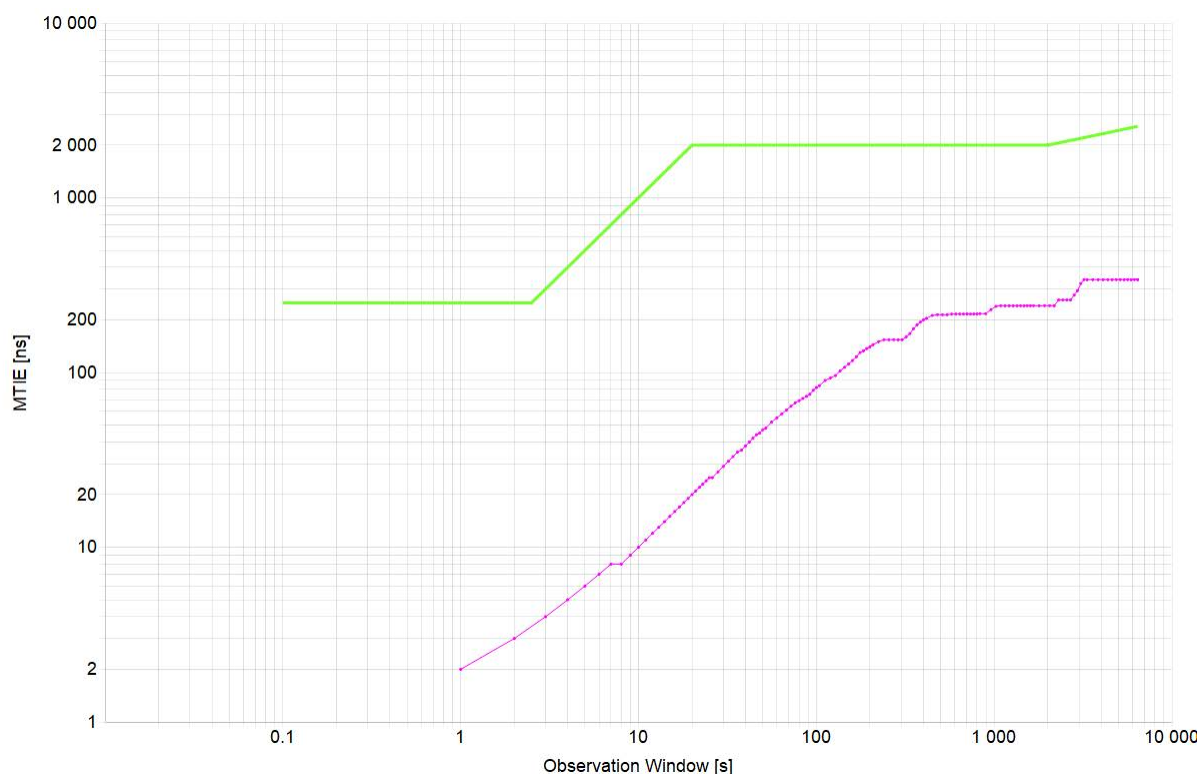
## 22.1 ONEPPS Analysis

|                        |     |
|------------------------|-----|
| Offset Removal Applied | Off |
| Zero Offset            | 0ns |



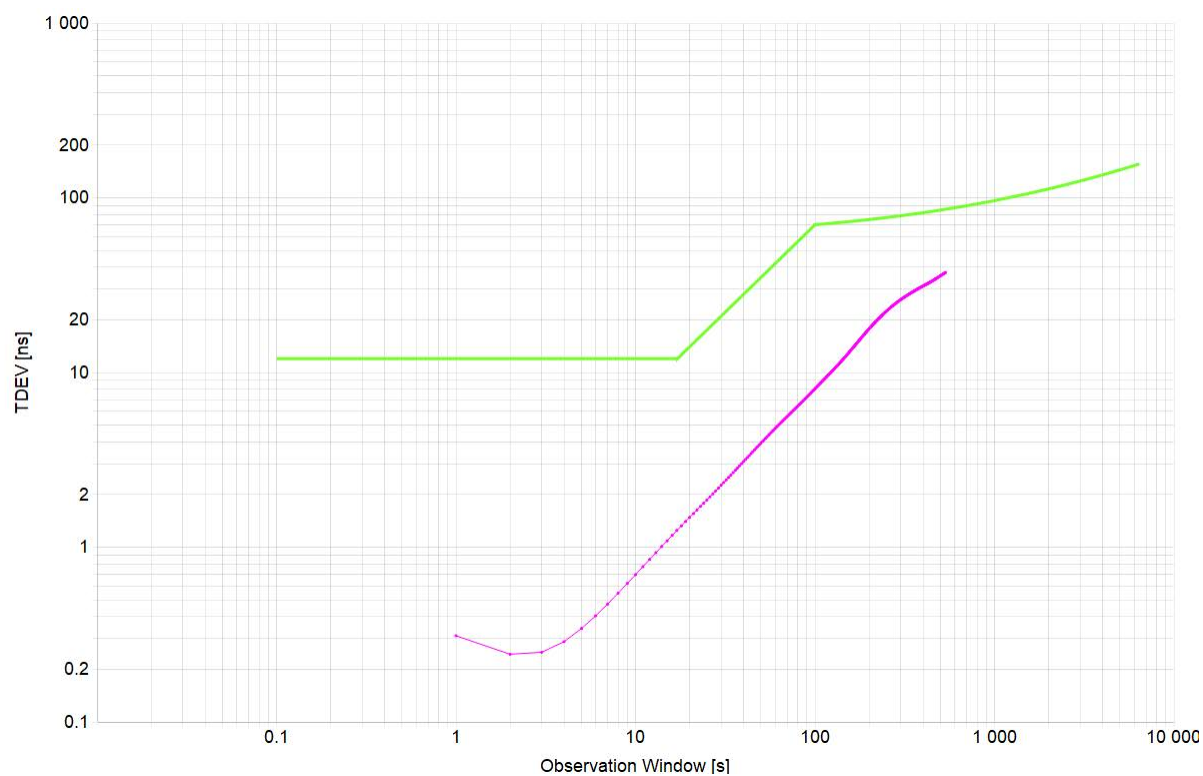
|              |         |
|--------------|---------|
| Mean [ns]    | -59.645 |
| Min [ns]     | -241    |
| Max [ns]     | 99      |
| Max-Min [ns] | 340     |

## 22.2 MTIE Analysis



|              |     |
|--------------|-----|
| Min [ns]     | 2   |
| Max [ns]     | 340 |
| Max-Min [ns] | 338 |

## 22.3 TDEV Analysis



|              |        |
|--------------|--------|
| Min [ns]     | 0.244  |
| Max [ns]     | 37.331 |
| Max-Min [ns] | 37.087 |

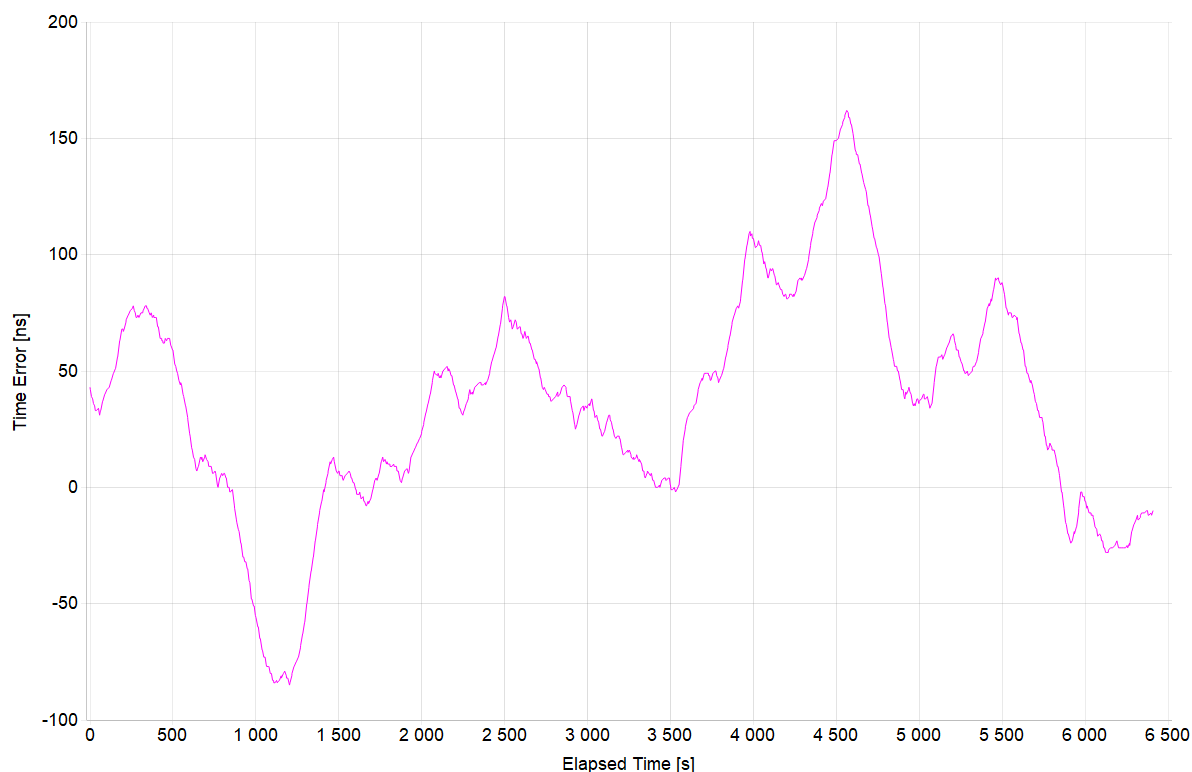
## 23. G.8261: Test Case 16b (SinglePath)

|                           |                                      |
|---------------------------|--------------------------------------|
| Test Description          | Test Case 16 Network Traffic Model 2 |
| Report Date               | 22-04-27_17-14-34                    |
| Packet Rate (pkt/s)       | 16                                   |
| Test Duration             | 01:46:50                             |
| Test Configuration        | 2                                    |
| Time to Phase Lock (s)    | 373                                  |
| Floor Delay Estimate (ns) | 6730                                 |

|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Pass                           |
| Mask ONEPPS        | -                              |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Pass                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Pass                           |

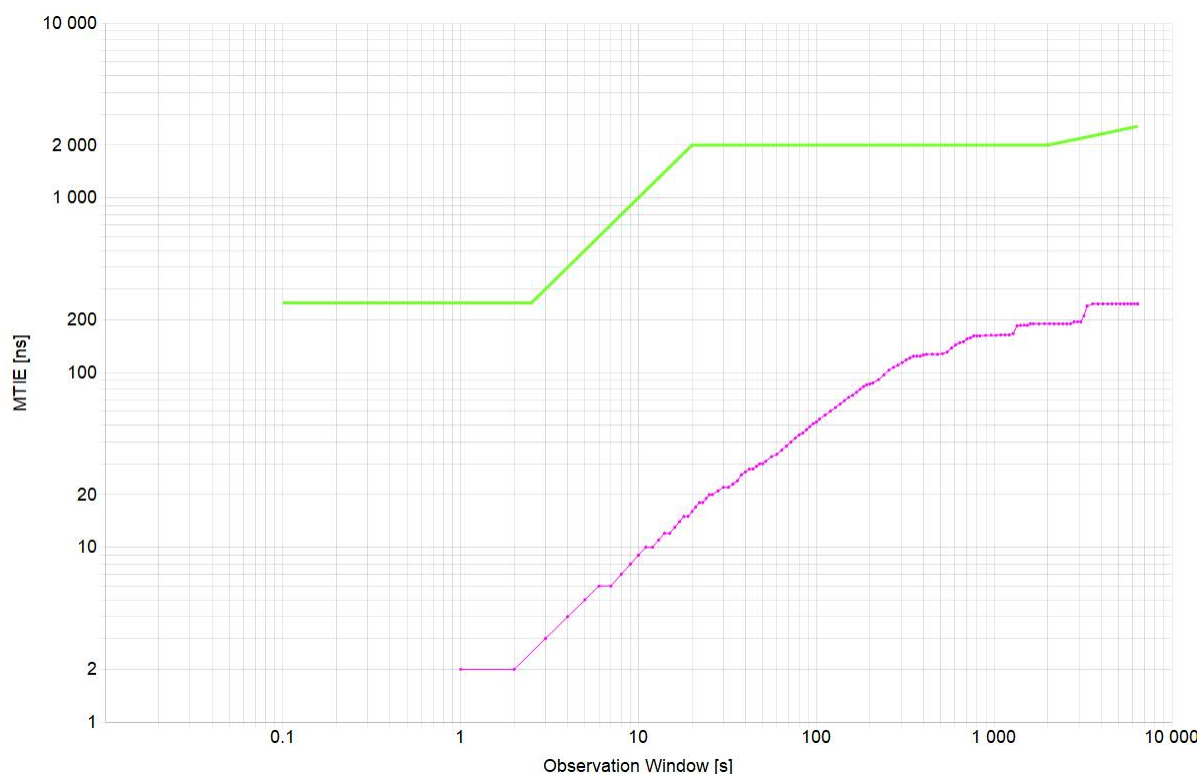
## 23.1 ONEPPS Analysis

|                        |      |
|------------------------|------|
| Offset Removal Applied | Off  |
| Zero Offset            | 43ns |



|              |        |
|--------------|--------|
| Mean [ns]    | 35.313 |
| Min [ns]     | -85    |
| Max [ns]     | 162    |
| Max-Min [ns] | 247    |

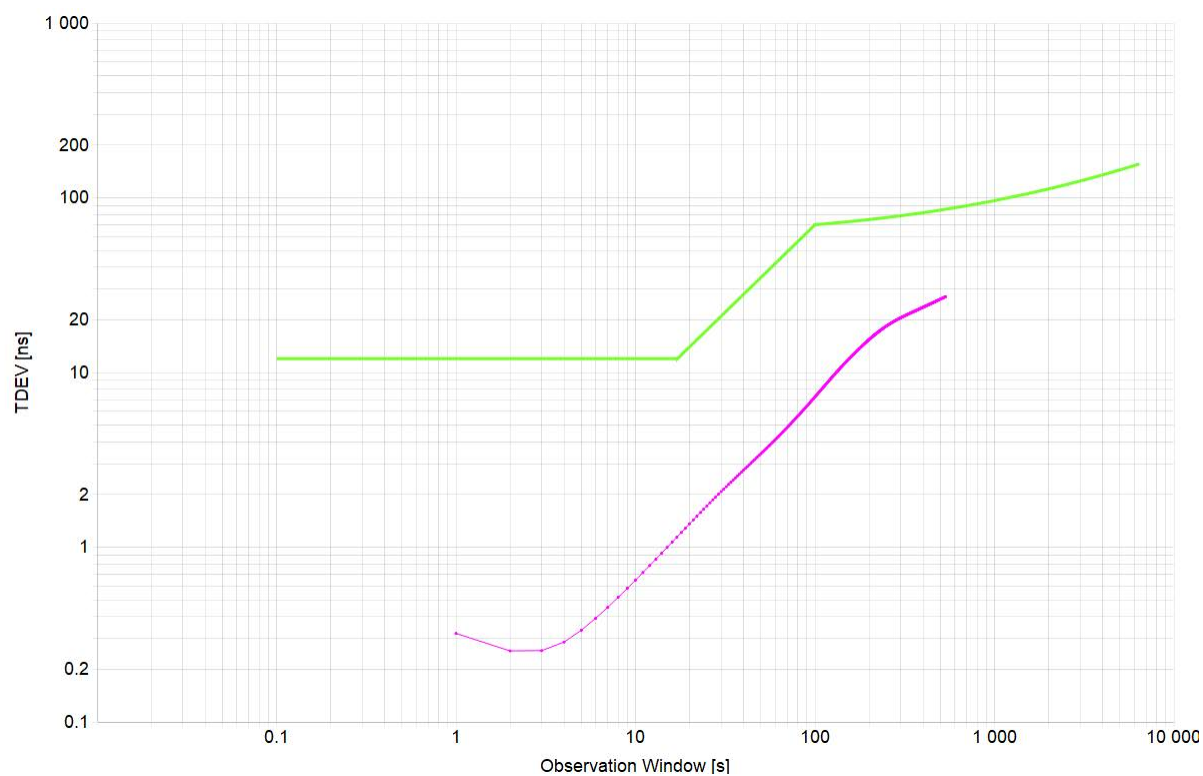
## 23.2 MTIE Analysis



|              |     |
|--------------|-----|
| Min [ns]     | 2   |
| Max [ns]     | 247 |
| Max-Min [ns] | 245 |



## 23.3 TDEV Analysis



|              |        |
|--------------|--------|
| Min [ns]     | 0.255  |
| Max [ns]     | 27.141 |
| Max-Min [ns] | 26.886 |

## 24. G.8261: Test Case 17b\_10us (SinglePath)

|                           |                                             |
|---------------------------|---------------------------------------------|
| Test Description          | Test Case17b (10μs) Network Traffic Model 2 |
| Report Date               | 22-04-28_08-58-37                           |
| Packet Rate (pkt/s)       | 16                                          |
| Test Duration             | 01:45:00                                    |
| Test Configuration        | 2                                           |
| Time to Phase Lock (s)    | 571                                         |
| Floor Delay Estimate (ns) | 6730                                        |

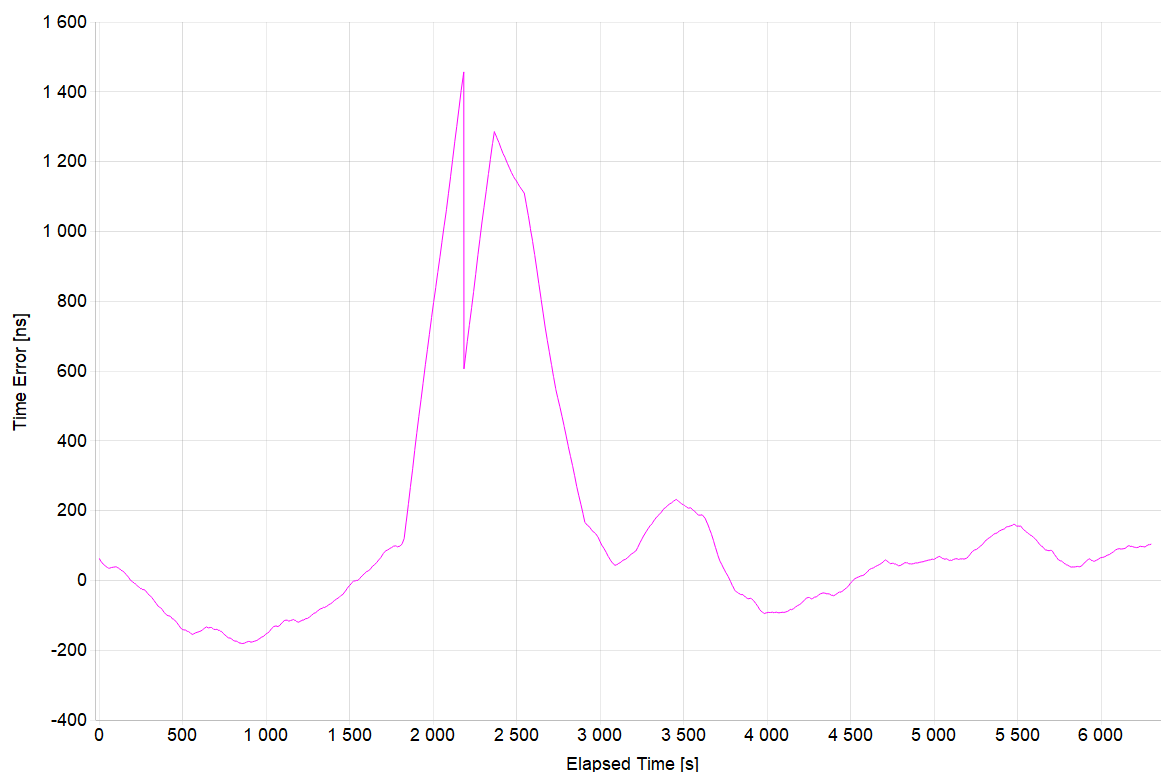
|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Fail                           |
| Mask ONEPPS        | -                              |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Fail                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Fail                           |

1. This test is expected to fail the G.8261 EEC Option 1 masks.

In this PDV pattern there is a prolonged noise floor change of 10μs at 1800s. This causes a loss of lock. In single path mode, large changes in PDV floor cannot be tolerated. Once the noise floor returns to normal, time lock is restored.

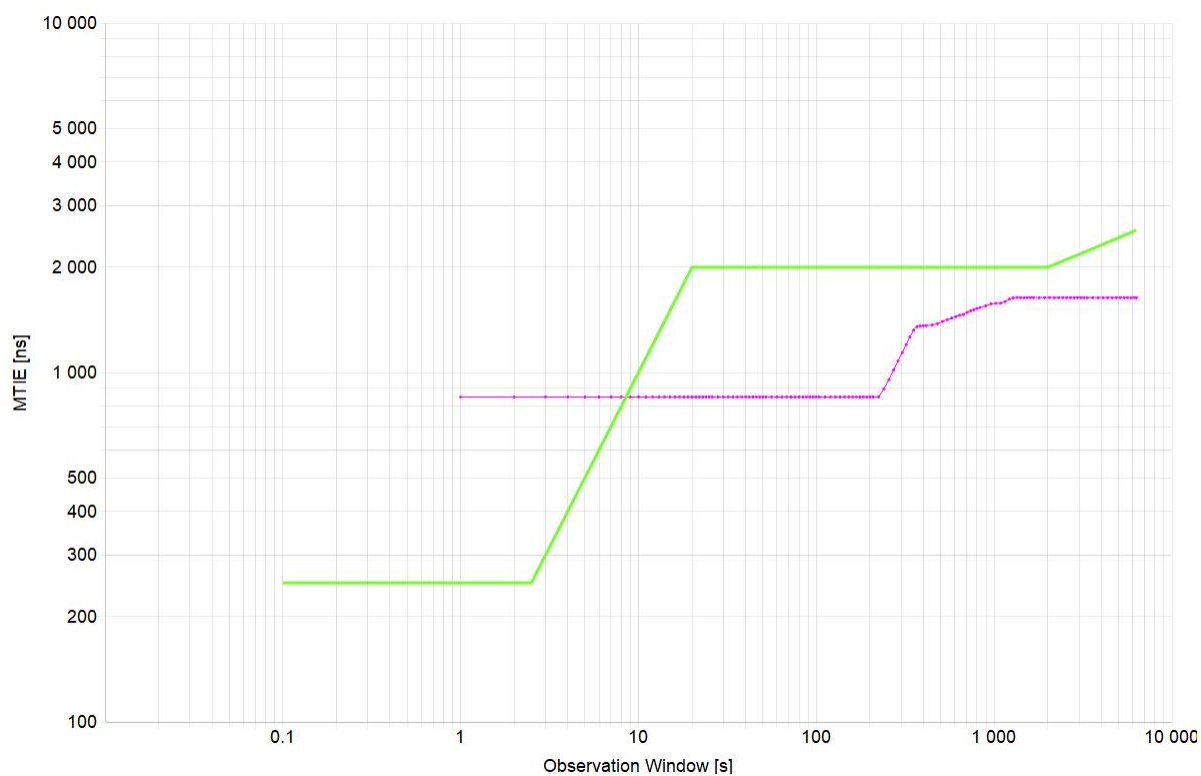
## 24.1 ONEPPS Analysis

|                        |      |
|------------------------|------|
| Offset Removal Applied | Off  |
| Zero Offset            | 63ns |



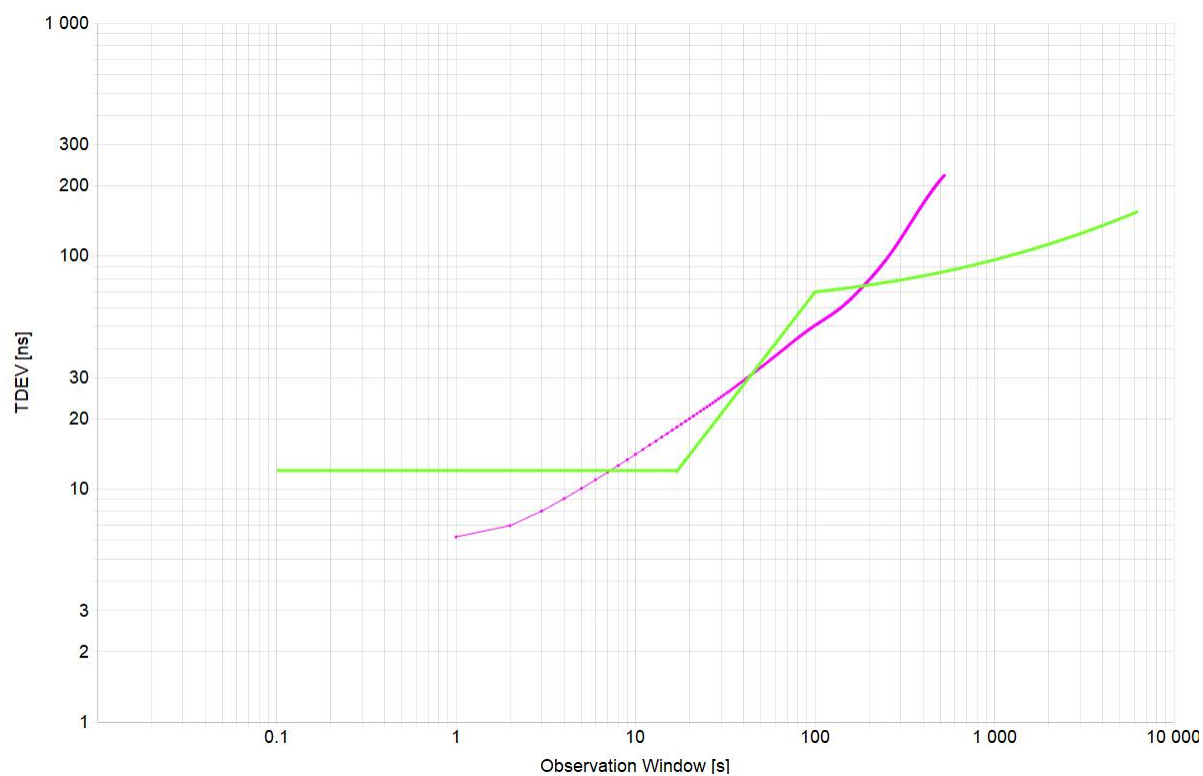
|              |         |
|--------------|---------|
| Mean [ns]    | 155.328 |
| Min [ns]     | -181    |
| Max [ns]     | 1457    |
| Max-Min [ns] | 1638    |

## 24.2 MTIE Analysis



|              |      |
|--------------|------|
| Min [ns]     | 851  |
| Max [ns]     | 1638 |
| Max-Min [ns] | 787  |

## 24.3 TDEV Analysis



|              |         |
|--------------|---------|
| Min [ns]     | 6.225   |
| Max [ns]     | 221.567 |
| Max-Min [ns] | 215.342 |

## 25. G.8261: Test Case 17b\_200us (SinglePath)

|                           |                                              |
|---------------------------|----------------------------------------------|
| Test Description          | Test Case17b (200μs) Network Traffic Model 2 |
| Report Date               | 22-04-27_17-14-34                            |
| Packet Rate (pkt/s)       | 16                                           |
| Test Duration             | 01:45:11                                     |
| Test Configuration        | 1                                            |
| Time to Phase Lock (s)    | 372                                          |
| Floor Delay Estimate (ns) | 8780                                         |

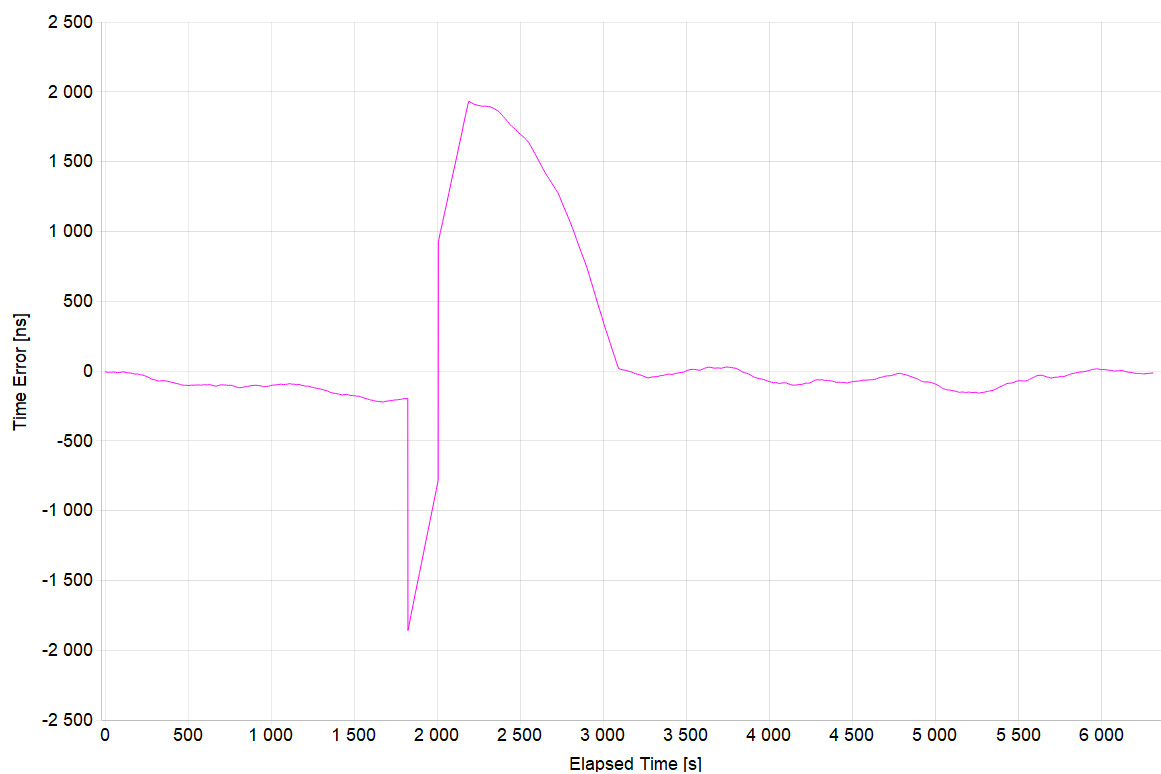
|                    |                                |
|--------------------|--------------------------------|
| All Mask Results   | Fail                           |
| Mask ONEPPS        | -                              |
| Mask ONEPPS Result | No Mask                        |
| Mask MTIE          | G.8261 EEC Opt. 1 Wander Limit |
| Mask MTIE Result   | Fail                           |
| Mask TDEV          | G.8261 EEC Opt. 1 Wander Limit |
| Mask TDEV Result   | Fail                           |

1. This test is expected to fail the G.8261 EEC Option 1 masks.

In this PDV pattern there is a prolonged noise floor change of 200μs at 1800s. This causes a loss of lock. In single path mode, large changes in PDV floor cannot be tolerated. Once the noise floor returns to normal, time lock is restored.

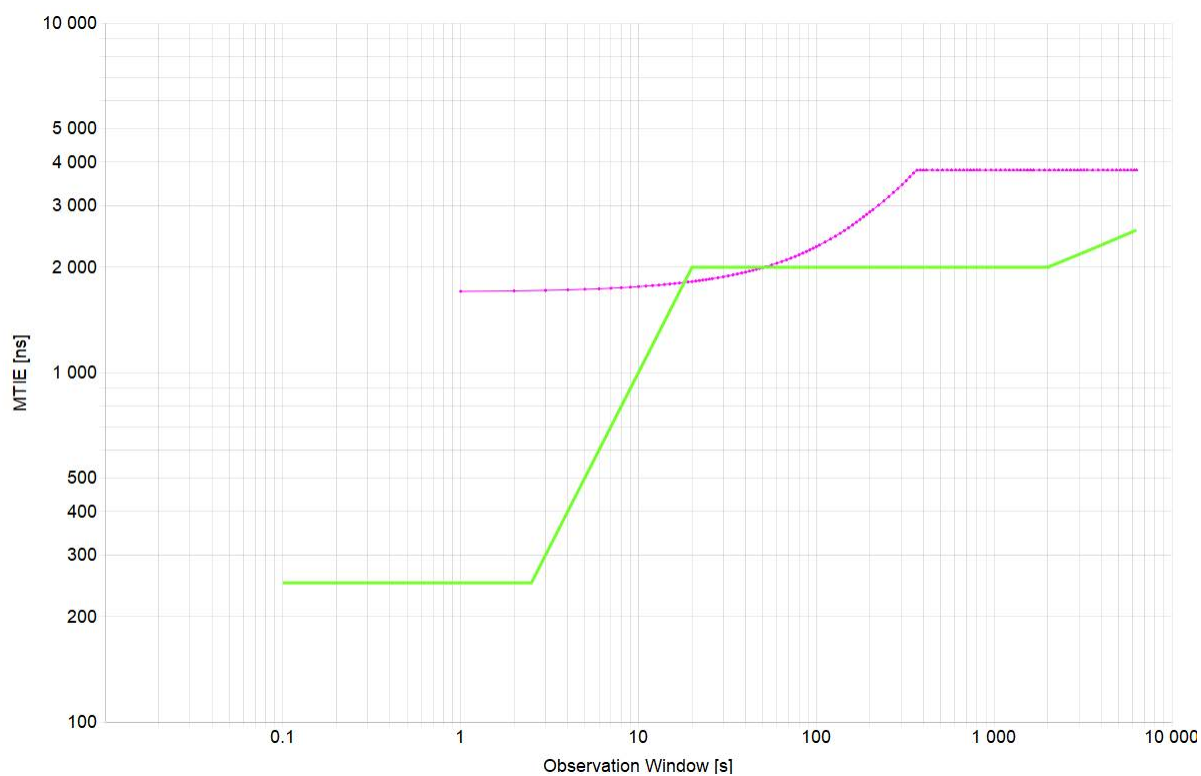
## 25.1 ONEPPS Analysis

|                        |          |
|------------------------|----------|
| Offset Removal Applied | Off      |
| Zero Offset            | -5.703ns |



|              |           |
|--------------|-----------|
| Mean [ns]    | 129.587   |
| Min [ns]     | -1859.203 |
| Max [ns]     | 1932.297  |
| Max-Min [ns] | 3791.5    |

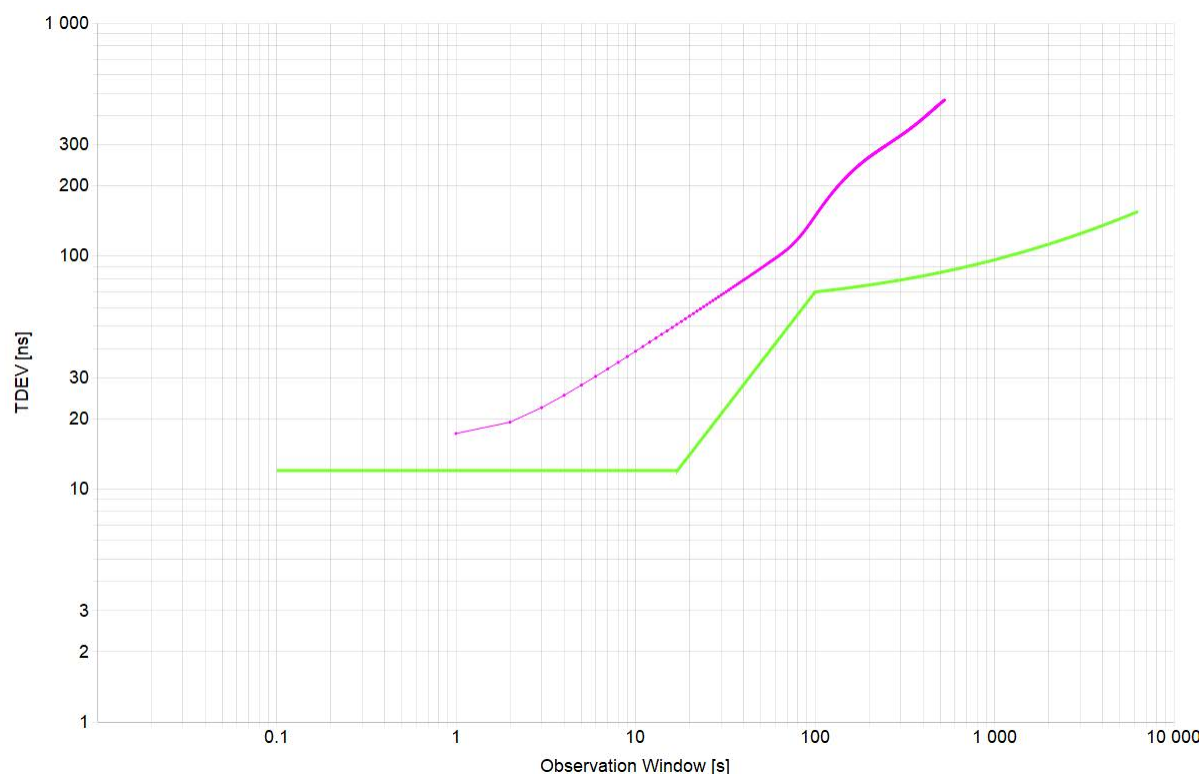
## 25.2 MTIE Analysis



|              |         |
|--------------|---------|
| Min [ns]     | 1706.25 |
| Max [ns]     | 3791.5  |
| Max-Min [ns] | 2085.25 |



## 25.3 TDEV Analysis



|              |         |
|--------------|---------|
| Min [ns]     | 17.298  |
| Max [ns]     | 466.594 |
| Max-Min [ns] | 449.296 |

## 26. Revision History

| Revision | Date        | Description      |
|----------|-------------|------------------|
| 1.00     | May 3, 2023 | Initial release. |

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