3GPP TSG-RAN2 Meeting #125 R2-240xxxx

Athens, Greece, 26th February - 1st March 2024

Agenda Item: 5.1.3.2 UE capabilities

Source: ZTE Corporation, Sanechips

Title:  Summary of  [Post125][763][SRS-only cell] Bandwidth of the SRS-only Cell (ZTE)

Document for: Discussion and Decision

# Introduction

This report provides a summary of the following offline discussion:

**[Post125][763][SRS-only cell] Bandwidth of the SRS-only Cell (ZTE)**

Scope:

Discuss and conclude whether we can confirm P1 in [R2-2401936](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_125/Docs/R2-2401936.zip)

                          Intended outcome:

Confirmation of P1 in [R2-2401936](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_125/Docs/R2-2401936.zip), if possible

                          Deadline:

Short

The deadline for providing comments is**March 7th at 21:00 UTC.**

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# 90M/400M Clarification

SRS carrier switching is the feature that is used when a TDD SCell doesn’t support uplink PUSCH transmission (38.214 6.2.1.3). For discussion convenience, we call it as a SRS-only cell (or PUSCH-less Cell) for that only the SRS can be sent on UL.When the UE wants to send SRS on such a SRS-only Cell, the UE can tune its uplink from a source cell which supports normal uplink transmission to this cell. As shown in the 38.306, the UE would report the SRS switching capability Per band pair Per BC by indicating the switching time.

| ***SRS-SwitchingTimeNR***  Indicates the interruption time on DL/UL reception within a NR band pair during the RF retuning for switching between a carrier on one band and another (PUSCH-less) carrier on the other band to transmit SRS. *switchingTimeDL/ switchingTimeUL*:n0us represents 0 us, n30us represents 30us, and so on. *switchingTimeDL/ switchingTimeUL* is mandatory present if switching between the NR band pair is supported, otherwise the field is absent. It is signalled per pair of bands per band combination. | FD | No | N/A | N/A |
| --- | --- | --- | --- | --- |

For the normal cell, the NW can determine the actual supported UL bandwidth based on the (BCS, *channelBWs-UL, supportedBandwidthUL*), in which the *supportedBandwidthUL* is reported *FeatureSetUplinkPerCC.*

But for the 90M, according to the 38.306(see Annex), the NW would only validate (*channelBW-90mhz*, BCS), which means the network would ignore the *channelBWs-UL.*

However for the SRS-only cell, there is no PUSCH, so the UE would not report th*e FeatureSetUplinkPerCC* and thus the UE would not report the *channelBW-90mhz* (this parameter is reported in FeatureSetUplinkPerCC). Then the question is how to determine whether the UE can support 90M for the SRS configuration on the SRS-only cell.

One solution is: If the 90M bandwidth is supported by the downlink of the SRS-only cell, then the network can configure SRS with 90M on the SRS-only cell. Similarly, for the 400M, the network would also ignore the channelBWs-UL, thus the same logic can be used for the UL.

Companies are invited to provide their comments on proposal 1:

**Proposal 1： For SRS carrier switching to a PUSCH-less carrier, if the 90MHz bandwidth is supported by the downlink, then the network can configure SRS with 90MHz on the PUSCH-less carrier, and the same logic can also be applied to the 400MHz.**

**Q1: Do companies agree with P1?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| ZTE | Yes | Agree with proposal 1 |
| CATT | Yes |  |
| Ericsson | Yes | But we think it is clearer to capture the proposal as “For SRS carrier switching to a PUSCH-less carrier” instead of “SRS-only cell” “For ~~the SRS-only cell~~ SRS carrier switching to a PUSCH-less carrier, if the 90MHz bandwidth is supported by the downlink, then the network can configure SRS with 90MHz on the ~~SRS-only cell~~PUSCH-less carrier, and the same logic can also be applied to the 400MHz  [Rapp]The proposal 1 has been updated based on the suggestion, thanks |
| OPPO | Yes |  |
| Apple | Yes |  |
| Huawei, HiSilicon | Yes | We are also fine with the description from Ericsson. |
| Nokia | Yes |  |
| MediaTek | Yes | The changes from Ericsson is okay. |
| Qualcomm Incorporated | Yes | Thank you for allowing us more time to check this. Now we are fine with this.  One suggestion for the next meeting.  In addition to settle on other bandwidths, we think it is also beneficial to discuss the handling of asymmetric UL-DL bandwidth.   1. Should the standard support SRS-only cell in asymmetric UL-DL bandwidth? 2. If yes, should the network check *channelBWs-UL* in addition to *asymmetricBandwidthCombinationSet* for the band.   [ZTE\_Wenting]Thanks so much, yes, some companies have also mentioned the *asymmetricBandwidthCombinationSet* case , hope this can be further discussed next meeting. |
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Summary：

Since all companies share the same understanding on the 90M/400M, the proposal 1 can be confirmed.

# **Conclusions**

**Proposal 1: Ran2 confirm that “For SRS carrier switching to a PUSCH-less carrier, if the 90MHz bandwidth is supported by the downlink, then the network can configure SRS with 90MHz on the PUSCH-less carrier, and the same logic can also be applied to the 400MHz.”**

# **Reference**

[1] [R2-2401936](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_125/Docs/R2-2401936.zip) Summary of [AT125][763] Clarification on the Supported Bandwidth of the SRS-only Cell (ZTE) ZTE

# Annex

| ***channelBWs-UL***  Indicates for each subcarrier spacing the UE supported channel bandwidths.  Absence of the *channelBWs-UL* (without suffix) for a band or absence of specific scs-XXkHz entry for a supported subcarrier spacing means that the UE supports the channel bandwidths among [5, 10, 15, 20, 25, 30, 40, 50, 60, 80, 100] and [50, 100, 200] that were defined in clause 5.3.5 of TS 38.101-1 version 15.7.0 [2] and TS 38.101-2 version 15.7.0 [3] for the given band or the specific SCS entry. For IAB-MT, to determine whether the IAB-MT supports a channel bandwidth of 100 MHz, the network checks *channelBW-UL-IAB-r16*.  For FR1, the bits in *channelBWs-UL* (without suffix) starting from the leading / leftmost bit indicate 5, 10, 15, 20, 25, 30, 40, 50, 60 and 80MHz. For FR2, the bits in *channelBWs-UL* (without suffix) starting from the leading / leftmost bit indicate 50, 100 and 200MHz. The third / rightmost bit (for 200MHz) shall be set to 1. For IAB-MT the third / rightmost bit (for 200MHz) is ignored. To determine whether the IAB-MT supports a channel bandwidth of 200 MHz, the network checks *channelBW-UL-IAB-r16*.  For FR1, the leading/leftmost bit in *channelBWs-UL-v1590* indicates 70 MHz, the second leftmost bit indicates 45MHz, the third leftmost bit indicates 35MHz, the fourth leftmost bit indicates 100MHz and all the remaining bits in *channelBWs-UL-v1590* shall be set to 0. The fourth leftmost bit (for 100MHz) is not applicable for bands n41, n48, n77, n78, n79 and n90 as defined in TS 38.101-1 [2]. For each band, (e)RedCap UEs shall indicate supporting the maximum of those channel bandwidths that are less than or equal to 20 MHz for FR1 and less than or equal to 100 Mhz for FR2, taking restrictions in TS 38.101-1 [2] and TS 38.101-2 [3] into consideration. For each band, NTN capable UEs shall indicate the supported channel bandwidths for FR1, taking restrictions in TS 38.101-5 [34] into consideration.  This feature is applicable only for FR1 and FR2-1 band, otherwise it is absent.  NOTE: To determine whether the UE supports a specific SCS for a given band, the network validates the *supportedSubCarrierSpacingUL* and the *scs-60kHz*. To determine whether the UE supports a channel bandwidth of 90 MHz the network may ignore this capability and validate instead the *channelBW-90mhz*, the *supportedBandwidthCombinationSet* and the *supportedBandwidthCombinationSetIntraENDC*. To determine whether the UE supports a channel bandwidth of 400 MHz, the network may ignore this capability and validate the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, and the *supportedBandwidthUL*. For serving cell(s) with other channel bandwidths the network validates the *channelBWs-UL*, the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, the *asymmetricBandwidthCombinationSet* (for a band supporting asymmetric channel bandwidth as defined in clause 5.3.6 of TS 38.101-1 [2]), *supportedBandwidthUL/supportedBandwidthUL-v1710* and *supportedMinBandwidthUL*. | Band | Yes | N/A | N/A |
| --- | --- | --- | --- | --- |