**3GPP TSG-RAN WG2 Meeting #116bis-e *R2-2XXXX***

**Electronic Meeting, 17 - 25 January 2022**

|  |
| --- |
| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **36.304** | **CR** |  | **rev** |  | **Current version:** | **16.6.0** |  |
|  |
| *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)*.* |
|  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network | **x** | Core Network |  |

|  |
| --- |
|  |
| ***Title:***  | Running CR to 36.304 for Multi-USIM devices |
|  |  |
| ***Source to WG:*** | China Telecom |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | LTE\_NR\_MUSIM-Core |  | ***Date:*** | 2022-1-26 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-17 |
|  | *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 canbe 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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | To capture the RAN2 agreements on LTE\_NR\_MUSIM-Core WI**RAN2#113-bis-e has reached the following agreements**:* For the EPS PO/PF calculation, include the UE\_offset to the UE\_ID calculation formula.
* No additional modification for the EPS eDRX case.

**RAN2#116-e agreements:*** 1: RAN2 prefers that for EPS, the alternative IMSI or offset should be calculated in AS, i.e., RRC. Send an LS to SA2 and CT1 to indicate RAN2’s preference and request to specify the necessary details. LS will be discussed in offline [230].
* 5: For LTE and NR, RAN2 leaves it up to UE implementation how UE AS indicates to UE NAS that paging collision issue is identified.
* 7: For LTE and NR, RAN2 leaves other detailed UE behavior up to UE implementation, including how to make predictable UE behavior for RAT/Network selection to avoid paging collision, rules for declaring paging collision issue, and RAT/Network selection for reporting paging collision issue.

**RAN2#116bis-e agreements:*** 1: Working assumption: RAN2 will define alternative IMSI = (IMSI + Accepted IMSI Offset) in 36.304. If an Accepted IMSI Offset is forwarded by upper layers, UE AS shall use the IMSI Offset value and IMSI to calculate an alternative IMSI value as IMSI + Accepted IMSI Offset. Here IMSI is used for the UE ID in paging offset calculation.
* 4: RAN2 do not define AS-NAS interaction on when and how UE indicate paging collision.
 |
|  |  |
| ***Summary of change:*** | 7.1 Specify how to derive the paging occasion when Accept IMSI offset is forwarded by upper layers. |
|  |  |
| ***Consequences if not approved:*** | Multi -SIM operations are not supported  |
|  |  |
| ***Clauses affected:*** | 7.1 Discontinuous Reception for paging |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  |  |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | This Running CR is based on the version 16.6.0 of 36.304 |
|  |  |
| ***This CR's revision history:*** | It was revised to account for the agreements in RAN2#116bis-e:Update the Alternative IMSI calculation formula |

#

START OF FIRST CHANGE

## 7.1 Discontinuous Reception for paging

The UE may use Discontinuous Reception (DRX) in idle mode in order to reduce power consumption. One Paging Occasion (PO) is a subframe where there may be P-RNTI transmitted on PDCCH or MPDCCH or, for NB-IoT on NPDCCH addressing the paging message. In P-RNTI transmitted on MPDCCH case, PO refers to the starting subframe of MPDCCH repetitions. In case of P-RNTI transmitted on NPDCCH, PO refers to the starting subframe of NPDCCH repetitions unless subframe determined by PO is not a valid NB-IoT downlink subframe then the first valid NB-IoT downlink subframe after PO is the starting subframe of the NPDCCH repetitions. The paging message is same for both RAN initiated paging and CN initiated paging.

The UE initiates RRC Connection Resume procedure upon receiving RAN paging. If the UE receives a CN initiated paging in RRC\_INACTIVE state, the UE moves to RRC\_IDLE and informs NAS.

One Paging Frame (PF) is one Radio Frame, which may contain one or multiple Paging Occasion(s). When DRX is used the UE needs only to monitor one PO per DRX cycle.

One Paging Narrowband (PNB) is one narrowband, on which the UE performs the paging message reception.

PF, PO, and PNB are determined by following formulae:

PF is given by following equation:

SFN mod T= (T div N)\*(UE\_ID mod N)

Index i\_s pointing to PO from subframe pattern defined in 7.2 will be derived from following calculation:

i\_s = floor(UE\_ID/N) mod Ns

If P-RNTI is monitored on MPDCCH, the PNB is determined by the following equation:

PNB = floor(UE\_ID/(N\*Ns)) mod Nn

If P-RNTI is monitored on NPDCCH and the UE supports paging on a non-anchor carrier, and if paging configuration for non-anchor carrier is provided in system information, then the paging carrier is determined by the paging carrier with smallest index n (0 ≤ n ≤ Nn-1) fulfilling the following equation:

floor(UE\_ID/(N\*Ns)) mod W < W(0) + W(1) + … + W(n)

System Information DRX parameters stored in the UE shall be updated locally in the UE whenever the DRX parameter values are changed in SI. If the UE has no IMSI, for instance when making an emergency call without USIM, the UE shall use as default identity UE\_ID = 0 in the PF, i\_s, and PNB formulas above. If the UE has no 5G-S-TMSI, for instance when the UE has not yet registered onto the network, the UE shall use as default identity UE\_ID = 0 in the PF and i\_s formulas above.

The following Parameters are used for the calculation of the PF, i\_s, PNB, wg, and the NB-IoT paging carrier:

- T: DRX cycle of the UE.

In RRC\_IDLE state:

- Except for NB-IoT: If a UE specific extended DRX value of 512 radio frames is configured by upper layers according to 7.3, T =512. Otherwise, T is determined by the shortest of the UE specific DRX value, if allocated by upper layers, and a default DRX value broadcast in system information. If UE specific DRX is not configured by upper layers, the default value is applied.

In RRC\_INACTIVE state, if extended DRX is not configured by upper layers as defined in 7.3:

- T is determined by the shortest of the RAN paging cycle, if configured, the UE specific paging cycle, if allocated by upper layers, and the default paging cycle.

In RRC\_INACTIVE state if extended DRX is configured by upper layers according to 7.3:

- If a UE specific extended DRX value of 512 radio frames is configured, T is determined by the shortest of the RAN paging cycle, if configured, and 512 radio frames.

- If a UE specific extended DRX value other than 512 radio frames is configured:

- During the PTW, T is determined by the shortest of the RAN paging cycle, if configured, the UE specific paging cycle, if allocated by upper layers, and the default paging cycle. Outside the PTW, T is determined by the RAN paging cycle, if configured.

 In RRC\_INACTIVE state, a BL UE or a UE in enhanced coverage uses the T value applicable for RRC\_IDLE state for the determination of PNB and i\_s.

 For NB-IoT: If UE specific DRX value is allocated by upper layers and minimum UE specific DRX value is broadcast in system information, T = min (default DRX value, max (UE specific DRX value, minimum UE specific DRX value broadcast in system information)). If UE specific DRX is not configured by upper layers or if the minimum UE specific DRX value is not broadcast in system information, the default DRX value is applied.

- nB: 4T, 2T, T, T/2, T/4, T/8, T/16, T/32, T/64, T/128, and T/256, and for NB-IoT also T/512, and T/1024.

- N: min(T,nB)

- Ns: max(1,nB/T)

- Nn: number of paging narrowbands (for P-RNTI monitored on MPDCCH) or paging carriers (for P-RNTI monitored on NPDCCH) determined as follows:

If UE monitors GWUS according to clause 7.5.1:

this is the number of paging narrowbands (paging carriers) that are configured with GWUS.

else:

this is the number of paging narrowbands (paging carriers) provided in system information.

- UE\_ID:

If the UE supports E-UTRA connected to 5GC and NAS indicated to use 5GC for the selected cell:

5G-S-TMSI mod 1024, if P-RNTI is monitored on PDCCH.

5G-S-TMSI mod 16384, if P-RNTI is monitored on NPDCCH or MPDCCH.

else

IMSI mod 1024, if P-RNTI is monitored on PDCCH and Accepted IMSI Offset is not available.

Alternative IMSI mod 1024, if P-RNTI is monitored on PDCCH and Accepted IMSI Offset is available.

IMSI mod 4096, if P-RNTI is monitored on NPDCCH.

IMSI mod 16384, if P-RNTI is monitored on MPDCCH or if P-RNTI is monitored on NPDCCH and the UE supports paging on a non-anchor carrier, and if paging configuration for non-anchor carrier is provided in system information.

- W(i): Weight for NB-IoT paging carrier i.

- W: Total weight of all NB-IoT paging carriers, i.e. W = W(0) + W(1) + … + W(Nn-1). If UE monitors GWUS according to clause 7.5.1, Total weight of all NB-IoT paging carriers configured with GWUS.

IMSI is given as sequence of digits of type Integer (0..9), IMSI shall in the formulae above be interpreted as a decimal integer number, where the first digit given in the sequence represents the highest order digit.

For example:

 IMSI = 12 (digit1=1, digit2=2)

In the calculations, this shall be interpreted as the decimal integer "12", not "1x16+2 = 18".

If an Accepted IMSI Offset is forwarded by upper layers, UE shall use the IMSI Offset value and IMSI to calculate an alternative IMSI value as IMSI + Accepted IMSI Offset.

5G-S-TMSI is a 48 bit long bit string as defined in TS 23.501 [39]. 5G-S-TMSI shall in the PF and i\_s formulae above be interpreted as a binary number where the left most bit represents the most significant bit.

END OF FIRST CHANGE

## Annex: RAN2 Agreements (LTE\_NR\_MUSIM-Core; leading WG: RAN2; REL-17; WID: RP-202895)

## RAN2#116bis-e

* 1: Working assumption: RAN2 will define alternative IMSI = (IMSI + Accepted IMSI Offset) in 36.304. If an Accepted IMSI Offset is forwarded by upper layers, UE AS shall use the IMSI Offset value and IMSI to calculate an alternative IMSI value as IMSI + Accepted IMSI Offset. Here IMSI is used for the UE ID in paging offset calculation.
* 2: Send LS to SA2/CT1 notifying them of RAN2 working assumption and ask if the working assumption is compatible and consistent with SA2/CT1 specifications (with minimal effort). If not, request them to indicate that to RAN2 so the topic can be rediscussed. LS to be drafted in (short) post-meeting email discussion.
* For P3 and P5, can discuss in open issue collection whether there is something to address.
* 4: RAN2 do not define AS-NAS interaction on when and how UE indicate paging collision.
* 1: From RAN2 perspective, at least the following MGL/MGRP values are applicable for MUSIM periodic gap:
* MGL: 1.5ms, 3ms, 3.5ms, 4ms, 5.5ms, 6ms, 10ms, 20ms
* MGRP: 20ms, 40ms, 80ms, 160ms, 320ms, 640ms, 1280ms, 2560ms.
* Can add additional MGL/MGRP if RAN4 indicates other values are needed
* 2: From RAN2 perspective, at least the following MGL values are applicable for MUSIM aperiodic gap.
* MGL: 1.5ms, 3ms, 3.5ms, 4ms, 5.5ms, 6ms, 10ms, 20ms
* Can add additional MGL/MGRP if RAN4 indicates other values are needed
* 3: keep three gaps agreement (i.e., 2 periodic gaps and 1 aperiodic gap) for now. Ask to RAN4 to clarify if one additional periodic gap can be possible without sacrificing NW A performance (exact LS wording for the question can be discussed offline).
* 4: In the gap assistance information, UE provides gap repetition period and offset for periodic gaps, and (optionally) provides start SFN and subframe for the aperiodic gap.
* 10: NW configures start SFN and subframe for the aperiodic gap.
* 7: UE is allowed to initiate a UAI message with MUSIM preference in the target cell after handover, if the UE has sent UAI during the last 1 second.
* Stage-3 details for gap configuration (e.g AddModReleaseList, gap id, gap modification) are postponed for now (pending the general MG discussion). Can consider P8/P9 as starting point from MUSIM perspective.
* FFS on UAI details (alt1 or alt2). Companies are requested to provide corresponding Stage-3 CRs to next meeting.
* NW is allowed to configure prohibit timer for MUSIM UAI, but it has to be allowed to be set to zero (i.e. no prohibit timer). FFS what is the maximum value (should be reasonable)
* NAS AS Interaction
* 1: For NW switching with leaving RRC Connected state, RAN2 confirms the following understanding (aligned with SA2 agreements):

1. For E-UTRAN/5GS scenario, only NAS-based solution is supported for UE network switching with leaving connected state.

2. For NR/5GS scenario, both NAS-based and RRC-based solution are supported for UE network switching with leaving connected state.

3. For NAS-based UE network switching with leaving connected state case, UE may provide a Paging Restriction Information to AMF only by NAS signaling.

4. For RRC-based UE network switching with leaving connected state case, it is NOT supported to provide the Paging Restriction Information from a UE to RAN by RRC message.

5. There is no need to define the interaction between RRC-level connection release procedure and NAS-level connection release procedure.

6. When both NAS-level Connection Release and RRC-level connection release are supported by the UE and are configured by the NW, it is up to the UE implementation to determine which one to use.

7. When NAS-based solution is used, the UE can only enter IDLE, while if RRC-based solution is used, then the UE can enter IDLE or INACTIVE.

* 4: Do not introduce a prohibit timer for RRC-level switching procedure for leaving RRC\_CONNECTED state.
* 5: The waiting timer for leaving RRC Connection state should be set to a finite value which can allow the UE to switch in a reasonable time and not delay the urgent procedures on the other NW. Network controls whether UE is allowed to use leaving RRC connection for MUSIM purposes.
* 2: Switching notification for leaving RRC\_CONNECTED state and without leaving RRC\_CONNECTED state can be enabled separately.

## RAN2#116-e

* 4: RAN2 confirms that E-UTRA connected to 5GC scenario is also in the WID scope for paging collision avoidance. The solution agreed for NR is the baseline solution for this scenario.
* 1: RAN2 prefers that for EPS, the alternative IMSI or offset should be calculated in AS, i.e., RRC. Send an LS to SA2 and CT1 to indicate RAN2’s preference and request to specify the necessary details. LS will be discussed in offline [230].
* Option 1 already agreed earlier, no need to optimize
* 5: For LTE and NR, RAN2 leaves it up to UE implementation how UE AS indicates to UE NAS that paging collision issue is identified.
* 7: For LTE and NR, RAN2 leaves other detailed UE behavior up to UE implementation, including how to make predictable UE behavior for RAT/Network selection to avoid paging collision, rules for declaring paging collision issue, and RAT/Network selection for reporting paging collision issue.

**=> RAN2 already agreed not to have assistance information**

* After the session, it was noted that the agreement on no assistance information only applied for 5GS, so the notes were amended by adding the "for 5GS" as per below:
* RAN2 already agreed not to have assistance information for 5GS
* RAN2 will not specify MN-SN coordination of MUSIM gaps with MR-DC in Rel-17
* RAN2 will not create MAC CE activation of gaps in MUSIM, but if the common gap discussion allows this anyway, RAN2 will not prevent that, either.
* 1: RAN2 will not work in Rel-17 for the case that Dual-RX/Single-TX UE or Single-RX/Single-TX UE stays in RRC\_CONNECTED mode in NW A while performing reception and transmission in NW B (in RRC\_ CONNECTED or during RRC setup/resume period).
* 2: MR-DC is not supported in Rel-17.
* No need for LS to SA2 on this (no specification efforts needed to prevent or allow dual RRC\_CONNECTED with MUSIM in Rel-17).
* Wait for RAN4 feedback on gap pattern support (can use FFS in RRC for maximum value)
* 4: RAN2 understands that the intent of aperiodic gap is as follows (no need to specify):

- If until the end of the aperiodic gap the UE still has not completed activity in NW B, e.g. due to the random access for on-demand SI request, the UE should stop the activity in NW B and switch to NW A. If needed, the UE can request another aperiodic gap in NW A.

* RAN2 does not intend to specify any new signalling in Rel-17 for early return. If legacy signalling allows it, RAN2 does not intend to preclude it.
* 5: Do not introduce gap purpose for gap related MUSIM assistance information.
* 6: FFS how UE indicates release of gap pattern.
* 7: FFS if UE is allowed to update UAI message after the UE performs cell reselection in NW B or after the UE performs handover in NW A.
* 8: Autonomous release of MUSIM gap by UE after N repetitions is not supported.

Bulk agreements

* 1: Introduce paging cause by using the ”nonCriticalExtension” in the Paging record.
* 2: No need to study solution proposals based on extending legacy Paging record.
* 4: The solution proposal to introduce paging cause in NR will be used for LTE.
* 5: No need to send an LS to SA2 asking to consider a NAS solution to introduce paging cause in LTE.
* 6: For paging reception in RRC\_IDLE, UE forwards the paging cause to NAS. It’s up to NAS whether to accept or reject the paging.
* 8: The AS-NAS interaction principles for NR are applied to LTE.
* No LS to SA3 needed on the LTE solution. Companies can raise this up directly in SA3 if needed.
* 3: Adopt B.1 (parallel list with 1 optional paging cause value “voice”).
* 9: Introduction of paging cause impacts 38.331 and 36.331 specs; FFS if it impacts stage 2 specs (38.300 and 36.300)
* 7: The AS-NAS interaction for paging reception in RRC\_INACTIVE is left up to UE implementation.
* 1 AS capability for paging collision avoidance is not needed (for any cases).
* 2 There is no need for AS capability for Busy indication.
* 6 There is no need for AS capability for Paging cause value.
* Can discuss UE capabilities for periodic/aperiodic gap request and RRC processing delay requirements for MUSIM in Rel-17 further in the next RAN2 meeting.
* The below is used as baseline for MUSIM capabilities (can still discuss exact details in the next meeting). FFS whether we need separate bits for periodic and aperiodic gaps. FFS if we need capability bit for leaving RRC\_CONNECTED.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Features** | **Index** | **Feature group** | **Components** | **Prerequisite feature groups** | **Type** **(the ‘type’ definition from UE features should be based on the granularity of 1) Per UE or 2) Per Band or 3) Per BC or 4) Per FS or 5) Per FSPC)**  | **Need of FDD/TDD differentiation** | **Need of FR1/FR2 differentiation** | **Capability interpretation for mixture of FDD/TDD and/or FR1/FR2** | **Note** | **Mandatory/Optional** |
| x. Rel-17 MUSIM  | X-0  | Gap support for MUSIM UE | Indicates UE support periodic gap for MUSIM | MUSIM support over NAS |  UE | No | No  |   |   | Optional with capability signalling |
|  |  |  | Indicates UE support aperiodic gap for MUSIM | MUSIM support over NAS |  UE | No | No  |   |   | Optional with capability signalling |

## RAN2#115-e

Agreement

1 RAN2 retains the agreement on NAS-based busy indication for RRC\_INACTIVE, and Reply SA2.

Agreements

Scenarios and supported gap types

1 RAN2 aims to support at least the below scenarios 1/2/3 in Rel-17 for cases when the UE is allowed to switch to network B without leaving connected state at network A.

- Scenarios 1: Periodic switching, including SSB detection/paging reception, serving cell measurement, neighboring cell measurement including intra-frequency,inter-frequency and inter-RAT measurement;

- Scenarios 2: SI receiving at network B;

- Scenarios 3: Aperiodic (one-shot) switching with both transmission and reception at network B but will not enter RRC-connected state in NW B (e.g. no RRC connection Resume/Setup) at network B, including On-demand SI request;

2 For switching without leaving connected state at network A, support gap types 2a (Normal periodic gap) and 2b (Normal aperiodic gap) in Rel-17.

3 Only per UE level scheduling gap is supported in Rel-17 for non-DC. FFS if we support MR-DC.

The scenarios will only be used for deriving RRC parameters. No need to capture them in e.g. Stage-2.

Agreements

Gap configuration and activation

5 The network is allowed to configure at most 3 gap patterns (for any MUSIM purpose).

6 Only a single aperiodic gap (for MUSIM) is supported in Rel-17. At most two periodic “gaps” (for MUSIM) and a single aperiodic gap (for MUSIM) is supported in Rel-17. FFS if signalling supports more.

7 The SFN and subframe of the PCell of the network A is used in the gap configuration to calculate the gap.

Agreements

Periodic/Aperiodic/autonomous Gap configuration and activation

8: The switching gap configuration will explicitly provide the gap starting position (e.g. offset value or start SFN and subframe explicitly), gap length and gap repetition period.

10: Switching Gaps (of any type) are configured or released by RRC signalling (e.g. RRCReconfiguration message) in Rel-17. FFS if gap can be released autonomously by UE after N repetitions.

Gap configuration assistance information

16 UE is allowed to include assistance information for setup or release of gaps for both 1) periodic gaps and 2) aperiodic gap in one UEAssistanceInformation Msg.

18 To report the assistance information, the UE maps the timing info of the Gap on the network B to the network A and reports the mapped timing info to the network A.

20 For the gap assistance information, the Gap start time, Duration of the gap and gap repetition period (for periodic) may be included. FFS is other information is included (e.g. gap purpose).

* Do not support autonomous gaps for MUSIM in Rel-17.
* 1 UE can indicate it wants to leave RRC\_CONNECTED in assistance information for MUSIM (FFS for signalling details, e.g. UAI).
* 3: UEAssistanceInformation message is extended for switching notification in both network switching procedures for leaving RRC\_CONNECTED state and without leaving RRC\_CONNECTED state.
* 6: UE is configured to provide assistance info for switching notification via otherConfig of RRCReconfiguration message
* 8: Introduce a new RRC timer for the “configured time”, used for the UE to leave RRC\_CONNECTED without a response.
* FFS if it's possible to configure UE to always wait for the network response (e.g. "infinite" waiting time)
* 7: UE is not allowed to enter RRC\_INACTIVE state if no NW response message is received within a certain configured time period after the network switching notification message is sent.
* 9: As baseline, how to handle the case, that UE performs switching without the response from network for a configured time during switching procedure without leaving RRC\_CONNECTED state, is not specified. Can re-discuss if there are serious issues found.

## RAN2#114-e

* 1: Send an LS to SA2 to inform that RAN2 majority would support, but there is no consensus to support NAS assistant information (similar to UE ID offset for LTE), so RAN2 thinks this issue should be discussed and decided by SA2.
* 2: RAN2 does not introduce RRC assistant information for paging collision issue for IDLE and INACTIVE. (Can revisit if serious problems are found.)
* 1: RRC signaling for network switching without leaving RRC\_Connected state should allow multiple configurations of periodic “gaps” with different parameters (e.g. periodicities and durations). FFS is multiple can be active at the same time. FFS if multiple aperiodic gaps are supported.
* 4: UE provides assistance information to the gNB of NW A in Connected state based on the configuration of USIM of NW B for the gNB to determine the necessary switching parameters. Up to network what is the action based on UE assistance information. FFS what assistance information is needed.
* 1: AS -based solution for network switching includes two steps: 1-) If configured, UE can send an RRC message to leave RRC\_CONNECTED for MUSIM purpose 2-) gNB may release the UE to Idle/Inactive.
* 2: Include the following RAN2#113bis-e agreement in the LS:

During switching procedure for leaving RRC\_CONNECTED state, UE is allowed to enter RRC\_IDLE state if it does not receive response message from network within a certain configured time period. FFS for RRC\_INACTIVE state

* 3: The “configured time” for AS-based solution for the UE to leave RRC\_CONNECTED without a response is configured by the gNB. Indicate RAN2 is still discussing this for AS-based solution in the LS.
* 4: Indicate that RAN2 has not discussed the interaction between AS-based solution and any SA2 agreement on NAS messages or NAS-based solution for network switching.

## RAN2#113-bis-e

Agreements

1: For the EPS PO/PF calculation, include the UE\_offset to the UE\_ID calculation formula.

2: No additional modification for the EPS eDRX case.

Agreements

1 Only support NAS-based busy indication (for IDLE and INACTIVE)

Agreements

1 RRC signalling is used for switching procedure without leaving RRC\_CONNECTED state in network A for UE temporarily switching to network B as a baseline. FFS on additional need of MAC signalling.

2 During switching procedure for leaving RRC\_CONNECTED state, UE is allowed to enter RRC\_IDLE state if it does not receive response message from network within a certain configured time period. FFS for RRC\_INACTIVE state.

* 1: RAN2 works to support the MUSIM paging cause feature that SA2 is working on and also addresses the paging cause issue raised by SA2 LS.
* 2: RAN2 attempts to reply LS to SA2 once we progress on solution and agree on CR(s) that support/address the above feature/issue.
* 5: If RAN2 agrees to add a paging cause value (or any other information that could lead to a specific paging cause) in Uu paging message, RAN2 specifies the relevant UE behavior (i.e. inform or passing to the upper layer) upon its reception in both LTE and NR specifications.
* RAN2 does not intend to introduce alternative paging IDs for MUSIM paging (unless requested by SA2).

## RAN2#113-e

* There is support for solution 1 (for 5GS) with something else, either solution 3 or 2b.

Agreement

1. Option 2b is the preferred solution to address paging collision for “LTE + LTE”.

Agreements

1 MUSIM UE determines potential paging collision on two networks and triggers actions on potential paging collision avoidance.

2 It is left to UE implementation as to how it selects one of the two RATs/networks for paging collision avoidance.

* FFS if we can make the UE behaviour predictable for paging collision avoidance

Agreements

1 Switching procedure can be used to notify network A that the UE has a preference to leave RRC\_CONNECTED state in network A.

2 The switching procedure can be used to notify network A that the UE has a preference to be kept in RRC\_CONNECTED state in network A while temporarily switching to network B.

Agreement

1 NAS signalling is baseline for UE reporting paging collision in 5GS side (to be confirmed by SA2).

2 It is FFS whether assistant information is needed for paging collision in 5GS side.

## RAN2#112-e

* Use: "Extending paging signalling is possible but RAN2 haven’t decided on overall feasibility of paging cause, including how it should be supported."
* With this change, the LS is approved in [R2-2011241](file:///C%3A%5CUsers%5Cterhentt%5CDocuments%5CTdocs%5CRAN2%5CRAN2_112-e%5CR2-2011241.zip) (unseen)
* From RAN2 point of view, Option 1 , 2a, 2b, and 3 are feasible to solve the paging collision issue in 5GS. Each have different effectiveness (as per analysis during the email discussion). When indicating reply to SA2, indicate both feasibility as well as effectiveness.
* Indicate to SA2 that RAN2 continues to further evaluate the pros and cons of options 1, 2a, 2b, 3.
* Option 4 is still allowed (but RAN2 will not specify UE implementation).
* Clarifying "No E-UTRA impact" can be done in RANP.
* Option 2c can be evaluated later as it doesn't work alone.
* Enhancement for 5GS should be prioritized since it can handle paging collision issue in both NR+NR and NR+LTE scenarios.
* Indicate to SA2 that the table 1 is a baseline on the discussion the expected time (in ms) required for UE to send a (NAS) busy indication to Network B.
* From RAN2 point of view, it is feasible that the busy indication is sent as an RRC message with security for RRC\_INACTIVE. FFS how this works.
* RAN2 will continue to discuss RRC-based switching/leaving and returning procedure in 5GS/NR when UE is in RRC\_CONNECTED. There may be different mechanisms (short/long, leaving/returning, etc.).
* Provide SA2 with information on paging cause costs based on the email discussion + contributions. Indicate that this may change if assumptions change.
* From RAN2 perspective, we haven't decided on paging cause feasibility yet.
* RAN2 will evaluate short/long time switching in this WI

**Agreements**

**1a: The sub-Case 3-1 is supported in WI, i.e., the switching/leaving and returning procedure in 5GS/NR when UE is in RRC\_CONNECTED includes the case where Dual-RX/Single-TX UE is in RRC\_CONNECTED state in NW A while performing only reception in NW B (i.e., in RRC\_idle State and RRC inactive state).**

**1b: For Sub-Case 3-1, whether the Rx capability coordination between UE and NW is needed can be decided after the RRC-based switching/leaving and returning procedure is defined.**

**2: The Sub-Case 3-2, i.e. Dual-RX/Single-TX UE stays in RRC\_CONNECTED mode in NW A while performing reception and transmission in NW B(in RRC\_ CONNECTED or during RRC setup/resume period ), is not considered in the WI from RAN2 viewpoint. Scheduling gap is not excluded.**

**4: FFS: The Sub-Case 4-1, i.e. Dual-RX/Dual-TX UE stays in RRC\_CONNECTED mode in NW A while performing both reception and transmission in NW B without changing into RRC\_CONNECTED state in NW B, is not considered in the WI from RAN2 viewpoint.**

**5: FFS: The Sub-Case 4-2, i.e. Dual-RX/Dual-TX UE stays in RRC\_CONNECTED state in NW A while performing both reception and transmission in RRC\_ CONNECTED in NW B, is not considered in the WI from RAN2 viewpoint.**

**=>** **FFS if/how to ensure UE doesn't disconnect from RRC\_CONNECTED during busy indication**

**=> Capability change is not precluded by proposals.**