**3GPP TSG-RAN WG4 Meeting #111 *R4-2410188***

**Fukuoka, JP, 20 May - 24 May, 2024**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.133** | **CR** | **draftCR** | **rev** |  | **Current version:** | **18.5.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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|  |
| ***Title:***  | Draft CR on measurement delay test cases for SL positioning, Sets 10-3, 10-4 |
|  |  |
| ***Source to WG:*** | vivo |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_pos\_enh2-Perf |  | ***Date:*** | 2024-05-12 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-18 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | Reason for change#1: Measurement delay test cases for SL AoA and SL RTOA needs to be defined. |
|  |  |
| ***Summary of change:*** | Change#1: Define the measurement delay test cases for SL AoA and SL RTOA, including the test purpose and environment, and the test requirements, |
|  |  |
| ***Consequences if not approved:*** | There will be no measurement delay test cases for SL AoA and SL RTOA. |
|  |  |
| ***Clauses affected:*** | A.9A.1.1.3, A.9A.1.1.4 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** | **X** |  |  Test specifications | TS 38.533 |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | R4-2408297 |

# **--- Start of Change #1 ---**

### A.9A.1.1.3 NR SL AoA measurements reporting delay test in FR1 SA

##### A.9A.1.1.3.1 Test Purpose and Environment

The purpose of the test is to verify that the SL AoA measurement meets the requirements specified in Clause 12A.6 in an environment with AWGN propagation conditions in FR1 in NR Uu standalone scenario, when a single frequency layer is configured for SL positioning.

The test is applicable for UEs supporting NR Uu and V2X or 5G ProSe operation, which are capable of performing SL AoA measurements.

The supported NR Uu test configurations are specified in Table A.9A.1.1.3.1-1.

The supported NR SL test configurations are specified in Table A.9A.1.1.3.1-2.

**Table A.9A.1.1.3.1-1: Supported Test Configurations for FR1 NR cell**

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR Uu: 15 kHz SSB SCS, 20 MHz BW, FDD duplex mode  |
| 2 | NR Uu: 15 kHz SSB SCS, 20 MHz BW, TDD duplex mode |
| 3 | NR Uu: SSB SCS 30 kHz, 40 MHz BW, TDD duplex mode |
| Note 1: The UE is only required to pass in one of the supported test configurations in FR1. |

Table A.9A.1.1.X.1-2: Supported test configurations for NR SL UEs

|  |  |
| --- | --- |
| NR SL configuration | Description |
| SL\_conf1 | NR SL: 15 kHz SSB SCS, 10 MHz bandwidth, HD duplex mode |
| SL\_conf2 | NR SL: 30 kHz SSB SCS, 10 MHz bandwidth, HD duplex mode |
| SL\_conf3 | NR SL: 30 kHz SSB SCS, 20 MHz bandwidth, HD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. |

In the test there is one target UE receiving SL-PRS and performing SL AoA measurements and two anchor UEs (anchor UE 1, anchor UE 2) transmitting SL-PRS for the SL AoA measurements. The target UE and all the anchor UEs are in RRC\_CONNECTED state, with Cell 1 as their PCell in FR1. Cell 1 is also the synchronization source of the target UE and all anchor UEs in the test.

The test consists of two consecutive time intervals, with the duration of T1 and T2. During the duration T1, the target UE shall not have any timing information of anchor UE 1 and anchor UE 2. All two anchor UEs transmit SL-PRS during T2.

The *SL-AOA-ProvideAssistanceData* and *SL-AOA-RequestLocationInformation* as defined in TS 38.355 [37], shall be provided to the target UE via Cell 1 during T1. The last TTI containing the two messages shall be provided to the target UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *SL-AOA assistance* data and location information request.

The general test parameters are listed in Table A.9A.1.1.3.1-3. NR Uu specific test parameters for Cell 1 and NR Uu UE-specific test parameters for all UEs in the test are listed in Table A.9A.1.1.3.1-4 and A.9A.1.1.3.1-5, respectively. Anchor UE specific test parameters for SL AoA measurement reporting delay during T1 and T2 are listed in Table A.9A.1.1.3.1-6.

Table A.9A.1.1.3.1-3: General test parameters for SL AoA measurement reporting delay

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| Serving cell |  | Cell 1 | NR PCell of the target UE and all anchor UEs (anchor UE 1, anchor UE 2), in FR1 on NR Uu RF channel 1. This cell is also the synchronization source for SL operation for all UEs in the test. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| Measurement gap |  | OFF |  |
| Target UE |  | UE 0 | The performing SL AoA measurements based on SL-PRS transmissions from anchor UEs |
| Other anchor UEs |  | UE 1 and UE 2 | Anchor UE 2 and Anchor UE 3 appear at the first and second places in the anchor UE list in the SL-AOA assistance data. |
| Number of anchor UEs provided in SL-TDOA assistance data |  | 4 | Including the reference anchor UE |
| Sidelink communication configuration |  | As specified in Table A.3.21.2-2 |  |
| Target UE antenna configuration |  | 1 x 2 |  |
| Timing offset between the anchor UEs at the target UE antenna connector | μs | UE 2 to UE 1: 0UE 3 to UE 1: 3 | Synchronous transmissions |
| T1 | s | 3 | The length of the time interval from the beginning of each test |
| T2 | s | 1.28 | The length of the time interval that follows immediately after time interval T1 |

Table A.9A.1.1.3.1-4: NR Uu specific test parameters for Cell 1

|  |  |  |  |
| --- | --- | --- | --- |
| Table A.9A.1.1.X.1-4: NR Uu specific test parameters for Cell 1Parameter | Unit | Value | Comment |
| NR Uu RF channel number |  | 1 | RF channel of Cell 1. |
| SSB configuration | Uu\_conf1 |  | SSB.1 FR1 | SSB configuration of Cell 1. |
| Uu\_conf2 |  | SSB.1 FR1 |
| Uu\_conf3 |  | SSB.2 FR1 |
| SMTC configuration | Uu\_conf1 |  | SMTC.2 | SMTC configuration of Cell 1. |
| Uu\_conf2 |  | SMTC.1 |
| Uu\_conf3 |  | SMTC.1 |
| PDSCH RMC configuration | Uu\_conf1 |  | SR.1.1 FDD |  |
| Uu\_conf2 |  | SR.1.1 TDD |  |
| Uu\_conf3 |  | SR.2.1 TDD |  |
| RMSI CORESET RMC configuration | Uu\_conf1 |  | CR.1.1 FDD | As specified in clause A.3.1.2.1 |
| Uu\_conf2 |  | CR.1.1 TDD |  |
| Uu\_conf3 |  | CR.2.1 TDD |  |
| Dedicated CORESET RMC configuration | Uu\_conf1 |  | CCR.1.1 FDD |  |
| Uu\_conf2 |  | CCR.1.1 TDD |  |
| Uu\_conf3 |  | CCR.2.1 TDD |  |
| Initial BWP configuration | Uu\_conf1,2,3 |  | DLBWP.0.1 ULBWP.0.1 |  |
| Active DL BWP configuration | Uu\_conf1,2,3 |  | DLBWP.1.1 |  |
| Active UL BWP configuration | Uu\_conf1,2,3 |  | ULBWP.1.1 |  |

Table A.9A.1.1.3.1-5: NR Uu UE-specific test parameters for UE 0, UE 1, and UE 2

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NR Uu RF channel number |  | 1 | RF channel of Cell 1. |
| DRX |  | OFF |  |
| OCNG Patterns |  | OP.1 |  |
| EPRE ratio of PSS to SSS | dB | 0 |  |
| EPRE ratio of PBCH DMRS to SSS |  |
| EPRE ratio of PBCH to PBCH DMRS |  |
| EPRE ratio of PDCCH DMRS to SSS |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |
| EPRE ratio of PDSCH DMRS to SSS  |  |
| EPRE ratio of PDSCH to PDSCH  |  |
| EPRE ratio of OCNG DMRS to SSS Note 1 |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |
| Note2 | Config 1,2,3 | dBm/15 kHz | -110 |  |
| Config 1, 2 | dBm /SCS | -110 |  |
| Config 3 | -107 |  |
|  | dB |  | 4.5 |  |
|  | dB |  | 4.5 |  |
| SS-RSRPNote3 | Config 1,2 | dBm /SCS | -105.5 |  |
|  | Config 3 | -102.5 |  |
| IoNote3 | Config 1,2 | dBm /9.36MHz | -76.2 |  |
| Config 3 | dBm/ 38.16MHz | -70.1 |  |
| Propagation condition |  | AWGN |  |
| NOTE 1: OCNG shall be used such that cell 1 is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.NOTE 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |

Table A.9A.1.1.3.1-6: Anchor UE specific test parameters on the SL carrier

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Anchor UE 1 | Anchor UE 2 | Comment |
| T1 | T2 | T1 | T2 |  |
| SL RF Channel number |  | 2 | 2 |  |
| SL DRX |  | OFF | OFF |  |
| networkControlledSyncTx |  | ON | ON |  |
| inCoverage (in MIB-SL) |  | TRUE | TRUE |  |
| SL pool configuration | SL\_conf1 |  | N/A | TBD | N/A | TBD |  |
| SL\_conf2 |  |
| SL\_conf3 |  |
| SL-PRS configuration | SL\_conf1 |  | N/A | TBD | N/A | TBD | As specified in Table A.3.X.2.1-1  |
| SL\_conf2 |
| SL\_conf3 |
| PSCCH RMC (defined in TBD) |  | TBD | TBD | TBD | TBD |  |
| PSSCH RMC (defined in A.3.21.3) |  | TBD | TBD | TBD | TBD |  |
|  Note 2 | dBm/SCS | -98 |  |
| SL-PRS  | dB | -Infinity | TBD | -Infinity | TBD |  |
| PSCCH  | dB | TBD | TBD | TBD | TBD |  |
| Io Note 3 | SL\_conf1 | dBm/BW | TBD | TBD | TBD | TBD |  |
| SL\_conf2 |  |
| SL\_conf3 |  |
| SL PRS-RSRP Note3 | dBm/SCS | -Infinity | TBD | -Infinity | TBD |  |
| Propagation Condition  |  | AWGN |  |
| Note 1: Interference from other UEs and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.Note 2: SL PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io level is based on the allocated RBs for SL PRS symbols. Note 3: The UE is only required to be tested in one of the supported test configurations.  |  |

##### A.9A.1.1.3.2 Test Requirements

The SL AoA measurement time fulfils the requirements specified in clause 12A.2.6.

The UE shall perform and report to LMF the SL AoA measurements for the anchor UE 1 and anchor UE 2, within the time duration specified in clause 12A.6 starting from the beginning of time interval T2.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the time duration above because of TTI insertion uncertainty of the measurement report in DCCH.

The rate of the correct events for each anchor UE observed during repeated tests shall be at least 90%, where the reported SL AoA measurement for each correct event shall be within the SL AoA reporting range specified in clause 10.4A.6.1.1, i.e., between A\_AoA\_0 and SL\_AoA\_3599, and between Z\_AoA\_0 and Z\_AoA\_1799.

# **--- End of Change #1 ---**

# **--- Start of Change #2---**

### A.9A.1.1.4 NR SL RTOA measurements reporting delay test in FR1 SA

##### A.9A.1.1.4.1 Test Purpose and Environment

The purpose of the test is to verify that the SL RTOA measurement meets the requirements specified in Clause 12A.7 in an environment with AWGN propagation conditions in FR1 in NR Uu standalone scenario, when a single frequency layer is configured for SL positioning.

The test is applicable for UEs supporting NR Uu and V2X or 5G ProSe operation, which are capable of performing SL AoA measurements.

The supported NR Uu test configurations are specified in Table A.9A.1.1.4.1-1.

The supported NR SL test configurations are specified in Table A.9A.1.1.4.1-2.

Table A.9A.1.1.4.1-1: Supported test configurations for FR1 NR Cell 1

|  |  |
| --- | --- |
| NR Uu configuration | Description |
| Uu\_conf1 | NR Uu: 15 kHz SSB SCS, 20 MHz bandwidth, FDD duplex mode |
| Uu\_conf2 | NR Uu: 15 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| Uu\_conf3 | NR Uu: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. |

Table A.9A.1.1.X.1-2: Supported test configurations for NR SL UEs

|  |  |
| --- | --- |
| NR SL configuration | Description |
| SL\_conf1 | NR SL: 15 kHz SSB SCS, 10 MHz bandwidth, HD duplex mode |
| SL\_conf2 | NR SL: 30 kHz SSB SCS, 10 MHz bandwidth, HD duplex mode |
| SL\_conf3 | NR SL: 30 kHz SSB SCS, 20 MHz bandwidth, HD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. |

In the test there is one target UE transmitting SL-PRS and performing SL RTOA measurements and one anchor UE (anchor UE 1) receiving SL-PRS for the SL RTOA measurements. The target UE and all the anchor UEs are in RRC\_CONNECTED state, with Cell 1 as their PCell in FR1. Cell 1 is also the synchronization source of the target UE and all anchor UEs in the test.

The test consists of two consecutive time intervals, with the duration of T1 and T2. During the duration T1, the target UE shall not have any timing information of anchor UE 1 and anchor UE 2. All two anchor UEs transmit SL-PRS during T2.

The *SL-TOA-ProvideAssistanceData* and *SL-TOA-RequestLocationInformation* as defined in TS 38.355 [37], shall be provided to the target UE via Cell 1 during T1. The last TTI containing the two messages shall be provided to the target UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *SL-TOA assistance* data and location information request.

The general test parameters are listed in Table A.9A.1.1.4.1-3. NR Uu specific test parameters for Cell 1 and NR Uu UE-specific test parameters for all UEs in the test are listed in Table A.9A.1.1.4.1-4 and A.9A.1.1.4.1-5, respectively. Anchor UE specific test parameters for SL RTOA measurement reporting delay during T1 and T2 are listed in Table A.9A.1.1.4.1-6.

Table A.9A.1.1.4.1-3: General test parameters for SL RTOA measurement reporting delay

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| Serving cell |  | Cell 1 | NR PCell of the target UE and all anchor UEs (anchor UE 1), in FR1 on NR Uu RF channel 1. This cell is also the synchronization source for SL operation for all UEs in the test. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| Measurement gap |  | OFF |  |
| Target UE |  | UE 0 | The performing SL RTOA measurements based on SL-PRS receiving from anchor UEs |
| Anchor UEs |  | UE 1 |  |
| Sidelink communication configuration |  | As specified in Table A.3.21.2-2 |  |
| Target UE antenna configuration |  | 1 x 2 |  |
| Timing offset between the anchor UEs at the target UE antenna connector | μs | Anchor UE 1 to target UE 1: 0 | Synchronous transmissions |
| T1 | s | 3 | The length of the time interval from the beginning of each test |
| T2 | s | 1.28 | The length of the time interval that follows immediately after time interval T1 |

Table A.9A.1.1.4.1-4: NR Uu specific test parameters for Cell 1

|  |  |  |  |
| --- | --- | --- | --- |
| Table A.9A.1.1.X.1-4: NR Uu specific test parameters for Cell 1Parameter | Unit | Value | Comment |
| NR Uu RF channel number |  | 1 | RF channel of Cell 1. |
| SSB configuration | Uu\_conf1 |  | SSB.1 FR1 | SSB configuration of Cell 1. |
| Uu\_conf2 |  | SSB.1 FR1 |
| Uu\_conf3 |  | SSB.2 FR1 |
| SMTC configuration | Uu\_conf1 |  | SMTC.2 | SMTC configuration of Cell 1. |
| Uu\_conf2 |  | SMTC.1 |
| Uu\_conf3 |  | SMTC.1 |
| PDSCH RMC configuration | Uu\_conf1 |  | SR.1.1 FDD |  |
| Uu\_conf2 |  | SR.1.1 TDD |  |
| Uu\_conf3 |  | SR.2.1 TDD |  |
| RMSI CORESET RMC configuration | Uu\_conf1 |  | CR.1.1 FDD | As specified in clause A.3.1.2.1 |
| Uu\_conf2 |  | CR.1.1 TDD |  |
| Uu\_conf3 |  | CR.2.1 TDD |  |
| Dedicated CORESET RMC configuration | Uu\_conf1 |  | CCR.1.1 FDD |  |
| Uu\_conf2 |  | CCR.1.1 TDD |  |
| Uu\_conf3 |  | CCR.2.1 TDD |  |
| Initial BWP configuration | Uu\_conf1,2,3 |  | DLBWP.0.1 ULBWP.0.1 |  |
| Active DL BWP configuration | Uu\_conf1,2,3 |  | DLBWP.1.1 |  |
| Active UL BWP configuration | Uu\_conf1,2,3 |  | ULBWP.1.1 |  |

Table A.9A.1.1.4.1-5: NR Uu UE-specific test parameters for UE 0 and UE 1

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NR Uu RF channel number |  | 1 | RF channel of Cell 1. |
| DRX |  | OFF |  |
| OCNG Patterns |  | OP.1 |  |
| EPRE ratio of PSS to SSS | dB | 0 |  |
| EPRE ratio of PBCH DMRS to SSS |  |
| EPRE ratio of PBCH to PBCH DMRS |  |
| EPRE ratio of PDCCH DMRS to SSS |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |
| EPRE ratio of PDSCH DMRS to SSS  |  |
| EPRE ratio of PDSCH to PDSCH  |  |
| EPRE ratio of OCNG DMRS to SSS Note 1 |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |  |
| Note2 | Config 1,2,3 | dBm/15 kHz | -110 |  |
| Config 1, 2 | dBm /SCS | -110 |  |
| Config 3 | -107 |  |
|  | dB |  | 4.5 |  |
|  | dB |  | 4.5 |  |
| SS-RSRPNote3 | Config 1,2 | dBm /SCS | -105.5 |  |
|  | Config 3 | -102.5 |  |
| IoNote3 | Config 1,2 | dBm /9.36MHz | -76.2 |  |
| Config 3 | dBm/ 38.16MHz | -70.1 |  |
| Propagation condition |  | AWGN |  |
| NOTE 1: OCNG shall be used such that cell 1 is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.NOTE 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |

Table A.9A.1.1.4.1-6: Anchor UE specific test parameters on the SL carrier

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Anchor UE 1 |
| T1 | T2 |
| SL RF Channel number |  | 2 |
| SL DRX |  | OFF |
| networkControlledSyncTx |  | ON |
| inCoverage (in MIB-SL) |  | TRUE |
| SL pool configuration | SL\_conf1 |  | N/A | TBD |
| SL\_conf2 |
| SL\_conf3 |
| SL-PRS configuration | SL\_conf1 |  | N/A | TBD |
| SL\_conf2 |
| SL\_conf3 |
| PSCCH RMC (defined in TBD) |  | TBD | TBD |
| PSSCH RMC (defined in A.3.21.3) |  | TBD | TBD |
|  Note 2 | dBm/SCS | -98 |
| SL-PRS  | dB | -Infinity | TBD |
| PSCCH  | dB | TBD | TBD |
| Io Note 3 | SL\_conf1 | dBm/BW | TBD | TBD |
| SL\_conf2 |
| SL\_conf3 |
| SL PRS-RSRP Note3 | dBm/SCS | -Infinity | TBD |
| Propagation Condition  |  | AWGN |
| NOTE 1: The resources for NR Uu uplink transmission are assigned to the UE prior to the start of time period T2.NOTE 2: Interference from other UEs and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.NOTE 3: SL PRS-RSRP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. |

##### A.9A.1.1.4.2 Test Requirements

The SL RTOA measurement time fulfils the requirements specified in clause 12A.2.7.

The UE shall perform and report to LMF the SL RTOA measurements for the anchor UE 1, within the time duration specified in clause 12A.7 starting from the beginning of time interval T2.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the time duration above because of TTI insertion uncertainty of the measurement report in DCCH.

The rate of the correct events for each anchor UE observed during repeated tests shall be at least 90%, where the reported SL RTOA measurement for each correct event shall be within the SL RTOA reporting range specified in clause 10.4A.7.1.1, i.e., between SL\_RTOA\_0 and SL\_RTOA\_985024.

# **--- End of Change #2 ---**