

WI template dec2016 (RAN #75 adaptation3)

Source: CATT, CAICT
Title: New WID: UE Power Saving in NR
Document for: Approval
Agenda Item:

3GPP™ Work Item Description

For guidance, see [3GPP Working Procedures](#), article 39; and [3GPP TR 21.900](#).
Comprehensive instructions can be found at <http://www.3gpp.org/Work-Items>

Title: UE Power Saving in NR

Acronym:

Unique identifier: *{A number to be provided by MCC at the plenary}*

NOTE: For new WIs/Sis leave the Unique identifier empty but you may make a proposal for an Acronym.
If this is a RAN WID including Core and Perf. Part, then Title, Acronym and Unique identifier refer to the feature WI.

Please tick (X) the applicable box(es) in the table below:

Either:

This WID includes a Core part	x
This WID includes a Performance part	x

or:

and it addresses the following 3GPP work area:	This WID includes a Testing part	
	Radio Access	
	Core Network	
	Services	

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Impacts

Affects:	UICC apps	ME	AN	CN	Others (specify)
Yes		x	x		
No	X			X	X
Don't know					

2 Classification of the Work Item and linked work items

2.1 Primary classification

This work item is a work item.

	Feature
	Building Block
X	Work Task
	Study Item

NOTE: Normally, Core/Perf./Testing parts in RAN WIDs are Building Blocks. Only if they are under an SA or CT umbrella, we define them as work tasks. If you are in doubt, please contact MCC.

2.2 Parent and child Work Items

Parent and child Work Items		
Unique ID	Title	Nature of relationship

NOTE: RAN agreed some time ago, that it describes the feature WI + Core/Perf. Part WI or Testing part WI in one WID. Therefore the table above should just include the feature WI Unique ID and title and Nature of relationship is “parent WID”.

2.3 Other related Work Items and dependencies

Other related Work Items (if any)		
Unique ID	Title	Nature of relationship
700058	Study on Scenarios and Requirements for Next Generation Access Technologies	
710062	Study on New Radio (NR) Access Technology	
700022	Study on Stage 1 for New Services and Markets Technology Enablers	

NOTE: Classical examples: List a preceding SI or a preceding WI (e.g. if you further enhance a topic). Also related or dependent Wis in other TSGs should be indicated.

3 Justification

UE battery life is an important aspect of the user’s experience, which will influence the adoption of 5G handsets and/or services. The UE power saving study to target that UE power efficiency for 5G NR UEs is better than that of LTE. Rel-15 UE power saving schemes, such as DRX operation and BWP adaptation, provide UE power saving in NR operation. The RAN1 study of the Rel-16 UE power saving had shown substantial power saving gain comparing to considered Rel-15 NR features, as described in TR38.840.

The UE power saving study completes the UE power consumption model for evaluation based on the inputs from many sources. Evaluation results have been shown based on the UE power consumption model through calibration and subsequent evaluations. The UE power model could be used as the reference model in evaluating the UE power consumption for any other features if applicable.

RAN1’s study shows the substantial power saving gains over the agreed baseline in UE power saving schemes with UE adaptation in frequency domain, time domain, antenna domain, DRX operations, and reducing PDCCH monitoring with different traffic types, such as FTP, IM, web browsing, video streaming, gaming and VoIP, and network configurations.

It is noted that the combined power saving techniques may not necessarily provide linear addition of individual power saving gains. Therefore, the proposed UE power saving work item is to select the appropriate power saving schemes with substantial power saving gain and tolerable system performance impact.

4 Objective

4.1 Objective of SI or Core part WI or Testing part WI

The objective is to specify the UE power saving techniques with UE adaption in achieving UE power saving. The power saving technique should address latency and performance in NR as well as network impact. The objective of the UE power saving includes the following,

- 1) Specify power saving techniques with UE adaptation with focus in RRC_CONNECTED mode [RAN1, RAN4]
 - a) Specify the power saving techniques with power saving signal/channel
 - i) Specify the PDCCH-based power saving signal/channel triggering UE adaptation in RRC_CONNECTED
 - ii) Note: this objective shall not duplicate DRX operation and impact to DRX is studied at RAN2
 - iii) Note: Any change of PDCCH channel coding and payload interleaver is not in the scope
 - b) Specify the procedure of cross-slot scheduling power saving techniques
 - i) Note: The procedure is in addition to Rel-15 cross-slot scheduling procedure
- 2) Evaluate the required switching and interruption times for UE dynamic adaptation to the maximum number of MIMO layers.[RAN4]

- a) Note: Switching on/off the RF is part of the evaluation

Note:

- These objectives are RAN1/RAN4 focus and do not consider RAN2 impact.
- The objectives are subject to further update in RAN#84. The update will be based on recommendations from the completion of RAN2 study and remaining RAN1 recommendations based on the conclusion of RAN1 study.

4.2 Objective of Performance part WI

NOTE: Leave empty if the WI proposal does not contain a RAN performance part.

Specify necessary performance requirements related to the above-mentioned core requirements [RAN4]

- UE performance requirements
- UE RRM performance requirements

4.3 RAN time budget request (not applicable to RAN5 Wis/Sis)

NOTE: For all RAN related Wis/Sis which are not led by RAN WG5 the WI/SI 3apporteurs has to fill out the attached Excel table to request time budgets for corresponding RAN WG meetings.

The Excel table has to be filled out for all affected RAN WGs and up to the target date of the WI/SI.

One time unit (TU) corresponds to ~ 2 hours in the meeting.

If no TU is needed leave the field empty otherwise enter a number in the field.

For revisions of already approved WI/SI descriptions: Please remove the Excel table from the WID/SID's zip file. The time budgets are already recorded. If you want to modify them, then this has to be done via the status report and not via a revised WID/SID.

If this WID is covering Core and Performance part, then please fill out one line for each of them in the attached Excel table.

Additional comments to the time budget request in the attached Excel table:

5 Expected Output and Time scale

New specifications {One line per specification. Create/delete lines as needed}					
Proposed Spec no. or series	Type (see note 1)	Title	For info at TSG#	For approval at TSG#	Remarks

Note 1: Only TSs may contain normative provisions. Study Items shall create or impact only TRs.
 "Internal TR" is intended for 3GPP internal use only whereas "External TR" may be transposed by Ops.

NOTE: If this is a RAN WID including Core and Perf. Part, then all new Core part specs have to be listed first and then all new Perf. Part specs. Indicate "Core part" or "Perf. Part" under Remarks for each spec.

Impacted existing TS/TR {One line per specification. Create/delete lines as needed}			
TS/TR No.	Description of change	Target completion plenary#	Remarks
38.133	Necessary RAN4 requirements	87	Core parts
38.101-1	Necessary RAN4 requirements	87	Core parts
38.101-2	Necessary RAN4 requirements	87	Core parts
38.101-3	Necessary RAN4 requirements	87	Core parts
38.300	Possible changes to NR Stage-3	86	Core parts
38.211	Possible changes to physical channels and modulation	86	Core parts
38.212	Possible changes to multiplexing and channel coding	86	Core parts
38.213	Possible changes to physical layer procedures	86	Core parts
38.214	Possible changes to physical layer procedures for data	86	Core parts
38.101-4	Necessary RAN4 requirements	89	Performance parts
38.133	Necessary RAN4 requirements	89	Performance parts

By default a new specs can only be new for one of both parts.

Impacted existing TS/TR {One line per specification. Create/delete lines as needed}			
TS/TR No.	Description of change	Target completion plenary#	Remarks

NOTE: If this is a RAN WID including Core and Perf. Part, then all new Core part specs have to be listed first and then all new Perf. Part specs. Indicate “Core part” or “Perf. Part” under Remarks for each spec. If an existing spec is affected by both (Core part and Perf. Part), then it has to be listed twice with appropriate approval dates.

6 Work item Rapporteur(s)

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7 Work item leadership

RAN WG1

Secondary RAN WAG4

8 Aspects that involve other WGs

NOTE: For RAN WIDs: Section 8 applies only to WGs outside of TSG RAN because RAN WG aspects have to be covered in section 4.

Supporting Individual Members

Supporting IM name
Apple
AT&T
CATT
CAICT
CMCC
China Unicom
China Telecom
CHTTL
Blackberry
Ericsson
Fujitsu
Huawei
Huawei Device
HiSilicon
III
Intel
InterDigital
ITRI
KT Corp
LG
Lenovo
MediaTek
Motorola Mobility
Nokia
Nokia Shanghai Bell
NTT DoCoMo
OPPO
Panasonic
Qualcomm
Samsung
Sharp
Sierra Wireless
SK Telecom
Softbank
Sony
Telecom Italia
Verizon
vivo
Xiaomi
ZTE