3GPP TSG-RAN WG2 #113e Tdoc DocNumber

Electronic meeting, 2021-01-25 - 2021-02-05

Agenda Item: 6.16

Source: Ericsson

Title: Summary of [AT113-e][029][TEI16] Miscellaneous II (Ericsson)

Document for: Discussion

# 1 Introduction

This is the summary of the following email discussion:

* [AT113-e][029][TEI16] Miscellaneous II (Ericsson)

Scope: R2-2100560, R2-2100561, R2-2100562, R2-2100484, R2-2101288, R2-2101243, R2-2101734

Phase 1: determine agreeable parts, Phase 2: for agreeable parts Work on CRs.

Intended outcome: Report and Agreed CRs if any agreeable.

Deadline: Schedule A

Please take note of the following deadlines (i.e. Schedule A):

Deadline for Phase 1: **Thursday Jan 28 12:00 UTC**

Deadline for Phase 2: **Thursday Feb 4 12:00 UTC**

# 2 Contact Information

|  |  |
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# 3 Discussion

## 3.1 Voice Fallback Indication

Voice Fallback Indication – Postponed from last meeting

[R2-2100560](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_113-e/Docs/R2-2100560.zip) Further discuss the usage of voiceFallbackIndication for Emergency Service Fallback ZTE Corporation, Sanechips discussion Rel-16 TEI16

[R2-2100561](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_113-e/Docs/R2-2100561.zip) CR to clarify the usage of voiceFallbackIndication for Emergency Services Fallback ZTE Corporation, Sanechips CR Rel-16 38.331 16.3.1 2048 1 F TEI16 R2-2009241

[R2-2100562](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_113-e/Docs/R2-2100562.zip) CR to introduce new capability for Emergency Services Fallback ZTE Corporation, Sanechips CR Rel-16 38.306 16.3.0 0492 - F TEI16

[R2-2100484](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_113-e/Docs/R2-2100484.zip) Clarify the usage of voiceFallbackIndication for emergency service Ericsson discussion Rel-16 TEI16

There are two ways to support emergency calls when IMS voice is not supported in 5GS:

* EPS fallback for IMS voice: The gNB redirects or handovers the UE to EPS when receiving QoS flow setup request from CN. And this may be triggered also for emergency QoS flow.
* Emergency service fallback: When the UE wants to initiate an emergency call it sends an emergency services fallback request to 5GC which in turn notifies NG-RAN which will redirect or handover the UE to EPS.

As can be seen, a main difference between the two approaches is that EPS fallback for IMS voice is network triggered while Emergency services fallback is UE triggered.

During RAN2#112 it was discussed whether the *voiceFallbackIndication* should be included in the redirect or handover message also for Emergency services fallback. In the redirect case the UE needs to set the establishment cause to “emergency” in the subsequent connection setup and it was concluded that this can be done without the indication since the UE is aware of the ongoing emergency call. Hence the *voiceFallbackIndication* is not included in the redirect message for Emergency services fallback. For the handover case the UE should prioritize E-UTRA cells in case the handover fails and there were different views whether the indication is needed for this purpose:

* [029] Regarding how to support “first attempt E-UTRAN cell upon HO failure” in case of emergency service fallback, postpone the discussion to next meeting. Following options can be considered:

Opt 1: leave it to UE implemetation;

Opt 2: reuse voiceFallbackIndication-r16 sent by network (FFS on new capability).

Basically [R2-2100484](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_113-e/Docs/R2-2100484.zip) argues for the first option while [R2-2100560](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_113-e/Docs/R2-2100560.zip) argues for the second option.

**Issue 1:** Which option do you prefer?

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| --- | --- | --- |
| **Company** | **Which option?** | **Comments** |
| Ericsson | Option 1 | The UE is aware of the ongoing emergency call and knows that it should prioritize E-UTRA cells in case the handover fails. Therefore, no indication is needed. This is also consistent with the agreement made for the redirect case. If needed, we can capture that the UE should prioritize E-UTRA cells in a requirement or informative note in the handover failure section in the RRC specification. |
| Lenovo | Option 1 | Referring to TS 23.502 we understand that it’s up to NW to include the voiceFallbackIndication in the redirect or handover message for Emergency services fallback depending on UE capability. However, from UE perspective this indication does not matter and we can leave it to UE implementation to prioritize E-UTRA cells when handover failure happens. We are fine with an informative note in RRC to capture this case. |
| ZTE | Option 2, Option 1 is acceptable | As long as all UE vendors confirm Option 1 is feasible and already be supported by UE implementation, we are fine to go for it.  Otherwise, we would prefer to do the same as for “EPS fallback for IMS service” case (Option 2 with new capability). |
| Apple | Optino 1 | We support to left this to UE implementation. |
| Huawei, HiSilicon | Option 1 | It was already discussed and clarified in last meeting that EPS fallback for IMS voice and Emergency service fallback are different procedures, where the first one is triggered by RAN, but the latter one is triggered by UE itself, so that RAN2 TEI *voiceFallbackIndication* applies to EPS fallback for IMS voice but not Emergency service fallback.  We agree with Ericsson there is no need to send indication to UE as UE is aware of the Emergency service of itself. Thus it would be enough leaving to UE implementation. A Note seems not necessary either. |
| Qualcomm | Option 1 | We share the view with Ericsson that UE knows the emergency call is ongoing and hence can make right decision in prioritizing E-UTRA in case the handover fails. |
| LG | Option 2 | While we think option 1 is feasible given that UE is aware of the on-going emergency call, we prefer option2 because UE implementation is consistent and straightforward for all voice fallback cases. |
| MediaTek | Option 1 | We think there is no need to have the complicate description and new capability for this function. The UE is anyway aware the emergency fallback is ongoing and it should of course not revert back to NR in case of handover failure. |
| CATT | Option 1 | We share the same view with Ericsson and think it can be left to UE implementation. |
| Samsung | Option 1 | We agree with earlier comments from Ericsson. |
| Intel | Option 1 | Emergency services handling in LTE is mostly left to good UE implementations. |
| OPPO | Option 1 | We prefer majorties view on the UE implementation. |
| vivo | Option 1 | We prefer to left this to UE implementation. Emergency service is triggered by the UE. In case of HO failure, UE can prioritize E-UTRAN. |

**Summary**: A clear majority of the companies prefer option 1, i.e. for emergency services fallback based on handover the *voiceFallbackIndication* is not included in the handover message and in case of handover failure it is left to UE implementation to prioritize E-UTRA cells.

**Rapporteur:** The rapporteur suggests to go with the majority view and discuss further in stage 2 if and how we need to capture in the specification or chairman’s notes that the UE should prioritize E-UTRA cells upon handover failure.

## 3.2 HO to EN-DC

[R2-2101288](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_113-e/Docs/R2-2101288.zip) Complete message at handover NR to EN-DC Ericsson CR Rel-16 38.331 16.3.1 2401 - F TEI16

Reason for change:

CR 1948r1 ([R2-2008509](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_111-e/Docs/R2-2008509.zip)) introduced missing procedure text for the transmission of RRCReconfigurationComplete for case of HO from NR to EN-DC.

But the procedure text was introduced at a position for the case “UE in EN-DC”. This makes the existing procedure text confusing. At HO from NR to EN-DC, UE will not be in EN-DC until after the procedure is completed. Further, existing procedure text gives the impression that conditional reconfiguration is applicable for handover NR to EN-DC. This is not true.

**Issue 2a:** Do companies agree with the reason for change?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments (e.g. other comments on the cover page)** |
| Ericsson | Yes |  |
| ZTE | See comments | In our understanding, the UE generates RRCReconfigruationComplete message only after applying the RRCReconfiguration message. So at that moment, the UE is already in EN-DC.  We think the below paragraph also applies to the case when EN-DC is setup (e.g. SN addition), so that is why we use “was” in the sentences, right?  1> if the UE is configured with E-UTRA *nr-SecondaryCellGroupConfig* (UE in (NG)EN-DC):  2> if the *RRCReconfiguration* message was received via E-UTRA SRB1 as specified in TS 36.331 [10]; |
| Apple | Yes |  |
| Huawei, HiSilicon | No | The same issue has been discussed in RAN2 #111e during the offline discussion [AT111-e][041][TEI16]. And the corresponding CR was agreed in [R2-2008509](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_111-e\Docs\R2-2008509.zip). The change is in 5.3.5.3 adding the handling of *RRCReconfigurationComplete* for case of HO from NR to EN-DC.  The reason for change is copied below:  The handling of *RRCReconfigurationComplete* for case of HO from NR to EN-DC is mssing, i.e. there is no entry for UE receiving the EN-DC configuration from *MobilityFromNRCommand* via NR. In this case, if following the current procedure text as below, during HO from NR to EN-DC, the UE configured with EN-DC in target side will not submit the NR *RRCReconfigurationComplete* in response to NR *RRCReconfiguration* embedded in E-UTRA *RRCConnectionReconfiguration* within *MobilityFromNRCommand*. The UE will only submit the E-UTRA *RRCReconfigurationComplete* in response to E-UTRA *RRCConnectionReconfiguration* within *MobilityFromNRCommand*. |
| Qualcomm | Yes |  |
| LG | Yes |  |
| MediaTek | Yes |  |
| CATT | No | Agree with the ZTE’s comment, the UE applies the reconfiguration with SCG, so the UE has been configured with ENDC |
| Samsung | Yes, but | We think ZTE's comment has a point i.e. wouldn't UE already consider to be in EN-DC at point where the concerned part is executed? |
| Intel | May be | While the current text also looks OK to us and the change is acceptable to us, we are not sure if it is essential. As the UE is configured with EN-DC after processing the message, the current text does not seem wrong as mentioned in the main motivation for change as also mentioned by ZTE. It could be sufficient to add “(handover from NR standalone to (NG)EN-DC)” after the existing text if there is some confusion with the current location. |
| OPPO | No | We share the view from ZTE |
| vivo | Yes |  |

**Issue 2b:** Do companies agree with the proposed correction in sections 5.3.5.3 in 38.331?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | Yes |  |
| ZTE | No | See comments to Q2a. |
| Apple | Yes |  |
| Huawei, HiSilicon | No | See comments to Issue 2a. |
| Qualcomm | Yes |  |
| LG | Yes |  |
| MediaTek | Yes |  |
| CATT | No |  |
| Samsung | Yes, but | See comments to the previous question. |
| Intel | ? | Please see comments above. |
| vivo | Yes |  |

**Summary:** There are split views whether the CR is needed. Some companies claim that the UE can be considered to be in EN-DC after it has processed the RRCReconfiguration message even though it has not yet transmitted the RRCReconfigurationComplete message. One company suggest to keep the existing text but add a clarification “(handover from NR standalone to (NG)EN-DC)” so that it is clear which scenario the text refers to.

**Rapporteur:** The rapporteur suggests to not pursue the CR but add the clarification “(handover from NR standalone to (NG)EN-DC)” mentioned above. The details of the clarification to be discussed in phase 2.

## 3.3 Aperiodic CSI with secondary DRX

[R2-2101243](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_113-e/Docs/R2-2101243.zip) Consideration on aperiodic CSI with secondary DRX CATT discussion Rel-16

[R2-2101734](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_113-e/Docs/R2-2101734.zip) Secondary DRX and aperiodic CSI Ericsson discussion Rel-16 TEI16 R2-2009948

This topic was discussed during RAN2#112-e in offline #028 ([R2-2011214](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs/R2-2011214.zip)), where it was discussed, but not concluded:

1. There is power consumption impact
2. There is RAN1 impact to support aperiodic CSI with secondary DRX
3. Aperiodic CSI is cross carrier scheduling which is not supported with secondary DRX
4. Aperiodic CSI with secondary DRX is an enhancement

These topics are again discussed in both [R2-2101243](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_113-e/Docs/R2-2101243.zip) and [R2-2101734](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_113-e/Docs/R2-2101734.zip).

During offline #028 there was some confusion how aperiodic CSI with secondary DRX would work, which is clarified in [R2-2101734](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_113-e/Docs/R2-2101734.zip):

* There is no change to the CSI measurement requirements, i.e. the UE is only required to measure during Active Time.
* The UE reports the latest measurement on FR2, when CSI is triggered on FR1 for FR2, and FR2 is outside Active Time.
* The aperiodic CSI trigger and CSI report on PUSH are configured on the same carrier, i.e. not on different carriers/FRs.



**Issue 3a:** Do companies think there is power consumption impact to support aperiodic CSI with secondary DRX?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments (e.g. other comments on the cover page)** |
| Ericsson2 | No | The UE is not required to measure outside Active Time, and the UE reports the latest measurement on FR2 when FR2 is outside Active Time.  @Apple: the network only trigger CSI when FR2 is active, because the CSI is used to support scheduling on FR2.  @HW: Yes, CSI trigger and repot are on the same serving cell. We thought this was clear from the figure, and proposed text change in our contribution [R2-2101734](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_113-e/Docs/R2-2101734.zip).  @SS: network triggers a CSI request when FR2 is in active time, i.e. no impact on CSI accuracy. |
| Apple | Yes | For the proposal to let UE report the latest measurement on FR2, when CSI is triggered on FR1 for FR2, and FR2 is outside Active Time, we think there still power consumption impact. UE reporting CSI in FR1, but there is no active traffic in FR2 carrier. The CSI reporting itself wastes UE power. |
| Huawei, HiSilicon |  | The proponent should first clarify if the CSI trigger/measure and report are on the same serving cell or different cell. According to the discussion in the last meeting, the focus is if they belong to different cell/FR, it would couple the DRX operations of both secondary DRX groups that cause additional power. |
| Qualcomm | No | We do not expect impact on power. In the scenario depicted in the right-hand side of the figure above, because the CSI trigger and PUSCH resource for the CSI report have to be on the same carrier (since cross-carrier scheduling is not allowed when secondary DRX is configured), FR2 carrier does not need to wake up – this is because UE reports the last measurement taken during the latest DRX active time (38.213). |
| LG | Yes | The UE should wake up the secondary DRX group to report A-CSI on FR2. This would cause power consumption on FR2. |
| MediaTek | Basically no | With the further clarification that CSI reporting is sending on the same carrier, we think maybe there would be no additional power consumption. |
| CATT | Yes | We agree with Huawei. |
| Samsung | Yes | Depending on solution, we see a trade-off relationship between power saving gain and CSI accuracy.  With the suggestion, no impact in power consumption could result in inaccurate CSI (i.e. outdated).  Since it may be related to CSI accuracy, we are not sure if RAN2 itself can decide any solution. |
| Intel | No | With the assumption that UE is not required to measure outside Active Time, we don’t think there is power consumption impact. |
| Nokia, Nokia Shanghai Bell | No | With the condition A-CSI trigger and PUSCH happen on the same serving cell. |
| OPPO | Yes | In the case when the Active Time is shorter than that of secondary DRX group, i.e., the measurement occasion of FR2 is within the Active Time of secondary DRX group, no sure whether the A-CSI should be reported in Default DRX group even if it’s out of the Active Time. |
| vivo | Yes | Once the reporting with secondary DRX group is out of the active time, there will be power consumption. Beside, we also agree it depends on the solutions. |

**Summary:** 7 companies replied yes and 5 companies replies yes. One company replied that when the UE reports the latest measurement on FR2, when FR2 is outside Active Time, power is wasted. Another company replied that the CSI report accuracy is impacted when UE reports the latest measurement. The proponent replies that network would not trigger a CSI for FR2 when FR2 is sleeping, because CSI is only requested to assist traffic scheduling. Two companies asked for confirmation that CSI trigger and report is on the same carrier/serving cell, which was confirmed by proponent. One company replied that FR2 is woken up to report CSI from FR2, which is not the case, i.e. FR2 remains outside Active Time, and the latest measurement during Active Time is reported. One company questioned if the latest measurement should be report when FR2 is outside Active Time, i.e. no measurement should be sent in such case.

**Rapporteur:** The rapporteur thinks that the use case is now clear to companies, i.e. the CSI trigger and CSI report are on the same carrier/serving cell. The rapporteur thinks that the concern of reporting the latest measurement when FR2 is outside Active Time can be further discussed in phase 2.

**Proposal 1:** Discuss alternative solutions when CSI is triggered when FR2 is outside Active Time (and FR1 is in Active Time) in phase 2:

1. UE reports latest measurements
2. UE does not report CSI
3. NW should not trigger CSI for FR2 when FR2 is outside Active Time

**Issue 3b:** Do companies think there is RAN1 impact to support aperiodic CSI with secondary DRX?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments (e.g. other comments on the cover page)** |
| Ericsson2 | No | Aperiodic CSI and cross slot scheduling are two different features, i.e. CSI trigger is not a scheduling DCI. Furthermore the aperiodic CSI trigger and CSI report on PUSH are on the same carrier.  @Apple/CATT: this topic was discussed in last meeting, i.e. companies had time to check.  @HW/LG: this is according to legacy CSI measurement requirement (38.214):  *If the UE is configured with DRX, the most recent CSI measurement occasion occurs in DRX active time for CSI to be reported.* |
| Apple | Yes | Need to check RAN1 |
| Huawei, HiSilicon | Yes (may be) | Currently CSI measurement is transparent to MAC spec and executed in PHY, while MAC is only responsible to determine whether to report CSI in presence of DRX. Therefore, we are not sure if there is any impact to the RAN2 spec. On the contrary, we are concerned on the second bullet that “The UE reports the latest measurement on FR2, where the cross-carrier measurement may need to be consulted with RAN1 and RAN4. |
| Qualcomm | No | We agree with the clarifications provided in [R2-2101734](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_113-e/Docs/R2-2101734.zip) (which are also copied in rapporteur’s summary above). |
| LG | Maybe | Reporting A-CSI outside the Active Time needs to be checked in RAN1. In current specification, RAN1 specification is already referred.  NOTE 4: If a UE multiplexes a CSI configured on PUCCH with other overlapping UCI(s) according to the procedure specified in TS 38.213 [6] clause 9.2.5 and this CSI multiplexed with other UCI(s) would be reported on a PUCCH resource outside DRX Active Time of the DRX group in which this PUCCH is configured, it is up to UE implementation whether to report this CSI multiplexed with other UCI(s). |
| MediaTek | Maybe No | Assuming no impact to RAN1 but we could confirm with RAN1. |
| CATT | Yes | In our understanding, there may be impacts on RAN1. And we need to ask RAN1 to investigate. |
| Samsung | Yes |  |
| Intel | Maybe no | Our understanding is there is no RAN1 impact, but we’re also OK to confirm this with RAN1. |
| Nokia, Nokia Shanghai Bell | Likely No | It could be confirmed from RAN1 but currently we don’t see any. |
| OPPO | Yes | We need to check with RAN1 that in the case when the measurement occasion is within Active Time of FR2, whether the A-CSI can be triggered which means it’s report may be out of Active Time of FR1. |
| vivo | Yes | We need to first check with RAN1 the impact before digging into the details. |

**Summary:** 6 companies answered yes, 1 company yes maybe, 2 companies answered no, 3 companies answered maybe/likely not, but were open to ask RAN1. One company thinks that RAN1 should be consulted whether CSI report on FR1 can be sent outside Active Time when the measurement occasions for FR2 is in Active Time.

**Rapporteur:** Cross carrier scheduling is supported in Rel-16 in RAN1 and when CSI trigger and report is on the same carrier/serving cell this is not cross carrier scheduling (in the view of the rapporteur). It is not clarified what possible RAN1 impact should be expected, i.e. there is no reason to check with RAN1 on potential impact.

Concerning the comment about CSI report outside Active Time on FR1, when FR2 is in Active Time: we think this is a corner case, i.e. typically FR1 is in Active Time when FR2 is in Active Time. However we think this is covered by legacy requirement (38.321):

*the MAC entity transmits HARQ feedback, aperiodic CSI on PUSCH, and aperiodic SRS defined in TS 38.214 [7] on the Serving Cells in the DRX group when such is expected*

**Proposal 2:** Discuss in phase 2 if further clarification for CSI report on FR1 outside Active Time when FR2 is in Active Time is needed and CSI trigger on FR1 was in Active Time.

**Issue 3c:** Do companies think that aperiodic CSI is cross carrier scheduling?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments (e.g. other comments on the cover page)** |
| Ericsson2 | No | RAN1 introduced aperiodic CSI across different SCS in REL-16, i.e. there is no further RAN1 impact  In our view this is not cross-carrier scheduling because trigger and report are on the same carrier/serving cell, i.e. same view as CATT.  We agree with the comment made by MDTK. |
| Apple | Yes | This is similar to cross-carrier scheduling. |
| Huawei, HiSilicon |  | It depends on Issue 3a |
| Qualcomm | No | Although whether cross-carrier scheduling is configured can affect how aperiodic A-CSI may be scheduled, cross-carrier scheduling is definitely not aperiodic CSI, just like apple is not orange 😊.  Cross-carrier scheduling = PDCCH and the corresponding PDSCH/PUSCH are scheduled on different carriers. When secondary DRX is configured, A-CSI trigger (PDCCH part) and the CSI report (PUSCH part) have to be on the same carrier because cross-carrier scheduling can’t be jointly configured with secondary DRX. However, the measurement can be configured on any cell, regardless of whether cross-carrier scheduling is configured or not, if that’s enabled by network. |
| LG | Yes | We think A-CSI with secondary DRX is similar to cross-carrier scheduling. |
| MediaTek | No, but | We think it is not so critical to define whether this is cross-carrier scheduling or not. The key is that whether there is additional RAN1 impact or power consumption, which we would like to avoid. |
| CATT | Depends on whether aperiodic CSI is reported on the same serving cell or not | If aperiodic CSI is reported on different carrier, PDCCH carries CIF and PUSCH of another serving cell. It is similar as cross carrier scheduling. But if aperiodic CSI is reported on the same carrier, it is just one normal aperiodic CSI trigger. |
| Samsung | - | In our view, it’s not important to clarify if the aperiodic CSI is cross carrier scheduling.  We need to discuss if aperiodic CSI will be handled similar to cross-carrier scheduling when secondary DRX has been configured, or if we will specify new behaviour. |
| Intel | No | Agree with MediaTek. |
| Nokia, Nokia Shanghai Bell | No | Agree with MediaTek. |
| OPPO | No |  |
| vivo | Yes | We need to first check with RAN1 the impact before digging into the details. |

**Summary:** 6 companies replied no, 2 companies replied it depends on whether CSI trigger and report are on the same carrier/serving cell, and 3 companies replied yes.

**Rapporteur:** Most companies seem to agree that aperiodic CSI is not cross-carrier scheduling when SCI trigger and report are on the same carrier/serving cell.This topic is not further discussed in phase 2.

**Issue 3d:** Do companies think that aperiodic CSI with secondary DRX is an enhancement?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments (e.g. other comments on the cover page)** |
| Ericsson2 | No | Similar as periodic CSI and secondary DRX it is not an optimization  Normally when we introduce a new feature, then the feature is supposed to work together with other features, unless there is a particular technical reason why this is not possible. So we would argue the other way around, i.e. we do not understand why companies want to prohibit secondary DRX to work with aperiodic CSI? |
| Apple | Yes | Compared with the baseline cross-carrier CSI reporting, this is an optimization, |
| Huawei, HiSilicon | Yes | If FR2 is in sleep but report the latest CSI measurement, the CSI is not timely and inaccurate, so we see the benefit is marginal while it may have risk of further RAN1 and RAN4 impact. So we think it is an optimization. |
| Qualcomm | No | Aperiodic CSI is a feature whose behavior is independent from whether secondary DRX is configured or not. |
| LG | Yes | The A-CSI with secondary DRX couples two DRX groups, similar to cross-carrier scheduling. We think such coupling between two DRX groups should be avoided at least in Rel-16. Moreover, the gain is not clear. |
| MediaTek | No strong view |  |
| CATT | Yes | We see there is still some impacts on RAN1 and also agree Huawei that the benefits are not so obvious. So in our understanding, this is an enhancement. |
| Samsung | Yes |  |
| Intel | No strong view | Current discussion is mainly to check whether aperiodic CSI can be configured together with secondary DRX. |
| Nokia, Nokia Shanghai Bell | No strong view |  |
| OPPO | Yes | It may have impact on the current A-CSI report considering secondary DRX group is in Active Time but the default one is not. |
| vivo | Yes | There may be some impact on RAN1. |

**Summary:** 7 companies replied yes, 3 companies replied no strong view, 2 companies replied no.

**Rapporteur:** Normally a new features (such as secondary DRX) is supported with other legacy features (such as CSI reporting), unless there is a strong technical reason why this cannot easily be supported. With the restriction that CSI trigger and report are on the same carrier/serving cell, this is not the case. This topic is not further discussed in phase 2

**Issue 3e:** Clarify in 38.331 that the aperiodic CSI trigger and CSI report on PUSCH on the same carrier is supported when secondary DRX is configured?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson2 | Yes | Based on CR discussed in RAN2#112-e ([R2-2009948](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs/R2-2009948.zip)) the following draft text is provided for information:  ***schedulingCellId***  Indicates which cell signals the downlink allocations and uplink grants, if applicable, for the concerned SCell. In case the UE is configured with DC, the scheduling cell is part of the same cell group (i.e. MCG or SCG) as the scheduled cell. If *drx-ConfigSecondaryGroup* is configured in the *MAC-CellGroupConfig* associated with this serving cell, the scheduling cell and the scheduled cell belong to the same Frequency Range. If *drx-ConfigSecondaryGroup* is configured in the *MAC-CellGroupConfig* associated with this serving cell, the serving cell with the aperiodic CSI trigger and PUSCH configured for reporting on the same carrier, the cell for which CSI is reported may belong to the same or different Frequency Range.  We are fine with the correction provided by QC, and in general fine to further discuss the wording in phase 2. We are also fine to discuss the suggestion from LG further, but we should that this was already captured by: “*the serving cell with the aperiodic CSI trigger and PUSCH configured for reporting on the same carrier*” |
| Apple | No | As we do not support to cross-carrier CSI reporting when 2nd DRX is configured. in the TP provided by Ericsson, we should also restrict the measured cells to be in the same DRX group |
| Huawei, HiSilicon | No | See our comments above |
| Qualcomm | Yes | We are fine with adding a clarification to the field description. But we’d like to suggest a few minor editorial changes:  ***schedulingCellId***  Indicates which cell signals the downlink allocations and uplink grants, if applicable, for the concerned SCell. In case the UE is configured with DC, the scheduling cell is part of the same cell group (i.e. MCG or SCG) as the scheduled cell. If *drx-ConfigSecondaryGroup* is configured in the *MAC-CellGroupConfig* associated with this serving cell, the scheduling cell and the scheduled cell belong to the same Frequency Range.In addition, the serving cell with an aperiodic CSI trigger and the PUSCH resource scheduled for the report are on the same carrier, but the cell for which CSI is reported may belong to the same or different Frequency Range. |
| MediaTek | Yes | We could further discuss the wording. |
| CATT | No | We think cross carrier CSI reporting is similar as cross carrier scheduling. There is no need to clarify it in the specification. And we don’t support cross-carrier aperiodic CSI reporting and secondary DRX group are configured simultaneously either. |
| Samsung | No |  |
| LG | See comments | We want to specify that A-CSI trigger and CSI reporting belongs to the same FR.  If *drx-ConfigSecondaryGroup* is configured in the *MAC-CellGroupConfig* associated with this serving cell, the serving cell with the aperiodic CSI trigger and PUSCH configured for reporting belong to the same Frequency Range. |
| Intel | Yes | We are fine with wording either by Ericsson or Qualcomm. |
| Nokia, Nokia Shanghai Bell |  | Since the wording seems not to create any restrictions, we could just clarify in Chairman’s notes. |
| OPPO | Yes | QC’s wording is clearer. |
| vivo | Yes | Both Qualcomm and Ericsson’s wording are fine. |

**Summary:** 8 companies replied positively (of which 3 companies proposed further corrections, and one company to clarify this in the chairman notes), 4 companies replied no (perhaps one company may be positive given that CSI trigger and report is on same carrier/serving cell).

**Rapporteur:** The rapporteur thinks there is sufficient support for aperiodic CSI with secondary DRX with the restriction that the CSI trigger and report are on the same carrier/serving cell. Furthermore there will be further discussion about further potential restriction in phase 2 for reporting of the latest measurements when FR2 is outside Active Time (see proposal 2).

**Proposal 3:** Continue discussion about the detailed wording in 38.331 for aperiodic CSI with secondary DRX with the restriction that CSI trigger and report are on the same carrier/serving cell (and possible new restriction from proposal 2).

# 4 Phase 2

## 4.1 Voice Fallback Indication

The following is proposed based on the outcome of Phase 1:

**Proposal 1:** The *voiceFallbackIndication* is not included in the handover message for handover based Emergency service fallback. It is left for UE implementation to prioritize E-UTRA cells in case of HO failure during the Emergency services fallback.

The rapporteur suggests to discuss further in stage 2 if and how we need to capture in the specification or chairman’s notes that the UE should prioritize E-UTRA cells upon handover failure.

**Issue Ph2\_1:** Do you see a need to capture the behaviour that the UE should prioritize E-UTRA cells in case of HO failure during Emergency services fallback? If so, please explain how (e.g. chairman’s notes, informative note or procedure text)?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | No | Don’t see a strong need; we trust that the UE will do what is necessary to speed up the emergency call setup. |
| Lenovo | No | There is no stringent need to capture something in the specifications. Capturing the summary of the discussion in the chairman notes is sufficient. |
| Qualcomm | No | We don’t see a need to capture anything |
| DOCOMO | Yes | Since this is about emergency calls, from an operator perspective, DCM believe we should make every effort to ensure fast and reliable call setup.  As for where to capture, we prefer procedure text. Informative note in the spec is also fine. |
| Huawei, HiSilicon | No | No need to capture anything in spec or chairman notes, otherwise there might be a possibility of changing UE behaviour implemented according to old version Rel-16 specification. |
| Intel | No | We don’t see a need to capture in either. These corner cases can be handled by good UE implementations. There is no interoperability issue. |
| Apple | No | We do not see a strong need to capture the behavior. Chairman note seems sufficient. |
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**Summary:** 7 companies responded and out of these 4 prefer to not capture anything, 2 companies prefer to capture the behaviour in the chairman’s notes, and 1 company prefer to capture it in the specification.

**Rapporteur:** Considering that the majority prefers not to capture anything and there is no interoperability issue, it is suggested to not capture anything.

**Proposal 2:** No need to capture the UE behaviour in proposal 2 in the specification or chairman’s notes.

## 4.2 HO to EN-DC

The rapporteur suggests to not pursue the CR but add the clarification “(handover from NR standalone to (NG)EN-DC)” mentioned above. The clarification could e.g. be added as follows:

\*\*\*\*\*\*\*\*\*\*\* Start of changes \*\*\*\*\*\*\*\*\*\*\*\*\*

5.3.5.3 Reception of an *RRCReconfiguration* by the UE

The UE shall perform the following actions upon reception of the *RRCReconfiguration,* or upon execution of the conditional reconfiguration (CHO or CPC):

< Text omitted>

1> if the UE is configured with E-UTRA *nr-SecondaryCellGroupConfig* (UE in (NG)EN-DC):

2> if the *RRCReconfiguration* message was received via E-UTRA SRB1 as specified in TS 36.331 [10]; or

2> if the *RRCReconfiguration* message was received via E-UTRA RRC message *RRCConnectionReconfiguration* within *MobilityFromNRCommand* (handover from NR standalone to (NG)EN-DC);

3> if the *RRCReconfiguration* is applied due to a conditional reconfiguration execution:

4> submit the *RRCReconfigurationComplete* message via the E-UTRA MCG embedded in E-UTRA RRC message *ULInformationTransferMRDC* as specified in TS 36.331 [10], clause 5.6.2a.

3> else:

4> submit the *RRCReconfigurationComplete* via E-UTRA embedded in E-UTRA RRC message *RRCConnectionReconfigurationComplete* as specified in TS 36.331 [10], clause 5.3.5.3/5.3.5.4/5.4.2.3;

3> if *reconfigurationWithSync* was included in *spCellConfig* of an SCG:

4> initiate the Random Access procedure on the SpCell, as specified in TS 38.321 [3];

3> else:

4> the procedure ends;

2> if the *RRCReconfiguration* message was received within *nr-SecondaryCellGroupConfig* in *RRCConnectionReconfiguration* message received via SRB3 within *DLInformationTransferMRDC*:

3> submit the *RRCReconfigurationComplete* via E-UTRA embedded in E-UTRA RRC message *RRCConnectionReconfigurationComplete* as specified in TS 36.331 [10], clause 5.3.5.3/5.3.5.4;

3> if *reconfigurationWithSync* was included in *spCellConfig* of an SCG:

4> initiate the Random Access procedure on the SpCell, as specified in TS 38.321 [3];

3> else:

4> the procedure ends;

NOTE 1: The order the UE sends the *RRCConnectionReconfigurationComplete* message and performs the Random Access procedure towards the SCG is left to UE implementation.

2> else (*RRCReconfiguration* was received via SRB3) but not within *DLInformationTransferMRDC*:

3> submit the *RRCReconfigurationComplete* message via SRB3 to lower layers for transmission using the new configuration;

NOTE 2: In (NG)EN-DC and NR-DC, in the case *RRCReconfiguration* is received via SRB1 or within *DLInformationTransferMRDC* via SRB3, the random access is triggered by RRC layer itself as there is not necessarily other UL transmission. In the case *RRCReconfiguration* is received via SRB3 but not within *DLInformationTransferMRDC*, the random access is triggered by the MAC layer due to arrival of *RRCReconfigurationComplete*.

< Text omitted>

\*\*\*\*\*\*\*\*\*\*\* End of changes \*\*\*\*\*\*\*\*\*\*\*\*\*

**Issue Ph2\_2:** Do you agree to add the above clarification?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | Yes | It would be good to add the clarification to make it easier to understand which scenario the text refers to. |
| Qualcomm | Yes |  |
| CATT | Yes |  |
| Huawei, HiSilicon | No strong view | Do not see the need, but fine to go with majority’s view. |
| Intel | Yes | It makes it easier to follow the scenario. It has been done in many other such scenarios. |
| Apple | Yes |  |
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**Summary:** 6 companies responded and all but one agree to add the clarification. The remaining company has no strong view.

**Rapporteur:** It is proposed to add the clarification “(handover from NR standalone to (NG)EN-DC)” in the RRC reconfiguration procedure. The CR R2-2101288 has been revised in R2-2102382 to capture this.

**Proposal 1:** Agree the revised CR in R2-2102382 which adds the clarification “(handover from NR standalone to (NG)EN-DC)” in the RRC reconfiguration procedure.

## 4.3 Aperiodic CSI with secondary DRX

**Proposal 1:** Discuss alternative solutions when CSI is triggered when FR2 is outside Active Time (and FR1 is in Active Time) in phase 2:

1. UE reports latest measurements
2. UE does not report CSI
3. NW should not trigger CSI for FR2 when FR2 is outside Active Time

**Issue Ph2\_3a:** Which option is preferred concerning CSI trigger when FR2 is outside Active Time (and FR1 is in Active Time)?

|  |  |  |
| --- | --- | --- |
| **Company** | **Option** | **Comments** |
| Ericsson | c | We have fine to have a network restriction, because there is little use for CSI reporting from FR2 when FR2 is sleeping. |
| Qualcomm | See comment | We do not see a need for any alternative solution, as the current RAN1 spec and RAN2 agreement are sufficient in handling this scenario (FR2 inactive and FR1 is active). Our view is based on the following facts:   * In Rel-16, it is an optional feature whether UE supports PDCCH and CSI-RS for A-CSI on carriers with different numerologies (FG18-6), and it is configurable on gNB side too; * When secondary DRX group is configured, cross-carrier scheduling can’t be configured. When cross-carrier scheduling is not configured, PDCCH and PUSCH for an A-CSI has to be scheduled on the same carrier. * UE is only required to report the last CSI measurement taken in the last DRX active time, i.e. in no circumstances, UE is required to take new CSI measurements outside DRX active (see 38.213).   Based on these two facts, we can see that for UEs not capable of supporting PDCCH and CSI-RS on carriers with different numerologies, there is no issue. For UEs capable of supporting PDCCH and CSI-RS on carriers with different numerologies, we can see that   * In addition, since UE is not required to take CSI measurements outside the active time of the carrier on which the target CSI-RS is transmitted, UE does not need to take a new measurement on FR2 carrier when FR2 is inactive. UE can simply report the last measurement it took (which it has stored in memory). * Because cross-carrier scheduling is not jointly configured with secondary DRX, PDCCH and PUSCH for an A-CSI have to be on the same carrier. So the CSI report has to be sent on a FR1 carrier.   Therefore, UE does not need to wake up FR2 carries to complete an A-CSI report. |
| CATT | c | We agree with Ericsson. |
| Huawei, HiSilicon | c | As we commented in Phase 1, we don't see real use case to report FR2 CSI during inactive period. |
| Intel | c | Agree with the restriction. |
| Apple | c | Agree with Ericsson. |
| Nokia, Nokia Shanghai Bell | c |  |

**Summary:** 7 companies replied: 6 companies preferred option c. while one companies points out that no restriction is needed, as UE can report the latest measurements during Active Time according to legacy requirements.

**Rapporteur:** It is proposed to capture option c in the CR.

**Proposal 2:** Discuss in phase 2 if further clarification for CSI report on FR1 outside Active Time when FR2 is in Active Time is needed and CSI trigger on FR1 was in Active Time.

The network cannot trigger a CSI request on FR1 when FR1 is outside Active Time, i.e. when FR1 is not monitoring PDCCH. But there can be a corner case, just as in legacy (single DRX) where a CSI trigger is requested just before the end of the Active Time, and the UE is then expected to reply to such request, similar as for HARQ, see section 5.7 in 38.321:

Regardless of whether the MAC entity is monitoring PDCCH or not on the Serving Cells in a DRX group, the MAC entity transmits HARQ feedback, aperiodic CSI on PUSCH, and aperiodic SRS defined in TS 38.214 [7] on the Serving Cells in the DRX group when such is expected.

**Issue Ph2\_3b:** Is further clarification needed for the use case when CSI is triggered in Active Time, but CSI report is sent outside Active Time.

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | No | We think this case is already covered in 38.321. |
| Qualcomm | No | If A-CSI trigger is received before end of DRX active time but the PUSCH resource is outside the DRX active time, UE has to send that CSI report, as required in the current MAC spec. No clarification is needed for this scenario. |
| CATT | No | We also think this has been covered in 38.321. |
| Huawei, HiSilicon | No | We agree with Ericsson |
| Intel | No | Agree that this is covered in TS 38.321. |
| Apple | No | Agree with Ericsson |
| Nokia, Nokia Shanghai Bell | No |  |

**Summary:** 7 companies replied and all companies think that no further clarification is needed the use case when CSI is triggered in Active Time, but CSI report is sent outside Active Time.

**Rapporteur:** It is proposed to not capture this use case in the CR.

**Proposal 3:** Continue discussion about the detailed wording in 38.331 for aperiodic CSI with secondary DRX with the restriction that CSI trigger and report are on the same carrier/serving cell (and possible new restriction from proposal 2).

Based on the suggestion from Ericsson and QC the following text is proposed for further discussion. LG commented to capture that CSI trigger and reporting below to the same FR, but this is captured where it says that CSI trigger and reporting below to the same carrier/serving cell. Furthermore the text proposal related to proposal 1 option c is provided in yellow:

|  |
| --- |
| ***schedulingCellId***  Indicates which cell signals the downlink allocations and uplink grants, if applicable, for the concerned Scell. In case the UE is configured with DC, the scheduling cell is part of the same cell group (i.e. MCG or SCG) as the scheduled cell. If *drx-ConfigSecondaryGroup* is configured in the *MAC-CellGroupConfig* associated with this serving cell, the scheduling cell and the scheduled cell belong to the same Frequency Range. In addition, the serving cell with an aperiodic CSI trigger and the PUSCH resource scheduled for the report are on the same carrier and serving cell, but the cell for which CSI is reporting may belong to the same or a different Frequency Range. The network should not trigger a CSI request for the cell in the other Frequency Range when that cell is outside Active Time. |

**Issue Ph2\_3c:** Do companies have further comments on the text proposal above?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | No | We think this case is already covered in 38.321. |
| Qualcomm | Yes | We do not think the last sentence is needed, as it is against the current RAN1 spec. See our comment to Ph2\_3b. |
| CATT | No | We also think this has been covered in 38.321. |
| Huawei, HiSilicon | No | No change is needed. |
| Intel | No | The text proposal is fine.  BTW, we suspect that some companies may have misunderstood the question? |
| Apple | No | We are fine to the text proposal above to clarify the option c restriction. |
| Nokia, Nokia Shanghai Bell | No, but | Some fine tuning seems needed:  In addition, the serving cell with an aperiodic CSI trigger and the PUSCH resource scheduled for the report are on the same carrier and serving cell, but the cell for which CSI is reported may belong to the same or a different Frequency Range. The network should not trigger a CSI request for a serving cell in the other Frequency Range when that serving cell is outside Active Time. |

**Summary:** 7 companies replied and most companies are fine with the proposed TP: one company commented that in accordance with their earlier comment the last sentence is not needed, and one company provides editorial comments on the TP.

**Rapporteur:** It is proposed to agree on the TP, including the last sentence and the editorial comments provided.

**Proposal 1:** Agree the revised CR in R2-2102405, which clarifies how aperiodic CSI can be used and configured when secondary DRX is configured.

# 5 Conclusion

## 5.1 Voice Fallback Indication

**Proposal 1:** The *voiceFallbackIndication* is not included in the handover message for handover based Emergency service fallback. It is left for UE implementation to prioritize E-UTRA cells in case of HO failure during the Emergency services fallback.

**Proposal 2:** No need to capture the UE behaviour in proposal 2 in the specification or chairman’s notes.

## 5.2 HO to EN-DC

**Proposal 1:** Agree the revised CR in R2-2102382 which adds the clarification “(handover from NR standalone to (NG)EN-DC)” in the RRC reconfiguration procedure.

## 5.3 Aperiodic CSI with secondary DRX

**Proposal 1:** Agree the revised CR in R2-2102405, which clarifies how aperiodic CSI can be used and configured when secondary DRX is configured.