**3GPP TSG-RAN WG2 Meeting #113-eR2-210xxxx**

**Electronic, 25nd Jan– 05th Feb, 2021**

Agenda Item: 8.11.3.2

Source: Huawei, HiSilicon

Title: Text proposal for IDLE and INACTIVE positioning-Ph2

**Document for: Discussion**

# Introduction

During RAN2#113e, the following email discussion is triggered after the meeting

* [AT113-e][609][POS] Continued discussion of positioning in idle/inactive (Huawei)

 Scope: Continue discussion of the issues from R2-2101230, and converge to an agreeable TP, taking as a baseline the principle that positioning in inactive is supported as recommended by RAN1. R2-2101229 to be taken into account.

 Intended outcome: Endorsable TP

 Deadline: Tuesday 2021-02-02 1200UTC

During the online discussion of the summary for the above email discussion, the following agreements have been made:

Agreements:

Proposal 1a: RAN2 confirms on the following recommendation of TSG RAN (17/17)

 Positioning in RRC\_INACTIVE

 DL, UL and DL+UL positioning methods

 UE-based and UE-assisted positioning solutions

 Support of UE positioning measurements for UEs in RRC\_INACTIVE state

 Options that can be considered include DL-PRS or DL-PRS and SSB

 Support of gNB positioning measurements for UEs in RRC\_INACTIVE state

Proposal 1b: RAN2 confirms on the following (17/17)

 Positioning in RRC\_IDLE

 It is feasible for a UE to perform DL positioning measurement in RRC\_IDLE state

 It is up to RAN2 to decide whether to support the enhancements of NR positioning reporting of DL positioning measurements and/or positioning estimates for RRC\_IDLE UEs.

Proposal2: RAN2 recommends the following for normative work for DL positioning

 The report of PRS measurement performed in RRC\_IDLE/INACTIVE when the UE is in RRC\_INACTIVE is supported (10/12)

 PRS measurement report and/or location estimate are sent from the UE to the gNB in RRC\_INACTIVE. RAN2 generally agree to do this by enhancing small data transmission in RRC\_INACTIVE (details of the use of SDT to be studied in the WI phase) (15/16)

Proposal4: For DL positioning in IDLE/INACTIVE, the followings are already supported for the current spec and can be reused:

 Current stage3 spec has already supported assistance data delivery for DL positioning during RRC\_CONNECTED and on-demand SI request in RRC\_IDLE/ INACITVE for IDLE/INACTIVE positioning. (14/14)

 Current stage3 spec already supports the transfer of RequestLocationInformation in RRC\_CONNECTED for PRS measurement in IDLE/INACTIVE. (14/14)

Proposal5: Support RAT-Independent positioning in RRC\_IDLE/INACTIVE. FFS the procedures that can be supported. (13/14)

Then, a further continuation of the email discussion is triggered during online to further polish on the text proposal based on the agreements.

* [AT113-e][609][POS] Continued discussion of positioning in idle/inactive (Huawei)

 Scope: Continue discussion of the issues from R2-2101230, and converge to an agreeable TP, taking as a baseline the principle that positioning in inactive is supported as recommended by RAN1. R2-2101229 to be taken into account.

 Intended outcome: Endorsable TP, in R2-2102100

 Deadline: Tuesday 2021-02-02 1200UTC – extended to 2021-02-04 0200 UTC to finalise the TP

In this discussion, we continue the discussion for the text proposal for the TR for positioning enhancement in R17

## Contacts

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| **Company** | **Delegate name** | **Delegate email** |
|  |  |  |

# Discussion

During RAN2#113e, the following agreement has been made on the downlink positioning in RRC\_INACTIVE

Agreements:

Proposal2: RAN2 recommends the following for normative work for DL positioning

 The report of PRS measurement performed in RRC\_IDLE/INACTIVE when the UE is in RRC\_INACTIVE is supported (10/12)

 PRS measurement report and/or location estimate are sent from the UE to the gNB in RRC\_INACTIVE. RAN2 generally agree to do this by enhancing small data transmission in RRC\_INACTIVE (details of the use of SDT to be studied in the WI phase) (15/16)

Proposal4: For DL positioning in IDLE/INACTIVE, the followings are already supported for the current spec and can be reused:

 Current stage3 spec has already supported assistance data delivery for DL positioning during RRC\_CONNECTED and on-demand SI request in RRC\_IDLE/ INACITVE for IDLE/INACTIVE positioning. (14/14)

 Current stage3 spec already supports the transfer of RequestLocationInformation in RRC\_CONNECTED for PRS measurement in IDLE/INACTIVE. (14/14)

For positioning in RRC\_INACTVE, we propose the following text proposal:

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| 10.1 NR positioning for UEs in RRC\_INACTIVE stateNR positioning for UEs in RRC\_INACTIVE state is recommended for normative work, including* + DL, UL and DL+UL positioning methods
	+ UE-based and UE-assisted positioning solutions
	+ Support of UE positioning measurements for UEs in RRC\_inactive state
		- Options that can be considered include DL-PRS or DL-PRS and SSB
	+ Support of gNB positioning measurements for UEs in RRC\_inactive state

The details of how to enable the UE positioning in RRC\_ INACTIVE state can be further discussed during normative work. These details may include, but are not limited to the following aspects:* + UL reference signals (e.g., SRS for positioning, PRACH preambles) for UL measurements
	+ Signalling and procedures for support the assistance data delivery, DL-PRS configuration, UL reference signals for positioning resource configuration, measurement reporting, which may be developed based on the enhancements of existing signalling and procedures (e.g., existing 2-step and/or 4-step PRACH procedures, paging procedure, small data transmission).

The following procedures are recommended for normative work for DL positioning methods in RRC\_INACTIVE:* + Reporting of PRS measurement and/or location estimate performed in RRC\_INACTIVE when the UE is in RRC\_INACTIVE.
		- The reporting of PRS measurement and/or location estimate performed in RRC\_IDLE/RRC\_INACTIVE when the UE is in RRC\_INACTIVE is enabled by enhancing small data transmission in RRC\_INACTIVE.

NOTE: The following procedures are considered to have already been supported and can be reused for DL positioning in RRC\_INACTIVE* + - On-demand SI request in RRC\_INACTIVE for assistance data delivery by broadcast in RRC\_INACTIVE
		- *ProvideAssistanceData* in RRC\_CONNECTED for PRS configuration in RRC\_INACTIVE downlink positioning

*RequestLocationInformation* can be sent in RRC\_CONNECTED for PRS measurement or location estimate in RRC\_INACTIVE |

**Question1: Do companies think the above text proposal has faithfully captured the agreement made during online for RRC\_INACTIVE positioning?**

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| **Company** | **Yes/No** | **Comments** |
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For positioning in RRC\_IDLE, we propose the following text proposal:

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| 10.9 DL positioning measurement in RRC\_IDLE stateFrom a physical layer perspective, it is feasible for a UE to perform DL positioning measurement in RRC\_IDLE state.* + Note: This does not imply that measurements have to be reported in RRC\_IDLE state.

The following procedures are considered as feasible for DL positioning methods in RRC\_IDLE:* + Reporting of PRS measurement and/or location estimate performed in RRC\_IDLE when the UE is in RRC\_CONNETED.

NOTE: The following procedures are considered to have already been supported and can be reused for positioning in RRC\_IDLE* + - On-demand SI request in RRC\_IDLE for assistance data delivery by broadcast in RRC\_IDLE
		- *ProvideAssistanceData* can be sent in RRC\_CONNECTED for PRS configuration in RRC\_IDLE downlink positioning
		- *RequestLocationInformation* can be sent in RRC\_CONNECTED for PRS measurement and/or location estimate in RRC\_IDLE
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**Question2: Do companies think the above text proposal has faithfully captured the agreement during online for RRC\_IDLE positioning?**

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| **Company** | **Yes/No** | **Comments** |
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Then, for RAT-independent positioning, during the online discussion, the following agreements have been made:

Agreements:

Proposal5: Support RAT-Independent positioning in RRC\_IDLE/INACTIVE. FFS the procedures that can be supported. (13/14)

Then, we propose the following text proposal for the above agreement:

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| 10.y RAT-Independent positioningRAT-Independent positioning in RRC\_IDLE/INACTIVE is recommended for normative work. The exact procedures that can be supported for RAT-Independent positioning in RRC\_IDLE/INACTVE can be further studied.  |

**Question3: Do companies think the above text proposal has faithfully captured the agreement during online for RAT-independent positioning?**

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| **Company** | **Yes/No** | **Comments** |
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During the first phase of [609], we have discussed on the definition of IDLE/INACTIVE positioning, with the following text proposal

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| 2 ReferencesThe 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] RP-193237: "new SID on NR Positioning Enhancements".[3] 3GPP TR 38.855: "Study on NR Positioning (Release 16)".[4] R1-2009433 Evaluation results for Rel-16 positioning and Rel-17 enhancement Huawei, HiSilicon[5] R1-2007665 Evaluation of NR positioning performance vivo[6] R1-2007720 Evaluation of achievable positioning accuracy BUPT[7] R1-2007754 Evaluation of achievable accuracy and latency ZTE[8] R1-2007859 Discussion of evaluation of NR positioning performance CATT[9] R1-2007908 NLOS Identification and Mitigation FUTUREWEI[10] R1-2009390 Update of Evaluation Results for NR Positioning Performance in I-IoT Scenarios Intel Corporation[11] R1-2007997 NR Positioning Latency Evaluations Lenovo, Motorola Mobility[12] R1-2008225 Evaluation of NR positioning in IIOT scenario OPPO[13] R1-2009555 Results on evaluation of achievable positioning accuracy and latency Nokia, Nokia Shanghai Bell[14] R1-2009502 Discussion on Performance evaluation of Rel-17 positioning Sony[15] R1-2008416 Discussions on evaluation of achievable positioning accuracy and latency for NR positioning LG Electronics[16] R1-2008489 Evaluation of achievable positioning latency InterDigital, Inc.[17] R1-2009708 Evaluation of achievable Positioning Accuracy & Latency Qualcomm Incorporated[18] R1-2009428 Evaluation of positioning enhancements Fraunhofer IIS, Fraunhofer HHI[19] R1-2008720 Positioning evaluation results on potential enhancements for additional use cases CeWiT[20] R1-2008764 Evaluation of achievable positioning accuracy and latency Ericsson[21] R1-2008765 Potential positioning enhancements Ericsson[22] R1-2007666 Discussion on potential positioning enhancements vivo[23] R1-2005380 Evaluation of achievable positioning accuracy and latency vivo[24] 3GPP TS 22.261 Service requirements for the 5G system; Stage 1 (Release 17)[25] RP-202094 Revised SID: Study on NR Positioning Enhancements CATT, Intel Corporation [26] 3GPP TS 38.901 Study on channel model for frequencies from 0.5 to 100 GHz (Release 16)[xx] 3GPP TS 24.571 Control plane Location Services (LCS) procedures (Release 16)===================================NEXT CHANGE===================================10.x Scope of RRC\_IDLE/INACTIVE positioningThe following UE positioning procedures are under the scope of RRC\_IDLE/RRC\_INACTIVE positioning if any of them are performed when the UE is in RRC\_IDLE/RRC\_INACTIVE.* NAS-transported positioning signalling
	+ LCS messages defined in Clause 4.1.2 for location services in TS 24.571 [xx]
	+ LPP signaling for positioning (e.g., Capability transfer, Assistance data transfer, Location information transfer)
* NRPPa
	+ E-CID information transfer (UE-associated)
	+ Positioning information transfer (UE-associated)
	+ Measurement information transfer (non-UE-associated)
* Uu Signaling and procedure
	+ RRC signaling for positioning (e.g., posSRS configuration)
	+ MAC procedure/L1 signaling (e.g., activation/deactivation for semi-persistent/aperiodic posSRS)
	+ Transmission of UL-PRS and reception of DL-PRS
	+ Reception for assistance information broadcast

====================================END OF CHANGE================================ |

The main difference with the first version of the text proposal [1] is that a separate section 7.x was created to capture the scope of discussion for IDLE/INACTIVE positioning.

**Question4: Do companies think the current structure of the text proposal is OK?**

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| **Company** | **Yes/No** | **Comments** |
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# Text proposal history

[1] Version 1: [R2-2101229](file:///C%3A%5CUsers%5Cmtk16923%5CDocuments%5C3GPP%20Meetings%5C202101-02%20-%20RAN2_113-e%2C%20Online%5CExtracts%5CR2-2101229%20TP%20for%20IDLE%20and%20INACTIVE%20postiioning.docx) TP for IDLE and INACTIVE postiioning Huawei, HiSilicon discussion Rel-17 FS\_NR\_pos\_enh

[2] Version 2: [R2-2102100](file:///C%3A%5CUsers%5Cmtk16923%5CDocuments%5C3GPP%20Meetings%5C202101-02%20-%20RAN2_113-e%2C%20Online%5CExtracts%5CR2-2102100%20TP%20for%20IDLE%20and%20INACTIVE%20postioning.docx) (TP from [609]) Huawei, HiSilicon discussion Rel-17 FS\_NR\_pos\_enh