**3GPP TSG RAN WG1 #110bis-e R1-2210279**

**e-Meeting, October 10th – 19th, 2022**

**Agenda item:** 8.16.3

**Source:** Moderator (NTT DOCOMO, INC.)

**Title:** Summary#1 on UE features for TEI17

**Document for:** Discussion and Decision

# **Introduction**

This document summarizes contributions submitted to AI 8.16.3 and AI 7.1 regarding UE features for TEI17 and captures company views based on the announcement in the following email thread.

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| [110bis-e-R17-UE-features-03] Remaining issues on Rel-17 UE features ([R1-2210100](file:///C%3A%5CUsers%5Cyounsun%5CDocuments%5C3GPP%20documents%5CRAN1%20tdocs%5CTSGR1_110b-e%5CDocs%5CR1-2210100.zip)) by October 14 – Hiroki (NTT DOCOMO)* Including [R1-2209848](file:///C%3A%5CUsers%5Cyounsun%5CDocuments%5C3GPP%20documents%5CRAN1%20tdocs%5CTSGR1_110b-e%5CDocs%5CR1-2209848.zip) from agenda item 7.1
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# **Discussion on UE features for TEI17**

## **2.1 39-3-1: Stay on the target CC for SRS carrier switching, and 39-3-2: Affected bands for inter-band CA during SRS carrier switching**

In [1], FG 39-3-1/2 are captured as below.

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| 39. TEI17 | 39-3-1 | Stay on the target CC for SRS carrier switching | Stay on the target CC when remaining SRS resource set(s) for SRS carrier switching exists | 2-56 | Yes | n/a |  | Per BC | n/a | n/a | n/a | Note1: When UE supports this capability, if the time period between the SRS resource sets is smaller than the total required RF switching time to the source CC and back to the target CC and a higher priority UL transmission and/or DL reception is not scheduled on the source CC in the time period between the two SRS resources sets, the UE stays in the target CC in the period between the SRS resource sets; otherwise, the UE switches back to the source CC after transmitting each SRS resource setNote2: If the UE does not indicate this capability, the UE falls back to Rel-15 behavior, that is UE switches back to source CC between the SRS resource setsThis is a working assumption. | Optional with capability signaling |
| 39. TEI17 | 39-3-2 | Affected bands for inter-band CA during SRS carrier switching | 1. Indicate which other bands in the band combination are affected by the SRS switch.2. The dropping rules / timelines apply to the indicated bands when SRS carrier switching on target CC and other UL on source CC are overlapped in the same symbol. | 2-56 | Yes | n/a |  | Per BC | n/a | n/a | n/a | Note: If this new indication is missing, the UE defaults to Rel-15 behavior.For each “source-target” pair (as indicated by srs-SwitchingTimesListNR), the UE can indicate which other bands in the band combination are affected by the SRS switch.This is a working assumption. | Optional with capability signaling |

Following view is provided in contributions for the RAN1#110bis-e meeting.

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| [2] | Nokia, Nokia Shanghai Bell | In RAN1#110 the following agreements have been made [2]:**Agreement****Confirm the following working assumption:**Working AssumptionA new UE capability is defined as below, 1. For each “source-target” pair (as indicated by *srs-SwitchingTimesListNR*), the UE can indicate which other bands in the band combination are affected by the SRS switch. If this new indication is missing, the UE defaults to Rel-15 behavior.
2. If the UE indicates the new list of bands, the dropping rules / timelines apply to the bands indicated by the list (requires update in RAN1 specs).

Note: the new UE capability has no impact on the legacy capability *txSwitchImpactToRx* and *txSwitchWithAnotherBand***Agreement****The CR** [**R1-2207960**](file:///C%3A%5CUsers%5Ccassribe%5CDocuments%5Clocal%20documents%5C3GPP%5CRAN1%5CRAN1%20110%5CTSGR1_110%5CDocs%5CR1-2207960.zip) **is endorsed in principle by deleting “**and the SRS is not dropped according to the priority rules defined in this subclause.**”**Hence, FGs 39-3-1 and 39-3-2 can be confirmed and the indication they are working assumptions should be removed.**Proposal: Remove the text “this is a working assumption” from FGs 39-3-1 and 39-3-2.** |

Meanwhile, in AI 7.1, there is following contribution proposing the modification of the working assumption for FG 39-3-1 and 39-3-2.

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| [3] | Huawei, HiSilicon | There is one working assumption on UE behavior for different time period between SRS resource sets in the target CC.Working assumptionIntroduce a new UE capability (from Rel-17) that indicates the UE behavior is as follows:* If the time period between the SRS resource sets is smaller than the total required RF switching time to the source CC and back to the target CC and a higher priority UL transmission and/or DL reception is not scheduled on the source CC in the time period between the two SRS resources sets, the UE stays in the target CC in the period between the SRS resource sets; otherwise, the UE switches back to the source CC after transmitting each SRS resource set.

If the UE does not indicate this capability, the UE falls back to Rel-15 behavior, that is UE switches back to source CC between the SRS resource sets.Based on the working assumption, the UE always switches back to source CC after transmitting the first SRS resource set if the time period is less than the switching time or UE doesn’t support this new capability. However, whether to physically switch back to source CC depends on UE implementation, that in some cases a UE does not have to switch back to the source CC. For example, when no uplink transmission is scheduled in the source CC during the time period, a UE can stay on any CC by its implementation. Considering the intention is to allow gNB scheduling on source CC, the following modification is proposed:***Proposal: To modify the agreement with the following change:***Confirm the following working assumption with modification in red:Working assumptionIntroduce a new UE capability (from Rel-17, ‘*SRS-StayInTargetCC*’ described in R1-2207960) that indicates the UE behavior is as follows :* If the time period between the SRS resource sets is smaller than the total required RF switching time to the source CC and back to the target CC and a higher priority UL transmission and/or DL reception is not scheduled on the source CC in the time period between the two SRS resources sets, the UE stays in the target CC in the period between the SRS resource sets; otherwise, the gNB may assumes that the UE switches back to the source CC after transmitting each SRS resource set.

If the UE does not indicate this capability, the UE falls back to Rel-15 behavior, that is the gNB may assumes that UE switches back to source CC between the SRS resource sets. |

Based on above, companies’ feedbacks can be checked at the RAN1#110bis-e meeting.

### **Proposal 4-1-1:**

* **Remove the text “this is a working assumption” from FG39-3-1 and FG39-3-2**

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| Company | Comment |
| Nokia, NSB | Support |
| Qualcomm | Support |
| Intel | Fine with the proposal |
| Huawei, HiSilicon | Support to remove the text for FG 39-3-2. For FG 39-3-1, see our comments to proposal 4-1-2. |
| Samsung | Support |
| Ericsson | Support |
| ZTE | Support |
| CATT | Support |
| Moderator (NTT DOCOMO) | Thank you very much for the feedbacks!It seems all companies are fine with the proposal. |
| Huawei, HiSilicon | As we have commented, we are fine to remove the text for FG 39-3-2. But we cannot accept to remove the text for FG 39-3-1 as it is, our comments are in proposal 4-1-1. |

### **Proposal 4-1-2:**

* **Modify the notes in FG39-3-1 as below**
	+ **Note1: When UE supports this capability, if the time period between the SRS resource sets is smaller than the total required RF switching time to the source CC and back to the target CC and a higher priority UL transmission and/or DL reception is not scheduled on the source CC in the time period between the two SRS resources sets, the UE stays in the target CC in the period between the SRS resource sets; otherwise, the gNB may assume that the UE switches back to the source CC after transmitting each SRS resource set**
	+ **Note2: If the UE does not indicate this capability, the UE falls back to Rel-15 behavior, that is the gNB may assume that UE switches back to source CC between the SRS resource sets**

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| Company | Comment |
| Nokia, NSB | Do not support the changes. We are not supposed to write in the UE feature groups definitions what gNB “may” assume about UE behaviour, as that is not useful information. It is always the case that UEs can be implemented in different ways as long as they appear to the gNB according to the behaviour described in the specs. So even if the UE doesn’t physically switch to the source CC immediately, from gNB point of view it can safely assume this has taken place, and that is what the specifications mean. If we write that “gNB may assume that” the UE switches, one can argue that some gNBs will not make that assumption, and in practice this agreement would now say that anything could happen and gNB cannot make any assumption on which carrier the UE is. I don’t think that was the original intention of the proponent either.  |
| Qualcomm | We do not see the need to modify this text, since the CR describing the text has already been approved. |
| Intel | The modification is not necessary. |
| Huawei, HiSilicon | Support the modification. As we explained in our contribution, we cannot accept to force UE to physically switch back. The intention is to allow gNB scheduling of uplink transmission on source CC, no matter UE physically switches back or not, UE will transmit the scheduled uplink transmission. The modification is to support this intention. Regarding the comment below, using gNB may assume is to not force gNB to assume something, whether gNB assumes or not depends on gNB implementation.*If we write that “gNB may assume that” the UE switches, one can argue that some gNBs will not make that assumption, and in practice this agreement would now say that anything could happen and gNB cannot make any assumption on which carrier the UE is.* |
| Samsung | The modification is not needed. |
| Ericsson | We don’t think the change in the notes are needed. The behavioral spec takes precedence over the summaries in UE features, and the CR agreed last meeting is clear on the behavior. |
| ZTE | No strong view, but the change seems not critical.  |
| CATT | The change is not needed. |
| Moderator (NTT DOCOMO) | Thank you very much for the feedbacks!It seems there is no consensus on the proposed update. |
| Huawei, HiSilicon | As we expressed, although there was CR approved, but the CR doesn’t have relationship with the proposed change here. The proposed change is for the description in FG 39-3-1. Without the modification, UE will be forced to physically switch back, which is not aligned with our understanding for Rel-15 behavior. |

# **Conclusions**

TBD

# **References**

[1] R1-2207923 Updated RAN1 UE features list for Rel-17 NR after RAN1 #110 Thursday Moderators (AT&T, NTT DOCOMO, INC.)

[2] R1-2210100 Remaining issues for Rel-17 UE features Nokia, Nokia Shanghai Bell

[3] R1-2209848 Discussion on SRS carrier switching Huawei, HiSilicon