**3GPP TSG-RAN2 Meeting #109e *rev02 of R2-2000421***

**Online, 24 February-6 March 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **36.300** | **CR** | **1258** | **rev** | **1** | **Current version:** | **16.0.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:*** | Introduction of RACS and DL RRC segmentation | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | MediaTek Inc., Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | RACS-RAN-Core, TEI16 | | | | |  | ***Date:*** | | | 2020-02-28 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
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| ***Reason for change:*** | | Agreements related to LTE portions of the RACS work item need to be captured in TS 36.300:   * Possibility to indicate a UE capability ID in NAS signalling; * RRC segmentation in uplink direction for the UE capabilities.   Segmentation agreements from TEI16 need to be captured:   * RRC segmentation in downlink direction for *RRCConnectionReconfiguration* and *RRCConnectionResume* messages. | | | | | | | | |
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| ***Summary of change:*** | | * Described the option to segment the capability information message * Indicated that the ID representing AS capabilities may be carried in NAS signalling (exception to the general principle that “RRC signalling carries AS capabilities and NAS signalling carries NAS capabilities”) * Described that the ID may be assigned either by the manufacturer or the PLMN * Captured that the manufacturer-assigned ID corresponds to a pre-provisioned set of capabilities * Captured that the PLMN-assigned ID is assigned in NAS signalling * Clarified in section 18 that the ID is carried in NAS signalling * Captured that the ID represents the capabilities for one or more RATs * Migrated changes to version 16.0.0 * Captured changes to make the description of segmentation generic for UL and DL * Included description of downlink segmentation in the new section 7.x | | | | | | | | |
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| ***Consequences if not approved:*** | | Stage 2 description of RACS and DL RRC segmentation is missing. | | | | | | | | |
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| ***Clauses affected:*** | | 7.x (new), 18 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 36.306 CR 1732 [TEI16]  TS 36.331 CR 4189 [RACS]  TS 36.331 CR 4200 [TEI16] | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

## 7.x Segmentation of RRC messages

An RRC message may be segmented in case the size of the encoded RRC message PDU exceeds the maximum PDCP SDU size. Segmentation is performed in the RRC layer using a separate RRC PDU to carry each segment. The receiver reassembles the segments to form the complete RRC message. All segments of an RRC message are transmitted before sending another RRC message. Segmentation is supported in both uplink and downlink.

In this version of the specification, segmentation applies only to the *UECapabilityInformation*, *RRCConnectionReconfiguration*, and *RRCConnectionResume* messages.

## […]

# 18 UE capabilities

RRC signalling carries AS capabilities and NAS signalling carries NAS capabilities. When a capability ID is used as described below, the ID representing AS capabilities may be carried in NAS signalling. The UE capability information is stored in the MME. In the uplink, except of NB-IoT no capability information is sent early in e.g. *RRCConnectionRequest* message. For NB-IoT, early indications for multi-tone support (IOT bit) and multi-carrier support (IOT bit) are sent in *RRCConnectionRequest-NB* message. In the downlink, enquiry procedure of the UE capability is supported.



Figure 18-1: Initial UE Capability Handling

The MME stores the UE Radio Capability uploaded in the UE CAPABILITY INFO INDICATION message.

The possible RAT-Types are: EUTRAN, UTRAN, GERAN-PS, GERAN-CS, CDMA2000-1XRTT. The GERAN capability is divided into separate parts. MS Classmark 2 and Classmark 3 are used for CS domain (in both AS and NAS) and MS Radio Access Capability is used for PS domain. The main part of CDMA2000 capabilities is not handled by the eNB or the MME, but is exchanged via tunnelling (see 10.3.2). The small part of CDMA2000 capabilities (for CDMA2000-1XRTT) is needed for the eNB to be able to build messages for the target CDMA2000 RNC (see 10.3.2).

The eNB may acquire the UE capabilities after a Handover completion. The UE capabilities are then uploaded to the MME.

Usually during handover preparation, the source RAN node transfers both the UE source RAT capabilities and the target RAT capabilities to the target RAN node, in order to minimize interruptions and to follow the principles in clause 10.2.2. The source RAN is not mandated to acquire other RAT capabilities (i.e. other than the source and target RAT capabilities) in order to start a handover preparation. This is described in clause 19.2.2.5.6. However, there are exceptions to this principle:

- For handover from GERAN to EUTRAN, due to limitations in GERAN radio interface signalling, source RAT (GERAN) never provides the EUTRA capabilities to the target RAN node.

- At handover from UTRAN to EUTRAN, it is optional to forward the UTRAN capabilities to the target RAN.

The UTRAN capabilities, i.e. the INTER RAT HANDOVER INFO, include START-CS, START-PS and "predefined configurations", which are "dynamic" IEs. In order to avoid the START values desynchronisation and the key replaying issue, the eNB always enquiry the UE UTRAN capabilities at transition from RRC\_IDLE to RRC\_CONNECTED and before Handover to UTRAN. The eNB does not upload the UE UTRAN capabilities to the MME.

Due to limitations in radio interface signalling, transfer of EUTRA capabilities is not supported in GERAN.

For a NB-IoT UE that supports S1-U data transfer or User Plane CIoT EPS optimizations, as defined in TS 24.301 [20], the procedure in Figure 18-1 is applicable except that RAT-Types and handover are not supported.

If a request to retrieve the UE Radio Capability is included in the DOWNLINK NAS TRANSPORT message, the eNB may request the UE Radio Capability from the UE and provide it to the MME in the UE CAPABILITY INFO INDICATION message. The detailed procedure is defined in TS 36.413 [25].

For a UE that supports Control Plane CIoT EPS optimization, as defined in TS 24.301 [20], the MME may initiate Connection Establishment Indication procedure to provide UE Radio Capability to the eNB after receiving INITIAL UE MESSAGE message. If the UE Radio Capability is not included in the procedure, this may trigger the eNB to request the UE Radio Capability from the UE and to provide it to the MME in the UE CAPABILITY INFO INDICATION message. The detailed procedure is defined in TS 36.413 [25].

In NB-IoT, for a UE that supports Control Plane CIoT EPS optimizations, as defined in TS 24.301 [20], the eNB, based on configuration, may retrieve the UE Radio capability from the MME upon reception of RRC Connection Request as defined in TS 23.401 [17], clauses 5.3.4B.2 and 5.3.4B.3.

If supported by the UE and the network, the UE may provide an ID in NAS signalling that represents its radio capabilities for one or more RATs in order to reduce signalling overhead. The ID may be assigned either by the manufacturer or by the serving PLMN. The manufacturer-assigned ID corresponds to a pre-provisioned set of capabilities. In the case of the PLMN-assigned ID, assignment takes place in NAS signalling.