3GPP RAN WG2 Meeting #113bis-e R2-2104396

eMeeting April 12th – April 20th, 2021

Title: [Draft] LS to SA3 on Small data transmissions

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Source: InterDigital [to be RAN2]

To: SA3, RAN3

CC:

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Attachments: None

**1. Overall Description:**

RAN2 has been discussing RRC-based small data transmission (SDT), where UE in INACTIVE state initiates a SDT procedure by transmitting *RRCResumeRequest* along with small data in first UL transmission. Upon initiating the resume procedure during SDT initiation, the UE re-establishes PDCP entities and applies the security keys for sending the data in SDT-DRBs and/or SRBs securely and the UE resumes only RBs configured for SDT. After initial UL transmission, multiple UL/DL packets can be transmitted/received during the same SDT session while remaining in RRC INACTIVE state. RAN2 design assumes SDT session, including subsequent SDT transmissions, is terminated upon reception of *RRCRelease*. Under normal scenarios, the RRCRelease message contains the new NCC that is used for the next SDT session.

**Reusing NCC and I-RNTI for RRC Resume procedure in the same cell:**

One issue discussed in RAN2 is how to notify the network about data arrival from DRBs not configured for SDT during an SDT procedure, since non-SDT DRBs are not resumed upon SDT initiating and thus are not reflected in buffer status reports. One option to notify the network is to transmit another CCCH message (i.e. RRC ResumeRequest). Per legacy procedure, the UE in RRC\_INACTIVE initiates an RRCResume procedure upon data arrival. However, if an RRCResume procedure has already been initiated for SDT, this second ResumeRequest reuses the I-RNTI and resumeMAC-I in the same cell as UE has not received the new NCC. It has been noted in RAN2, that this reuse of the I-RNTI and resumeMAC-I already happen in Rel-15/16 after reception of a RRC Reject message. Similarly, it should be noted that UE may or may not have received network response upon non-SDT data arrival (ie., before contention resolution).

***Question 1:*** *Can a second CCCH message resuing the I-RNTI and resumeMAC-I be transmitted again in the same cell after SDT initiation similarly to legacy RRC Reject case?*

**Reusing NCC and I-RNTI for RRC Resume procedure in different cells:**

According to Rel-16, if UE transmits *RRCResumeRequest* and performs cell re-selection before receiving RRC response message (e.g. *RRCRelease or RRCResume*), UE transitions to IDLE. However, this may result in data loss if RRCResume procedure was used to initiate a SDT procedure since UE may transmit/receive multiple packets before cell re-selection.

An alternative approach discussed by RAN2 is for UE to remain in INACTIVE and attempt a new SDT procedure or a new RRC resume procedure in new cell. However, per TS 33.501 UE is provided with updated I-RNTI and NCC in subsequent *RRCRelease* with *suspendConfig* messages. If UE attempts the new SDT procedure in the new cell before completing the SDT procedure in the first cell, it will not have received updated I-RNTI and NCC per current procedure. One potential solution discussed in RAN2 is to temporarily allow re-use of the NCC and I-RNTI from the former cell to initiate SDT procedure/RRC resume by sending another CCCH message in the new cell.

***Question 2:*** *Can NCC and I-RNTI from a former cell in which an SDT procedure was initiated be re-used to initiate an new SDT procedure in a new cell?*

*Question 3 (to RAN3): In case of anchor relocation, can RAN3 signalling support the old anchor gNB receiving the second CCCH message.*

**2. Actions:**

**To** **SA WG3**

**ACTION:** RAN2 kindly asks SA WG3:

1) whether a CCCH message reusing the I-RNTI and *resumeMAC-I* can be transmitted again in the same cell after SDT initiation ?

2) whether NCC and I-RNTI from a former cell *in which an SDT procedure was initiated* can be re-used to initiate a new SDT procedure/RRC resume procedure in a new cell?

**ACTION:** RAN2 kindly asks RAN WG3:

3) Whether RAN3 signalling can support the old anchor gNB receiving the second CCCH message in case cell reselection during SDT

**3. Date of Next RAN2 Meetings:**

TSG-RAN WG2#114- e May 19th – 27th, 2020 Online meeting