**3GPP TSG RAN WG1 #109-e R1-220nnnn**

**e-Meeting, May 9th – 20th, 2022**

**Title:** [Draft]Reply LS on updated Rel-17 RAN1 UE features list for NR

**Response to:** R2-2204360

**Release:** Rel-17

**Work Items:** NR\_FeMIMO, NR\_ext\_to\_71GHz, NR\_IIOT\_URLLC\_enh, NR\_NTN\_solutions, NR\_pos\_enh, NR\_redcap, NR\_UE\_pow\_sav\_enh, NR\_cov\_enh, NR\_IAB\_enh, NR\_SL\_enh, NR\_MBS, NR\_DSS, LTE\_NR\_DC\_enh2, NR\_DL1024QAM\_FR1, NR\_RF\_FR1\_enh, NR\_SmallData\_INACTIVE

**Source:** vivo [RAN1]

**To:** RAN2

**CC:**

**Contact Person:**

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**Attachment:**

**1. Overall Description:**

RAN1 would like to thank RAN2 for the questions on Rel-17 UE features, please find RAN1 replies below:

A) R1 23-8-3

RAN2 understanding is that this feature is an extension of *srs-TxSwitch/srs-TxSwitch-v1610* to support SRS antenna switching xTyR with y>4. However, RAN2 is unclear on how this new capability is populated for a band in a band combination where at least one band in the band combination supports xTyR with y>4 and how it works with the existing *srs-TxSwitch/srs-TxSwitch-v1610*. There are 2 interpretations:

(a) the new capabilities is populated for a band in the band combination only if at least one xTyR entry for the band supports y>4

(b) the new capabilities is populated for a band in the band combination regardless of whether the band supports y>4

If the interpretation is (a), the following note will not occur since the candidate values with xTyR with y>4 are {t2r6, t1r6, t4r8, t2r8, t1r8} where x and y are never equal. For b), the Note can be applicable to, but only in band of the band combination where xTyR supports y ≤ 4, while not applicable in band of the band combination where at least one xTyR entry supports y>4.

In addition RAN2 understands component 2 and 3 are not reported if x=y as below, and wonders if there is any other case that component 2 and 3 are not reported.

Note: Component 2 and component 3 is not reported if component 1 is reported as xTyR with x=y.

For both interpretations (a) and (b), should the component 1 be set consistently with the existing *supportedSRS-TxPortSwitch/ supportedSRS-TxPortSwitch-v1610* in *srs-TxSwitch/srs-TxSwitch-v1610* (i.e. the R1 23-8-3 bitmap in component 1 be aligned with the existing *supportedSRS-TxPortSwitch/supportedSRS-TxPortSwitch-v1610* for the xTyR entries where y<=4). Also how are component 2 and 3 being set with respect to the Rel-15/16 capabilities if xTyR entries in component 1 contains the xTyR in the existing Rel-15/16 capabilities

RAN2 would also like to inform that R1 23-8-3 will be implemented similar to Rel-15/16 *srs-TxSwitch/srs-TxSwitch-v1610* in the BandParameters of a band combination rather than in FeatureSetUplink as components 2 and 3 require setting them to the band entry of a combination.

**Reply A**:

RAN1 is still discussing whether it is interpretation (a) or (b), will inform RAN2 on decision later.

RAN1 agrees with RAN2 that component 1 should be set consistently with existing Rel-15/16 capabilities reporting. FG 23-8-3 implemented as band combination is also fine.

**Huawei, HiSilicon:** Regarding the “should the component 1 be set consistently with the existing *supportedSRS-TxPortSwitch/ supportedSRS-TxPortSwitch-v1610* in *srs-TxSwitch/srs-TxSwitch-v1610*” issue, we think the answer should be “No”, i.e., FG 23-8-3 bitmap can include xTyR configurations (y<=4) that are not supported by *supportedSRS-TxPortSwitch/supportedSRS-TxPortSwitch-v1610.* The reason is quite straightforward, only by this means the FG 23-8-3 bitmap for y<=4 is meaningful.

Regarding the “how are component 2 and 3 being set with respect to the Rel-15/16 capabilities if xTyR entries in component 1 contains the xTyR in the existing Rel-15/16 capabilities” issue, we think clarification is certainly needed about whether the component 2 and 3 of 23-8-3 or the component 2 and 3 of *supportedSRS-TxPortSwitch/supportedSRS-TxPortSwitch-v1610* should be complied with. Either way is OK for us, here a potential way is listed below:

***For the xTyR antenna switching configurations that are both reported in 23-8-3 and in Rel-15/16 SRS antenna switching feature (2-55 and 14-4), the component 2 and 3 of 23-8-3 apply.***

**Intel:**

For component 1, we think the xTyR configuration for y<=4 reported in Rel-15/Rel-16 capability should also be reported in FG 23-8-3. For example, if the Rel-15 capability reports 1T2R, then 1T2R should also be reported in FG 23-8-3; otherwise, the setting is weird. In this sense, component 1 in FG 23-8-3 should be set consistently with the existing *supportedSRS-TxPortSwitch/ supportedSRS-TxPortSwitch-v1610*.

RAN2 informs RAN1 that 23-8-3 will be implemented in the BandParameters of a band combination, we think RAN1 is fine. The response could just align with RAN2’s information.

Regarding the question on how to set component 2 and component 3 with respect to Rel-15/Rel-16 capabilities, we think RAN1 needs further discussion.

We suggest the following change on top of the version from vivo:

RAN1 is still discussing whether it is interpretation (a) or (b), will inform RAN2 on decision later.

RAN1 agrees with RAN2 that component 1 should be set consistently with existing Rel-15/16 capabilities reporting, i.e., the xTyR configuration for y<=4 reported in *supportedSRS-TxPortSwitch/supportedSRS-TxPortSwitch-v1610* should also be reported in Component 1 of FG 23-8-3. FG 23-8-3 implemented in the BandParameters of a band combination is also fine.

RAN1 will further discuss how to set Component 2 and Component 3 with respect to Rel-15/Rel-16 capabilities.

**Reply B**: From RAN1’s perspective, reuse of ‘OLPC-SRS-Pos-r16/SpatialRelationsSRS-Pos-r16’ doesn’t mean pre-requisite of FGs 13-9 and 13-10. Pre-requisite for FGs 27-16, 27-16a, 27-19, and 27-19a should be FG 27-15 (Positioning SRS transmission in RRC\_INACTIVE state for initial UL BWP).

B). R1 27-16 and 27-19

R1 27-16 and 27-19 have a component description of ‘Same as RRC OLPC-SRS-Pos-r16’ and ‘Same as RRC SpatialRelationsSRS-Pos-r16’ respectively. It is unclear to RAN2 whether the pre-requisite in R1 27-16/27-19 should be *srs-PosResources-r16* as in RRC *OLPC-SRS-Pos-r16/SpatialRelationsSRS-Pos-r16* or should be *“srs-PosResourcesRRC-Inactive-r17”* (i.e. R1 27-15)). RAN2 would like RAN1 to clarify the pre-requisite used in the R1 27-16 and 27-19.

C) R1 24-2 and 24-3

Both of the features have N/A in the column of “Need for the gNB to know if the feature is supported” while indicate in the column of “Mandatory/Optional” as “optional with capability signalling”. From RAN2 perspective, if there is no need for gNB to know whether a feature is supported or not, no capability signalling should be defined. RAN2 also noticed that there are other features in NTN that have such ambiguities (e.g. R1 26-1/26-8 for NTN WI). RAN2 would like to know whether such capabilities are really “optional with capability signalling”

**Reply C**:

For FG 24-2 and 24-3, RAN1 has already concluded that they should be supported as “optional with capability signaling” in the column of “Mandatory/Optional”. Besides, gNB needs to know if they are supported since it is beneficial in certain cases, e.g. whether gNB can handover the UE to a serving cell in FR 2-2 with 120K/480K SCS. In general, in RAN1’s understanding, FG 24-2 and 24-3 are optional with capability signalling and gNB needs to know if they are supported. Accordingly, RAN1 revised the column of “Need for the gNB to know if the feature is supported” as “Yes”.

FGs 26-1 must be supported for UEs supporting NR communication via satellite, as described in the column of “Mandatory/Optional”. However, it is not mandated for UEs not supporting satellite communication but supporting other NTN scenarios, e.g. HAPS, ATG. In other words, this FG is UE optional with capability signalling and gNB needs to know if the feature is supported. Accordingly, RAN1 revised the column of “Need for the gNB to know if the feature is supported” as “Yes”.

As for FGs 26-8, gNB would indicate the polarization for UE with circular polarization to take the advantage of polarization information to save power. For UE with linear polarization, reading the polarization signalling is not necessary however UE can also work well in NTN scenario. In NTN scenarios, various UE types could coexist, e.g. UE with linear polarization, UE with LHCP, UE with RHCP, or with a combination of different polarization types. Thus, gNB could always indicate the polarization but it can be UE optional to support the feature without capability signalling. Hence, RAN1 revised the column “Mandatory/Optional” as “Optional without capability signalling”.

**2. Actions:**

**To RAN WG2**

**ACTION:** RAN1 respectfully asks RAN2 to take into account above replies in their work.

**3. Date of Next RAN WG1 Meetings:**

TSG-RAN WG1 Meeting #110 August 2022, Toulouse, France

TSG-RAN WG1 Meeting #110b-e October 2022, Electronic