3GPP TSG-RAN WG3 Meeting #113-e [R3-214156](file:///D:\3GPPmeeting\202108%20RAN3%20113e\CB\Inbox\R3-214156.zip)

Online, 16 – 26 Aug 2021

**Agenda item: 9.3.4.1**

**Source: ZTE (moderator)**

**Title: Summary of offline: EHC**

**Document for: Discussion and Decision**

# 1 Introduction

This paper summarizes the following email discussion:

**CB: # 22\_EHC**

**- Two options on the table**

**- Solution down-selection, provide CRs if agreeable**

(ZTE - moderator)

Summary of offline disc in [R3-214156](file:///D:\3GPPmeeting\202108%20RAN3%20113e\CB\Inbox\R3-214156.zip)

# 2 For the Chairman’s Notes

**R3-213357 rev in R3-21xxxx is agreed**

**Proposal 1: maxCID-EHC-DL parameter is added to restrict the number of established DL EHC contexts.**

**Proposal 2: add the new EHC parameter in EHC Parameters IE.**

**Proposal 3: specify the restriction that the total number of EHC contexts for the UE is guaranteed to be less than or equal to the maxNumberEHC-Contexts in case of multiple CU-UPs.**

**Proposal 4: R3-213357 with some modification is to be agreeable CR.**

# 3 Discussion (Phase 1)

At RAN3#112e, the issue of missing EHC IE to restrict the number of established DL EHC issue was proposed in[1] and is discussed in offline disc[2], and the following open issue for PDC was captured in the Chair’s Minutes.

**FFS how to restrict the number of established DL EHC contexts.**

**FFS how total number of EHC contexts for the UE is guaranteed to be less than or equal to the maxNumberEHC-Contexts in case of multiple CU-UPs. To be continued.**

And in this meeting, two companies provide the solution both with two options. But there are some minor difference.

Overview of papers:

In Huawei and China Unicom’s Option 1([3][4]): *maxCID-EHC-DL* parameter is added in the *EHC Parameters* IE

In Huawei and China Unicom’s Option 2([3][5]): *maxCID-EHC-DL* IE is added in the *BEARER CONTEXT SETUP REQUEST* message and *BEARER CONTEXT MODIFICATION REQUEST* message.

In Huawei’s both options, there is not description for configuration restriction in case of multiple CU-UPs.

In ZTE’s Option 1([6][7]): *maxCID-EHC-DL* parameter is added in the *EHC Parameters* IE

In ZTE’s Option 2[(6][8]): *maxCID-EHC* parameter is added in the *EHC Parameters* IE.

In ZTE’s both options, there is description for configuration restriction in case of multiple CU-UPs that the total number of established EHC contexts across all bearers for the UE should be less than or equal to the value of *maxNumberEHC-Contexts* parameter as indicated by the UE.

Moderator’s Summary and Proposal:

There is difference for the contribution on the following, and should be discussed in RAN3:

* Add *maxCID-EHC-DL* parameter or *maxCID-EHC* parameter
* Add new EHC parameter in *EHC Parameters* IE or in the *BEARER CONTEXT SETUP REQUEST* message and *BEARER CONTEXT MODIFICATION REQUEST* message.
* Whether or how to description to restrict that the total number of EHC contexts for the UE is guaranteed to be less than or equal to the *maxNumberEHC-Contexts* in case of multiple CU-UPs

**Question 1: Do companies prefer to add *maxCID-EHC-DL* parameter or *maxCID-EHC* parameter?**

**Option 1: maxCID-EHC-DL**

**Option 2: maxCID-EHC**

|  |  |  |
| --- | --- | --- |
| **Company** | **Option** | **Comments** |
| ZTE | Option 2 | If *maxCID-EHC-DL* and maxCID-EHC-UL are configured separately, the number of DL EHC contexts and the number of UL EHC contexts cannot share the *maxNumberEHC-Contexts*(e.g. UE capability) flexibly during the EHC contexts establishment stage. E.g. the *maxNumberEHC-Contexts* is defined as the maximal number of DL EHC contexts and UL EHC contexts, and can be used by DL EHC contexts only or UL EHC contexts, so long as that the total number of EHC contexts does not exceed *maxNumberEHC-Contexts.*  So we prefer to configure *maxCID-EHC* (the maximal number of DL EHC contexts and UL EHC contexts) as that in RoHC. |
| Huawei | Option 1. | First, I acknowledge that the first option may cause some waste of EHC resources. However, I want to note that configure a total CID value based on the number of actually used EHC resource is risky and not feasible in some cases. This is mainly due to the following two reasons:   1. Option 2 is not suitable for use cases where UE supports only very few UL EHC contexts. With the second option, CU-UP determines how many DL resources it can use based on how many UL contexts has been established. However, the UE may want to establish more UL contexts in the future. If the resource reserved for UL is consumed by DL in advance, it in the end leads to performance loss in uplink. For example, if only 2 EHC contexts are reserved for UE, and UE uses one of them, but later DL thinks “Oh UL use only one EHC resource, we can use the other one in the DL.” Then later the UL cannot establish UL EHC contexts anymore, even it wants to. 2. I want to mention that establish EHC context is a dynamic progress. This means there exist delay for CU-UP/UE to know a new EHC context resource is used on the other hand. It could happen that the UL is establishing an EHC context at the moment, but the DL doesn’t realize it immediately, so DL continue to establish DL EHC context at the same time, which could also cause the total number of established contexts (UL+DL) exceeds UE’s capability.   Based on the above, option 1 is more feasible and has less drawbacks. |
| CATT | Option 2 | Option 2 is more flexible. The UP can handle it with the complete information |
| Samsung | Option 1 | We have similar view as Huawei.  Option 2 may be more flexible, but we don’t think that Option 2 is more efficient. And Option 2 requires more complexity in CU-UP. |
| Nokia | Option 1 |  |
| Ericsson | Option 1 | We prefer the simplest solution for this issue. |

**Summary:**

6 companies provided inputs to this question.

2 companies prefer option 2, and 4 companies prefer option 1. So, option 1(e.g. *maxCID-EHC-DL* parameter) is adopted.

**Proposal 1: *maxCID-EHC-DL* parameter is added to restrict the number of established DL EHC contexts.**

**Question 2: Do companies prefer to add the new EHC parameter in the *EHC Parameters* IE [4][7][8]or in the *BEARER CONTEXT SETUP REQUEST* message and *BEARER CONTEXT MODIFICATION REQUEST* message[5]?**

**Option 1: add the new EHC parameter in *EHC Parameters* IE**

**Option 2: add the new EHC parameter in the *BEARER CONTEXT SETUP REQUEST* message and *BEARER CONTEXT MODIFICATION REQUEST* message**

|  |  |  |
| --- | --- | --- |
| **Company** | **Option** | **Comments** |
| ZTE | Option 1 | Usually, the EHC related configuration over E1 is included in *EHC Parameters* IE. |
| Huawei | Both OK | We in fact don’t have strong views about the two options. Both are fine.  Here I just want to state the advantage of option 2. Compared to option 1 where the new IE is added on a per-DRB basis, the second method is configured on a per-UE basis. Note that option 2 is more flexible, because in the first option, if certain amount of DL resources is assigned to a certain DRB, but only fewer DL EHC contexts are actually used in that DRB, it causes waste of EHC resources. With option 2, we can configure the resource in a more flexible way. |
| CATT | Both |  |
| Samsung | Option 2 (slightly) | EHC parameter is per-UE and not per-bearer, so Option 2 is slightly preferred. But we don’t have strong position. |
| Nokia | Option 2 |  |
| Ericsson | Option 1 | Option 2 would make the EHC compression configuration different than existing ROHC configuration. No need for such divergence |

**Summary:**

6 companies provided inputs to this question:

2 companies prefer option 1;

1 company prefer option 2;

1 company slightly prefer option 2 and have no strong option;

2 companies think both are ok.

Based on the inputs, option 1 is slightly preferred, but has no obvious preponderance. Since option 1 is also used in the existing ROHC configuration, moderator suggests to go for the majority(e.g. option 1 is used)

**Proposal 2: add the new EHC parameter in *EHC Parameters* IE.**

**Question 3: Do companies prefer to specify the restriction that the total number of EHC contexts for the UE is guaranteed to be less than or equal to the *maxNumberEHC-Contexts* in case of multiple CU-UPs?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| ZTE | Yes | Since this CR is used to guarantee that the total number of EHC contexts for the UE is less than or equal to the *maxNumberEHC-Contexts*(e.g. UE capability), the explicit restriction description is very important to guarantee that the total number of EHC contexts for the UE is less than or equal to the *maxNumberEHC-Contextss*. |
| Huawei | Yes | Such restriction description is necessary. I am a bit not understand why the moderator thinks the papers in [3] [4] [5] lack the description for configuration restriction. I think in [3], the restriction is clearly stated. If it is about the description in CR [4] and [5], I agree with the moderator, and we can add such description later. |
| CATT | Yes | It is necessary to have the restriction description |
| Samsung | Yes |  |
| Nokia | Yes |  |
| Ericsson | Not sure | If not needed for RoHC, why should this be needed for EHC? |

**Summary:**

6 companies provided inputs to this question:

5 companies prefer to specify the restriction that the total number of EHC contexts for the UE is guaranteed to be less than or equal to the *maxNumberEHC-Contexts* in case of multiple CU-UPs.

1 company is not sure because he think there is not such restriction in the ROHC.

Moderator’s clarification:

Even in ROHC, there is such restriction, e.g.

In RAN3 specification, the *max CID* parameter refers to *maxCID* in TS 38.331 as follows:

#### 9.3.1.40 ROHC Parameters

This IE carries the ROCH parameters for header compressions.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| **Choice ROHC Parameters** | M |  |  | For more information see *PDCP-Config IE* in TS 38.331 [10]. |
| >ROHC |  |  |  |  |
| >>max CID | M |  | INTEGER (0..16383) | See description of maxCID inTS 38.331 [10] |
| *//SKIP THE UNRELATED PART//* | | | | |
| >uplinkOnlyROHC |  |  |  |  |
| >>max CID | M |  | INTEGER (0..16383) | See description of maxCID inTS 38.331 [10] |

And in TS 38.331, there is restriction as follows:

### 6.3.2 Radio resource control information elements

*//SKIP THE UNRELATED PART//*

| *PDCP-Config* field descriptions |
| --- |
|  |
| ***maxCID***  Indicates the value of the MAX\_CID parameter as specified in TS 38.323 [5].  The total value of MAX\_CIDs across all bearers for the UE should be less than or equal to the value of *maxNumberROHC-ContextSessions* parameter as indicated by the UE. |

So, moderator suggests to go for the majority’s view(e.g. specify the restriction that the total number of EHC contexts for the UE is guaranteed to be less than or equal to the *maxNumberEHC-Contexts* in case of multiple CU-UPs.)

**Proposal 3: specify the restriction that the total number of EHC contexts for the UE is guaranteed to be less than or equal to the *maxNumberEHC-Contexts* in case of multiple CU-UPs.**

**Question 4: Based on the answers for the previous questions, which CR do companies prefer to be agreed?**

**CR 1: the CR in [4]**

**CR 2: the CR in [5]**

**CR 3: the CR in [7]**

**CR 4: the CR in [8]**

**CR 5: Other or merged from above CRs, if needed.**

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| --- | --- | --- |
| **Company** | **Option** | **Comments** |
| ZTE | CR 4 | Only CR 3 and CR 4 have the restriction that the total number of EHC contexts for the UE is guaranteed to be less than or equal to the *maxNumberEHC-Contexts.*  But the restriction in CR 3 should be “The total value of *maxCID-EHC-DL* and *maxCID-EHC-UL* across all bearers for the UE should be less than or equal to the value of *maxNumberEHC-Contexts* parameter as indicated by the UE.” Furthermore, with the CR3, the number of DL EHC contexts and the number of UL EHC contexts cannot share the *maxNumberEHC-Contexts*(e.g. UE capability) flexibly during the EHC contexts establishment stage.  For the CR4, although a CU-UP cannot know the number of UL EHC contexts of other CU-UPs in case of multiple CU-UPs, it can be based gNB implementation as that in RoHC, e.g. during EHC parameters configuration stage, it can assume that each CU-UP configured with EHC may establish *maxCID-EHC-UL* number of UL EHC contexts. |
| Huawei | CR 1,2,3 | As stated in the previous questions, the solution in CR 4 is not feasible and has more drawbacks. We don’t have strong views about the other solutions, we think all can work. The methods shown in CR 1 and CR 3 are in fact the same… |
| Samsung | CR 5 | Based on the agreements. |
| Nokia |  | Depends on agreements. |
| Ericsson | CR 1/3 or 5 | Depends on agreements |
|  |  |  |

**Summary:**

5 companies provided inputs to this question:

1 company prefer CR 4 based on his answers for the previous questions.

1 company prefer 1, 2,3

3 companies think the CR should be based on the previous agreements.

Based on the proposal 1, 2 and 3:

*maxCID-EHC-DL* parameter should be added in the *EHC Parameters* IE, and should specify the restriction that the total number of EHC contexts for the UE is guaranteed to be less than or equal to the *maxNumberEHC-Contexts* in case of multiple CU-UPs.

Moderator’s suggestion:

All of above CRs will be fine with some modification. For instance, the restriction in the CR [4, R3-213357] should be changed to “The total value of *maxCID-EHC-DL* and *maxCID-EHC-UL* across all bearers for the UE should be less than or equal to the value of *maxNumberEHC-Contexts* parameter as indicated by the UE.

**Proposal 4: R3-213357 ([4]) with some modification is to be agreeable CR.**

# 4 Conclusions, Recommendations

Capture the following in the Chair’s Notes:

# References

1. R3-212016 Correction on missing IE of EHC, Huawei, China Unicom, TS 38.463 v16.5.0, Rel-16, Cat. F, May, 2021, RAN3#102-e
2. R3-212758 Summary of Offline Discussion on Correction on missing IE of EHC, Huawei (moderator), May, 2021, RAN3#102-e
3. R3-213356 Enhancement for EHC contexts (Huawei, China Unicom), August, 2021, RAN3#103-e
4. R3-213357 Restricting the number of DL EHC contexts – Option 1 (Huawei, China Unicom), TS 38.463 v16.6.0, Rel-16, Cat. F, August, 2021, RAN3#103-e
5. R3-213358 Restricting the number of DL EHC contexts – Option 2 (Huawei, China Unicom), TS 38.463 v16.6.0, Rel-16, Cat. F, August, 2021, RAN3#103-e
6. R3-213993 Discussion on missing IE of EHC (ZTE), August, 2021, RAN3#103-e
7. R3-213994 CR for TS38.463 on Correction on missing IE of EHC (option 1) (ZTE), TS 38.463 v16.6.0, Rel-16, Cat. F, August, 2021, RAN3#103-e
8. R3-213995 CR for TS38.463 on Correction on missing IE of EHC (option 2) (ZTE), TS 38.463 v16.6.0, Rel-16, Cat. F, August, 2021, RAN3#103-e