**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

|  |  |  |
| --- | --- | --- |
| **Company** | **Delegate name** | **Delegate email** |
| **Ericsson** | **Ritesh Shreevastav** | **Ritesh.shreevastav@ericsson.com** |
| **vivo** | **Elliah Wang** | **yuanyuanwang@vivo.com** |
| **Xiaomi** | **Li Xiaolong** | **lixiaolong1@xiaomi.com** |
| **CATT** | **Jianxiang Li** | **lijianxiang@datangmobile.cn** |
| **Lenovo, Motorola Mobility** | **Robin Thomas** | **rthomas7@lenovo.com** |
| **InterDigital** | **Jaya Rao, Fumihiro Hasegawa** | **jaya.rao@interdigital.com,** **fumihiro.hasegawa@interdigital.com** |
| **Nokia** | **Mani Thyagarajan** | **mani.thyagarajan@nokia.com** |
| **ZTE** | **Liu Yansheng** | **liu.yansheng@zte.com.cn** |
| **Samsung**  | **June Hwang** | **June77.hwang@samsung.com** |
| **Intel** | **Yi guo** | **Yi.guo@intel.com** |

# 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:

|  |
| --- |
| 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?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | No | As discussed online, the agreement is to also capture “details of the use of SDT to be studied in the WI phase”Hence we think the TP should be as below.The following is recommended for further study during normative work for DL positioning methods in RRC\_INACTIVE:- Use of Small Data Transmission (SDT) framework in RRC\_INACTIVE for positioning |
| vivo | Yes |  |
| Xiaomi | Yes with comment | * + - 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.

The RRC\_IDLE should be deleted. [Rapp Comment]I don’t find it in the text above. It has already been removed.  |
| CATT | Yes, but with some modifications | We prefer to make the following modifications: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 used in RRC\_INACTIVE downlink positioning

*RequestLocationInformation* can be sent in RRC\_CONNECTED for PRS measurement or location estimate performed in RRC\_INACTIVE[Rapp Comment]OK with this, revised in the TP |
| Lenovo, Motorola Mobility | Yes with editorial comment | Suggest another editorial comment, all instances of “PRS” can be changed to “DL-PRS” to align with RAN1’s text. [Rapp Comment]OK with this, revised in the TP |
| InterDigital | Yes | The agreed Proposal 2 recommends to do reporting of PRS measurement and/or location estimate by small data transmission. The note suggests that the details of SDT will be discussed during the work item phase. Considering one of the key use cases for Rel. 17 positioning is IIoT applications, it is important to make progress in positioning and reporting during INACTIVE mode by recommending the SDT as normative for Rel. 17 WI NR POS. The CP related topics are being discussed in the SDT group, including the working assumption made to support configuration of SRB1 and SRB2 for SDT, and resuming SRB2 configured for SDT. Therefore, the details to use SDT for reporting during INACTIVE mode exist. We support the TP from the Rapporteur. |
| Nokia | See comments | 1. To answer the specific question viz. whether the TP has faithfully captured the agreements made during online, for RRC\_INACTIVE positioning, the answer is NO because the part about “details of the use of SDT to be studied in the WI phase” in the agreement on Proposal 2 is not captured in the TP. So, we agree with Ericsson’s comment on this. So, we should add this text about “studying SDT” as shown in the agreement, also in the TP.2. We see that the TP for Section 10.1 has contradictions between the RAN1 and RAN2 texts. RAN1 text recommends for normative work all DL, UL and DL+UL methods for positioning in RRC\_INACTIVE. RAN2 TP restricts it to only DL positioning method. We should align with RAN1 recommendation or we should make it clear that the RAN2 TP is an extension of the items agreed in RAN1. If we are indeed restricting the inactive positioning to DL methods only then this needs to be informed to RAN1.[Rapp Comments]The text proposal is recommendation for the DL positioning, which from our view, is “addition” to the previous recommendation from RAN1. Could you please clarify why you see it as “restriction”? |
| Ericsson |  | Yes we hope rapporteur respects the agreement made onlineTo further comment InterDigital: We do not think IIOT UEs are classified as low power or BW limited UE. IIOT UEs are not NB-IoT UEs.Anyhow, We see the use of SDT may be useful but we still need to understand few details:a) If mapping positioning data to DRB can be done instead of SRBb) What is the typical size that the UE can report without segmentation. Do we restrict only certain positioning message to be used by SDT if there would be need of any subsequent transmissionWe need to further analyze in Positioning session before we let SDT folks do the work and at the same time get some input also from SDT. Hence a study would be really helpful to understand the details. |
| ZTE | Yes | We share the same view with CATT. We think CATT’s modification is clearer than the current description.In addition, considering the agreements we made in the online discussion, we also prefer to make the following modification: * + - 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(FFS details of the use of SDT in the WI phase).
 |
| Samsung  |  | Regarding faithfully capturing or not, we have the same view with Ericsson/Nokia. So we also think “details of the use of SDT to be studied in the WI phase” need to be captured.For the editorial, I agree with CATT correction. |
| Intel | Yes | To have progress, we may simply add “details of the use of SDT to be studied in the WI phase” in the TP. [Rapp Comment]OK with this, revised in the TP |

**The main revision of the TP, summarized as below**

* **Slight modification of the wording per comments from CATT**
* **Add the wording “details of the use of SDT to be studied in the WI phase” per comments from Nokia, ZTE, Samsung, Intel**
* **Change the wording from PRS to DL-PRS according to Lenovo**

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

|  |
| --- |
| 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
 |

**Question2: Do companies think the above text proposal has faithfully captured the agreement during online for RRC\_IDLE positioning?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | Yes |  |
| Xiaomi | Yes |  |
| CATT | Yes, but with some modifications | We prefer to make the following modifications: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 used in RRC\_IDLE downlink positioning
		- *RequestLocationInformation* can be sent in RRC\_CONNECTED for PRS measurement and/or location estimate performed in RRC\_IDLE
 |
| Lenovo, Motorola Mobility | Yes |  |
| InterDigital | Yes |  |
| Nokia | Yes |  |
| ZTE | Yes with comments | Share the same view with CATT. |
| Samsung  | Yes with comment | Same as CATT. |
| Intel | Yes  | Agree the modification from CATT |

**The main revision of the TP, summarized as below**

* **Slight modification of the wording per comments from CATT**
* **Change the wording from PRS to DL-PRS according to Lenovo**

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:

|  |
| --- |
| 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?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| vivo | Yes |  |
| Xiaomi | Yes |  |
| Lenovo, Motorola Mobility | Yes  |  |
| InterDigital | Yes |  |
| Nokia | Yes |  |
| ZTE | Yes |  |
| Samsung  | Yes  |  |
| Intel | Yes |  |

**The above text proposal can be agreed as it is.**

During the first phase of [609], we have discussed on the definition of IDLE/INACTIVE positioning, with the following text proposal

|  |
| --- |
| 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 10.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?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| vivo | Yes |  |
| Xiaomi | Yes |  |
| InterDigital | Yes |  |
| Nokia | No | We don’t think this detail is essential in the TR. The whole text is conditional when it says “if any of them are performed when the UE is in RRC\_IDLE/RRC\_INACTIVE”. Also, we may run in to issues with RAN3 saying they have not been consulted on NRPPa impacts. The scope of idle/inactive positioning can be discussed as part of WID by referencing the email discussion [AT113-e][609] since anyway the TP captures that inactive positioning is recommended for normative work and that idle positioning is feasible.[Rapp Comments]The above text is just used to define the scope of IDLE/INACTIVE positioning instead of specifying what is supported or not supported.  |
| ZTE | Yes | The text proposal is ok for us. We think whether the existing NRPPa procedures can be used in IDLE/INACTIVE should be checked by RAN3. |
| Samsung  | Yes  |  |
| Intel | Yes |  |

# **The above text proposal can be agreed as it is.** 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