**3GPP TSG-RAN WG2 Meeting #113-eR2-2102100**

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

Agenda Item: 8.11.3.2

Source: Huawei, HiSilicon

Title: Text proposal for IDLE and INACTIVE positioning

**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

In this contribution, we propose a text proposal for the TR for the study of positioning enhancement in R17

# Discussion

In this text proposal, we propose the following based on the current TR 38.857 and the progress in the email discussion

* Reorganize the sections for IDLE/INACTIVE positioning
* Adding the definition for IDLE/INACTIVE positioning
* Implementing RAN2 agreements for the discussions in [AT113-e][609]

Note that the part highlighted in yellow below are still up to further confirmation

# Text proposal

================================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] 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 Identified NR impacts in Rel-17

## 10.1 NR positioning for UEs in RRC\_INACTIVE state

NR 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\_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 by UE 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

The following procedures are recommended for normative work for UL positioning methods in RRC\_INACTIVE if SRS transmission is supported in RRC\_INACTIVE.

* + Delivery of SRS configuration for UE SRS transmission in RRC\_INACTIVE when the UE is in RRC\_CONNECTED.

NOTE: The following procedures have already been supported for UE in RRC\_CONNECTED and can be reused for UE in RRC\_INACTIVE

* + - NRPPa message for uplink positioning for UE in RRC\_INACTIVE

The following procedures are recommended for normative work for NR E-CID in RRC\_INACTIVE

* + Reporting of RRM measurement performed in RRC\_INACTIVE in LPP for DL NR E-CID by the UE in RRC\_INACTIVE
	+ Reporting of RRM measurement performed in RRC\_INACTIVE in RRC message for UL NR E-CID by the UE in RRC\_INACTIVE.

NOTE: The following procedures have already been supported for NR E-CID in RRC\_INACTIVE

* + Reporting of RRM measurement performed in RRC\_INACTIVE in LPP/RRC by the UE in RRC\_CONNECTED

## 10.9 DL positioning measurement in RRC\_IDLE state

From 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 by UE 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

NOTE: The following procedures have already been supported for NR E-CID in RRC\_IDLE

* + Reporting of RRM measurement performed in RRC\_IDLE in LPP/RRC by the UE in RRC\_CONNECTED

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

## 10.x Scope of RRC\_IDLE/INACTIVE positioning

The 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

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

### 10.y RAT-Independent positioning

RAT-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.

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