**3GPP TSG-RAN WG2 Meeting #117 electronic R2-2203765**

**Online, February 21 - March 3, 2022**

**Agenda Item: 9.4**

**Source: Vodafone (Rapporteur)**

**Title: Report of second phase [AT117-e][203][UPIP] LTE UPIP configuration and capabilities (Vodafone)**

**Document for: Discussion and Decision**

# Introduction

This document aims to be a place to record any discussions that can’t be simply reflected in updates to the CRs submitted to AI 9.4 “User Plane Integrity Protection support for EPC connected architectures”.

**Comment deadline: Monday Week 2, 1000 UTC.**

# Tdoc numbers of CRs

R2-2202717 36.331 CR4763 will be revised in R2-2203819

R2-2202718 38.331 CR2904 will be revised in R2-2203820

R2-2202719 36.300 CR1353 will be revised in R2-2203821

R2-2202720 37.340 CR0294 will be revised in R2-2203822

R2-2202721 38.323 CR0085 will be revised in R2-2203823

# Discussion

## 3.1 Handling of UPint key at handover

Please use the table below for any comments/discussion that can’t be addressed by just updating the revised CR

|  |  |
| --- | --- |
| **Company** | **comments** |
|  |  |
|  |  |

**Moderator’s summary:** the 36.331 CR has been extended to cover handover and re-establishment.

## 3.2 Overall process for release of UPIP=required bearers at handover to non-supporting eNB

Please use the table below for comments/discussion

|  |  |
| --- | --- |
| **Company** | **comments** |
| Vodafone (as meeting delegate) | Initial thoughts (and more research needed):  This might work in the same way as we do 5GS to R15/R16 LTE-EPC handovers for a UE that has two PDN connections, one with UPIP policy=required and one with UPIP policy=preferred… but that type of handover is always followed by a Tracking Area Update which enables NAS level to release the unsynchronised bearers.  With normal X2 handovers, I think that the S1-AP Path Switch Request message tells the MME a list of RABs-that-failed-to be established and the MME uses this to clean up resources (at the UE (?) and) PDN GW. Similarly, at S1 handover, the MME is informed of the RABs that could not be established on the target eNB. However, the source eNB does not normally do this clean up… But perhaps we can (for this UPIP=required situation) mandate (in RAN 3) that the source eNB sends RAB Release messages to the MME – but the timing of this release needs to be done carefully, e.g. in case the handover fails on the radio interface. |
| Qualcomm | If the target eNB does not understand UPIP configuration, it should issue fullConfig. So, the scenario we are looking at seems to be the case when the target eNB does understand the UPIP config (i.e. has been already upgraded), but does not want to continue UPIP for such bearer.  For DRBs with UPIP policy = required, our understanding is SA3 security requirements dictate that such RBs are not handed over to eNBs which cannot fulfil UPIP requirement. This is for the network to make sure.  For DRBs with UPIP policy = not needed, changing UPIP during HO seems to be a moot point.  So, the remaining question is for DRBs with UPIP policy = preferred. This should be a rare case. So, we think keeping the NR way should be fine instead of trying to optimize further for rare event. I.e. current draft CRs seem sufficient. |
| Intel | We should consider two scenarios for the target eNB:  Case 1) eNBs that cannot comprehend the Rel-17 configuration, including the NR PDCP configuration. This could be a pre-release 17 eNBs or a Rel-17 eNB that does not support NR PDCP or EN-DC and hence cannot comprehend the R17 NR specification. For these, full config has to be used according to the general principle.  Case 2) Rel-17 eNBs that can comprehend the source configuration but do not support UPIP or does not support UPIP at the data rate configured by the source. When the UE is required to support UPIP at full data rate (if UPIP is supported), the previous motivation to turn on or off UPIP based on UPIP policy for a DRB is not so relevant anymore. Considering both these points, the original restriction we have in NR that integrity protection can only be configured at DRB set up will require DRBs to released and added.  ***integrityProtection***  Indicates whether or not integrity protection is configured for this radio bearer. The network configures all DRBs with the same PDU-session ID with same value for this field. The value for this field cannot be changed after the DRB is set up.  This restriction could have been updated to allow a change during a HO for LTE. This would be similar to a change of algorithm and should not cause any issue or require other specification changes.  But we also accept that this change is not essential and the only consequence of not supporting it would be that there would be data loss during a HO between an eNB supporting UPIP to another Rel-17 eNB not supporting UPIP.  In summary, while removing this restriction is helpful in terms of performance, we are also fine not to do this at this time. |
| Huawei, HiSilicon | Basically we share the similar view as Vodafone and Qualcomm.  This seems related to the HO procedure on X2/S1 interface which is under discussed in RAN3. We observe RAN3 agreed that when a RAN node receives IEs or IE groups for a functionality that is not supported, the handling is based on received Criticality information. And the criticality of the IE indicating UPIP policy/security indication of the E-RABs to be handover in HO request is “reject”, means if the target eNB cannot perform UPIP (no matter it can comprehend this IE or not), it should reject the HO request. Then if the source still want to handover the UE to this target eNB, what it can do is removing the E-RABs having UPIP policy in the HO request, resulting in DRB release/full-config in target side.  Thus we feel the current method of DRB release and add is sufficient for LTE UP IP, seems no need for further optimization. |
| Ericsson | We have similar view as HW |
| Vodafone(2) (as meeting delegate) | I think that there are two main issues here:   1. When UPIP is in use on the source eNB and the policy is “UPIP=preferred” and handover occurs to a eNB that does not support UPIP, can we be sure that the target eNB will send a ‘full configuration’ so that, after handover, both the UE and target eNB are not using UPIP?  And it seems that from discussion in RAN 3 and comments in RAN2, that we can be confident of this. 2. When UPIP is in use on the source eNB and the policy is “UPIP=required” and handover occurs to a eNB that does not support UPIP, then RAN 3 are in the process of designing procedures so that the source eNB only requests handover for the DRBs that do not require UPIP, but, how are the UPIP=required RABs released at AS and NAS in both UE and Network?   I’ve now checked TS 36.413 (S1-AP) and TS 23.401 a bit more: The S1-AP Path Switch Request only carries a list of RABs that should be switched by the MME. TS 23.401 section 5.5.1.1.2 step 2 then specifies:  *“The MME uses the list of EPS bearers to be switched, received in step 1, to determine whether any dedicated EPS bearers in the UE context have not been accepted by the target eNodeB. The MME releases the non-accepted dedicated bearers by triggering the bearer release procedure as specified in clause 5.4.4.2. …..”*  In S1 Handover Request, the target MME sends a list of EPS bearers to Setup to the target eNB, and the target eNB sends a list of EPS bearers that failed to set up in the S1-AP Handover Request Ack to the target MME. This enables a (UPIP supporting) target MME to clear down the UPIP=required bearers. With a non-UPIP supporting target MME, we need to rely on the source MME to clear the bearers down and/or the (likely) TAU after the MME change to resync the state of the bearers.  Overall, the RAN 2 aspects seem OK (although a little more SA2 checking might be needed). |

**Moderator’s summary:** existing RAN 2 (and RAN 3) specifications cope with this situation. However, it may be worthwhile for SA2 and CT 4 to check their specifications regarding the source MME’s behaviour at handover to a UPIP-non-supporting target MME.

## 3.3 Placeholder for discussion on CR to TS 36.331

Please use the table below for any comments/discussion that can’t be addressed by just updating the revised CR

|  |  |
| --- | --- |
| **Company** | **comments** |
| Qualcomm | Please check comments to updated draft CRs in the drafts folder. |
| Intel | Key derivation for re-establishment should also be updated, I think |
| Ericsson | v01 looks OK to us. |
| Vodafone | V02 updates should be just implementing Qualcomm’s suggestions. |

## 3.4 Placeholder for discussion on CR to TS 38.331

Please use the table below for any comments/discussion that can’t be addressed by just updating the revised CR

|  |  |
| --- | --- |
| **Company** | **comments** |
| Qualcomm | Please check comments to updated draft CRs in the drafts folder. |
| Ericsson | QC comments in v01 look OK to us. |
| Vodafone | V02 updates should be just implementing Qualcomm’s suggestions. |

## 3.5 Placeholder for discussion on CR to TS 36.300

Please use the table below for any comments/discussion that can’t be addressed by just updating the revised CR

|  |  |
| --- | --- |
| **Company** | **comments** |
| Qualcomm | Please check comments to updated draft CRs in the drafts folder. |
| Ericsson | QC comments in v01 look OK to us. |
| Vodafone | V02 tries to avoid UPIP usage being linked to UE Radio Avvess Capabilities |

## 3.6 Placeholder for discussion on CR to TS 37.340

Please use the table below for any comments/discussion that can’t be addressed by just updating the revised CR

|  |  |
| --- | --- |
| **Company** | **comments** |
| Qualcomm | Please check comments to updated draft CRs in the drafts folder. |
| Intel | Regarding Qualcomm comment in the CR, it would be useful to keep the text “when configured with EN-DC” in 37.340 CR as this spec is only applicable in the context of MR-DC. Standalone LTE operation for EN-DC capable UE is captured in 36.300. |
| Ericsson | No strong view, QC version also fine to us. |
| Vodafone | V02 tries to avoid UPIP usage being linked to UE Radio Access Capabilities |

## 3.7 Placeholder for discussion on CR to TS 38.323

Please use the table below for any comments/discussion that can’t be addressed by just updating the revised CR

|  |  |
| --- | --- |
| **Company** | **comments** |
| Qualcomm | Please check comments to updated draft CRs in the drafts folder. |
| Ericsson | Cover page changes OK to us. |

# 4. Summary and Proposals

Based on the discussion, the rapporteur makes the following summary and proposals:

**Summary:**

1. The 36.331 CR has been extended to cover handover and re-establishment.
2. Small updates/edits have been made to all five CRs and their cover pages.
3. The discussion on “how UPIP=required bearers are released at handover to a UPIP-non-supporting eNB” indicates that the existing RAN 2 (and RAN 3) specifications cope with this situation. However, it may be worthwhile for SA2 and CT 4 to check their specifications regarding the source MME’s behaviour at handover to a UPIP-non-supporting target MME.

**Proposal 1: approve the following five CRs and mark the WID as completed in RAN 2:**

**a) 36.331 CR4763 in R2-2203819**

**b) 38.331 CR2904 in R2-2203820**

**c) 36.300 CR1353 in R2-2203821**

**d) 37.340 CR0294 in R2-2203822**

**e) 38.323 CR0085 in R2-2203823**

# 5. Contact information

(Includes people from round 1)

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| --- | --- |
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