**3GPP T****SG-RAN WG2 Meeting #112-electronic R2-200xxxx**

**Online, November 2nd - 13th, 2020**

**Agenda item: 6.1.3**

**Source: vivo**

**Title: Report of [AT112-e][016][NR16] Dyn UL skip and other**

**Document for: Discussion and Decision**

# 1 Introduction

This contribution is aimed at reporting the discussion and result of the following email discussion at RAN2#112-e Meeting [1]:

* [AT112-e][016][NR16] Dyn UL skip and other (vivo)

 Treat R2-2008711, R2-2009824, R2-2009484, R2-2010051, R2-2010317, R2-2009813, R2-2009485, R2-2008862, R2-2009819, R2-2009487, R2-2009486, R2-2010565, R2-2010162

 Intended outcome: Intermediate: Determine agreeable parts. Final: For agreeable parts, agreed CRs.

 Deadline: Intermediate deadline(s) by Rapporteur, Final: Discussion stop at Wed Nov 11, 1200 UTC

According to Chairman’s indication, this discussion includes the following two parts with the corresponding contributions.

1. Dynamic UL skipping
* Treat: [R2-2008711](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2008711.zip), [R2-2009824](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2009824.zip), [R2-2009484](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2009484.zip), [R2-2010051](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2010051.zip), [R2-2010317](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2010317.zip), [R2-2009813](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2009813.zip), [R2-2009485](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2009485.zip), [R2-2008862](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2008862.zip), [R2-2009819](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2009819.zip), [R2-2009487](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2009487.zip), [R2-2009486](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2009486.zip), [R2-2010565](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2010565.zip)
1. MAC correction
* Treat: [R2-2010162](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Docs/R2-2010162.zip)

Besides, rapporteur would like to split this discussion into two phases as follows,

* In phase 1, companies are invited to provide their views by Nov. 6 (Friday), 2020, 12:00 UTC.
* In phase 2, rapporteur will provide the summary report, CRs, and draft reply LS based on the input collected in phase 1 by Nov. 9 (Monday), 2020,08:00 UTC. Further polish the related CRs and draft reply LS by Nov. 11 (Wednesday), 2020, 12:00 UTC.

*Note: The parallel discussion regarding UL skipping issues for the configured grant is still being discussed in RAN1, companies are kindly requested to focus on the dynamic UL skipping issues. We can further discuss the CG UL skipping in phase 2 as long as the new LS from RAN1 is received.*

# 2 Discussion

## 2.1 Dynamic UL skipping

Based on the below agreement quoted from the RAN1 LS [2], it can be concluded that a UL transmission on the dynamic scheduled PUSCH with overlapping CSI/HARQ-ACK on PUCCH cannot be skipped any more for Rel-16.

|  |
| --- |
| **Agreement**For UL skipping of dynamic UL grant in non-CA and CA case, when there is PUCCH carrying UCI overlapping with a set of PUSCHs, the PUSCH with UCI multiplexing from the set cannot be skipped. MAC generates MAC PDU for the PUSCH and the UCI is multiplexed on the PUSCH. |

Consequently, given that the support of dynamic UL skipping requires capability signaling, whether a new UE capability should be introduced for Rel-16 dynamic UL skipping comes to the surface. In the RAN1 LS, the following two options for the capability signaling handling are listed and RAN2 is kindly requested to make the final decision for Rel-16 dynamic UL skipping capability.

* Option 1: introduce a new UE capability for Rel-16 dynamic UL skipping.
* Option 2: Reuse Rel-15 UE capability with the understanding that Rel-15 dynamic UL skipping is not implementable therefore UEs indicating this capability should implement Rel-16 behavior.

The related contributions [2]-[13] submitted to RAN2#112-e meeting are reviewed and proposals on Rel-16 dynamic UL skipping capability are summarized as follows,

|  |  |
| --- | --- |
| **Contribution Number** | **Proposals** |
| R2-2009824 | Proposal 1: Introduce a new UE capability for Rel-16 dynamic UL skipping (i.e. *skipUplinkTxDynamic-r16*). |
| R2-2009484 | Proposal 4: Introduce two new capabilities to indicate the support of the uplink skipping enhancement for CG and DG. Proposal 5: Define the new capabilities for the uplink skipping enhancement as per feature set capability. |
| R2-2010051 | Proposal 2 Introduce a new UE capability for Rel-16 dynamic UL skipping.  |
| R2-2010317 | Proposal 1: RAN2 to confirm Option 1 is preferred that a new UE capability can be introduced in Rel-16 for the updated UL skipping behavior. |

All the input contributions share a common understanding that a new UE capability should be introduced for Rel-16 dynamic UL skipping. Please companies to provide feedback on the introduction of a new UE capability.

### **Q1: Do companies agree to introduce a new UE capability for Rel-16 dynamic UL skipping?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Detailed comments** |
| vivo | Yes | Currently, the first version of Rel-16 RRC spec has been frozen. If the legacy “*skipUplinkTxDynamic*” capability is reused, the network cannot determine whether a Rel-16 UE is capable of new-defined dynamic UL skipping. This is because the network can't know whether this UE is manufactured based on the specs in the 2020 Dec version. To avoid the back-compatibility issue, it is necessary to introduce a new UE capability for Rel-16 dynamic UL skipping. |
| HW | Yes | Whether to have a separate UE capability for CG and DG can be discussed later based on additional RAN1 inputs. For now, we share the view as vivo that a new UE capability for Rel-16 should be introduced for dynamic grant, i.e. Option 1(indicated in the LS) is our preference. |
| Ericsson | Yes | This was discussed and agreed on Tuesday (2020-11-03) session. |
| Xiaomi | Yes | Already agreed during the online discussion. |
| Qualcomm | Yes | Agree with vivo |
| LG | Yes | We think it is already agreed in online session. |
| OPPO | Yes |  |
| Nokia, Nokia Shanghai Bell | Yes |  |
| CATT | Yes |  |
| MediaTek | Yes | Agreed with vivo |
| Intel | Yes |  |
| Apple | Yes |  |
| Samsung | Yes |  |

**Conclusion:**

13 companies have provided their views. And all the companies agree to introduce a new UE capability for Rel-16 dynamic UL skipping. Based on the input, it is clear that we can confirm the assumption (i.e. RAN2 Assumes a new UE cap is used) achieved in the online session.

**Proposal 1: RAN2 confirms that a new UE capability is introduced for Rel-16 dynamic UL skipping.**

If the company’s answer to Q1 is Yes, the next coming questions are to determine the field name in TS 38.331, the field description in TS 38.306, and the attribute in TS 38.306 of the new UE capability for Rel-16 dynamic UL skipping (e.g. should it be per UE or BC?).

For the field name and the field description, according to R2-2009824, R2-2010051, R2-2010317, and R2-2009487, rapporteur thinks the following field name and the field description can be as used as the baseline.

|  |
| --- |
| ***skipUplinkTxDynamic-r16***Indicates whether the UE supports skipping of UL transmission for an uplink grant indicated on PDCCH if no data is available for transmission and no UCI to be multiplexed on the corresponding PUSCH of the uplink grant as specified in TS 38.321 [8]. |

Please share your view on Q2 and Q3.

### **Q2: Do companies agree to the above-mention field name and the field description for the new UE capability for Rel-16 dynamic UL skipping?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/Yes with comments/No** | **Detailed comments** |
| vivo | Yes | We are fine with the proposed name and description. |
| HW | Yes |  |
| Ericsson | No | Depending on the conclusion of the Q4 below, if the legacy capability bit *skipUplinkTxDynamic* (without suffix)is not dummified, then we prefer another name to distinguish these two capability bits. One option is *skipUplinkTxDynamic****Enhanced****-r16*. If the legacy bit is dummified, then we are fine to use this one as there is no confusion.  |
| Xiaomi | Yes with comments | If RAN1 agreed to require the MAC to generate MAC PDU for the configured grant, we are wondering whether we would also need another capability bit for the configured grant. |
| Qualcomm | Yes with comments | We’d like to suggest a few minor changes to the proposed field description, because UE supporting only R15 dynamic UL skipping can also meet the two conditions in the proposed field description:Indicates whether the UE supports skipping UL transmission for a dynamic uplink grant indicated on PDCCH only if no data is available for transmission and no UCI to be multiplexed on the corresponding PUSCH of the uplink grant as specified in TS 38.321 [8]. |
| LG | No | We agree with Ericsson that use of a new name like *skipUplinkTxDynamic****Enhanced****-r16* is beneficial. |
| OPPO | Yes | We are fine with the wording suggested by Qualcomm.And the IE should be renamed to differentiate from the legacy IE which may be also kept. |
| Nokia, Nokia Shanghai Bell | Yes | We are fine with the proposed changes for the field description, (though it may change if RAN1 provides additional feedback).For the name change, this is not really "enhanced": RAN1 made an error in Rel-15 and just didn't correct it (due to noticing the mistake too late). The new capability brings the behaviour in line with what was intended originally. Hence, we think we can just use the -r16 suffix to differentiate the capability. |
| CATT | Yes | Agree with Nokia that we can’t really consider this as an enhancement. |
| MediaTek | Yes with comments | The suggested wording from Qualcomm looks fine. Also we agree that using a new name is better. |
| Intel | Yes | This is just for dynamic grant skipping. We may also need another capability bit for configured grant if agreed by RAN1 |
| Apple | No | We generally agree with the intention of having a new UE capability for Rel-16. We have two comments and a proposal for a slightly updated wording.1. With a view to possible upcoming further enhancements for Rel-16 CG skipping, a new capability name like *skipUplinkTxDynamic****Enh****-r16* would be slightly more aligned.
2. In some of the proposed MAC CRs the new functionality uses the existing Rel-15 *skipUplinkTxDynamic* parameter in a logical AND in the procedure. Depending on how this logic will be covered in the final MAC CR, we may as well need to add this condition to the capability.

***skipUplinkTxDynamicEnh-r16***Indicates whether the UE supports skipping of UL transmission for a dynamic uplink grant indicated on PDCCH if no data is available for transmission and no UCI is to be multiplexed on the corresponding PUSCH of the uplink grant as specified in TS 38.321 [8]. A UE indicating support of this feature shall also support *skipUplinkTxDynamic*. |
| Samsung | No | We share the view with Ericsson, and to use different name, although it is not an enhanced one, would make the specification clear. |

**Conclusion:**

13 companies have provided their views.

* Yes (including Yes with comments): 9 companies. All these 9 companies are basically fine with the proposed field name (i.e. *skipUplinkTxDynamic-r16*). Besides, two of them have some comments on the field description. Specifically, some modifications are needed to emphasize that the new UE capability is introduced for the dynamic uplink grant.
* No: 4 companies. 4 companies hold a view that we should use a different field name (e.g. *skipUplinkTxDynamicEnhanced-r16*) to better make a distinguish between the Rel-15 UL skipping and the Rel-16 dynamic UL skipping. One company thinks that a UE supporting the new capability shall also support the legacy UL skipping capability.

Based on the above, it is clear that the majority of the companies agree with the proposed field name (i.e. *skipUplinkTxDynamic-r16*) of the new UE capability for Rel-16 dynamic UL skipping. The corresponding field description can be updated based on companies’ inputs.

**Proposal 2: RAN2 assumes the field name of the new UE capability is *skipUplinkTxDynamic-r16*.**

**Proposal 3: RAN2 assumes that the following is introduced for the field description of the new UE capability:**

* **Indicates whether the UE supports skipping UL transmission for a dynamic uplink grant indicated on PDCCH only if no data is available for transmission and no UCI to be multiplexed on the corresponding PUSCH of the uplink grant as specified in TS 38.321 [8].**

### **Q3: What are companies’ preferences on the attribute of the new UE capability for Rel-16 dynamic UL skipping (e.g. Per UE, M, FDD-TFF DIFF)?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Response** | **Detailed comments** |
| **Per** | **M** | **FDD-TDD DIFF** | **FR1-FR2****DIFF** |
| vivo | UE | Yes | Yes | No | Considering that the new-defined dynamic UL skipping feature is directly inherited from the Rel-15 feature, we can take the legacy feature as a reference, which is shown in the following, according to TR 38.822.  |
| HW | UE | No? | Yes | No | We are not sure whether the column “M” should be updated or not in Rel-16.  |
| Ericsson | UE | Yes | Yes | No | We don’t see any reasons to deviate from the legacy Rel-15 capability bit skipUplinkTxDynamic (without suffix). As also mentioned in Q5, it is concluded in RP-181397 that ”This feature is optional in rel 15 and mandatory with IoT bit starting from rel 16.” We are fine to follow this guideline and make the “intended/corrected” dynamic UL skipping feature mandatory with IoT bit from Rel-16. |
| Xiaomi | UE |  | Yes | No |  |
| Qualcomm | BC | No | Yes | Yes | We think the feature should be optional at least for DG.We think it is useful to have FRx differentiation, because FR2 tend to have more unused UL grants and no PUCCH configured.Once we have xDD and FRx differentiation, it makes more sense to make the feature per BC instead of per UE. |
| LG | UE | Yes | Yes | No | Making this feature mandatory from Rel-16 is conclusion in RAN#80. |
| OPPO |  | No |  |  | At least yes to FDD/TDD-diff and FR1/FR2-diff, or per-BC is also fine. |
| Nokia, Nokia Shanghai Bell | UE | Yes | Yes | No | This is a per-UE level feature, so we don't see how the BC could affect whether UE has implemented the logic or not.As this is truly an error in Rel-15, we think it should be mandatory for Rel-16 UEs.We are fine to differentiate for XDD (there are technical reasons for that), but don't see why FRX would change anything: E.g. for FR2 TDD, why would the UE implementation logic change in any way compared to FR1 TDD? |
| CATT | UE | Yes | Yes | No | We agree with Ericsson. |
| MediaTek | UE | No | Yes | No | In general, we believe that all new Rel-16 feature should be optional. We understand that the feature is beneficial, but it is too late have mandatory feature in Rel-16.On the other part (per UE or per BC capability, FR1/FR2 separation), we could follow the original design from Rel-15. |
| Intel | UE | Yes | Yes | No | The xDD and FRx diff are as per Rel-15. As mentioned by Vivo, it was decided to make dynamic grant skipping to mandatory in Rel-16, as indicated in TR 38.822. |
| Apple | FSorBC | No | N/A | N/A | We think it would be better to define the feature per BC or per FS uplink. For example, UCI may contain CSI/HARQ-ACK from another CC with different SCSs in CA mode. In such a case per feature set uplink allows for a UE capability indication that is clear and also simple from a testing perspective. |
| Samsung | UE | No | Yes | No | We think this is a per-UE level feature.Regarding mandatory/optional, since we are discussing a bit new behaviour, we do not have to follow the RP decision for this new one, and it can be optional. |

**Conclusion:**

* Per UE (13 companies have provided their views): Amongst the 13 companies' inputs, 10 companies propose the new Rel-16 dynamic UL skipping feature is per UE level. Another 3 companies think the new feature be per-BC level. Further, 1 company thinks the new capability can be per FS.
* Mandatory (12 companies have provided their views): Amongst the 12 companies' inputs, 6 companies think the new feature should be mandatory while 6 companies propose No.
* FDD-TDD-DIFF (13 companies have provided their views): Amongst the 13 companies' inputs, 12 companies propose that the new feature can be FDD-TDD-DIFF. 1 company thinks it is not since the feature should be per FS or BC level.
* FR1-FR2-DIFF (13 companies have provided their views): Amongst the 13 companies' inputs, 10 companies propose that the new feature can be FR1-FR2-DIFF. 3 company think it is not since the feature is supposed to be a per BC feature.

Based on the above, it is clear that the majority of the companies agree with the new UE capability for Rel-16 dynamic UL skipping is a per-UE level, FDD-TDD-DIFF, and FR1-FR2-DIFF feature. Regarding whether it is mandatory or not, it is better to put it as an FFS.

**Proposal 4: RAN2 assumes the Rel-16 dynamic UL skipping isper UE level. FFS whether it is mandatory.**

**Proposal 5: RAN2 assumes the Rel-16 dynamic UL skipping is FDD/TDD differentiation.**

**Proposal 6: RAN2 assumes the Rel-16 dynamic UL skipping isFR1/FR2 differentiation.**

Next, as R2-2010051 [5] clarified, the Rel-15 dynamic UL skipping features cannot be implemented in the scenario in which there is PUCCH with CSI/HARQ-ACK that overlaps in time with the PUSCH. Thus, the functionality in Rel-15 capability is not useful in future releases and it is RAN1’s understanding that the dynamic UL skipping cannot be implemented based on the Rel-15 specification. In this regard, it is proposed that RAN2 may consider dummying the field in the Rel-16 spec to make it clear.

### **Q4: Do companies agree to dummify the legacy dynamic UL skipping capability (i.e. *skipUplinkTxDynamic*)?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Detailed comments** |
| vivo | No | We prefer to keep the existing text for the legacy dynamic UL skipping feature, considering the network might configure *skipUplinkTxDynamic* with *true* only when it can guarantee PUSCH will not be overlapping with PUCCH or supports blind detection. |
| HW | No | It seems feasible that some Rel-16 UE only support the existing dynamic UL skipping for dynamic grant, but not the updated UE behaviour as discussed, and therefore NW can be still allowed to enable the existing dynamic skipping in some cases. |
| Ericsson | Preferably, yes. If the intended UE behaviours are clarified, we can accept not to dummify. | The UE behaviour is not clear if the legacy dynamic UL skipping capability is kept and a Rel-16 UE indicates the support. Firstly, it is our understanding that Rel-15 UE follows Rel-15 spec and Rel-16 follows Rel-16 spec. The issue now is that UE behaviours in PHY specs are different in Rel-15 and Rel-16. If the exsiting capability *skipUplinkTxDynamic*(without suffix) is kept, the RAN1 LS (with the agreed CRs) means that * If Rel-15 UE indicates the support *skipUplinkTxDynamic*(without suffix) and network configures it
	+ MAC (38.321 v15): PUSCH is skipped even if there is UCI that would be multiplexed on it
	+ PHY (38.214 v15): **UE behaviour is undefined** if there is UCI that would be multiplexed on the PUSCH but there is no TB generated by MAC.
* If Rel-16 UE indicates the support *skipUplinkTxDynamic*(without suffix) and network configures it
	+ MAC (38.321 v16): PUSCH is skipped even if there is UCI that would be multiplexed on it
	+ PHY (38.214 v16): **UE behaviour is defined:** UE does not transmit on the PUSCH if there is no TB generarted by MAC. The UCI that would be multiplexed on the PUSCH will either be transmitted as PUCCH or multiplexed on the PUSCH in other carriers according to PHY specs.

It is a bad precedence if the same capability bit means different UE behaviours depending on the release number. More importantly, we are not sure if the above UE behaviour with a Rel-16 UE indicating the support of *skipUplinkTxDynamic*(without suffix) is the RAN1 intention.We would like to get a clarification, from the companies who support keeping this capability, the intended UE behaviors if Rel-16 and future releases UEs indicate the support of the legacy *skipUplinkTxDynamic*(without suffix). |
| Xiaomi | No | We think that some Rel-16 UE may also only support the legacy uplink skipping. The Rel-16 new feature should not impact the legacy behaviour. |
| Qualcomm | No | We share the same view with vivo |
| LG | No | We should not touch the legacy behavior. |
| OPPO | No  | Same view as vivo and Qualcomm |
| Nokia, Nokia Shanghai Bell | No | Since the Rel-15 capability serves a purpose (i.e. allowing UE to indicate the support for the slightly erroneous version of the UL skipping), there's no real need for skipping. From network viewpoint, even the Rel-15 feature can work if the network supports (blind) double decoding. |
| CATT | No | We also have the same concern that some Rel-16 UE does not support the capability, i.e. skipping of UL transmission for a dynamic uplink grant if no data is available for transmission and no UCI to be multiplexed on the corresponding uplink grant. |
| MediaTek | No | We share the same view with vivo. We should not dummify this R15 capability because it provide the flexibility for the NW to configure dynamic UL grant skipping for R15 UE, e.g. if NW applies smart scheduling method to avoid the overlap between PUSCH and PUCCH. |
| Intel | No | Same view as Vivo |
| Apple | No | We share the same view as vivo, MediaTek, Oppo and Qualcomm. UL skipping is useful both from a latency and from a UE power perspective. If a network can support the blind decoding (on PUSCH and PUCCH) and the UE is capable of Rel-15 functionality, then this will be beneficial. Besides some UEs may have already implemented UL skipping according to Rel-15. It's actually a little late to remove it from Rel-15. To Ericsson’s point, in our understanding a UE that supports the Rel-15 capability and also supports the Rel-16 behavior, there will be no contradiction with the 38.214 Rel-15 spec. A UE that only supports Rel-15 capability is subject to the limitations as far as the Rel-15 functionality is concerned. UE implementation will have to resolve this. |
| Samsung | No | We do not see the need to dummify the Rel-15 capability. |

**Conclusion:**

13 companies have provided their views. 12 companies think that the legacy UL skipping feature might be useful and more operation can be provided if the legacy capability bit is kept. 1 company thinks there might lead to misunderstanding if the legacy capability bit is kept and the new capability bit is introduced.

Regarding the responses from Q7, it seems the intended UE behaviors are clear even though both the legacy and the new UL skipping feature are used in Rel-16. Therefore, the legacy capability bit shall not be dummified.

**Proposal 7: The legacy capability bit (i.e. *skipUplinkTxDynamic*) is not dummified.**

In addition, R2-2009819 raised that the achieved agreement in the RAN#80 meeting (i.e. skipping UL transmission for dynamic UL grant is mandatory with capability signaling from Rel-16) has not been captured in the lastest Rel-16 38.306 spec. Thus, it is needed to align Rel-16 38.306 spec with the NR UE feature list [14]. If the company’s answer to Q4 is No, please share your view on Q5.

### **Q5: Do companies agree the change in Rel-16 CR (R2-2009819) (i.e. make the legacy capability *skipUplinkTxDynamic* mandatory)?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Detailed comments** |
| vivo | Yes | The legacy feature might be useful in some cases. Thus, the previous agreement for it should be explicitly captured in the spec. |
| HW |  | As commented to Q3, unclear why it is not implemented in the current 38.306 spec. |
| Ericsson |  | As commented in Q4, we would like to first get a clarification on the UE behaviours if Rel-16 UE indicating the support of this feature. |
| xiaomi |  | Not sure about the final decision on the uplink skipping in Rel-15. The UE implementation would anyway follow the specification, not the intermediate meeting agreement. We still prefer to have this capability optional as it is. |
| Qualcomm | Yes |  |
| LG | Yes | This is the outcome of the offline discussion in RAN#80. |
| OPPO | No | There might be different interpretation on the legacy skipping behaviour, there is no point to further work on it. |
| Nokia, Nokia Shanghai Bell | Yes | As others have commented, this is linked to Q4.To be precise: UE supporting Rel-16 UL skipping must also support what is defined for Rel-15 UL skipping. |
| CATT | Yes |  |
| MediaTek | No | The UE implementation follow the latest specification. We don’t know why 38.306 is not updated according to the feature table at that time but it is too late to change this.  |
| Intel | No | We don’t think we need to work more on Rel-15 dynamic uplink skipping. |
| Apple | No | The RAN#80 agreement is based on the assumption that the existing UL skipping functionality - which is now considered broken – was going to be carried forward to Rel-16. So not sure if this the existing functionality is still to be considered mandatory.At this point in time we are not sure if the Rel-16 feature has already reached sufficient maturity for a mandatory feature, and we can already see other aspects like treatment of CGs and intra-UE prioritization will require further consideration. RAN1 and RAN2 could first stabilize UL skipping for Rel-16, and then review the RAN#80 decision. |
| Samsung | No | Same view as Apple: we do not have to make it mandatory for the broken feature. |

**Conclusion:**

13 companies have provided their views. 5 companies think we should follow the RAN#80 agreement for the legacy dynamic UL skipping feature. 7 companies explicitly think the legacy dynamic UL skipping feature should not be mandatory in Rel-16 considering it is a broken feature. 1 company says it is not sure.

Give that whether the new capability is a mandatory feature in Rel-16 is still an FFS issue, perhaps we can further discuss whether this CR can be agreed after the discussion of the new capability.

**Proposal 8: R2-2009819 is postponed, and the issue can be discussed after deciding whether the Rel-16 dynamic UL skipping is mandatory.**

Further, we have to look after the MAC behavior. According to R2-2009484 and R2-2010317, it is proposed that a new RRC switch parameter (e.g. *skipUplinkTxDynamic1*) should be introduced along with the newly introduced UE capability for Rel-16 dynamic UL skipping. Basically, if the legacy dynamic UL skipping feature is kept, the existing text for the legacy feature in the MAC spec shall be not changed, in order to facilitate the protocol development. As a result, it is natural to draft additional MAC text for the new dynamic UL skipping feature with a new RRC switch parameter. Besides, the UE and NW behavior have to be aligned in the case when both capability signaling bits are reported from one UE. For example, from the NW point of view, with the new RRC switch parameter, it can select the expected Rel-15 or Rel-16 MAC behavior by configuring the corresponding legacy or new RRC switch parameter.

### **Q6: Do companies agree to introduce a new RRC parameter to enable the new dynamic UL skipping feature?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Detailed comments** |
| vivo | Yes | In our understanding, if both legacy and new dynamic UL skipping features are kept, the UE behavior related to both features should be explicitly captured in the MAC spec. Thus, we have to add a new text for the new feature. As a result, a new RRC parameter is needed to indicate whether the new dynamic UL skipping feature can be implemented. Otherwise, it is hard to distinguish the corresponding MAC behavior associated with a given dynamic UL skipping feature in the MAC spec. |
| HW  | Yes | The new UE behaviour of dynamic skipping should not impact the existing Rel-16 UEs who only support the existing scheme. From this perspective, with the new UE capability, it is more reasonable to set different RRC switch parameters by the NW to indicate the intended UE behaviour for alignment between UE and NW.  |
| Ericsson | Yes, if the legacy dynamic UL skipping capability is kept.  |  |
| Xiaomi | Yes |  |
| Qualcomm | Yes | We share the same view as vivo |
| LG | Yes |  |
| OPPO | Yes |  |
| Nokia, Nokia Shanghai Bell | Not needed? | Is there really any need for new configuration? Rel-16 specification could just specify the new Rel-16 behaviour and that could be sufficient. There are four cases to consider:1. UE Rel-15, gNB Rel-15: No issue, same as legacy
2. UE Rel-15, gNB Rel-16: gNB knows from the capabilities what UE does, so no issues
3. UE Rel-16, gNB Rel-15: If gNB configures the UE, it expects to require double decoding and does this for nothing. But this still causes no issues.
4. UE Rel-16, gNB Rel-16: No issue, gNB knows what UE does
 |
| CATT | Yes | If both legacy and new UE features for uplink skipping are supported, we should make sure that the UE behaviours are specified respectively for these two features. And one new RRC parameter is necessary to be used to enable the new dynamic UL skipping feature. |
| MediaTek | Yes |  |
| Intel | Yes | A separate configuration will be cleaner since there are some changes to UE behaviour in MAC spec. |
| Apple | Yes | Agree with vivo. The parameter name would be good to align with the naming of the Rel-16 capability. |
| Samsung | Yes | We prefer to remove any ambiguity. |

**Conclusion:**

13 companies have provided their views. 12 companies think a new RRC parameter is needed for the new dynamic UL skipping feature, which allows the network to explicitly indicate the UE to perform the Rel-15 or Rel-16 dynamic UL skipping feature. 1 company wonders whether this new RRC parameter is needed.

Based on the input, it is clear that the majority of the companies agree to introduce a new RRC parameter to enable the new dynamic UL skipping feature. The corresponding field name of this RRC parameter can be FFS. Furthermore, as indicated by chair’s note, the corresponding update for Rel-16 dynamic UL skipping in TS 38.321/331/306 and reply LS should be done along with the CG case.

**Proposal 9: A new RRC parameter is introduced to enable Rel-16 dynamic UL skipping. FFS the field name.**

**Proposal 10: The corresponding 38.321/331/306 CR and reply LS for Rel-16 dynamic UL skipping should be done along with the CG case.**

Last but not least, companies can provide their comments on the dynamic UL skipping capability issue if they are not covered by the discussions.

### **Q7: Are there any additional comments on the dynamic UL skipping capability?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Detailed comments** |
| Ericsson | Yes | This was already mentioned in our answer to Q4, but we would like to highlight here to hear more views. Basically, we would like to get a clarification, from the companies who support keeping the legacy capability *skipUplinkTxDynamic* (without suffix), the intended UE behaviors if Rel-16 and future releases UEs indicate the support. For a Rel-16 UE supporting *skipUplinkTxDynamic* (without suffix). Suppose there is a PUCCH carrying UCI overlapping with a set of PUSCHs and the PUSCH with UCI multiplexing from the set is called *PUSCH\_A*. According to the legacy *skipUplinkTxDynamic* feature, MAC may not generate the MAC PDU for this *PUSCH\_A* (i.e., there is no TB for this PUSCH), the question is which one of the two is the correct understanding for Rel-16 UE? 1. As in TS 38.214 v15.10.0, UE behavior is undefined;
2. As intended to be implemented in TS 38.214 V16.x.0, UE skips the transmission on the *PUSCH\_A* and transmits the UCI by other means specified in the PHY specs.

  |
| Nokia, Nokia Shanghai Bell | Yes | To answer questions from Ericsson: The Rel-15 behaviour can, in our understanding, be handled by network behaviour (double decoding to see what UE does). |
| MediaTek |  | In response to Ericsson’s question, we think the UE behaviour is 1 in this case. To be specific,* If a Rel-16 UE supports both R15 and R16 feature, and gNB configure R15 (*skipUplinkTxDynamic*), then we follow R15 RAN1 spec:
	+ If PUSCH and PUCCH carrying UCI are overlapped: UE behavior **is undefined**
	+ If PUSCH and PUCCH carrying UCI are not overlapped: UE can skip
* If a Rel-16 UE supports both R15 and R16 feature, and gNB configure R16 (*e.g. skipUplinkTxDynamic****Enhanced****-r16*), we follow R16 RAN1 spec
	+ If PUSCH and PUCCH carrying UCI are overlapped: UE **cannot skip**
	+ If PUSCH and PUCCH carrying UCI are not overlapped: UE can skip
* If a Rel-16 UE supports only R15/R16 feature and gNB configure, then UE behavior follows R15/R16 RAN1 spec respectively.

In case of undefined behaviour in R15 (i.e. UE may skip or transmit the PUSCH when overlapped), we agree with Nokia’s comment that it is then up to NW to handle the undefined behaviour (e.g. apply a more complicated blind decoding or avoid the overlapped case through smart scheduling).  |
|  |  |  |
|  |  |  |

**Conclusion:**

3 companies have provided their views. 1 company expresses some concerns about the usage of the Rel-15 dynamic UL skipping feature. 2 companies respond that the corresponding UE behaviors are clear and it is up to the network to handle the potential impacts when UL skipping is performed even though there is a UCI to be multiplexed on the PUSCH.

## 2.2 Alignment of SR clause

According to the MAC CR R2-2010162 [15], the reason for the change is:

|  |
| --- |
| Three WIs have introduced new type of SRs, and the text in the SR section is becoming less understandable and less maintainable. Aligning the new Rel-16 parts of SR cancelling into a list and add some editorial corrections for incerased readability and maintainability. |

### **Q8: Do companies agree the change in Rel-16 CR (R2-2010162)?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree as is;Agree with changes;Disagree** | **Detailed comments** |
| vivo | Agree with changes | In our understanding, TEI16 should be added to the WI code in the coversheet since the BSR related text is modified as well. |
| HW | Agree with the intention | Note that this discussion has been postponed for several times. As discussed in the last meeting, not sure if there is a possibility to simplify the text related to stopping on-going RA procedures so that we don't need to repeatedly indicate it for each event. |
| Ericsson | Agree as it is  | The changes are non-technical and only to increase readability and maintainability.  |
| Xiaomi | Agree as it is |  |
| LG | Agree as it is | Support a co-sourcing company. |
| OPPO | Agree with comment | WID code of 5G\_V2X\_NRSL-Core should be added. |
| Nokia, Nokia Shanghai Bell | Agree with changes | We don’t understand what is “**relevant** Pre-emptive BSR”. We note this was there already but since we are anyway changing, we could as well remove the word “relevant”.…Several editorials:“1> if this SR was trigg**e**red by beam failure recovery (see clause 5.17) of an SCell and a MAC PDU is transmitted and this PDU includes ~~an~~ **a** BFR MAC CE or **a** Truncated BFR MAC CE which contains beam failure recovery information for this **SCell** ~~Serving Cell~~; or1> if this SR was trigg**e**red by beam failure recovery (see clause 5.17) of an SCell and this **SCell** ~~Serving Cell~~ is deactivated (see clause 5.9); or1> if this SR was triggered by consistent LBT failure **recovery** (see clause 5.21) **of a SCell** and a MAC PDU is transmitted and the MAC PDU includes an LBT failure MAC CE that indicates consistent LBT failure for this **SCell** ~~Serving Cell~~; or”…The proposed text for BSR RA stopping is not aligned to legacy text as it does not take the RA initiation time point into account, hence, the **following** needs to be added:“The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for BSR, which has no valid PUCCH resources configured, **which was initiated by MAC entity prior to the MAC PDU assembly,** if:Although this was also the case for BFR, it is OK to remove it from BFR since we removed it from the BFR triggers cancellation in clause 5.17 as well.…It seems the earlier text can also be improved to align also the new bulleting conditions format:“- the SCell ~~configured with beam failure recovery~~ is deactivated (as specified in clause 5.9) and all triggered BFRs for SCells are cancelled.”This is because we talk about “a pending SR for BFR of an SCell” in the upper condition, hence, we should talk about that SCell in the lower condition as well.…“- all the SCells that triggered consistent LBT failure **recovery** are deactivated (see clause 5.9).”…Addition in 5.9 is not needed, it is already the case from the text in 5.4.4:1> if this SR was triggred by beam failure recovery (see clause 5.17) of an SCell and this Serving Cell is deactivated (see clause 5.9); or2> cancel the pending SR and stop the corresponding *sr-ProhibitTimer*, if running.We shouldn’t specify redundant text. |
| CATT | Agree |  |
| MediaTek | Agree as it is |  |
| Intel | Agree with changes | It is OK in general and some improvements (e.g. as proposed by Nokia) can be considered. |
| Apple | Agree |  |
| Samsung | Agree as it is/Agree with changes | The purpose of the CR is merely to improve the readability, and we are also fine with suggestions from Nokia, except for the term 'relevant': it can be left as it is for now, and be corrected by IAB experts later, if needed. |

**Conclusion:**

**Conclusion:**

13 companies have provided their views. And all the companies agree with the CR (with some additional comments). Thus, the author should update the CR based on the comments above.

**Proposal 11: Ericsson provides the revision of R2-2010162 based on the feedback from other companies.**

# 3 Conclusion

The proposals captured are the following:

**Proposal 1: RAN2 confirms that a new UE capability is introduced for Rel-16 dynamic UL skipping.**

**Proposal 2: RAN2 assumes the field name of the new UE capability is *skipUplinkTxDynamic-r16*.**

**Proposal 3: RAN2 assumes that the following is introduced for the field description of the new UE capability:**

* **Indicates whether the UE supports skipping UL transmission for a dynamic uplink grant indicated on PDCCH only if no data is available for transmission and no UCI to be multiplexed on the corresponding PUSCH of the uplink grant as specified in TS 38.321 [8].**

**Proposal 4: RAN2 assumes the Rel-16 dynamic UL skipping isper UE level. FFS whether it is mandatory.**

**Proposal 5: RAN2 assumes the Rel-16 dynamic UL skipping is FDD/TDD differentiation.**

**Proposal 6: RAN2 assumes the Rel-16 dynamic UL skipping isFR1/FR2 differentiation.**

**Proposal 7: The legacy capability bit (i.e. *skipUplinkTxDynamic*) is not dummified.**

**Proposal 8: R2-2009819 is postponed, and the issue can be discussed after deciding whether the Rel-16 dynamic UL skipping is mandatory.**

**Proposal 9: A new RRC parameter is introduced to enable Rel-16 dynamic UL skipping. FFS the field name.**

**Proposal 10: The corresponding 38.321/331/306 CR and reply LS for Rel-16 dynamic UL skipping should be done along with the CG case.**

**Proposal 11: Ericsson provides the revision of R2-2010162 based on the feedback from other companies.**

# 4 References

[1] RAN2 112-e Chairman Notes 2020-11-02 1600 UTC.

[2] R2-2008711, LS on PUSCH with UL skipping, RAN1.

[3] R2-2009824, Discussion on new UE capability of dynamic UL skipping in Rel-16, vivo, Nokia, Nokia Shanghai Bell, Xiaomi.

[4] R2-2009484, RAN2 Impact on UL skipping enhancement, Apple.

[5] R2-2010051, PUSCH with UL skipping, Ericsson.

[6] R2-2010317, Discussions on the remaining issues on PUSCH with UL skipping, Huawei, HiSilicon.

[7] R2-2009813, Correction to UL skipping of dynamic UL grant, vivo, Nokia, Nokia Shanghai Bell, Xiaomi.

[8] R2-2009485, MAC CR on UL skipping enhancement, Apple.

[9] R2-2008862, Correction on dynamic PUSCH skipping when PUCCH with UCI overlaps with PUSCH, CATT.

[10] R2-2009819, Correction to skipUplinkTxDynamic, vivo.

[11] R2-2009487, UE capability on UL skipping enhancement, Apple.

[12] R2-2009486, RRC CR on UL skipping enhancement, Apple.

[13] R2-2010565, Draft reply LS on PUSCH with UL skipping, vivo.

[14] 3GPP TS 38.822, User Equipment (UE) feature list, V15.0.1.

[15] [R2-2010162](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_112-e%5CDocs%5CR2-2010162.zip), Alignment of SR clause, Ericsson, Samsung, LG Electronics.

# 5 Participants

|  |  |
| --- | --- |
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