**3GPP TSG-RAN WG2 Meeting #116 R2-21xxxxx**

**Online, 01 – 12 November 2021**

**Agenda item:** 5.5

**Source:** Huawei, HiSilicon

**Title:** Summary of [AT116-e][619][POS] Stage 2 Rel-16 positioning CRs (Huawei)

**Document for:**  Discussion

# 1. Introduction

This document summarizes the following email discussion:

* [AT116-e][619][POS] Stage 2 Rel-16 positioning CRs (Huawei)

Scope: Check the CRs in R2-2110169 and R2-2110170.

Intended outcome: Agreed CRs

Deadline: Tuesday 2021-11-09 0800 UTC

## 1.1 References

[1] R2-2110169 Correction to the alignement between stage2 and stage3 Huawei, HiSilicon CR Rel-16 38.305 16.6.0 0081 - F NR\_pos-Core

[2] R2-2110170 Correciton to Event Reporting in RRC\_IDLE Huawei, HiSilicon CR Rel-16 38.305 16.6.0 0076 - F NR\_pos-Core R2-2107333

## 1.2 Contact Points

Respondents to the email discussion are kindly asked to fill in the following table.

|  |  |  |
| --- | --- | --- |
| Company | Name | Email Address |
| Huawei, HiSIlicon (Rapp) | Yinghao Guo | [yinghaoguo@huawei.com](mailto:yinghaoguo@huawei.com) |
| ZTE | Yu Pan | pan.yu24@zte.com.cn |
| Ericsson | Ritesh Shreevastav | Ritesh.shreevastav@ericsson.com |
| CATT | Jianxiang Li | lijianxiang@datangmobile.cn |
| Intel | Yi Guo | Yi.guo@intel.com |
| Apple | Sasha Sirotkin | ssirotkin@apple.com |
| Xiaomi | Xiaolong Li | lixiaolong1@xiaomi.com |
| vivo | Xiang Pan | panxiang@vivo.com |
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# 2. Discussion

## 2.1 Alignment between stage2 and stage3 spec

Within [1], the following corrections have been provided:

==================================FIRST CHANGE==================================

## 8.10 Multi-RTT positioning

### 8.10.2 Information to be transferred between NG-RAN/5GC Elements

This clause defines the information that may be transferred between LMF and UE/gNB.

#### 8.10.2.1 Information that may be transferred from the LMF to UE

The information that may be transferred from the LMF to the UE are listed in Table 8.10.2.1-1.

Table 8.10.2.1-1: Information that may be transferred from LMF to the UE

|  |
| --- |
| Information |
| Physical cell IDs (PCIs), global cell IDs (GCIs), and PRS IDs, ARFCNs of candidate NR TRPs for measurement |
| Timing relative to the serving (reference) TRP of candidate NR TRPs |
| DL-PRS configuration of candidate NR TRPs |
| SSB information of the TRPs (the time/frequency occupancy of SSBs) |
| PRS-only TP indication |
| Report configuration related informaiton |

#### 8.10.2.2 Information that may be transferred from the UE to LMF

The information that may be signalled from UE to the LMF is listed in Table 8.10.2.2-1. The individual UE measurements are defined in TS 38.215 [37].

Table 8.10.2.2-1: Information that may be transferred from UE to the LMF

|  |
| --- |
| Information |
| PCI, GCI, and PRS ID, ARFCN, PRS resource ID, PRS resource set ID for each measurement |
| DL-PRS-RSRP measurement |
| UE Rx-Tx time difference measurement |
| Time stamp of the measurement |
| Quality for each measurement |
| TA offset used by UE |

#### 8.10.2.3 Information that may be transferred from the gNB to LMF

The assistance data that may be transferred from gNB to the LMF is listed in Table 8.10.2.3-1.

Table 8.10.2.3-1: Assistance data that may be transferred from gNB to the LMF

|  |
| --- |
| Information |
| PCI, GCI, ARFCN and TRP IDs of the TRPs served by the gNB |
| Timing information of TRPs served by the gNB |
| DL-PRS configuration of the TRPs served by the gNB |
| SSB information of the TRPs (the time/frequency occupancy of SSBs) |
| Spatial direction information of the DL-PRS Resources of the TRPs served by the gNB |
| Geographical coordinates information of the DL-PRS Resources of the TRPs served by the gNB |

The configuration data for a target UE that may be transferred from the serving gNB to the LMF is listed in Table 8.10.2.3-2.

Table 8.10.2.3-2: UL information/UE configuration data that may be transferred from serving gNB to the LMF

|  |
| --- |
| UE configuration data |
| UE SRS configuration |
| SFN initialization time for the SRS configuration |

The measurement results that may be signalled from gNBs to the LMF is listed in Table 8.10.2.3-3.

Table 8.10.2.3-3: Measurement results that may be transferred from gNBs to the LMF

|  |
| --- |
| Measurement results |
| NCGI, and TRP ID of the measurement |
| gNB Rx-Tx time difference measurement |
| UL-SRS-RSRP |
| UL Angle of Arrival (azimuth and elevation) |
| Time stamp of the measurement |
| Quality for each measurement |
| Beam Information of the measurement |

#### 8.10.2.4 Information that may be transferred from the LMF to gNBs

The requested UL-SRS transmission characteristics information that may be signalled from the LMF to the gNB is listed in Table 8.10.2.4-1.

Table 8.10.2.4-1: Requested UL-SRS transmission characteristics information that may be transferred from LMF to gNB.

|  |
| --- |
| Information |
| Number Of Transmissions/duration for which the UL-SRS is requested |
| Bandwidth |
| Resource type (periodic, semi-persistent, aperiodic) |
| Number of requested SRS resource sets and SRS resources per set |
| Pathloss reference:  - PCI, SSB Index  - DL-PRS ID, DL-PRS Resource Set ID, DL-PRS Resource ID |
| Spatial relation info  - PCI, SSB Index  - DL-PRS ID, DL-PRS Resource Set ID, DL-PRS Resource ID  - NZP CSI-RS Resource ID  - SRS Resource ID  - Positioning SRS Resource ID |
| Periodicity of the SRS for each SRS resource set |
| SSB Information |
| The carrier frequency of SRS transmission bandwidth |

The TRP measurement request information that may be signalled from the LMF to the gNBs is listed in Table 8.10.2.4-2.

Table 8.10.2.4-2: TRP Measurement request information that may be transferred from LMF to gNBs.

|  |
| --- |
| Information |
| TRP ID, and NCGI of the TRP to receive UL-SRS |
| UE-SRS configuration |
| UL timing information together with timing uncertainty, for reception of SRS by candidate TRPs |
| Report characteristics for the measurements |
| Measurement Quantities |
| Measurement periodicity |
| Timing information including the SFN initialization time, SFN, and slot number for the SRS configuration |
| Measurement beam information request |

The Positioning Activation/Deactivation request information that may be signalled from the LMF to the gNB is listed in Table 8.10.2.4-3.

Table 8.10.2.4-3: Requested positioning activation/deactivation information that may be transferred from LMF to gNB.

|  |
| --- |
| Information |
| SP UL-SRS:  - Activation or Deactivation request  - Positioning SRS Resource Set ID which is to be activated/deactivated  - Spatial relation for Resource IDi  - Activation Time |
| Aperiodic UL-SRS  - Aperiodic SRS Resource Trigger List  - Activation Time |
|  |
| UL-SRS:  - Release ALL |

==================================NEXT CHANGE==================================

## 8.11 DL-AoD positioning

### 8.11.2 Information to be transferred between NG-RAN/5GC Elements

This clause defines the information that may be transferred between LMF and UE/gNB.

#### 8.11.2.1 Information that may be transferred from the LMF to UE

The information that may be transferred from the LMF to the UE are listed in table 8.11.2.1-1.

Table 8.11.2.1-1: Information that may be transferred from LMF to the UE

|  |  |  |
| --- | --- | --- |
| Information | UE-assisted | UE-based |
| Physical cell IDs (PCIs), global cell IDs (GCIs), ARFCN, and PRS IDs of candidate NR TRPs for measurement | Yes | Yes |
| Timing relative to the serving (reference) TRP of candidate NR TRPs | Yes | Yes |
| DL-PRS configuration of candidate NR TRPs | Yes | Yes |
| SSB information of the TRPs (the time/frequency occupancy of SSBs) | Yes | Yes |
| Spatial direction information (e.g. azimuth, elevation etc.) of the DL-PRS Resources of the TRPs served by the gNB | No | Yes |
| Geographical coordinates of the TRPs served by the gNB (include a transmission reference location for each DL-PRS Resource ID, reference location for the transmitting antenna of the reference TRP, relative locations for transmitting antennas of other TRPs) | No | Yes |
| PRS-only TP indication | Yes | Yes |
| Report configuration related informaiton | Yes | No |

#### 8.11.2.2 Information that may be transferred from the UE to LMF

The information that may be signalled from UE to the LMF is listed in Table 8.11.2.2-1. The individual UE measurements are defined in TS 38.215 [37].

Table 8.11.2.2-1: Information that may be transferred from UE to the LMF

|  |  |  |
| --- | --- | --- |
| Information | UE‑assisted | UE‑based |
| Latitude/Longitude/Altitude, together with uncertainty shape | No | Yes |
| PCI, GCI, ARFCN, PRS resource ID, PRS resource set ID and PRS ID for each measurement | Yes | No |
| DL-PRS-RSRP measurement | Yes | No |
| Time stamp of the measurements | Yes | No |
| Time stamp of location estimate | No | Yes |
| DL-PRS receive beam index | Yes | No |
| Location source | No | Yes |

#### 8.11.2.3 Information that may be transferred from the gNB to LMF

The assistance data that may be transferred from gNB to the LMF is listed in Table 8.11.2.3-1.

Table 8.11.2.3-1: Assistance data that may be transferred from gNB to the LMF

|  |
| --- |
| Information |
| PCI, GCI, ARFCN, and TRP IDs of the TRPs served by the gNB |
| Timing information of TRPs served by the gNB |
| DL-PRS configuration of the TRPs served by the gNB |
| SSB information of the TRPs (the time/frequency occupancy of SSBs) |
| Spatial direction information of the DL-PRS Resources of the TRPs served by the gNB |
| Geographical coordinates information of the DL-PRS Resources of the TRPs served by the gNB |

==================================NEXT CHANGE==================================

## 8.12 DL-TDOA positioning

### 8.12.2 Information to be transferred between NG-RAN/5GC Elements

This clause defines the information that may be transferred between LMF and UE/gNB.

#### 8.12.2.1 Information that may be transferred from the LMF to UE

The information that may be transferred from the LMF to the UE are listed in table 8.12.2.1-1.

Table 8.12.2.1-1: Information that may be transferred from LMF to the UE

|  |  |  |
| --- | --- | --- |
| Information | UE‑assisted | UE‑based |
| Physical cell IDs (PCIs), global cell IDs (GCIs), ARFCN, and PRS IDs of candidate NR TRPs for measurement | Yes | Yes |
| Timing relative to the serving (reference) TRP of candidate NR TRPs | Yes | Yes |
| DL-PRS configuration of candidate NR TRPs | Yes | Yes |
| SSB information of the TRPs (the time/frequency occupancy of SSBs) | Yes | Yes |
| Spatial direction information (e.g. azimuth, elevation etc.) of the DL-PRS Resources of the TRPs served by the gNB | No | Yes |
| Geographical coordinates of the TRPs served by the gNB (include a transmission reference location for each DL-PRS Resource ID, reference location for the transmitting antenna of the reference TRP, relative locations for transmitting antennas of other TRPs) | No | Yes |
| Fine Timing relative to the serving (reference) TRP of candidate NR TRPs | No | Yes |
| PRS-only TP indication | Yes | Yes |
| Report configuration related informaiton | Yes | No |

#### 8.12.2.2 Information that may be transferred from the UE to LMF

The information that may be signalled from UE to the LMF is listed in Table 8.12.2.2-1. The individual UE measurements are defined in TS 38.215 [37].

Table 8.12.2.2-1: Information that may be transferred from UE to the LMF

|  |  |  |
| --- | --- | --- |
| Information | UE‑assisted | UE‑based |
| Latitude/Longitude/Altitude, together with uncertainty shape | No | Yes |
| PCI, GCI, ARFCN, PRS resource ID, PRS resource set ID and PRS ID for each measurement | Yes | No |
| DL RSTD measurement | Yes | No |
| DL-PRS-RSRP measurement | Yes | No |
| Time stamp of the measurements | Yes | No |
| Time stamp of location estimate | No | Yea |
| Quality for each measurement | Yes | No |
| Location source | No | Yes |

#### 8.12.2.3 Information that may be transferred from the gNB to LMF

The assistance data that may be transferred from gNB to the LMF is listed in Table 8.12.2.3-1.

Table 8.12.2.3-1: Assistance data that may be transferred from gNB to the LMF

|  |
| --- |
| Information |
| PCI, GCI, ARFCN, and TRP IDs of the TRPs served by the gNB |
| Timing information of TRPs served by the gNB |
| DL-PRS configuration of the TRPs served by the gNB |
| SSB information of the TRPs (the time/frequency occupancy of SSBs) |
| Spatial direction information of the DL-PRS Resources of the TRPs served by the gNB |
| Geographical coordinates information of the DL-PRS Resources of the TRPs served by the gNB |

==================================NEXT CHANGE==================================

## 8.13 UL-TDOA positioning

### 8.13.2 Information to be transferred between NG-RAN/5GC Elements

#### 8.13.2.1 Configuration Data that may be transferred from the gNB to the LMF

The configuration data for a target UE that may be transferred from the serving gNB to the LMF is listed in Table 8.13.2.1-1.

Table 8.13.2.1-1: UE configuration data that may be transferred from serving gNB to the LMF

|  |
| --- |
| UE configuration data |
| UE SRS configuration |
| Timing information of the TRP, which configured the UE SRS transmission |

#### 8.13.2.2 Location Information that may be transferred from the gNBs to LMF

The information that may be transferred from gNBs to the LMF include measurement results listed in Table 8.13.2.2-1. The individual measurements are defined in TS 38.215 [37].

Table 8.13.2.2-1: Measurement results that may be transferred from gNBs to the LMF

|  |
| --- |
| Measurement results |
| NCGI, and TRP ID of the measurement |
| UL-RTOA |
| UL-SRS-RSRP |
| Time stamp of the measurement |
| Quality for each measurement |
| Beam Information for each measurement |

#### 8.13.2.3 Information that may be transferred from the LMF to gNBs

The requested UL-SRS transmission characteristics information that may be signalled from the LMF to the gNB is listed in Table 8.13.2.3-1.

Table 8.13.2.3-1: Requested UL-SRS transmission characteristics information that may be transferred from LMF to gNB.

|  |
| --- |
| Information |
| Number Of Transmissions/duration for which the UL-SRS is requested |
| Bandwidth |
| Resource type (periodic, semi-persistent, aperiodic) |
| Pathloss reference:  - PCI, SSB Index, SSB configuration (time/frequency occupancy of SSBs)  - DL-PRS ID, DL-PRS Resource Set ID, DL-PRS Resource ID |
| Spatial relation info  - PCI, SSB Index, SSB configuration (time/frequency occupancy of SSBs)  - DL-PRS ID, DL-PRS Resource Set ID, DL-PRS Resource ID  - NZP CSI-RS Resource ID  - SRS Resource ID  - Positioning SRS Resource ID |
| SSB Information |
| Periodicity of the SRS for each SRS resource set |
| The carrier frequency of SRS transmission bandwidth |

The TRP measurement request information that may be signalled from the LMF to the gNB is listed in table 8.13.2.3-2.

Table 8.13.2.3-2: TRP Measurement request information that may be transferred from LMF to gNB.

|  |
| --- |
| Information |
| TRP ID, cell ID of the TRP to receive UL-SRS |
| UE-SRS configuration |
| UL timing information together with timing uncertainty, for reception of SRS by candidate TRPs |
| Report characteristics for the measurements |
| Measurement Quantities |
| Measurement periodicity |
| Timing information of the TRP, which configured the SRS transmission |
| Timing information of the activation of SRS transmission |

The Positioning Activation/Deactivation request information that may be signalled from the LMF to the gNB is listed in Table 8.13.2.3-3.

Table 8.13.2.3-3: Requested positioning activation/deactivation information that may be transferred from LMF to gNB.

|  |
| --- |
| Information |
| SP UL-SRS:  - Activation or Deactivation request  - Positioning SRS Resource Set ID which is to be activated/deactivated  - Spatial relation for Resource IDi  - Activation Time |
| Aperiodic UL-SRS:  - Aperiodic SRS Resource Trigger List  - Activation time |
|  |
| UL-SRS:  - Release ALL |

==================================NEXT CHANGE==================================

## 8.14 UL-AoA positioning

### 8.14.2 Information to be transferred between NG-RAN/5GC Elements

This clause defines the information that may be transferred between LMF and gNB/TRPs.

#### 8.14.2.1 Configuration Data that may be transferred from the gNB to the LMF

The configuration data for a target UE that may be transferred from the serving gNB to the LMF is listed in Table 8.14.2.1-1.

Table 8.14.2.1-1: UE configuration data that may be transferred from serving gNB to the LMF

|  |
| --- |
| UE configuration data |
| UE SRS configuration |
| Timing information of the TRP, which configured the UE SRS transmission |

#### 8.14.2.2 Location Information that may be transferred from the gNBs to LMF

The information that may be transferred from gNBs to the LMF include measurement results are listed in Table 8.14.2.2-1. The individual measurements are defined in TS 38.215 [37].

Table 8.14.2.2-1: Measurement results that may be transferred from gNBs to the LMF

|  |
| --- |
| Measurement results |
| NCGI, and TRP ID of the measurement |
| UL Angle of Arrival (azimuth and elevation) |
| UL-SRS-RSRP |
| Time stamp of the measurement |
| Quality for each measurement |
| Beam Information for each measurement |

#### 8.14.2.3 Information that may be transferred from the LMF to gNB

The requested UL-SRS transmission characteristics information that may be signalled from the LMF to the gNB is listed in Table 8.14.2.3-1.

Table 8.14.2.3-1: Requested UL-SRS transmission characteristics information that may be transferred from LMF to gNB.

|  |
| --- |
| Information |
| Number Of Transmissions/duration for which the UL-SRS is requested |
| Bandwidth |
| Resource type (periodic, semi-persistent, aperiodic) |
| Number of requested SRS resource sets and SRS resources per set |
| Pathloss reference:  - PCI, SSB Index, SSB configuration (time/frequency occupancy of SSBs)  - DL-PRS ID, DL-PRS Resource Set ID, DL-PRS Resource ID |
| Spatial relation info  - PCI, SSB Index, SSB configuration (time/frequency occupancy of SSBs)  - DL-PRS ID, DL-PRS Resource Set ID, DL-PRS Resource ID  - NZP CSI-RS Resource ID  - SRS Resource ID  - Positioning SRS Resource ID |
| SSB Information |
| Periodicity of the SRS for each SRS resource set |
| The carrier frequency of SRS transmission bandwidth |

The TRP measurement request information that may be signalled from the LMF to the gNB is listed in table 8.14.2.3-2.

Table 8.14.2.3-2: TRP Measurement request information that may be transferred from LMF to gNB.

|  |
| --- |
| Information |
| TRP ID, cell ID of the TRP to receive UL-SRS |
| UE-SRS configuration |
| UL timing information together with timing uncertainty, for reception of SRS by candidate TRPs |
| Report characteristics for the measurements |
| Measurement Quantities |
| Measurement periodicity |
| Timing information of the TRP, which configured the SRS transmission |
| Timing information of the activation of SRS transmission |

The Positioning Activation/Deactivation request information that may be signalled from the LMF to the gNB is listed in Table 8.14.2.3-3.

Table 8.14.2.3-3: Requested positioning activation/deactivation information that may be transferred from LMF to gNB.

|  |
| --- |
| Information |
| SP UL-SRS:  - Activation or Deactivation request  - Positioning SRS Resource Set ID which is to be activated/deactivated  - Spatial relation for Resource IDi  - Activation Time |
| Aperiodic UL-SRS:  - Aperiodic SRS Resource Trigger list  - Activation time |
|  |
| UL-SRS:  - Release ALL |

==================================END OF CHANGES==================================

During the offline discussion, companies are invited to review the current stage2 description with the LPP and NRPPa spec. if there is any issue detected, companies are welcomed to provide feedback to the following question:

**Question 1:** Do you have any comments on the contents of the CR?

|  |  |
| --- | --- |
| Company | Comments |
| ZTE | We wonder that in ‘information that may be provided from LMF to UE’ part, whether to capture stage 3 description of *NR-Multi-RTT-ProvideAssistanceData, NR-DL-TDOA-ProvideAssistanceData* and *NR-DL-AoD-ProvideAssistanceData*, or only to capture *NR-DL-PRS-AssistanceData* in 38.305?  If former is to be captured, *nr-SelectedDL-PRS-IndexList* and corresponding error cause should be captured in 305, too.  If latter is to be captured, suggest the following change:  The assistance information related with TRP information that may be transferred from the LMF to the UE are listed in Table 8.10.2.1-1. |
| Ericsson | We need RAN3 input on this. It would be good if RAN3 can discuss based upon RAN3 contributions as what is missing with respect to aligning NRPPa with stage 2 or LPP and then if they can produce the CR.  There are many details here that needs to be checked especially with respect to periodic UL SRS.  We would prefer if proponent company disucsses in RAN3 based upon upon RAN3 CR/contribution.  How far RAN2 wants to go capturing NRPPa stage 3 stuff is also a question. Best is RAN3 should look into the details based upon RAN3 contribution.  As there may be for sure other details that could still be missing. We can’t guarantee that it is only this. |
| fCATT | We generally agree with the modification however there are few mistakes. More info are put in some tables according to the message definition. Please check all the modifications with notes named as CATT above. |
| Intel | In general, we should avoid to capture every stage 3 details into stage 2 in order to avoid duplicated work.  It would be good to only mention high level information in stage 2.  For the changes, Should not information “Timing information of the TRP, which configured the SRS transmission  Timing information of the activation of SRS transmission”be covered by “  UL timing information together with timing uncertainty, for reception of SRS by candidate TRPs”? |
| Xiaomi | We think the modification is essential and it is good to align the stage 2 and stage 3 specification. |
| vivo | General fine with the corrections if not controversial, but we are also in sympathy with Ericsson that the corrections are based on NRPPa message, which shall be driven by RAN3 contributions. Propose to LS to RAN3 informing that RAN2 expect RAN3 to introduce the essential update of information between LMF and gNB to stage 2 spec, the agreed corrections can be attached for reference. Meanwhile, RAN2 will not update the information between LMF and gNB to the stage2 spec anymore, any info not introduced by RAN3 is regarded as not essential. |
|  |  |
|  |  |
|  |  |
|  |  |

## 2.2 Event reporting in RRC\_IDLE

==================================FIRST CHANGE==================================

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.501 "System Architecture for the 5G System; Stage 2".

[3] 3GPP TS 22.071: "Location Services (LCS); Service description, Stage 1".

[4] 3GPP TS 23.032: "Universal Geographical Area Description (GAD)".

[5] IS-GPS-200, Revision D, Navstar GPS Space Segment/Navigation User Interfaces, March 7th, 2006.

[6] IS-GPS-705, Navstar GPS Space Segment/User Segment L5 Interfaces, September 22, 2005.

[7] IS-GPS-800, Navstar GPS Space Segment/User Segment L1C Interfaces, September 4, 2008.

[8] Galileo OS Signal in Space ICD (OS SIS ICD), Draft 0, Galileo Joint Undertaking, May 23rd, 2006.

[9] Global Navigation Satellite System GLONASS Interface Control Document, Version 5, 2002.

[10] IS-QZSS, Quasi Zenith Satellite System Navigation Service Interface Specifications for QZSS, Ver.1.0, June 17, 2008.

[11] Specification for the Wide Area Augmentation System (WAAS), US Department of Transportation, Federal Aviation Administration, DTFA01-96-C-00025, 2001.

[12] RTCM 10402.3, RTCM Recommended Standards for Differential GNSS Service (v.2.3), August 20, 2001.

[13] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".

[14] 3GPP TS 38.331: "NR Radio Resource Control (RRC) protocol specification".

[15] OMA-AD-SUPL-V2\_0: "Secure User Plane Location Architecture Approved Version 2.0".

[16] OMA-TS-ULP-V2\_0\_4: "UserPlane Location Protocol Approved Version 2.0.4".

[17] 3GPP TS 36.214: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer – Measurements".

[18] 3GPP TS 36.302: "Evolved Universal Terrestrial Radio Access (E-UTRA); Services provided by the physical layer".

[19] 3GPP TS 36.355: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol (LPP)".

[20] BDS-SIS-ICD-B1I-3.0: "BeiDou Navigation Satellite System Signal In Space Interface Control Document Open Service Signal B1I (Version 3.0)", February, 2019.

[21] IEEE 802.11: "Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications"

[22] Bluetooth Special Interest Group: "Bluetooth Core Specification v4.2", December 2014.

[23] ATIS-0500027: "Recommendations for Establishing Wide Scale Indoor Location Performance", May 2015.

[24] 3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical channels and modulation".

[25] 3GPP TS 36.305: "Stage 2 functional specification of User Equipment (UE) positioning in E‑UTRA".

[26] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[27] 3GPP TS 38.455: "NG-RAN; NR Positioning Protocol A (NRPPa)".

[28] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".

[29] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

[30] 3GPP TS 38.413: "NG-RAN; NG Application Protocol (NGAP)".

[31] RTCM 10403.3, "RTCM Recommended Standards for Differential GNSS Services (v.3.3)", October 7, 2016.

[32] 3GPP TS 38.133: "NR; Requirements for support of radio resource management".

[33] 3GPP TS 29.572: "Location Management Services; Stage 3".

[34] BDS-SIS-ICD-B1C-1.0: "BeiDou Navigation Satellite System Signal In Space Interface Control Document Open Service Signal B1C (Version 1.0)", December, 2017

[35] 3GPP TS 23.273: "5G System (5GS) Location Services (LCS); Stage 2".

[36] IS-QZSS-L6-001, Quasi-Zenith Satellite System Interface Specification – Centimetre Level Augmentation Service, Cabinet Office, November 5, 2018.

[37] 3GPP TS 38.215: "NR; Physical layer – Measurements".

[38] 3GPP TS 38.401: "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; NG-RAN; Architecture description".

[39] 3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification".

[40] 3GPP TS 38.212: "NR; Multiplexing and channel coding".

[41] 3GPP TS 24.571: "Control plane Location Services (LCS) procedures".

[xx] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2".

===================================NEXT CHANGE=====================================

## 7.x Event reporting in RRC\_IDLE

UE may perform event reporting in RRC\_IDLE state when the UE supports and the LMF allows the use of Control Plane CIoT 5GS Optimization.

Figure 7.x-1: UE event report in RRC\_IDLE with Control Plane CIoT 5GS Optimization.

1. The UE is in RRC\_CONNECTED and Step 1 for MT-LR procedure for Periodic or Triggered Location Events in Clause 6.7.1 in TS 23.273 [35] is performed. The AMF indicates to the LMF of the UE’s capability in Control Plane CIoT 5GC Optimization and the LMF also indicates to the UE that the UE can report the Event Report with Control Plane CIoT 5GC Optimization. The LMF may also include an LPP message to request the type of location measurement or location estimate in Step 4.
2. The UE may finish any other activities in progress, and waits until the network releases or suspends the connection (after a certain period of inactivity). The UE will then receive an *RRCConnectionRelease*. Note that Step2 can happen after Step 3 and 4.
3. The UE monitors for the occrruence of the triggered or periodic event as configured by the LMF in Step 1;
4. If event is detected in Step 3, the UE can perform measurement and possibly calculate location according to the LPP message received in Step 1;
5. With the measurement and location estimate in Step 4, if the UE and ng-eNB node both support Control Plane CIoT 5GC Optimization, the UE sends the event report to the ng-eNB with RRC message *RRCEarlyDataRequest* as in TS 36.300 [xx] and includes a NAS control plane service request as in TS 24.501 [29]. The NAS control plane service request includes an Event Report message as in Clause 7.3.4, including the measurement report or location estimate with the measurement performed in Step 4;

6. The ng-eNB forwards the received NAS message to the AMF with NG-AP Initial UE NAS message and then the AMF further forwards the Event Report to LMF by invoking Namf\_Communication\_N1MessageNotify service operation;

7. After receiving the event report from the UE, if the LMF can handle the event report, LMF returns an Event Report Acknowledgement to the UE.

======================================END OF CHANGES================================

During online discussion, the general thinking is that the content of the CR seems to be OK, by the following note in the chairman note:

* Check by email whether to capture anything (content appears to be OK if we want to have a CR)

The question is still whether companies think this CR is needed

**Question 2:** Do companies agree that the CR can be agreed?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| ZTE | No | We don’t think such detailed SA2 procedure should be captured in 38.305. 38.305 does need to clarify the transmission can happen in RRC\_IDLE and RRC\_INACTIVE, but not a new section. |
| Ericsson | No | We do not think it is essential to capture in such details regarding the C-IoT operation with regards to LCS event reporting when SA2 specification is complete.  Besides our stage 2 descripton already captures the step TS 38.305 has already below 7.1.3 UE positioning measurements in RRC\_IDLE state for NB-IoT 8. Before the location measurements are to be sent to the LMF, the UE instigates a UE-triggered service request or, when User Plane CIoT 5GC optimization applies, the Connection Resume procedure as defined in TS 23.501 [2], if the UE is not using Control Plane CIoT 5GC Optimisation, in order to establish a signalling connection with the AMF. If the UE is using Control Plane CIoT 5GC Optimisation, procedures for Mobile Originated Data Transport in Control Plane CIoT 5GC optimisation as defined in TS 23.501 [2] are performed by the UE to establish a signalling connection with the AMF. |
| CATT | Yes |  |
| Intel | No | In general we should not capture every SA2 procedure into RAN2, and we should not couple UE state and positioning too much, especially the details since from RAN perspective, there is not additional impact. |
| Apple | No | Agree with other companies – we should not replicate SA2 specs here |
| Xiaomi | No | We think there is no need to capture the detailed procedures in the TS 38.305. |
| vivo | No | If we have reached the consensus that the event report is not the only message that can be transferred by EDT, then no need to combine the EDT procedure and SA2 procedure in the stage 2 spec. Otherwise, we may have more combinations. |
|  |  |  |
|  |  |  |

# 3. Proposed Conclusion

TBD