**3GPP TSG-RAN WG2 Meeting #113-eR2-2102121**

**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**

# Discussion

During RAN2#113e, the following agreements have been made on R17 positioning. 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)

In this TP, we capture the following agreement to the TR 38.857

# 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)

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# 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 DL-PRS measurement and/or location estimate performed in RRC\_INACTIVE when the UE is in RRC\_INACTIVE.
		- The reporting of DL-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. (Details of the use of SDT to be studied in the WI phase)

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 DL-PRS configuration used in RRC\_INACTIVE downlink positioning

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

## 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 DL-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 DL-PRS configuration used in RRC\_IDLE downlink positioning
		- *RequestLocationInformation* can be sent in RRC\_CONNECTED for DL-PRS measurement and/or location estimate performed in RRC\_IDLE

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## 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

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### 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============================