**3GPP TSG RAN WG1 #109-e R1-2204854**

**e-Meeting, May 9th – 20th, 2022**

**Agenda Item: 8.16.13**

**Source: Moderator (AT&T)**

**Title: Summary of UE features for DSS**

**Document for:** **Discussion/Decision**

# Introduction

This document presents the summary of email discussion/approval [109-e-R17-UE-features-DSS-01] during RAN1 #109-e. According to the Chairman’s Notes:

|  |
| --- |
| [109-e-R17-UE-features-DSS-01] Email discussion on UE features for DSS – Ralf (AT&T)   * 1st check point for LS to RAN2: May 13 * Final check point for any remaining issues: May 20 |

The following was discussed and/or agreed during RAN1 #109-e within the scope of [109-e-R17-UE-features-DSS-01]. All proposals are based on the latest RAN1 UE features list for Rel-17 NR in [1].

# Summary of Contributions Submitted to RAN1 #109-e

The following is the moderator’s summary of contributions submitted to RAN1 #109-e in this agenda item.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 34. NR\_DSS | 34-1 | Cross-carrier scheduling from SCell to PCell/PSCell with search space restrictions (Type A) | Support of Cross-carrier scheduling from sSCell to PCell/PSCell with search space restrictions (Type A)   1. Cross-carrier scheduling from sSCell to PCell/PSCell with CIF 2. Search space restrictions: sSCell USS set(s) (for CCS from sSCell to PCell/PSCell) and at least following search space sets on PCell/PSCell can only be configured such that UE does not monitor them in overlapping slot of PCell/PSCell and sSCell    * USS sets for DCI formats 0\_1,1\_1,0\_2,1\_2    * USS sets for DCI formats 0\_0,1\_0    * Type3-CSS set(s) for DCI formats 1\_0/0\_0 with C-RNTI/CS-RNTI/MCS-C-RNTI 3. Configuration of scaling factor α for BD and CCE limit handling and PDCCH overbooking handling on P(S)Cell 4. FFS: # The number of unicast DCI limits for PCell/PSCell scheduling  * Processing K1 unicast DCI scheduling DL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * Processing K2 unicast DCI scheduling UL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * FFS: N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60)  1. Same numerology between sSCell and P(S)Cell or sSCell SCS is larger than P(S)Cell SCS 2. USS set(s) for DCI format 0\_1,1\_1 configured on sSCell for CCS from sSCell to Pcell/PSCell and USS set(s) for DCI format 0\_2,1\_2 configured on sSCell for CCS from sSCell to PCell/PSCell if UE supports FG 11-1 (*dci-Format1-2And0-2-r16*) 3. sSCell USS set(s) (for CCS from sSCell to Pcell/PSCell) and Type0/0A/1/2 CSS sets on Pcell/PSCell can be configured so that the UE monitors them in overlapping slot of Pcell/PSCell and sSCell    * no simultaneous monitoring between ‘USS sets (for P(S)Cell scheduling) on sSCell’ and ‘Type 0/0A/1/2/CSS sets on P(S)Cell for DCI formats with CRC scrambled by C-RNTI/MCS-C-RNTI/CS-RNTI’    * simultaneous monitoring of ‘USS sets (for P(S)Cell scheduling) on sSCell’ and ‘Type 0/0A/1/2/CSS sets on P(S)Cell for DCI formats with CRC not scrambled by C-RNTI/MCS-C-RNTI/CS-RNTI’ 4. FFS: Support of monitoring DCI formats 0\_1,1\_1,0\_2,1\_2 on PCell/PSCell USS set(s) 5. PDCCH monitoring occasion(s) 6. FFS: frame boundary alignment between PCell/PSCell and sSCell | 6-5 | Yes | N/A | Cross-carrier scheduling from SCell to PCell/PSCell with search space restrictions (Type A) is not supported | Per BC | No | Applicable to FR1 only | No | Candidate value set: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), [{30,30}, {30,60},{60,60}])  [Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}]  Component 4 candidate values: (K1, K2) = {(1,1) for FDD P(S)Cell; (K1, K2) = (1,2) for TDD P(S)Cell, [(K1, K2) = (2,2) for FDD P(S)Cell; (K1, K2) = (2,4) for TDD P(S)Cell]}  Component 9 candidate values:  [Value 1: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first 3 OFDM symbols of a PCell/PSCell slot.  Value 2: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to the first 3 OFDM symbols of a PCell/PSCell slot]  Note: The CCS from sSCell to PCell is applicable to FR1 only but there can be other SCells in FR2 configured for the UE  Note: The SCell configured with Cross-carrier scheduling to PCell/PSCell is referred to as ‘sSCell’ | Optional with capability signalling |

|  |  |
| --- | --- |
| Company | Summary |
| Huawei/HiSilicon [2] | Regarding the component bullet 4 for FG 34-1 and the component bullet 4 for FG 34-2, the SCS 15 kHz, 30 kHz and 60 kHz are all typical SCSs in FR1, so the pairs that satisfy sSCell SCS is larger than or equal to P(S)Cell SCS should be supported. “FFS” can be removed.  The reason for introducing candidate value [(K1, K2) = (2,2) for FDD P(S)Cell; (K1, K2) = (2,4) for TDD P(S)Cell] for FG 34-1 needs to be further justified since FG 34-1 is assumed to be the basic one while the proposed candidate value is beyond some legacy UE capabilities. For example, a legacy UE does not support processing up to 4 unicast DCI scheduling UL on scheduling cell with SCS 15 kHz for a scheduled cell with SCS 15 kHz.  ***Proposal 1: Remove “FFS” from bullet 4 for FG 34-1 and bullet 4 for FG 34-2.***  ***Proposal 2: Remove the candidate value [(K1, K2) = (2,2) for FDD P(S)Cell; (K1, K2) = (2,4) for TDD P(S)Cell] from bullet 4 for FG 34-1.***  Regarding the component bullet 8 for FG 34-1:   * *FFS: Support of monitoring DCI formats 0\_1,1\_1,0\_2,1\_2 on PCell/PSCell USS set(s).*   The design of R17 DSS appears to be the simplest UE implementation to allow SCell scheduling PCell for DSS carrier. Therefore, the need of also allowing USS also on PCell may not be very significant and can be considered in future releases if necessary.  ***Proposal 3: Remove bullet 8 for FG 34-1.***  Regarding the component bullet 9 for FG 34-1 and the component bullet 7 for FG 34-2:   * *PDCCH monitoring occasion(s).*    + *Component 7 candidate values:*     - *[Value 1: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first 3 OFDM symbols of a PCell/PSCell slot.*     - *Value 2: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to the first 3 OFDM symbols of a PCell/PSCell slot]*   There were some attempt to clarify the candidate Value 2. Given that R17 DSS enh. is designed with single cell PDCCH budget, the PDCCH MO restriction for a UE supporting FG 34-1 can generally follow the UE capability of MO reported as legacy. This can be the interpretation of Value 2 instead of no restriction at all.  ***Proposal 4: Adopt the Value 1 in Component 9 for FG 34-1 and Component 7 for FG 34-2.***  ***Proposal 5: Clarify and adopt the Value 2 as PDCCH MO capability follows the UE capability about MO reported via FG 3-x (as legacy).***  Regarding the component bullet 10 for FG 34-1 and the component bullet 8 for FG 34-2:   * *FFS: frame boundary alignment between PCell/PSCell and sSCell.*   The basic operation with 34-1 and 34-2 can assume that the frame boundary is aligned between P(S)Cell and sSCell, therefore “FFS” can be removed. If necessary, a separate UE capability can be introduced to allow unaligned frame boundary for both operations.  ***Proposal 6: Remove “FFS” from bullet 10 for FG 34-1 and bullet 8 for FG 34-2.***  Regarding the Candidate value set for FG 34-1 and FG 34-2 in the “Note” column:   * *Candidate value set: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), [{30,30}, {30,60},{60,60})] [Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}]*   [{30,30}, {30,60},{60,60})] can be adopted for expanding the application scenarios and aligned with proposal 1. While since this capability is to be reported per BC and the most relevant factor is the SCS configuration of a CC as in usual CA capability, we do not see the motivation to adopt Candidate value set 2. The possible signaling overhead is also too much compared to the potential benefit it could bring.  ***Proposal 7: Adopt [{30,30}, {30,60},{60,60})] and remove candidate value set 2 for FG 34-1 and FG 34-2 in the “Note” column.***   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 34. NR\_DSS | 34-1 | Cross-carrier scheduling from SCell to PCell/PSCell with search space restrictions (Type A) | Support of Cross-carrier scheduling from sSCell to PCell/PSCell with search space restrictions (Type A)   1. Cross-carrier scheduling from sSCell to PCell/PSCell with CIF 2. Search space restrictions: sSCell USS set(s) (for CCS from sSCell to PCell/PSCell) and at least following search space sets on PCell/PSCell can only be configured such that UE does not monitor them in overlapping slot of PCell/PSCell and sSCell    * USS sets for DCI formats 0\_1,1\_1,0\_2,1\_2    * USS sets for DCI formats 0\_0,1\_0    * Type3-CSS set(s) for DCI formats 1\_0/0\_0 with C-RNTI/CS-RNTI/MCS-C-RNTI 3. Configuration of scaling factor α for BD and CCE limit handling and PDCCH overbooking handling on P(S)Cell 4. The number of unicast DCI limits for PCell/PSCell scheduling  * Processing K1 unicast DCI scheduling DL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * Processing K2 unicast DCI scheduling UL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * ~~FFS:~~ N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60)  1. Same numerology between sSCell and P(S)Cell or sSCell SCS is larger than P(S)Cell SCS 2. USS set(s) for DCI format 0\_1,1\_1 configured on sSCell for CCS from sSCell to Pcell/PSCell and USS set(s) for DCI format 0\_2,1\_2 configured on sSCell for CCS from sSCell to PCell/PSCell if UE supports FG 11-1 (*dci-Format1-2And0-2-r16*) 3. sSCell USS set(s) (for CCS from sSCell to Pcell/PSCell) and Type0/0A/1/2 CSS sets on Pcell/PSCell can be configured so that the UE monitors them in overlapping slot of Pcell/PSCell and sSCell    * no simultaneous monitoring between ‘USS sets (for P(S)Cell scheduling) on sSCell’ and ‘Type 0/0A/1/2/CSS sets on P(S)Cell for DCI formats with CRC scrambled by C-RNTI/MCS-C-RNTI/CS-RNTI’    * simultaneous monitoring of ‘USS sets (for P(S)Cell scheduling) on sSCell’ and ‘Type 0/0A/1/2/CSS sets on P(S)Cell for DCI formats with CRC not scrambled by C-RNTI/MCS-C-RNTI/CS-RNTI’ 4. ~~FFS: Support of monitoring DCI formats 0\_1,1\_1,0\_2,1\_2 on PCell/PSCell USS set(s)~~ 5. PDCCH monitoring occasion(s) 6. ~~FFS: f~~Frame boundary alignment between PCell/PSCell and sSCell | 6-5 | Yes | N/A | Cross-carrier scheduling from SCell to PCell/PSCell with search space restrictions (Type A) is not supported | Per BC | No | Applicable to FR1 only | No | Candidate value set: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), ~~[~~{30,30}, {30,60},{60,60}~~]~~)  ~~[Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}]~~  Component 4 candidate values: (K1, K2) = {(1,1) for FDD P(S)Cell; (K1, K2) = (1,2) for TDD P(S)Cell~~, [(K1, K2) = (2,2) for FDD P(S)Cell; (K1, K2) = (2,4) for TDD P(S)Cell]~~}  Component 9 candidate values:  ~~[~~Value 1: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first 3 OFDM symbols of a PCell/PSCell slot.  Value 2: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to the first 3 OFDM symbols of a PCell/PSCell slot (PDCCH MO capability follows the UE capability about MO reported via FG 3-x (as legacy))~~]~~  Note: The CCS from sSCell to PCell is applicable to FR1 only but there can be other SCells in FR2 configured for the UE  Note: The SCell configured with Cross-carrier scheduling to PCell/PSCell is referred to as ‘sSCell’ | Optional with capability signalling | |
| ZTE [3] | **Issue#1: FG34-1, 8) FFS: Support of monitoring DCI formats 0\_1,1\_1,0\_2,1\_2 on PCell/PSCell USS set(s)**  Based on the discussion, the main complexity from UE implementation on SCell scheduling PCell is the simultaneous monitoring of PDCCH on both Cells instead of the DCI formats. Meanwhile, it would be too restrictive if only fallback DCI formats can be used in PCell scheduling if sSCell experiences some heavy channel fade.  ***Proposal 1****: Include “Support of monitoring DCI formats 0\_1,1\_1,0\_2,1\_2 on PCell/PSCell USS set(s)” as a component for FG 34-1.*  **Issue#2: FG34-1 and FG34-2, supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz})**  The controversial part is whether to include “[{30,30}, {30,60},{60,60})]”. From our perspective, since it is anyway optional UE features and UE is allowed to indicate support or not for each SCS combination, they should not be excluded in the specification/feature group.  ***Proposal 2****: Include “{30,30}, {30,60},{60,60}” in the supported SCS combinations for FG34-1 and FG34-2.*  **Issue#3: FG34-1 and FG34-2, [Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}]**  Since we already have the component to allow UE to report the supported SCS combination, we don’t need this component to indicate the band pair. If this component is introduced, it basically means UE can indicate which Cell is allowed to be PCell and which is allowed to be SCell. This kind of reporting should be avoided.  ***Proposal 3****: Remove “Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}” fom FG34-1 and FG34-2.*  **Issue#4: FG34-1 and FG34-2, PDCCH monitoring occasion(s)**  Currently, the following two values are listed as potential values for PDCCH monitoring occasion(s) for FG34-1 and FG34-2. Our preference is not to have this component at all. However, if UE vendors really see the need of it, we can live with it.  ***Proposal 4****: further discuss whether to introduce the following values for PDCCH monitoring occasion(s) for FG34-1 and FG34-2.*  *Value 1: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first 3 OFDM symbols of a PCell/PSCell slot.*  *Value 2: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to the first 3 OFDM symbols of a PCell/PSCell slot*  **Issue#5: FG34-1 and FG34-2, FFS: frame boundary alignment between PCell/PSCell and sSCell**  During the discussion, companies didn’t figure out any spec impact to support sSCell scheduling PCell and unaligned frame boundary CA together. Since we already have one FG from Rel-16, we don’t think we need separate FG for sSCell scheduling PCell in case of unaligned frame boundary CA.  ***Proposal 5****: Remove “frame boundary alignment between PCell/PSCell and sSCell” for FG34-1 and FG34-2.* |
| Vivo [4] | * **Candidate values of Component 4 in FG34-1**   At the last meeting, a 2nd set of (K1, K2) value for the number of processed DCI per slot was proposed by companies. Considering that the monitoring occasions of the Pcell SS may be limited by the sScell SS when the sScell is deactivated/dormant, the new set of values aims to allowe more opportunities for Pcell self-scheduling with the support of more unicast DCIs per time slot. However, there are several issues regarding this new set.   1. The deactivation/dormancy of sScell is interpreted as a sign that there is no heavy traffic load on the Pcell and that the SS on the Pcell itself should be sufficient to satisfy the needs of Pcell scheduling. If relying on restricted SS on Pcell alone would be problematic, why would gNB deactivate sScell? 2. If the 2nd set of (K1, K2) value is supported and reported, e.g, if (K1, K2) = (2,2) is reported for a FDD Pcell, what’s the expected UE capability it refers to? Does it mean UE has to support all the following combiantions of #unicast DCI from different scheduling cells? If the new set is to allow more Pcell self-scheduling, there seems no reason to support case b) and case c).    1. 2 unicast UL or DL DCI for Pcell self-scheduling+0 unicast UL or DL DCI for sScell scheduling Pcell    2. 0 unicast UL or DL DCI for Pcell self-scheduling+2 unicast UL or DL DCI for sScell scheduling Pcell    3. 1 unicast UL or DL DCI for Pcell self-scheduling+1 unicast UL or DL DCI for sScell scheduling Pcell 3. If the 2nd set of (K1, K2) value is supported and reported, is UE expected to decode more unicast DCIs only when sScell is deactivated/dormant? Or does UE need to decode more unicast DCIs in every Pcell slot after reporting the new set of (K1, K2) value even if sScell scheduling Pcell is not configured yet or sScell is still activated/non-dormant? Note that in any case it requires the UE to increase the hardward capability, i.e., higher than that on non-DSS case, which seems to be out of the WI scope.   In conclusion, we think the motivation and corresponding requirements of the new 2nd set of (K1, K2) value are unclear, thus the 2nd set should be removed.  Proposal 1. For the UE feature on 34-1, the highlighted candidate value of K1/K2 for component 4 should be removed.   * **SCS combination and the granularity of FG 34-1/34-2**   In the last meeting, it was discussed whether the following candidate value sets were needed.  Candidate value set 1: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), [{30,30}, {30,60},{60,60})]  [Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}]  BandCombination ::= SEQUENCE {  bandList SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters,  featureSetCombination FeatureSetCombinationId,  ca-ParametersEUTRA CA-ParametersEUTRA OPTIONAL,  ca-ParametersNR CA-ParametersNR OPTIONAL,  mrdc-Parameters MRDC-Parameters OPTIONAL,  supportedBandwidthCombinationSet BIT STRING (SIZE (1..32)) OPTIONAL,  powerClass-v1530 ENUMERATED {pc2} OPTIONAL  }  First of all, 30/60kHz should be supported for Pcell SCS as sScell scheduling Pcell is a general feature for Pcell offloading. Sceond, this feature is reported per BC, but UE should not be mandated to support all possible combinations of {PCell/PSCell, sSCell} on the BC considering the practical scenarios for sScell scheduling Pcell/PScell would be very specific and highly demand-driven. For example, for a band combination (A, B, C) for CA, band B and band C are wide bands and band A is a narrow band, thus band B/C can be used as sScell to schedule PCell/PSCell on band A, but there is no need to force to UE to support sScell scheduling Pcell between band B and band C. Therefore, further details such as which band(s) in the reported BC can be used for PCell/PSCell and which one(s) are for sScell should be provided to avoid overcomplicated implementation. Therefore, both candidate value set and candidate value set2 should be included in the UE capability.  One way to move forward is to make the candiate value set2 as a separate FG. If it is not reported by UE together with FG 34-1/34-2 for a BC, it means UE support all possible band pairs of the BC for {PCell/PSCell, sSCell}. If value set2 is reported and set to one or more specific band pair(s), it means that UE only supports the indicated band pair(s) for {PCell/PSCell, sSCell}.  Proposal 2. For the UE feature on 34-1/34-2, the following aspects should be considered.   * + **Both candidate value set and candidate value set2 should be supported as part of 34-1 and 34-2**     - **Support {30,30}, {30,60}, {60,60}, and remove the highlighting and bracket on {30,30}, {30,60},{60,60} in candidate value set** |
| Xiaomi [5] | Component 4) defines UE capability on DCI processing. Considering PCell/PSCell is the scheduled cell, it is reasonable to define the number of unicast DCI limits for PCell/PSCell scheduling from perspective of PCell/PSCell. It also respects the spirit of defining processing DCI from scheduled cell perspective.  Another open issue is how to determine {K1,K2} value combination. Currently, the following {K1, K2} value has been agreed which complies the principle of FG 3-1.   * (K1, K2) = {(1,1) for FDD P(S)Cell; (K1, K2) = (1,2) for TDD P(S)Cell.   Additionally, more advanced (K1, K2) was also proposed in order to increase scheduling flexibility on the scheduled PCell/PSCell. Actually, we face the same situation for CCS with different numerology in Rel-16, i.e. a scheduled cell has a much smaller SCS compared to that of a scheduling cell. However, the limit on number of processing DCI is still defined per slot per scheduled cell. Hence we don’t see the necessity to introduce advanced (K1, K2) for CCS from SCell to PCell/PSCell.  **Proposal 1: Confirm the following component 4) for FG 34-1:**   |  | | --- | | 1. *The number of unicast DCI limits for PCell/PSCell scheduling*  * *Processing K1 unicast DCI scheduling DL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s)* * *Processing K2 unicast DCI scheduling UL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s)* * *N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60)* |     **Proposal 2: For FG 34-1, the candidate (K1,K2) values for component 4) should be (K1, K2) = {(1,1) for FDD P(S)Cell; (K1, K2) = (1,2) for TDD P(S)Cell}.**  Considering component 4) already address different SCS combinations between scheduled PCell/PSCell and scheduling SCell, i.e. same numerology or different numerology, component 5) becomes redundant and can be removed.  **Observation: For FG 34-1, component 5) is already covered by component 4) which can be removed.**  Regarding the supported DCI formats on PCell/PSCell, the highlighted texts already implies a FG 34-1 UE can monitor DCI foramts 0\_1, 1\_1, 0\_2, 1\_2 on PCell/PSCell USS sets. Therefore component 8) is not needed.   |  | | --- | | 1. Search space restrictions: sSCell USS set(s) (for CCS from sSCell to PCell/PSCell) and at least following search space sets on PCell/PSCell can only be configured such that UE does not monitor them in overlapping slot of PCell/PSCell and sSCell    * USS sets for DCI formats 0\_1,1\_1,0\_2,1\_2    * USS sets for DCI formats 0\_0,1\_0    * Type3-CSS set(s) for DCI formats 1\_0/0\_0 with C-RNTI/CS-RNTI/MCS-C-RNTI |   **Proposal 3: For FG 34-1, component 8) is already addressed by component 2) and should be removed.** |
| Samsung [6] | As for PDCCH monitoring occasion (MO), two candidate values have been discussed:   |  | | --- | | [Value 1: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first 3 OFDM symbols of a PCell/PSCell slot.  Value 2: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to the first 3 OFDM symbols of a PCell/PSCell slot] |   Current formulation is referring the MOs not only ‘on sSCell’ but also ‘on PCell/PSCell’. However, since the MOs for Type 0/0A/1/2 CSS do not have ‘the first 3 OFDM symbols’ restriction, it should be clarified to avoid unnecessary restriction. Further, it is understood that we are not targeting any symbol positions for ‘Value 2’. For example, in case of 15kHz PCell and 30kHz sSCell, the intended option would be either within in the first 3 OFDM symbols of the first sSCell slot or within the first 3 OFDM symbols of the second sSCell slot overlapping with the PCell slot.  **Proposal 2: Update component 9) and 7) for FG 34-1 and 34-2, respectively, and corresponding candidate values as following:**  Component: PDCCH monitoring occasion(s) on sSCell for cross-carrier scheduling to PCell/PSCell  Candidate values:  ~~[~~Value 1: ~~PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is~~ within the first 3 OFDM symbols of sSCell slot overlapping with the first 3 OFDM symbols of ~~a~~ PCell/PSCell slot.  Value 2: ~~PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to~~ within the first 3 OFDM symbols of any sSCell slot overlapping with ~~a~~ PCell/PSCell slot~~]~~  Regarding unaligned frame boundary for sSCell, RAN1 has not yet addressed whether it is supported or not.   |  | | --- | | **Conclusion (RAN1#106bis-e)**   * A UE configured for cross-carrier scheduling from SCell to P(S)Cell can also be configured with unaligned CA (i.e., using  *ca-SlotOffset* ), and a non-zero value for *ca-SlotOffset* can be configured at least for SCells other than the sSCell   + FFS: Whether case when sSCell is configured with non-zero *ca-SlotOffset* is supported and any associated capability signalling * Note: No additional L1 spec impact related to *ca-SlotOffset* had been identified |   Since RAN1 discussion under UE feature so far can be assumed that it is supported, we need to first agree upon that point. Then, next question is whether to have a separate FG or not. Our view is that it is good enough for a UE to indicate Rel-16 FG 18-7 (CA with non-aligned frame boundaries) and FG34-1 (or 34-2) with corresponding band combination, i.e., no separate FG for unaligned frame boundary for sSCell.  **Proposal 3: Support sSCell with non-zero *ca-SlotOffset*.**  **Proposal 4: Remove “FFS: frame boundary alignment between PCell/PSCell and sSCell” from FGs 34-1 and 34-2.**  In terms of the number of unicast DCI limits (component #4 for both FGs 34-1 and 34-2), the supported SCS combinations are still open. It is mainly whether or not to support PCell SCS beyond 15kHz:   * FFS: N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60)   We are open to discuss further in RAN1#109e. However, if RAN1 fails to converge in RAN1#109e, it would be better to remove (30, 30), (60, 60), and (30, 60) and close the discussion.  **Proposal 5: Conclude the supported SCS combinations in RAN1#109e. Otherwise, remove (30, 30), (60, 60), and (30, 60).**  RAN1 has agreed the following for Type A UE (FG 34-1):   |  | | --- | | 2) Search space restrictions: sSCell USS set(s) (for CCS from sSCell to PCell/PSCell) and at least following search space sets on PCell/PSCell can only be configured such that UE does not monitor them in overlapping slot of PCell/PSCell and sSCell   * + USS sets for DCI formats 0\_1,1\_1,0\_2,1\_2   + USS sets for DCI formats 0\_0,1\_0   + Type3-CSS set(s) for DCI formats 1\_0/0\_0 with C-RNTI/CS-RNTI/MCS-C-RNTI |   Therefore, the following component #8 can be removed for consistency:  8) FFS: Support of monitoring DCI formats 0\_1,1\_1,0\_2,1\_2 on PCell/PSCell USS set(s)  **Proposal 6: Remove component 8) for FG 34-1.** |
| OPPO [7] | **FG 34-1 component 8: Support of monitoring non-fallback unicast DCI on P(S)Cell USS**  According to RAN1 #105e agreement copied below, the USS monitoring for non-fallback unicast DCI is subject to UE’s support. Therefore, the component 8 should be maintained for FG34-1.   |  | | --- | | * For Type A UE   + At least following search space sets on P(S)Cell and search space sets on sSCell are configured so that the UE does not monitor them in overlapping [slot/symbol] of P(S)Cell and sSCell     - search space sets on P(S)Cell       * USS sets for DCI formats 0\_1,1\_1,0\_2,1\_2 (if supported for Type A UE)       * USS sets for DCI formats 0\_0,1\_0       * Type3-CSS set(s) for DCI formats 1\_0/0\_0 with C-RNTI/CS-RNTI/MCS-C-RNTI     - search space sets on sSCell       * USS set(s) for scheduling P(S)Cell |   ***Proposal 2: The component 8 of FG34-1 (currently marked FFS) should be maintained (i.e., remove wording “FFS”).***  **FG 34-1 and FG 34-2: Supported SCS combinations**  The justification of the DSS WID mentions the WID motivation is to enhance the scheduling capacity on the carrier shared between LTE and NR. From this understanding, the SCS combinations of {P(S)Cell\_SCS, sSCell\_SCS} should not include those with P(S)Cell\_SCS≠15kHz. However, it does not harm, and the RAN1 study in this WID does not restrict either, to have P(S)Cell\_SCS go beyond 15kHz. Consequently, the value N in component 4 can be calculated against all allowable SCS combinations (as currently stated in the table).  ***Proposal 1: SCS combinations of {30,30}, {30,60} and {60,60} are included in the candidate list that can be indicated by the UE.***   * ***The value of N in component 4 covers all allowed SCS combinations as currently listed in the table (i.e., just remove wording “FFS”).***   **FG 34-1 component 10 & FG 34-2 component 8: Frame boundary misalignment between P(S)Cell and sSCell**  The existing CA frame boundary misalignment is reflected in FG 18-7 (Inter-band CA with non-aligned frame boundaries) and FG 18-7a (Inter-band CA with non-aligned frame boundaries between SpCell and SCell within the same cell group), both of which are per BC. It should be noted that, whether to support non-aligned frame boundary between P(S)Cell and sSCell for Rel-17 sSCell-to-P(S)Cell CCS is still not decided yet.   * If non-aligned frame boundary between P(S)Cell and sSCell is supported in Rel-17 (as a UE capability), FG 34-1 component 10 and FG 34-2 component 8 should be maintained. * If non-aligned frame boundary between P(S)Cell and sSCell is not supported in Rel-17, FG 34-1 component 10 and FG 34-2 component 8 need to be removed.   We do not see strong motivation to support non-aligned frame boundary between P(S)Cell and sSCell; on the other hand, we can also be open to such support as a UE capability if this is the majority preference. Nevertheless, if such UE capability is supported, we would like to confirm that there is no correlation between this UE capability and the Rel-16 UE capabilities in supporting:   * Non-aligned frame boundary between P(S)Cell and SCell in P(S)Cell-to-SCell CCS, even for the case where the SCell in the Rel-16 capability and the sSCell in the Rel-17 capability refer to the same cell. * Non-aligned frame boundary between Rel-16 scheduling SCell and its corresponding scheduled SCell, even for the case where the SCell in the Rel-16 capability and the P(S)Cell are in the same band.   ***Proposal 3: If non-aligned frame boundary between P(S)Cell and sSCell is supported as a UE capability, such capability is independent from the Rel-16 UE capabilities including the support of:***   * ***Non-aligned frame boundary between P(S)Cell and SCell in P(S)Cell-to-SCell CCS, even for the case where the SCell in the Rel-16 capability and the sSCell in the Rel-17 capability refer to the same cell.*** * ***Non-aligned frame boundary between Rel-16 scheduling SCell and its corresponding scheduled SCell, even for the case where the SCell in the Rel-16 capability and the P(S)Cell are in the same band.*** |
| Apple [8] |  |
| Nokia/Nokia Shanghai Bell [9] | Support of Cross-carrier scheduling (CCS) from sSCell to PCell/PSCell (Type B)   1. Cross-carrier scheduling from sSCell to PCell/PSCell with CIF 2. sSCell USS set(s) (for CCS from sSCell to PCell/PSCell) and search space sets on PCell/PSCell can be configured so that the UE monitors them in overlapping slot of PCell/PSCell and sSCell 3. Configuration of scaling factor α for BD and CCE limit handling and PDCCH overbooking handling on P(S)Cell 4. The number of unicast DCI limits for PCell/PSCell scheduling  * Processing K1 unicast DCI scheduling DL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * Processing K2 unicast DCI scheduling UL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * FFS: N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60)  1. Same numerology between sSCell and P(S)Cell or sSCell SCS is larger than P(S)Cell SCS 2. USS set(s) for DCI format 0\_1,1\_1 configured on sSCell for CCS from sSCell to PCell/PSCell and USS set(s) for DCI format 0\_2,1\_2 configured on sSCell for CCS from sSCell to PCell/PSCell if UE supports FG 11-1 (*dci-Format1-2And0-2-r16*) 3. PDCCH monitoring occasion(s) 4. FFS: frame boundary alignment between PCell/PSCell and sSCell 5. The same components as with Rel-15 cross-carrier scheduling and Rel-16 cross-carrier scheduling with different SCS should be automatically included by corresponding FGs, if supported by the UE, and the ability for the PCell to be the scheduled cell does not impact those functionalities. Hence, this component is redundant. Given it has been agreed to already, it should include at least all combinations already supported by Rel-15/16. The DCI processing capacity should not be impacted by the fact that the scheduling cell is not a PCell, and thus Rel-16 capability here should apply. 6. This component is not needed if only defining the minimum already supported by R15 UEs. If defined candidate values need to be precise on what are the possible PDCCH monitoring occasions, i.e. it is not enough to say it is not restricted to the first 3 OFDM symbols in PCell/PSCell slot, as no UE will indicate support to this value in practice. 7. This is a basic requirement, could be confirmed or removed as redundant. |
| MediaTek Inc. [10] | For the “note” column of UE feature 34-2 (Type B UE, more advanced UE), the following is captured for component 4:   * Component 4 candidate values: (K1, K2) = {(1,1) for FDD P(S)Cell; (K1, K2) = (1,2) for TDD P(S)Cell}   However, for the “note” column of UE feature 34-1 (Type A UE, more basic UE), the following is captured for component 4:   * Component 4 candidate values: (K1, K2) = {(1,1) for FDD P(S)Cell; (K1, K2) = (1,2) for TDD P(S)Cell, [(K1, K2) = (2,2) for FDD P(S)Cell; (K1, K2) = (2,4) for TDD P(S)Cell]}   **Observation 1: For the “note” column of UE feature 34-2 (Type B UE, more advanced UE) and UE feature 34-1 (Type A UE, more basic UE), the description of “Component 4 candidate values” are different and 34-1 (Type A UE, more basic UE) possesses a potentially more advanced DCI processing capability than 34-2 (Type B UE, more advanced UE), which is not reasonable.**  Hence, we have the following proposal:  **Proposal 1: For the “note” column, align the description of “Component 4 candidate values” of 34-1 (Type A UE, more basic UE) with 34-2 (Type B UE, more advanced UE):**  **Component 4 candidate values: (K1, K2) = {(1,1) for FDD P(S)Cell; (K1, K2) = (1,2) for TDD P(S)Cell~~, [(K1, K2) = (2,2) for FDD P(S)Cell; (K1, K2) = (2,4) for TDD P(S)Cell]~~}**   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 34. NR\_DSS | 34-1 | Cross-carrier scheduling from SCell to PCell/PSCell with search space restrictions (Type A) | Support of Cross-carrier scheduling from sSCell to PCell/PSCell with search space restrictions (Type A)   1. Cross-carrier scheduling from sSCell to PCell/PSCell with CIF 2. Search space restrictions: sSCell USS set(s) (for CCS from sSCell to PCell/PSCell) and at least following search space sets on PCell/PSCell can only be configured such that UE does not monitor them in overlapping slot of PCell/PSCell and sSCell    * USS sets for DCI formats 0\_1,1\_1,0\_2,1\_2    * USS sets for DCI formats 0\_0,1\_0    * Type3-CSS set(s) for DCI formats 1\_0/0\_0 with C-RNTI/CS-RNTI/MCS-C-RNTI 3. Configuration of scaling factor α for BD and CCE limit handling and PDCCH overbooking handling on P(S)Cell 4. FFS: # The number of unicast DCI limits for PCell/PSCell scheduling  * Processing K1 unicast DCI scheduling DL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * Processing K2 unicast DCI scheduling UL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * FFS: N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60)  1. Same numerology between sSCell and P(S)Cell or sSCell SCS is larger than P(S)Cell SCS 2. USS set(s) for DCI format 0\_1,1\_1 configured on sSCell for CCS from sSCell to Pcell/PSCell and USS set(s) for DCI format 0\_2,1\_2 configured on sSCell for CCS from sSCell to PCell/PSCell if UE supports FG 11-1 (*dci-Format1-2And0-2-r16*) 3. sSCell USS set(s) (for CCS from sSCell to Pcell/PSCell) and Type0/0A/1/2 CSS sets on Pcell/PSCell can be configured so that the UE monitors them in overlapping slot of Pcell/PSCell and sSCell    * no simultaneous monitoring between ‘USS sets (for P(S)Cell scheduling) on sSCell’ and ‘Type 0/0A/1/2/CSS sets on P(S)Cell for DCI formats with CRC scrambled by C-RNTI/MCS-C-RNTI/CS-RNTI’    * simultaneous monitoring of ‘USS sets (for P(S)Cell scheduling) on sSCell’ and ‘Type 0/0A/1/2/CSS sets on P(S)Cell for DCI formats with CRC not scrambled by C-RNTI/MCS-C-RNTI/CS-RNTI’ 4. FFS: Support of monitoring DCI formats 0\_1,1\_1,0\_2,1\_2 on PCell/PSCell USS set(s) 5. PDCCH monitoring occasion(s) 6. FFS: frame boundary alignment between PCell/PSCell and sSCell | 6-5 | Yes | N/A | Cross-carrier scheduling from SCell to PCell/PSCell with search space restrictions (Type A) is not supported | Per BC | No | Applicable to FR1 only | No | Candidate value set: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), [{30,30}, {30,60},{60,60}])  [Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}]  Component 4 candidate values: (K1, K2) = {(1,1) for FDD P(S)Cell; (K1, K2) = (1,2) for TDD P(S)Cell~~, [(K1, K2) = (2,2) for FDD P(S)Cell; (K1, K2) = (2,4) for TDD P(S)Cell]~~}  Component 9 candidate values:  [Value 1: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first 3 OFDM symbols of a PCell/PSCell slot.  Value 2: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to the first 3 OFDM symbols of a PCell/PSCell slot]  Note: The CCS from sSCell to PCell is applicable to FR1 only but there can be other SCells in FR2 configured for the UE  Note: The SCell configured with Cross-carrier scheduling to PCell/PSCell is referred to as ‘sSCell’ | Optional with capability signalling | |
| Ericsson [11] | For FG 34-1 (Type A) UE   * Regarding text related to support of 30/60kHz SCS for P(S)Cell) we propose the following   + Confirm yellow parts in below text. i.e, confirm indication of supported P(S)Cell SCS including 30/60kHz SCS for P(S)Cell, and also confirm indication of candidate value set 2 indicating frequency band pair(s) for P(S)Cell and sSCell     - Component 4: “… FFS: N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60) ”     - Notes: Candidate value set: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), [{30,30}, {30,60},{60,60}]); [Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}] * Regarding text related to additional values of K1, K2, as discussed in [2], it is preferable to allow the possibility of more #unicast DCIs per MO due the TDM restriction on search space set configurations for Type A UE. When sSCell is deactivated, the P(S)Cell USS PDCCH monitoring would still have the TDM restriction (i.e., to avoid overlap USS sets configured for sSCell) and having more #DCIs per MO is helpful in such case by allowing possibility for cross-slot scheduling (i.e., along with mandatory UE capabilities FG 5-30/5-30a). We support additional (K1,K2) values in yellow part considering this aspect and propose the following   + Confirm yellow parts in below text. i.e., additional values of K1, K2.     - Component 4 candidate values: (K1, K2) = {(1,1) for FDD P(S)Cell; (K1, K2) = (1,2) for TDD P(S)Cell, [(K1, K2) = (2,2) for FDD P(S)Cell; (K1, K2) = (2,4) for TDD P(S)Cell]} * Regarding candidate value description of Component 9) in Notes column, considering the discussion in RAN1#108-e we propose the following   + Update the description for Value1 and Value2 and also include a Note as given below     - Value 1: If UE indicates FG 22-12 and P(S)Cell SCS is 15kHz, PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within a single span of any three contiguous OFDM symbols that are within the first four OFDM symbols in a PCell/PSCell slot; otherwise, PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first three OFDM symbols in a PCell/PSCell slot.     - Value 2: The description of Value 1 is not applied     - Note: Regardless of Value 1 or Value2, other UE capability indications related to PDCCH monitoring on P(S)Cell or PDCCH monitoring on sSCell are still applicable. * Regarding Component 8), FFS: Support of monitoring DCI formats 0\_1,1\_1,0\_2,1\_2 on PCell/PSCell USS set(s),   + Our preference is to Support of monitoring DCI formats 0\_1,1\_1,0\_2,1\_2 on PCell/PSCell USS set(s)   + As explained in our previous contribution [2], considering the agreements made in RAN1#105-e and RAN1#107-e (i.e., subsequent meetings after the RAN1#104b-e WA) on PDCCH BD/CCE handling and PDCCH overbooking handling (relevant agreements shown in Annex A), there is no benefit to restrict DCI formats 0\_1,1\_1,0\_2,1\_2 (for P(S)Cell scheduling) only on sSCell USS set(s) while there are several disadvantages     - Such restriction does not provide any BD complexity reduction for the UE since the agreed BD handling and overbooking handling should still be applied. It also does not provide benefit from PDCCH monitoring perspective since monitoring of DCI formats 0-0 and 1-0 using USS sets on P(S)Cell is anyway allowed.     - Introduction of such restriction (on top of already agreed TDM restriction in RAN1#105-e) would mean essential functionalities (e.g., related to MIMO and CSI triggering) provided by DCI formats 0\_1,1\_1 are precluded for P(S)Cell self-scheduling when sSCell is deactivated (sSCell must be removed via RRC reconfiguration to ‘recover’ the functionality of DCI formats 0\_1,1\_1 on P(S)Cell). When the sSCell is in good radio condition, it must be always be activated regardless of data bursts present or not, which has significant negative impact on UE power consumption. Also, frequent RRC reconfigurations using the limited TDM restricted USS sets on P(S)Cell must be done to remove/add the sSCell based on varying radio conditions.   + In spite of the disadvantages of restricting DCI formats 0\_1,1\_1,0\_2,1\_2 (for P(S)Cell scheduling) only on sSCell USS set(s), if proponents still see to need to support such UE, we propose to discuss such UE as a separate FG 34 instead of discussing it within context of Type A UE in 34-1. * Regarding Component 10), our preference is to support unaligned CA between P(S)Cell and sSCell in FG 34-2. However, considering discussion so far, we are also OK to capture support for unaligned CA as a separate FG. We propose the following   + Confirm current yellow text in component 10) “frame boundary alignment between PCell/PSCell and sSCell”   + Add following Notes column (relevant conclusion made in RAN1#106b-e) – “Note: Non-zero value for *ca-SlotOffset* can be configured for SCells other than the sSCell”   + Add new FG row FG 34-1x “Support of CCS from sSCell to PCell/PSCell Type A with non-aligned frame boundary between PCell/PSCell and sSCell” |
| Qualcomm Incorporated [12] | FG34-1: Cross-carrier scheduling from SCell to PCell/PSCell with search space restrictions (Type A)   * Candidate value set: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), [{30,30}, {30,60},{60,60}])   + [Qualcomm] So far, we do not see a use-case of cross-carrier scheduling from sSCell to P(S)Cell when P(S)Cell SCS is not 15kHz. * [Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}]   + [Qualcomm] We propose to confirm this by removing the square blacket because of the following reason:     - The feature is supposed to be used in a DSS carrier. For a DSS carrier, the UE is typically configured with LTE-CRS rate-matching for PDSCH. The relevant FGs for LTE-CRS rate-matching, FG5-28, FG14-1, and FG14-1a, are per-band capability. Therefore, for a given CA band combination, the UE may not support DSS features in all the bands. If the UE is not able to report frequency band pair(s) of {PCell/PSCell, sSCell} in a CA band combination, the UE has to support Rel-17 cross-carrier scheduling for any pair bands of {PCell/PSCell, sSCell}, including the pair(s) where there is no DSS operation on PCell/PSCell. This must cause interoperability issue. * Component 4): FFS: N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60)   + [Qualcomm] So far, we do not see a use-case of cross-carrier scheduling from sSCell to P(S)Cell when P(S)Cell SCS is not 15kHz. * Component 4) candidate values of K1, K2: [(K1, K2) = (2,2) for FDD P(S)Cell; (K1, K2) = (2,4) for TDD P(S)Cell]   + [Qualcomm] We are OK to confirm this by removing the square blacket * Component 9) candidate values: [Value 1: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first 3 OFDM symbols of a PCell/PSCell slot. Value 2: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to the first 3 OFDM symbols of a PCell/PSCell slot]   + [Qualcomm] We support having these candidate values. Value 2 essentially requires UE to implement “PDCCH case 2” equivalent and hence should not be mandated. We propose to confirm both values by removing the square blacket. * Component 10) FFS: frame boundary alignment between PCell/PSCell and sSCell   + [Qualcomm] During WI discussion, RAN1 agreed to support unaligned boundary between two cells other than PCell/PSCell and sSCell. Therefore, regardless of wether or not the component 10) is present, unaligned CA between PCell/PSCell and sSCell is not supported. We are OK to enable unaligned CA between PCell/PSCell and sCell if an optional UE capability is defined. We propose to delete the FFS to confirm the component 10), and discuss a separate FG for unaligned CA between PCell/PSCell and sSCell. Example is provided in the table below as FG34-3.  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 34. NR\_DSS | 34-1 | Cross-carrier scheduling from SCell to PCell/PSCell with search space restrictions (Type A) | Support of Cross-carrier scheduling from sSCell to PCell/PSCell with search space restrictions (Type A)   1. Cross-carrier scheduling from sSCell to PCell/PSCell with CIF 2. Search space restrictions: sSCell USS set(s) (for CCS from sSCell to PCell/PSCell) and at least following search space sets on PCell/PSCell can only be configured such that UE does not monitor them in overlapping ~~[~~slot~~/symbol]~~ of PCell/PSCell and sSCell    * USS sets for DCI formats 0\_1,1\_1,0\_2,1\_2    * USS sets for DCI formats 0\_0,1\_0    * Type3-CSS set(s) for DCI formats 1\_0/0\_0 with C-RNTI/CS-RNTI/MCS-C-RNTI 3. Configuration of scaling factor α for BD and CCE limit handling and PDCCH overbooking handling on P(S)Cell 4. The number of unicast DCI limits for PCell/PSCell scheduling  * Processing K1 unicast DCI scheduling DL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * Processing K2 unicast DCI scheduling UL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * ~~FFS:~~ N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15)~~, (30,30), (60,60)~~ and N=2 for (15,30)~~, (30,60)~~ and N=4 for (15, 60)  1. Same numerology between sSCell and P(S)Cell or sSCell SCS is larger than P(S)Cell SCS 2. USS set(s) for DCI format 0\_1,1\_1 configured on sSCell for CCS from sSCell to Pcell/PSCell and USS set(s) for DCI format 0\_2,1\_2 configured on sSCell for CCS from sSCell to PCell/PSCell if UE supports FG 11-1 (*dci-Format1-2And0-2-r16*) 3. sSCell USS set(s) (for CCS from sSCell to Pcell/PSCell) and Type0/0A/1/2 CSS sets on Pcell/PSCell can be configured so that the UE monitors them in overlapping ~~[~~slot~~/symbol]~~ of Pcell/PSCell and sSCell    * no simultaneous monitoring between ‘USS sets (for P(S)Cell scheduling) on sSCell’ and ‘Type 0/0A/1/2/CSS sets on P(S)Cell for DCI formats with CRC scrambled by C-RNTI/MCS-C-RNTI/CS-RNTI’    * simultaneous monitoring of ‘USS sets (for P(S)Cell scheduling) on sSCell’ and ‘Type 0/0A/1/2/CSS sets on P(S)Cell for DCI formats with CRC not scrambled by C-RNTI/MCS-C-RNTI/CS-RNTI’ 4. ~~FFS:~~ Support of monitoring DCI formats 0\_1,1\_1,0\_2 (if supported),1\_2 (if supported) on PCell/PSCell USS set(s) 5. PDCCH monitoring occasion(s)   ~~FFS:~~ frame boundary alignment between PCell/PSCell and sSCell | 6-5 | Yes | N/A | Cross-carrier scheduling from SCell to PCell/PSCell with search space restrictions (Type A) is not supported | Per BC | No | Applicable to FR1 only | No | Candidate value set: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), ~~[{30,30}, {30,60},{60,60}])~~  ~~[~~Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}~~]~~  Component 4 candidate values: (K1, K2) = {(1,1) for FDD P(S)Cell; (K1, K2) = (1,2) for TDD P(S)Cell, ~~[~~(K1, K2) = (2,2) for FDD P(S)Cell; (K1, K2) = (2,4) for TDD P(S)Cell~~]~~}  Component 9 candidate values:  ~~[~~Value 1: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first 3 OFDM symbols of a PCell/PSCell slot.  Value 2: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to the first 3 OFDM symbols of a PCell/PSCell slot~~]~~  Note: The CCS from sSCell to PCell is applicable to FR1 only but there can be other SCells in FR2 configured for the UE  Note: The SCell configured with Cross-carrier scheduling to PCell/PSCell is referred to as ‘sSCell’ | Optional with capability signalling | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 34. NR\_DSS | 34-2 | Cross-carrier scheduling from SCell to PCell/PSCell (Type B) | Support of Cross-carrier scheduling (CCS) from sSCell to PCell/PSCell (Type B)   1. Cross-carrier scheduling from sSCell to PCell/PSCell with CIF 2. sSCell USS set(s) (for CCS from sSCell to PCell/PSCell) and search space sets on PCell/PSCell can be configured so that the UE monitors them in overlapping slot of PCell/PSCell and sSCell 3. Configuration of scaling factor α for BD and CCE limit handling and PDCCH overbooking handling on P(S)Cell 4. The number of unicast DCI limits for PCell/PSCell scheduling  * Processing K1 unicast DCI scheduling DL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * Processing K2 unicast DCI scheduling UL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * FFS: N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60)  1. Same numerology between sSCell and P(S)Cell or sSCell SCS is larger than P(S)Cell SCS 2. USS set(s) for DCI format 0\_1,1\_1 configured on sSCell for CCS from sSCell to PCell/PSCell and USS set(s) for DCI format 0\_2,1\_2 configured on sSCell for CCS from sSCell to PCell/PSCell if UE supports FG 11-1 (*dci-Format1-2And0-2-r16*) 3. PDCCH monitoring occasion(s) 4. FFS: frame boundary alignment between PCell/PSCell and sSCell | 6-5 | Yes | N/A | Cross-carrier scheduling from SCell to PCell/PSCell (Type B) is not supported | Per BC | No | Applicable to FR1 only | No | Candidate value set: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), [{30,30}, {30,60},{60,60})]  [Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}]  Component 4 candidate values: (K1, K2) = {(1,1) for FDD P(S)Cell; (K1, K2) = (1,2) for TDD P(S)Cell}  Component 7 candidate values:  [Value 1: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first 3 OFDM symbols of a PCell/PSCell slot.  Value 2: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to the first 3 OFDM symbols of a PCell/PSCell slot]  Note: The CCS from sSCell to Pcell is applicable to FR1 only but there can be other Scells in FR2 configured for the UE  Note: The SCell configured with Cross-carrier scheduling to PCell/PSCell is referred to as ‘sSCell’ | Optional with capability signalling |

|  |  |
| --- | --- |
| Company | Summary |
| Huawei/HiSilicon [2] | Regarding the component bullet 4 for FG 34-1 and the component bullet 4 for FG 34-2, the SCS 15 kHz, 30 kHz and 60 kHz are all typical SCSs in FR1, so the pairs that satisfy sSCell SCS is larger than or equal to P(S)Cell SCS should be supported. “FFS” can be removed.  The reason for introducing candidate value [(K1, K2) = (2,2) for FDD P(S)Cell; (K1, K2) = (2,4) for TDD P(S)Cell] for FG 34-1 needs to be further justified since FG 34-1 is assumed to be the basic one while the proposed candidate value is beyond some legacy UE capabilities. For example, a legacy UE does not support processing up to 4 unicast DCI scheduling UL on scheduling cell with SCS 15 kHz for a scheduled cell with SCS 15 kHz.  ***Proposal 1: Remove “FFS” from bullet 4 for FG 34-1 and bullet 4 for FG 34-2.***  ***Proposal 2: Remove the candidate value [(K1, K2) = (2,2) for FDD P(S)Cell; (K1, K2) = (2,4) for TDD P(S)Cell] from bullet 4 for FG 34-1.***  Regarding the component bullet 9 for FG 34-1 and the component bullet 7 for FG 34-2:   * *PDCCH monitoring occasion(s).*    + *Component 7 candidate values:*     - *[Value 1: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first 3 OFDM symbols of a PCell/PSCell slot.*     - *Value 2: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to the first 3 OFDM symbols of a PCell/PSCell slot]*   There were some attempt to clarify the candidate Value 2. Given that R17 DSS enh. is designed with single cell PDCCH budget, the PDCCH MO restriction for a UE supporting FG 34-1 can generally follow the UE capability of MO reported as legacy. This can be the interpretation of Value 2 instead of no restriction at all.  ***Proposal 4: Adopt the Value 1 in Component 9 for FG 34-1 and Component 7 for FG 34-2.***  ***Proposal 5: Clarify and adopt the Value 2 as PDCCH MO capability follows the UE capability about MO reported via FG 3-x (as legacy).***  Regarding the component bullet 10 for FG 34-1 and the component bullet 8 for FG 34-2:   * *FFS: frame boundary alignment between PCell/PSCell and sSCell.*   The basic operation with 34-1 and 34-2 can assume that the frame boundary is aligned between P(S)Cell and sSCell, therefore “FFS” can be removed. If necessary, a separate UE capability can be introduced to allow unaligned frame boundary for both operations.  ***Proposal 6: Remove “FFS” from bullet 10 for FG 34-1 and bullet 8 for FG 34-2.***  Regarding the Candidate value set for FG 34-1 and FG 34-2 in the “Note” column:   * *Candidate value set: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), [{30,30}, {30,60},{60,60})] [Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}]*   [{30,30}, {30,60},{60,60})] can be adopted for expanding the application scenarios and aligned with proposal 1. While since this capability is to be reported per BC and the most relevant factor is the SCS configuration of a CC as in usual CA capability, we do not see the motivation to adopt Candidate value set 2. The possible signaling overhead is also too much compared to the potential benefit it could bring.  ***Proposal 7: Adopt [{30,30}, {30,60},{60,60})] and remove candidate value set 2 for FG 34-1 and FG 34-2 in the “Note” column.***   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 34. NR\_DSS | 34-2 | Cross-carrier scheduling from SCell to PCell/PSCell (Type B) | Support of Cross-carrier scheduling (CCS) from sSCell to PCell/PSCell (Type B)   1. Cross-carrier scheduling from sSCell to PCell/PSCell with CIF 2. sSCell USS set(s) (for CCS from sSCell to PCell/PSCell) and search space sets on PCell/PSCell can be configured so that the UE monitors them in overlapping slot of PCell/PSCell and sSCell 3. Configuration of scaling factor α for BD and CCE limit handling and PDCCH overbooking handling on P(S)Cell 4. The number of unicast DCI limits for PCell/PSCell scheduling  * Processing K1 unicast DCI scheduling DL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * Processing K2 unicast DCI scheduling UL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * ~~FFS:~~ N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60)  1. Same numerology between sSCell and P(S)Cell or sSCell SCS is larger than P(S)Cell SCS 2. USS set(s) for DCI format 0\_1,1\_1 configured on sSCell for CCS from sSCell to PCell/PSCell and USS set(s) for DCI format 0\_2,1\_2 configured on sSCell for CCS from sSCell to PCell/PSCell if UE supports FG 11-1 (*dci-Format1-2And0-2-r16*) 3. PDCCH monitoring occasion(s) 4. ~~FFS: f~~Frame boundary alignment between PCell/PSCell and sSCell | 6-5 | Yes | N/A | Cross-carrier scheduling from SCell to PCell/PSCell (Type B) is not supported | Per BC | No | Applicable to FR1 only | No | Candidate value set: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), ~~[~~{30,30}, {30,60},{60,60})~~]~~  ~~[Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}]~~  Component 4 candidate values: (K1, K2) = {(1,1) for FDD P(S)Cell; (K1, K2) = (1,2) for TDD P(S)Cell}  Component 7 candidate values:  ~~[~~Value 1: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first 3 OFDM symbols of a PCell/PSCell slot.  Value 2: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to the first 3 OFDM symbols of a PCell/PSCell slot (PDCCH MO capability follows the UE capability about MO reported via FG 3-x (as legacy))~~]~~  Note: The CCS from sSCell to Pcell is applicable to FR1 only but there can be other Scells in FR2 configured for the UE  Note: The SCell configured with Cross-carrier scheduling to PCell/PSCell is referred to as ‘sSCell’ | Optional with capability signalling | |
| ZTE [3] | **Issue#2: FG34-1 and FG34-2, supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz})**  The controversial part is whether to include “[{30,30}, {30,60},{60,60})]”. From our perspective, since it is anyway optional UE features and UE is allowed to indicate support or not for each SCS combination, they should not be excluded in the specification/feature group.  ***Proposal 2****: Include “{30,30}, {30,60},{60,60}” in the supported SCS combinations for FG34-1 and FG34-2.*  **Issue#3: FG34-1 and FG34-2, [Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}]**  Since we already have the component to allow UE to report the supported SCS combination, we don’t need this component to indicate the band pair. If this component is introduced, it basically means UE can indicate which Cell is allowed to be PCell and which is allowed to be SCell. This kind of reporting should be avoided.  ***Proposal 3****: Remove “Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}” fom FG34-1 and FG34-2.*  **Issue#4: FG34-1 and FG34-2, PDCCH monitoring occasion(s)**  Currently, the following two values are listed as potential values for PDCCH monitoring occasion(s) for FG34-1 and FG34-2. Our preference is not to have this component at all. However, if UE vendors really see the need of it, we can live with it.  ***Proposal 4****: further discuss whether to introduce the following values for PDCCH monitoring occasion(s) for FG34-1 and FG34-2.*  *Value 1: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first 3 OFDM symbols of a PCell/PSCell slot.*  *Value 2: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to the first 3 OFDM symbols of a PCell/PSCell slot*  **Issue#5: FG34-1 and FG34-2, FFS: frame boundary alignment between PCell/PSCell and sSCell**  During the discussion, companies didn’t figure out any spec impact to support sSCell scheduling PCell and unaligned frame boundary CA together. Since we already have one FG from Rel-16, we don’t think we need separate FG for sSCell scheduling PCell in case of unaligned frame boundary CA.  ***Proposal 5****: Remove “frame boundary alignment between PCell/PSCell and sSCell” for FG34-1 and FG34-2.* |
| Vivo [4] | * **SCS combination and the granularity of FG 34-1/34-2**   In the last meeting, it was discussed whether the following candidate value sets were needed.  Candidate value set 1: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), [{30,30}, {30,60},{60,60})]  [Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}]  BandCombination ::= SEQUENCE {  bandList SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters,  featureSetCombination FeatureSetCombinationId,  ca-ParametersEUTRA CA-ParametersEUTRA OPTIONAL,  ca-ParametersNR CA-ParametersNR OPTIONAL,  mrdc-Parameters MRDC-Parameters OPTIONAL,  supportedBandwidthCombinationSet BIT STRING (SIZE (1..32)) OPTIONAL,  powerClass-v1530 ENUMERATED {pc2} OPTIONAL  }  First of all, 30/60kHz should be supported for Pcell SCS as sScell scheduling Pcell is a general feature for Pcell offloading. Sceond, this feature is reported per BC, but UE should not be mandated to support all possible combinations of {PCell/PSCell, sSCell} on the BC considering the practical scenarios for sScell scheduling Pcell/PScell would be very specific and highly demand-driven. For example, for a band combination (A, B, C) for CA, band B and band C are wide bands and band A is a narrow band, thus band B/C can be used as sScell to schedule PCell/PSCell on band A, but there is no need to force to UE to support sScell scheduling Pcell between band B and band C. Therefore, further details such as which band(s) in the reported BC can be used for PCell/PSCell and which one(s) are for sScell should be provided to avoid overcomplicated implementation. Therefore, both candidate value set and candidate value set2 should be included in the UE capability.  One way to move forward is to make the candiate value set2 as a separate FG. If it is not reported by UE together with FG 34-1/34-2 for a BC, it means UE support all possible band pairs of the BC for {PCell/PSCell, sSCell}. If value set2 is reported and set to one or more specific band pair(s), it means that UE only supports the indicated band pair(s) for {PCell/PSCell, sSCell}.  Proposal 2. For the UE feature on 34-1/34-2, the following aspects should be considered.   * + **Both candidate value set and candidate value set2 should be supported as part of 34-1 and 34-2**     - **Support {30,30}, {30,60}, {60,60}, and remove the highlighting and bracket on {30,30}, {30,60},{60,60} in candidate value set** |
| Xiaomi [5] | For component 4), as analyzed in the aforementioned section, we think FFS point can be confirmed.  **Proposal 4: For component 4) under FG 34-2, N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for (15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60).** |
| Samsung [6] | As for PDCCH monitoring occasion (MO), two candidate values have been discussed:   |  | | --- | | [Value 1: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first 3 OFDM symbols of a PCell/PSCell slot.  Value 2: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to the first 3 OFDM symbols of a PCell/PSCell slot] |   Current formulation is referring the MOs not only ‘on sSCell’ but also ‘on PCell/PSCell’. However, since the MOs for Type 0/0A/1/2 CSS do not have ‘the first 3 OFDM symbols’ restriction, it should be clarified to avoid unnecessary restriction. Further, it is understood that we are not targeting any symbol positions for ‘Value 2’. For example, in case of 15kHz PCell and 30kHz sSCell, the intended option would be either within in the first 3 OFDM symbols of the first sSCell slot or within the first 3 OFDM symbols of the second sSCell slot overlapping with the PCell slot.  **Proposal 2: Update component 9) and 7) for FG 34-1 and 34-2, respectively, and corresponding candidate values as following:**  Component: PDCCH monitoring occasion(s) on sSCell for cross-carrier scheduling to PCell/PSCell  Candidate values:  ~~[~~Value 1: ~~PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is~~ within the first 3 OFDM symbols of sSCell slot overlapping with the first 3 OFDM symbols of ~~a~~ PCell/PSCell slot.  Value 2: ~~PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to~~ within the first 3 OFDM symbols of any sSCell slot overlapping with ~~a~~ PCell/PSCell slot~~]~~  Regarding unaligned frame boundary for sSCell, RAN1 has not yet addressed whether it is supported or not.   |  | | --- | | **Conclusion (RAN1#106bis-e)**   * A UE configured for cross-carrier scheduling from SCell to P(S)Cell can also be configured with unaligned CA (i.e., using  *ca-SlotOffset* ), and a non-zero value for *ca-SlotOffset* can be configured at least for SCells other than the sSCell   + FFS: Whether case when sSCell is configured with non-zero *ca-SlotOffset* is supported and any associated capability signalling * Note: No additional L1 spec impact related to *ca-SlotOffset* had been identified |   Since RAN1 discussion under UE feature so far can be assumed that it is supported, we need to first agree upon that point. Then, next question is whether to have a separate FG or not. Our view is that it is good enough for a UE to indicate Rel-16 FG 18-7 (CA with non-aligned frame boundaries) and FG34-1 (or 34-2) with corresponding band combination, i.e., no separate FG for unaligned frame boundary for sSCell.  **Proposal 3: Support sSCell with non-zero *ca-SlotOffset*.**  **Proposal 4: Remove “FFS: frame boundary alignment between PCell/PSCell and sSCell” from FGs 34-1 and 34-2.**  In terms of the number of unicast DCI limits (component #4 for both FGs 34-1 and 34-2), the supported SCS combinations are still open. It is mainly whether or not to support PCell SCS beyond 15kHz:   * FFS: N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60)   We are open to discuss further in RAN1#109e. However, if RAN1 fails to converge in RAN1#109e, it would be better to remove (30, 30), (60, 60), and (30, 60) and close the discussion.  **Proposal 5: Conclude the supported SCS combinations in RAN1#109e. Otherwise, remove (30, 30), (60, 60), and (30, 60).** |
| OPPO [7] | **FG 34-1 and FG 34-2: Supported SCS combinations**  The justification of the DSS WID mentions the WID motivation is to enhance the scheduling capacity on the carrier shared between LTE and NR. From this understanding, the SCS combinations of {P(S)Cell\_SCS, sSCell\_SCS} should not include those with P(S)Cell\_SCS≠15kHz. However, it does not harm, and the RAN1 study in this WID does not restrict either, to have P(S)Cell\_SCS go beyond 15kHz. Consequently, the value N in component 4 can be calculated against all allowable SCS combinations (as currently stated in the table).  ***Proposal 1: SCS combinations of {30,30}, {30,60} and {60,60} are included in the candidate list that can be indicated by the UE.***   * ***The value of N in component 4 covers all allowed SCS combinations as currently listed in the table (i.e., just remove wording “FFS”).***   **FG 34-1 component 10 & FG 34-2 component 8: Frame boundary misalignment between P(S)Cell and sSCell**  The existing CA frame boundary misalignment is reflected in FG 18-7 (Inter-band CA with non-aligned frame boundaries) and FG 18-7a (Inter-band CA with non-aligned frame boundaries between SpCell and SCell within the same cell group), both of which are per BC. It should be noted that, whether to support non-aligned frame boundary between P(S)Cell and sSCell for Rel-17 sSCell-to-P(S)Cell CCS is still not decided yet.   * If non-aligned frame boundary between P(S)Cell and sSCell is supported in Rel-17 (as a UE capability), FG 34-1 component 10 and FG 34-2 component 8 should be maintained. * If non-aligned frame boundary between P(S)Cell and sSCell is not supported in Rel-17, FG 34-1 component 10 and FG 34-2 component 8 need to be removed.   We do not see strong motivation to support non-aligned frame boundary between P(S)Cell and sSCell; on the other hand, we can also be open to such support as a UE capability if this is the majority preference. Nevertheless, if such UE capability is supported, we would like to confirm that there is no correlation between this UE capability and the Rel-16 UE capabilities in supporting:   * Non-aligned frame boundary between P(S)Cell and SCell in P(S)Cell-to-SCell CCS, even for the case where the SCell in the Rel-16 capability and the sSCell in the Rel-17 capability refer to the same cell. * Non-aligned frame boundary between Rel-16 scheduling SCell and its corresponding scheduled SCell, even for the case where the SCell in the Rel-16 capability and the P(S)Cell are in the same band.   ***Proposal 3: If non-aligned frame boundary between P(S)Cell and sSCell is supported as a UE capability, such capability is independent from the Rel-16 UE capabilities including the support of:***   * ***Non-aligned frame boundary between P(S)Cell and SCell in P(S)Cell-to-SCell CCS, even for the case where the SCell in the Rel-16 capability and the sSCell in the Rel-17 capability refer to the same cell.*** * ***Non-aligned frame boundary between Rel-16 scheduling SCell and its corresponding scheduled SCell, even for the case where the SCell in the Rel-16 capability and the P(S)Cell are in the same band.*** |
| Apple [8] |  |
| Nokia/Nokia Shanghai Bell [9] | Support of Cross-carrier scheduling (CCS) from sSCell to PCell/PSCell (Type B)   1. Cross-carrier scheduling from sSCell to PCell/PSCell with CIF 2. sSCell USS set(s) (for CCS from sSCell to PCell/PSCell) and search space sets on PCell/PSCell can be configured so that the UE monitors them in overlapping slot of PCell/PSCell and sSCell 3. Configuration of scaling factor α for BD and CCE limit handling and PDCCH overbooking handling on P(S)Cell 4. The number of unicast DCI limits for PCell/PSCell scheduling  * Processing K1 unicast DCI scheduling DL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * Processing K2 unicast DCI scheduling UL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * FFS: N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60)  1. Same numerology between sSCell and P(S)Cell or sSCell SCS is larger than P(S)Cell SCS 2. USS set(s) for DCI format 0\_1,1\_1 configured on sSCell for CCS from sSCell to PCell/PSCell and USS set(s) for DCI format 0\_2,1\_2 configured on sSCell for CCS from sSCell to PCell/PSCell if UE supports FG 11-1 (*dci-Format1-2And0-2-r16*) 3. PDCCH monitoring occasion(s) 4. FFS: frame boundary alignment between PCell/PSCell and sSCell 5. The same components as with Rel-15 cross-carrier scheduling and Rel-16 cross-carrier scheduling with different SCS should be automatically included by corresponding FGs, if supported by the UE, and the ability for the PCell to be the scheduled cell does not impact those functionalities. Hence, this component is redundant. Given it has been agreed to already, it should include at least all combinations already supported by Rel-15/16. The DCI processing capacity should not be impacted by the fact that the scheduling cell is not a PCell, and thus Rel-16 capability here should apply. 6. This component is not needed if only defining the minimum already supported by R15 UEs. If defined candidate values need to be precise on what are the possible PDCCH monitoring occasions, i.e. it is not enough to say it is not restricted to the first 3 OFDM symbols in PCell/PSCell slot, as no UE will indicate support to this value in practice. 7. This is a basic requirement, could be confirmed or removed as redundant. |
| MediaTek Inc. [10] |  |
| Ericsson [11] | For FG 34-2 (Type B) UE   * Regarding text related to support of 30/60kHz SCS for P(S)Cell) we propose the following   + Confirm yellow parts in below text. i.e, confirm indication of supported P(S)Cell SCS including 30/60kHz SCS for P(S)Cell, and also confirm indication of candidate value set 2 indicating frequency band pair(s) for P(S)Cell and sSCell     - Component 4: “… FFS: N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60) ”     - Notes: Candidate value set: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), [{30,30}, {30,60},{60,60}]); [Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}] * Regarding candidate value description of Component 7) in Notes column, considering the discussion in RAN1#108-e we propose the following   + Update the description for Value1 and Value2 and also include a Note as given below     - Value 1: If UE indicates FG 22-12 and P(S)Cell SCS is 15kHz, PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within a single span of any three contiguous OFDM symbols that are within the first four OFDM symbols in a PCell/PSCell slot; otherwise, PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first three OFDM symbols in a PCell/PSCell slot.     - Value 2: The description of Value 1 is not applied     - Note: Regardless of Value 1 or Value2, other UE capability indications related to PDCCH monitoring on PCell/PSCell or PDCCH monitoring on sSCell are still applicable. * Regarding Component 8), our preference is to support unaligned CA between P(S)Cell and sSCell in FG 34-2. However, considering discussion so far, we are also OK to capture support for unaligned CA as a separate UE capability. We propose the following   + Confirm current yellow text in component 10) “frame boundary alignment between PCell/PSCell and sSCell”   + Add following Note in Notes column (relevant conclusion made in RAN1#106b-e) – “Note: Non-zero value for *ca-SlotOffset* can be configured for SCells other than the sSCell”   + Add new FG row FG 34-2x “Support of CCS from sSCell to PCell/PSCell Type B with non-aligned frame boundary between PCell/PSCell and sSCell” |
| Qualcomm Incorporated [12] | FG34-2: Cross-carrier scheduling from SCell to PCell/PSCell (Type B)   * Candidate value set: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), [{30,30}, {30,60},{60,60}])   + [Qualcomm] So far, we do not see a use-case of cross-carrier scheduling from sSCell to P(S)Cell when P(S)Cell SCS is not 15kHz. * [Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}]   + [Qualcomm] We propose to confirm this by removing the square blacket because of the following reason:     - The feature is supposed to be used in a DSS carrier. For a DSS carrier, the UE is typically configured with LTE-CRS rate-matching for PDSCH. The relevant FGs for LTE-CRS rate-matching, FG5-28, FG14-1, and FG14-1a, are per-band capability. Therefore, for a given CA band combination, the UE may not support DSS features in all the bands. If the UE is not able to report frequency band pair(s) of {PCell/PSCell, sSCell} in a CA band combination, the UE has to support Rel-17 cross-carrier scheduling for any pair bands of {PCell/PSCell, sSCell}, including the pair(s) where there is no DSS operation on PCell/PSCell. This must cause interoperability issue. * Component 4): FFS: N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60)   + [Qualcomm] So far, we do not see a use-case of cross-carrier scheduling from sSCell to P(S)Cell when P(S)Cell SCS is not 15kHz. * Component 7) candidate values: [Value 1: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first 3 OFDM symbols of a PCell/PSCell slot. Value 2: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to the first 3 OFDM symbols of a PCell/PSCell slot]   + [Qualcomm] We support having these candidate values. Value 2 essentially requires UE to implement “PDCCH case 2” equivalent and hence should not be mandated. We propose to confirm both values by removing the square blacket. * Component 8) FFS: frame boundary alignment between PCell/PSCell and sSCell   + [Qualcomm] During WI discussion, RAN1 agreed to support unaligned boundary between two cells other than PCell/PSCell and sSCell. Therefore, regardless of wether or not the component 10) is present, unaligned CA between PCell/PSCell and sSCell is not supported. We are OK to enable unaligned CA between PCell/PSCell and sCell if an optional UE capability is defined. We propose to delete the FFS to confirm the component 10), and discuss a separate FG for unaligned CA between PCell/PSCell and sSCell. Example is provided in the table below as FG34-3.  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 34. NR\_DSS | 34-2 | Cross-carrier scheduling from SCell to PCell/PSCell (Type B) | Support of Cross-carrier scheduling (CCS) from sSCell to PCell/PSCell (Type B)   1. Cross-carrier scheduling from sSCell to PCell/PSCell with CIF 2. sSCell USS set(s) (for CCS from sSCell to PCell/PSCell) and search space sets on PCell/PSCell can be configured so that the UE monitors them in overlapping ~~[~~slot~~/symbol]~~ of PCell/PSCell and sSCell 3. Configuration of scaling factor α for BD and CCE limit handling and PDCCH overbooking handling on P(S)Cell 4. The number of unicast DCI limits for PCell/PSCell scheduling  * Processing K1 unicast DCI scheduling DL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * Processing K2 unicast DCI scheduling UL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * ~~FFS:~~ N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15)~~, (30,30), (60,60)~~ and N=2 for (15,30)~~, (30,60)~~ and N=4 for (15, 60)  1. Same numerology between sSCell and P(S)Cell or sSCell SCS is larger than P(S)Cell SCS 2. USS set(s) for DCI format 0\_1,1\_1 configured on sSCell for CCS from sSCell to PCell/PSCell and USS set(s) for DCI format 0\_2,1\_2 configured on sSCell for CCS from sSCell to PCell/PSCell if UE supports FG 11-1 (*dci-Format1-2And0-2-r16*) 3. PDCCH monitoring occasion(s) 4. ~~FFS:~~ frame boundary alignment between PCell/PSCell and sSCell   ~~Note: The SCell configured with Cross-carrier scheduling to PCell/PSCell is referred to as ‘sSCell’~~ | 6-5 | Yes | N/A | Cross-carrier scheduling from SCell to PCell/PSCell (Type B) is not supported | Per BC | No | Applicable to FR1 only | No | Candidate value set: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), ~~[{30,30}, {30,60},{60,60})]~~  ~~[~~Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}~~]~~  Component 4 candidate values: (K1, K2) = {(1,1) for FDD P(S)Cell; (K1, K2) = (1,2) for TDD P(S)Cell}  Component 7 candidate values:  ~~[~~Value 1: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first 3 OFDM symbols of a PCell/PSCell slot.  Value 2: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to the first 3 OFDM symbols of a PCell/PSCell slot~~]~~  Note: The CCS from sSCell to Pcell is applicable to FR1 only but there can be other Scells in FR2 configured for the UE  Note: The SCell configured with Cross-carrier scheduling to PCell/PSCell is referred to as ‘sSCell’ | Optional with capability signalling | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 35. LTE\_NR\_DC\_enh2 | 35-1 | Aperiodic CSI-RS for tracking for fast SCell activation | 1. Aperiodic CSI-RS for tracking for fast SCell activation is triggered by enhanced SCell activation/deactivation MAC CE 2. Aperiodic CSI-RS for tracking for fast SCell activation is triggered within the BWP indicated by firstActiveDownlinkBWP-Id for the SCell 3. Maximum number of aperiodic CSI-RS resource set configurations for tracking for fast SCell activation that can be configured to UE per CC in a reported band   Maximum number of aperiodic CSI-RS resource set configurations for tracking for fast SCell activation that can be configured to UE across CCs in a reported band | 6-5 | Yes | N/A | Aperiodic CSI-RS for tracking for fast SCell activation is not supported | Per band | N/A | N/A | N/A | Component 3 candidate values: {[1,] 8,16,32,48,64,128,255}  Component 4 candidate values: {[1,] 8,16,32,64,128,256,512,1024}  Note: In component 3, the candidate component values {FFS} do not apply to FR2  Note: In component 4, the candidate component values {FFS} do not apply to FR2  Note: component 3 and 4 candidate values refer to the number of RS configurations for fast SCell activation that can be indicated by the MAC CE  The NZP-CSI-RS configured as RS for tracking for fast SCell activation are not considered when counting the maximum NZP-CSI-RS configurations of FG2-33 | Optional with capability signalling |

|  |  |
| --- | --- |
| Company | Summary |
| Huawei/HiSilicon [2] | Regarding the note of FG 35-1, candidate values of aperiodic CSI-RS resource set configurations are further discussed. As presented in RRC CR from RAN2 [3], one resource set configuration contains the information of *qcl-Info-r17* and *gapBetweenBursts-r17*. If only one aperiodic CSI-RS resource set for tracking can be reported by a UE, the available TRS resource configurations are greatly limited, which affects the flexibility of configuration. Therefore, it is inappropriate to take the value of 1 for aperiodic CSI-RS resource set configuration for fast activation. In addition, compared with the CSI-RS resource set configurations for fast activation in FR1, more CSI-RS resource sets are required for indication of beam information in FR2 to provide more configuration flexibility. Therefore, some small candidate values such as 1 and 8 may not be applicable in the FR2 scenarios. The following proposals are provided,  ***Proposal 8: For FG 35-1, remove the candidate value “1” for components 3 and 4 in the column “Note”.***  ***Proposal 9: For FG 35-1, candidate values “1” and “8” for components 3 and 4 may not be applicable to FR2 and should be removed from the column “Note”.***  ***Proposal 10: Adopt the changes in Appendix for FG 35-1.***   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 35. LTE\_NR\_DC\_enh2 | 35-1 | Aperiodic CSI-RS for tracking for fast SCell activation | 1. Aperiodic CSI-RS for tracking for fast SCell activation is triggered by enhanced SCell activation/deactivation MAC CE 2. Aperiodic CSI-RS for tracking for fast SCell activation is triggered within the BWP indicated by firstActiveDownlinkBWP-Id for the SCell 3. Maximum number of aperiodic CSI-RS resource set configurations for tracking for fast SCell activation that can be configured to UE per CC in a reported band   Maximum number of aperiodic CSI-RS resource set configurations for tracking for fast SCell activation that can be configured to UE across CCs in a reported band | 6-5 | Yes | N/A | Aperiodic CSI-RS for tracking for fast SCell activation is not supported | Per band | N/A | N/A | N/A | Component 3 candidate values: {~~[1,]~~ 8,16,32,48,64,128,255}  Component 4 candidate values: {~~[1,]~~ 8,16,32,64,128,256,512,1024}  Note: In component 3, the candidate component values {~~FFS~~1,8} do not apply to FR2  Note: In component 4, the candidate component values {~~FFS~~1,8} do not apply to FR2  Note: component 3 and 4 candidate values refer to the number of RS configurations for fast SCell activation that can be indicated by the MAC CE  The NZP-CSI-RS configured as RS for tracking for fast SCell activation are not considered when counting the maximum NZP-CSI-RS configurations of FG2-33 | Optional with capability signalling | |
| ZTE [3] | One left issue is whether to have value “1” as the candidate value for component 3 and component 4. From network perspective, value “1” is too limited especially for TDD case, network may need different slot offset for TRS.  ***Proposal 6****: Remove value “1” from candidate value of component 3 and component 4 for FG35-1.* |
| Vivo [4] |  |
| Xiaomi [5] |  |
| Samsung [6] |  |
| OPPO [7] |  |
| Apple [8] |  |
| Nokia/Nokia Shanghai Bell [9] | No need for component value 1 in components 3 and 4. The number of configured “triggering states” was specifically introduced to allow for the gNB to schedule the two bursts of A-CSI-RS for fast SCell Activation around TDD-carrier UL phases, SSBs, and other DL signals that cannot be pre-empted by this CSI-RS, as well as allow for some level of frequency multiplexing capability. If a value of 1 is indicated as the UE capability there is no possibility for scheduling the CSI-RSs in frequency domain, whatsoever, and there is just one time-domain pattern that the gNB can trigger and the whole design is essentially obsoleted and reduced to a single-bit trigger as if the CSI-RS for the UE being activated was the only thing there was in the system. 8 for FDD and 64 for TDD as minimum capabilities are suggested. |
| MediaTek Inc. [10] |  |
| Ericsson [11] | For FG 35-1 TRS RS for SCell activation   * Regarding candidate values   + Component 3: {[1,] 8,16,32,48,64,128,255}; OK to keep value 1 for FR1.   + Component 4: {[1,] 8,16,32,64,128,256,512,1024}; Since this is related to reporting for all CCs in a reported band, starting with value ‘8’ seems to be more reasonable. Propose to remove value 1 from this candidate set.   + Regarding restrictions for FR2:     - exclude values 1,8 for component 3 to result in candidate set [16,32,48,64,128,255]     - exclude values 1,8,16 for component 4 to result in candidate set [32,64,128,256,512,1024] |
| Qualcomm Incorporated [12] | FG35-1: Aperiodic CSI-RS for tracking for fast SCell activation   * For the candidate values of components 3) and 4):   + [Qualcomm] For legacy TRS (FG2-51), a UE is able to report maximum number of TRS resource sets from the value range of {1, … 64} per CC and {1, … 256} per UE. Compared to FG2-51, the current FG35-1 has too coarse granularity for value ranges of component 3) and component 4). We have a concern on this and think the value ranges of component 3) and component 4) should be finer. Instead of coming up with a very limited set of possible values in RAN1, we propose to leave them up to RAN2. RAN2 should be able to come up with a balanced conclusion on the granularity and overhead. Once RAN2 reaches the value ranges, RAN1 can further discuss, if necessary, whether one or some values are not applicable to FR2.  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 35. LTE\_NR\_DC\_enh2 | 35-1 | Aperiodic CSI-RS for tracking for fast SCell activation | 1. Aperiodic CSI-RS for tracking for fast SCell activation is triggered by enhanced SCell activation/deactivation MAC CE 2. Aperiodic CSI-RS configurations for tracking for fast SCell activation is triggered within the BWP indicated by firstActiveDownlinkBWP-Id for the ~~s~~SCell 3. Maximum number of aperiodic CSI-RS resource set configurations for tracking for fast SCell activation that can be configured to UE per CC in a reported band 4. ~~FFS:~~ Maximum number of aperiodic CSI-RS resource sets for tracking for fast SCell activation that can be configured to UE across CCs in a reported band 5. ~~FFS: Maximum number of aperiodic CSI-RS for tracking for fast SCell activation by a MAC-CE~~ | 6-5 | Yes | N/A | Aperiodic CSI-RS for tracking for fast SCell activation is not supported | ~~[Per UE/Per BC/~~Per band~~]~~ | ~~[No/Yes]~~ N/A | ~~[No/Yes]~~ N/A | N/A | Component 3 candidate values: ~~FFS {[1,] 8,16,32,48,64,128,255}~~ Up to RAN2  Component 4 candidate values: ~~FFS {[1,] 8,16,32,64,128,256,512,1024}~~ Up to RAN2  ~~Note: In component 3, the candidate component values {FFS} do not apply to FR2~~  ~~Note: In component 4, the candidate component values {FFS} do not apply to FR2~~  Note: component 3 and 4 candidate values refer to the number of RS configurations for fast SCell activation that can be indicated by the MAC CE  ~~Component 5 candidate values: FFS~~  The NZP-CSI-RS configured as ~~temporary~~ RS for tracking for fast SCell activation are not considered when counting the maximum NZP-CSI-RS configurations of FG2-33 | Optional with capability signalling | |

**Others**

|  |  |
| --- | --- |
| Company | Summary |
| Huawei/HiSilicon [2] |  |
| ZTE [3] |  |
| Vivo [4] | * **Behavior of UE indicating 34-1 and 34-2**   As 34-1 and 34-2 are independent FGs, a UE may be able to support both 34-1 and 34-2. But it is not clear if such UE is allowed to indicate both FGs to gNB. If yes, the UE behavior may be unclear especially when sSCell USS set(s) (for CCS from sSCell to Pcell/PSCell) and Type0/0A/1/2 CSS sets on Pcell/PSCell are configured with overlapping slots. In this case, there are two interpretations of the UE behavior in the overlapping slots as analyzed in [2]:   1. UE monitors DCIs from sScell and Pcell/PSCell simultaneously for any RNTI following 34-2; 2. UE does not monitor DCI formats with CRC scrambled by C-RNTI/MCS-C-RNTI/CS-RNTI from Pcell/PSCell and sScell simultaneously. In other words, once UE has decoded a DCI format with CRC scrambled by C-RNTI/MCS-C-RNTI/CS-RNTI from sScell in a overlapping slot, it may stop blind decoding for DCI formats with CRC scrambled by C-RNTI/MCS-C-RNTI/CS-RNTI for Pcell/PSCell self-scheduling in the same slot, as described in 34-1.   If such reporting is not allowed, it should be specified in the FGs 34-1 and 34-2 that only one of them can be indicated by UE.  Proposal 3. Clarify if UE can report both 34-1 and 34-2 to gNB, and the expected UE behavior if this reporting is possible.   * **Disabling of scaling factor α when sScell is deactivated/dormant**  |  | | --- | | Agreement   * For a UE configured for CCS from sSCell to P(S)Cell, scaling factor is not applied for PDCCH overbooking/BD/CCE limit computation when sSCell is deactivated, or when an activated sSCell is switched to dormant BWP; otherwise scaling factor is applied  * + Timing for disabling scaling factor when sSCell is deactivated follows sSCell deactivation timing in current specifications, i.e., no later than the minimum requirement defined in TS 38.133 as captured in 38.213 subclause 4.3  * + Timing for disabling scaling factor follows the non-dormant to dormant BWP switching delay in current specifications ( TS 38.133).  * + Introduce separate FG to indicate UE support for disabling scaling factor when sSCell is deactivated  * + Introduce separate FG to indicate UE support for disabling scaling factor when activated sSCell is switched to dormant BWP  * + Note: It is up to UE implementation whether/when to apply the scaling factor α during sSCell activation and during sSCell BWP switch |   It has been agreed when sScell is dormant or deactivated, the scaling factor α is no longer applied to Pcell self-scheduling, and new features should be introduced for sScell deactivation/dormant cases. Examples of the component description of the new FGs are as below:   |  |  |  |  | | --- | --- | --- | --- | | Index | Feature group | Components | Prerequisite feature groups | | 34-3 | Disabling scaling factor α when sSCell is deactivated | Support of disabling scaling factor α for Cross-carrier scheduling (CCS) from sSCell to PCell/PSCell (Type A or Type B) when sSCell is deactivated   1. scaling factor α is not applied for PDCCH overbooking/BD/CCE limit computation when sSCell is deactivated | 34-1 or 34-2 | | 34-4 | Disabling scaling factor α when sSCell is dormant | Support of disabling scaling factor α for Cross-carrier scheduling (CCS) from sSCell to PCell/PSCell (Type A or Type B) when sSCell is switched to dormant BWP  scaling factor α is not applied for PDCCH overbooking/BD/CCE limit computation when sSCell is switched to dormant BWP | 34-1 or 34-2 |   Proposal 4. Introduce new UE features 34-3 and 34-4 for disabling scaling factor α when sScell is deactivated/dormant.   * **Additional bandwidths for aperiodic CSI-RS for tracking for fast SCell activation**  |  | | --- | | Agreement   * Introduce new FG35-2 additional bandwidth for fast SCell activation |   In the last meeting, it was agreed to introduce FG35-2 for additional bandwidths for aperiodic CSI-RS for tracking for fast SCell activation. Following is an example of the new FG based on *trs-AdditionalBandwidth-r16*.  **Proposal 5. Introduce new UE feature 35-2 for additional bandwidths for aperiodic CSI-RS for tracking for fast SCell activation.** |
| Xiaomi [5] |  |
| Samsung [6] | According the following RAN1 agreement, FGs for disabling scaling factor are needed.   |  | | --- | | Agreement   * For a UE configured for CCS from sSCell to P(S)Cell, scaling factor is not applied for PDCCH overbooking/BD/CCE limit computation when sSCell is deactivated, or when an activated sSCell is switched to dormant BWP; otherwise scaling factor is applied  * + Timing for disabling scaling factor when sSCell is deactivated follows sSCell deactivation timing in current specifications, i.e., no later than the minimum requirement defined in TS 38.133 as captured in 38.213 subclause 4.3  * + Timing for disabling scaling factor follows the non-dormant to dormant BWP switching delay in current specifications ( TS 38.133).  * + Introduce separate FG to indicate UE support for disabling scaling factor when sSCell is deactivated  * + Introduce separate FG to indicate UE support for disabling scaling factor when activated sSCell is switched to dormant BWP  * + Note: It is up to UE implementation whether/when to apply the scaling factor α during sSCell activation and during sSCell BWP switch |   As per the agreement, introducing each separate FG would be fine while a single FG for both sSCell deactivation and dormant BWP is also acceptable for us. Like other FGs 34-1 and 34-2, the granularity can be ‘Per BC’.  **Proposal 1: Add FGs to indicate UE support for disabling scaling factor as following:**   |  |  |  |  | | --- | --- | --- | --- | | **Feature group** | **Components** | **Prerequisite feature groups** | **Type** | | Disabling scaling factor for deactivated sSCell | Indicate UE support for disabling scaling factor α when sSCell is deactivated | 34-1 or 34-2 | Per BC | | Disabling scaling factor for dormant BWP | Indicate UE support for disabling scaling factor α when activated sSCell is switched to dormant BWP | 34-1 or 34-2 | Per BC | |
| OPPO [7] | **New FGs to cover scaling factor disabling when sSCell is deactivated or switched to dormancy**  The adding of new FGs should be straightforward based on the RAN1 #108e agreement, for example, as given in the table below.     |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Features | Index | Feature group | Components | Prerequisite feature groups | ….. | | 34. NR\_DSS | 34-3 | sSCell is deactivated | The scaling factor α is disabled. | 34-1 or 34-2 | Same as FG 34-1 and FG 34-2 | | 34. NR\_DSS | 34-4 | sSCell is switched to dormancy | The scaling factor α is disabled. | 34-1 or 34-2 | |
| Apple [8] | Based on the updated UE feature list for Rel-17 NR provided by the moderators in [1,2], we provide our views on the Rel-17 DSS enhancement UE features as below   * We propose to introduce a new FG34-1a to cover another simplified Type A UE, i.e., the USS can only be configured on sSCell, but cannot be configured on PCell/PSCell. This is based on the following Working Assumption  |  | | --- | | Working Assumption   * When CCS from sSCell to PCell/PSCell is configured, UE can be configured to monitor DCI formats 0\_1/1\_1/0\_2/1\_2 that schedule PDSCH/PUSCH on PCell/PSCell on PCell/PSCell USS set(s), and/or on sSCell USS set(s) * The WA to be confirmed after agreements are made on PDCCH BD/CCE handling and PDCCH overbooking handling for CCS from sSCell to PCell/PSCell * Specs also allow UEs supporting functionality of only Alt-1. Capability signaling details, if any, can be handled during the UE capability discussion for Rel17 * FFS: Whether the UE can monitor PDCCH from both cells in the same slot. |   Even though we agree to support both the sSCell activation/deactivation and sSCell dormancy. Its operation is in contrary to the objective of this WID, i.e., to enable sSCell scheduling SpCell to improve DSS performance. From UE performance perspective, we would prefer to ensure reliable and good performance on the primary cell as much as possible, therefore   * We propose UE feature FG34-3 on whether UE support sSCell deactivation/activation * We propose UE feature FG34-4 on whether UE support sSCell dormancy * We propose UE feature FG34-3a and FG34-4a for the following agreement made in the last RAN1 meeting  |  | | --- | | Agreement   * For a UE configured for CCS from sSCell to P(S)Cell, scaling factor is not applied for PDCCH overbooking/BD/CCE limit computation when sSCell is deactivated, or when an activated sSCell is switched to dormant BWP; otherwise scaling factor is applied  * + Timing for disabling scaling factor when sSCell is deactivated follows sSCell deactivation timing in current specifications, i.e., no later than the minimum requirement defined in TS 38.133 as captured in 38.213 subclause 4.3  * + Timing for disabling scaling factor follows the non-dormant to dormant BWP switching delay in current specifications ( TS 38.133).  * + Introduce separate FG to indicate UE support for disabling scaling factor when sSCell is deactivated  * + Introduce separate FG to indicate UE support for disabling scaling factor when activated sSCell is switched to dormant BWP  * + Note: It is up to UE implementation whether/when to apply the scaling factor α during sSCell activation and during sSCell BWP switch |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 34. NR-DSS | 34-1a | Further restriction to Type A | Support of monitoring DCI formats 0\_1,1\_1,0\_2,1\_2 on PCell/PSCell USS set(s), | 34-1 | Yes | N/A |  | Per BC | N | N |  |  | Optional with capability signalling | | 34. NR-DSS | 34-3 | Support of sSCell deactivation/activation | Support of sSCell deactivation/activation when sSCell cross carrier scheduling to PCell/PSCell is configured | 34-1 or 34-2 | Yes | N/A |  | Per BC | N | N |  |  | Optional with capability signalling | | 34. NR-DSS | 34-3a | Support for disabling scaling factor when sSCell is deactivated | Support of disabling scaling factor α when sSCell is deactivated | 34-3 | Yes | N/A |  | Per BC | N | N |  |  | Optional with capability signalling | | 34. NR-DSS | 34-4 | Support of sSCell dormancy | Support of sSCell dormancy when sSCell cross carrier scheduling to PCell/PSCell is configured | 34-1 or 34-2 | Yes | N/A |  | Per BC | N | N |  |  | Optional with capability signalling | | 34. NR-DSS | 34-4a | Support for disabling scaling factor α when activated sSCell is switched to dormant BWP | Support of disabling scaling factor α when activated sSCell is switched to dormant BWP | 34-4 | Yes | N/A |  | Per BC | N | N |  |  | Optional with capability signalling | |
| Nokia/Nokia Shanghai Bell [9] |  |
| MediaTek Inc. [10] |  |
| Ericsson [11] | Following was agreed in RAN1#108-e and two new FGs to capture the agreement need to be introduced. We propose below FG 34-x and 34-y to describe the new FGs  *Agreement*   * *For a UE configured for CCS from sSCell to P(S)Cell, scaling factor is not applied for PDCCH overbooking/BD/CCE limit computation when sSCell is deactivated, or when an activated sSCell is switched to dormant BWP; otherwise scaling factor is applied*  * + *Timing for disabling scaling factor when sSCell is deactivated follows sSCell deactivation timing in current specifications, i.e., no later than the minimum requirement defined in TS 38.133 as captured in 38.213 subclause 4.3*  * + *Timing for disabling scaling factor follows the non-dormant to dormant BWP switching delay in current specifications ( TS 38.133).*  * + *Introduce separate FG to indicate UE support for disabling scaling factor when sSCell is deactivated*  * + *Introduce separate FG to indicate UE support for disabling scaling factor when activated sSCell is switched to dormant BWP*  * + *Note: It is up to UE implementation whether/when to apply the scaling factor α during sSCell activation and during sSCell BWP switch*  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 34. NR\_DSS | 34-x | disabling scaling factor α when sSCell is deactivated | For cross-carrier scheduling (CCS) from sSCell to PCell/PSCell, support of disabling scaling factor α (provided *by ccs-BlindDetectionSplit*) when sSCell is deactivated | 34-1 or 34-2 | Yes | N/A | disabling scaling factor α for deactivated sSCell is not supported | Per BC | No | Applicable to FR1 only | No | Note: The CCS from sSCell to Pcell is applicable to FR1 only but there can be other Scells in FR2 configured for the UE  Note: The SCell configured with Cross-carrier scheduling to PCell/PSCell is referred to as ‘sSCell’ | Optional with capability signalling | | 34. NR\_DSS | 34-y | disabling scaling factor when activated sSCell is switched to dormant BWP | For cross-carrier scheduling (CCS) from sSCell to PCell/PSCell, support of disabling scaling factor α (provided *by ccs-BlindDetectionSplit*) when activated sSCell is switched to dormant BWP | 34-1 or 34-2 | Yes | N/A | disabling scaling factor α for activated sSCell switched to dormant BWP is not supported | Per BC | No | Applicable to FR1 only | No | Note: The CCS from sSCell to Pcell is applicable to FR1 only but there can be other Scells in FR2 configured for the UE  Note: The SCell configured with Cross-carrier scheduling to PCell/PSCell is referred to as ‘sSCell’ | Optional with capability signalling | |
| Qualcomm Incorporated [12] | FG34-3 (new): Non-aligned frame boundaries between PCell/PSCell and sSCell  As discussed in the above FG34-1 and FG34-2, we propose to add a new FG to accommodate the possible operation of unaligned CA between PCell/PSCell and sSCell. Since non-aligned frame boundaries is enabled only if/where a specific need is identifed, we propose to enable that a UE can report this UE capability per candidate value set of SCS combination(s) and candidate value set of frequency band pair(s) as in FG34-1 or FG34-2. Detailed proposed FG is given as FG34-3 below.   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 34. NR\_DSS | 34-3 | Non-aligned frame boundaries between PCell/PSCell and sSCell | CA with non-aligned frame boundaries for PCell/PSCell and sSCell in inter-band CA   * Candidate value set 1: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), [{30,30}, {30,60}, {60,60})] * Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell} | 34-1 or 34-2 |  |  | Non-aligned frame boundaries between PCell/PSCell and sSCell is not supported | Per BC | No | Applicable to FR1 only |  | Indicates whether the UE supports carrier aggregation operation where the frame boundaries of the PCell/PSCell and the sSCell are not aligned, while the slot boundaries are. | Optional with capability signalling |   FG34-4 (new): disabling scaling factor  when sSCell is deactivated  At the RAN1#108-e meeting, introducing a new FG for the support of disabling scaling factor  when sSCell is deactivated was agreed. We propose to introduce a new FG to capture this agreement as FG34-4.   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 34. NR\_DSS | 34-4 | Disabling the scaling factor  when sSCell is deactivated | For a UE configured for CCS from sSCell to PCell/PSCell, scaling factor  is not applied for PDCCH overbooking/BD/CCE limit computation when sSCell is deactivated; otherwise scaling factor  is applied | 34-1 or 34-2 |  |  | Scaling factor  is applied even when sSCell is deactivated | Per BC | No | Applicable to FR1 only |  | * Timing for disabling scaling factor α when sSCell is deactivated follows sSCell deactivation timing in current specifications, i.e., no later than the minimum requirement defined in TS 38.133 as captured in 38.213 subclause 4.3 * Note: It is up to UE implementation whether/when to apply the scaling factor α during sSCell activation | Optional with capability signalling |   FG34-5 (new): disabling scaling factor  when sSCell is switched to dormant BWP  At the RAN1#108-e meeting, introducing a new FG for the support of disabling scaling factor  when sSCell is switched to dormant BWP was agreed. We propose to introduce a new FG to capture this agreement as FG34-5.   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 34. NR\_DSS | 34-5 | Disabling the scaling factor  when sSCell is switched to dormant BWP | For a UE configured for CCS from sSCell to PCell/PSCell, scaling factor  is not applied for PDCCH overbooking/BD/CCE limit computation when sSCell is switched to dormant BWP; otherwise scaling factor  is applied | 34-1 or 34-2 |  |  | Scaling factor  is applied even when sSCell is swiched to dormant BWP | Per BC | No | Applicable to FR1 only |  | * Timing for disabling scaling factor α follows the non-dormant to dormant BWP switching delay in current specifications (TS 38.133) * Note: It is up to UE implementation whether/when to apply the scaling factor α during sSCell BWP switch | Optional with capability signalling |   FG35-2 (new): supported aperiodic CSI-RS bandwidth for tracking for fast SCell activation for 10MHz UE channel bandwidth  At the RAN1#108-e meeting, support of additional TRS bandwidth for fast SCell activation for 10MHz UE channel bandwidth was agreed. RAN1 spec already captures this as FG35-2. We propose to define it as below. In general, it is a copy of *trs-AdditionalBandwidth-r16*.   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 35. LTE\_NR\_DC\_enh2 | 35-2 | aperiodic CSI-RS bandwidth for tracking for fast SCell activation for 10MHz UE channel bandwidth | Indicates the UE supported TRS bandwidths for fast SCell activation, in addition to 52 RBs, for a 10MHz UE channel bandwidth. This only applies for the BWPs configured with 52 RBs size and 15kHz SCS, in FDD bands.   * Candidate values of Set 1: 28, 32, 36, 40, 44, 48 RBs * Candidate values of Set 2: 32, 36, 40, 44, 48 RBs | 35-1 |  |  |  | Per band | FDD only | FR1 only | N/A |  | Optional with capability signalling | |

# Discussion/Approval Items during RAN1 #109-e — First Checkpoint

After review of contributions submitted to RAN1 #109-e in this agenda item, the following topics were identified by the moderator for discussion/approval during RAN1 #109-e.

**General comments**

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
|  |  |

# Issue 1: FG 34-1

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 34. NR\_DSS | 34-1 | Cross-carrier scheduling from SCell to PCell/PSCell with search space restrictions (Type A) | Support of Cross-carrier scheduling from sSCell to PCell/PSCell with search space restrictions (Type A)   1. Cross-carrier scheduling from sSCell to PCell/PSCell with CIF 2. Search space restrictions: sSCell USS set(s) (for CCS from sSCell to PCell/PSCell) and at least following search space sets on PCell/PSCell can only be configured such that UE does not monitor them in overlapping slot of PCell/PSCell and sSCell    * USS sets for DCI formats 0\_1,1\_1,0\_2,1\_2    * USS sets for DCI formats 0\_0,1\_0    * Type3-CSS set(s) for DCI formats 1\_0/0\_0 with C-RNTI/CS-RNTI/MCS-C-RNTI 3. Configuration of scaling factor α for BD and CCE limit handling and PDCCH overbooking handling on P(S)Cell 4. FFS: # The number of unicast DCI limits for PCell/PSCell scheduling  * Processing K1 unicast DCI scheduling DL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * Processing K2 unicast DCI scheduling UL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * ~~FFS:~~ N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60)  1. Same numerology between sSCell and P(S)Cell or sSCell SCS is larger than P(S)Cell SCS 2. USS set(s) for DCI format 0\_1,1\_1 configured on sSCell for CCS from sSCell to Pcell/PSCell and USS set(s) for DCI format 0\_2,1\_2 configured on sSCell for CCS from sSCell to PCell/PSCell if UE supports FG 11-1 (*dci-Format1-2And0-2-r16*) 3. sSCell USS set(s) (for CCS from sSCell to Pcell/PSCell) and Type0/0A/1/2 CSS sets on Pcell/PSCell can be configured so that the UE monitors them in overlapping slot of Pcell/PSCell and sSCell    * no simultaneous monitoring between ‘USS sets (for P(S)Cell scheduling) on sSCell’ and ‘Type 0/0A/1/2/CSS sets on P(S)Cell for DCI formats with CRC scrambled by C-RNTI/MCS-C-RNTI/CS-RNTI’    * simultaneous monitoring of ‘USS sets (for P(S)Cell scheduling) on sSCell’ and ‘Type 0/0A/1/2/CSS sets on P(S)Cell for DCI formats with CRC not scrambled by C-RNTI/MCS-C-RNTI/CS-RNTI’ 4. ~~FFS:~~ Support of monitoring DCI formats 0\_1,1\_1,0\_2 (if supported),1\_2 (if supported) on PCell/PSCell USS set(s) 5. PDCCH monitoring occasion(s) 6. ~~FFS:~~ frame boundary alignment between PCell/PSCell and sSCell | 6-5 | Yes | N/A | Cross-carrier scheduling from SCell to PCell/PSCell with search space restrictions (Type A) is not supported | Per BC | No | Applicable to FR1 only | No | Candidate value set: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), ~~[~~{30,30}, {30,60},{60,60}~~]~~)  ~~[Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}]~~  Component 4 candidate values: (K1, K2) = {(1,1) for FDD P(S)Cell; (K1, K2) = (1,2) for TDD P(S)Cell~~, [(K1, K2) = (2,2) for FDD P(S)Cell; (K1, K2) = (2,4) for TDD P(S)Cell]~~}  Component 9 candidate values:  ~~[~~Value 1: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first 3 OFDM symbols of a PCell/PSCell slot.  Value 2: PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to the first 3 OFDM symbols of a PCell/PSCell slot~~]~~  Note: The CCS from sSCell to PCell is applicable to FR1 only but there can be other SCells in FR2 configured for the UE  Note: The SCell configured with Cross-carrier scheduling to PCell/PSCell is referred to as ‘sSCell’ | Optional with capability signalling |

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| Apple | We do not agree on component 8. Component 8 should be a separate FG based on the following working assumption  Working Assumption   * When CCS from sSCell to PCell/PSCell is configured, UE can be configured to monitor DCI formats 0\_1/1\_1/0\_2/1\_2 that schedule PDSCH/PUSCH on PCell/PSCell on PCell/PSCell USS set(s), and/or on sSCell USS set(s) * The WA to be confirmed after agreements are made on PDCCH BD/CCE handling and PDCCH overbooking handling for CCS from sSCell to PCell/PSCell * Specs also allow UEs supporting functionality of only Alt-1. Capability signaling details, if any, can be handled during the UE capability discussion for Rel17 * FFS: Whether the UE can monitor PDCCH from both cells in the same slot. |
| OPPO | W are ok to either keep component 8 as is, or move it to a separate FG. |
| ZTE | We are ok with the FL proposal.  For component 8, we see the necessity of it because otherwise only fallback DCI can be used for PCell self-scheduling, this would be too restrictive for example when SCell is experiencing some fast fading suddenly. |
| Qualcomm | We are not OK to delete [Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}].  It is quite unreasonable if the UE is required to support and tested with cross-carrier scheduling from sSCell to P(S)Cell for all the band pair(s) of CA band combination where DSS is never deployed/operated anywhere in the world. This is a bigger issue if we support {30,30}, {30,60}, {60,60} in the candidate value set 1 – there must be no case where e.g., 100MHz carrier in band n77/78/79 is the P(S)Cell for cross-carrier scheduling from sSCell. We propose to confirm the Candidate value set 2. |
| vivo | Same view as Qualcomm, it is not reasonable to force UE to support SSP on all band pairs. We suggest confirming value set2. |
| Samsung | #4: Remove the first FFS as well: ~~FFS: #~~  #8: Remove entire component #8. Component #2 already captured “USS sets for DCI formats 0\_1,1\_1,0\_2,1\_2” as per RAN1#108e agreement.  #9: As explained in our Tdoc [6], the description for the component and its candidate value should be clarified:  ------------------  Current formulation is referring the MOs not only ‘on sSCell’ but also ‘on PCell/PSCell’. However, since the MOs for Type 0/0A/1/2 CSS do not have ‘the first 3 OFDM symbols’ restriction, it should be clarified to avoid unnecessary restriction. Further, it is understood that we are not targeting any symbol positions for ‘Value 2’. For example, in case of 15kHz PCell and 30kHz sSCell, the intended option would be either within in the first 3 OFDM symbols of the first sSCell slot or within the first 3 OFDM symbols of the second sSCell slot overlapping with the PCell slot.  --------------------  We suggest to update component #9 and corresponding candidate values as following:  Component: PDCCH monitoring occasion(s) on sSCell for cross-carrier scheduling to PCell/PSCell  Candidate values:  ~~[~~Value 1: ~~PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is~~ within the first 3 OFDM symbols of sSCell slot overlapping with the first 3 OFDM symbols of ~~a~~ PCell/PSCell slot.  Value 2: ~~PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is not restricted to~~ within the first 3 OFDM symbols of any sSCell slot overlapping with ~~a~~ PCell/PSCell slot~~]~~ |
| Intel | Component 4): we share same view as Samsung  Component 8): Above all, we believe the DCI formats 0\_1,1\_1,0\_2,1\_2 should be supported on P(S)Cell. As commented by Samsung, since it is already allowed by component 2) |
| Nokia, NSB | Candidate value set 2 We support the deletion. Re: Qualcomm/vivo: If, for example, the UE supports multiple 15 kHz bands and multiple 30 kHz bands, why it would be able to support 30 kHz sSCell scheduling 15 kHz PCell on one band pair, but not on the other band pair? This is a functional issue, not an RF issue.  Component 4): agree with Samsung  Component 8) Agree with Intel that these should be supported, and tend to agree with Samsung that component 8 may not be needed as component 2) seems to cover this already  Component 9) Values are not ok. It is very hard to see value 2 being indicated by any UE in the field, given the monitoring occasions are completely unbounded in that case, and we know from R15 and R16 that several FGs have been created to address the needs for increased flexibility in monitoring occasions, with definition of span gaps etc.  Component 10) not really needed |
| Ericsson1 | OK with moderator proposal except for below   * Include correction of removing first FFS in component 4 (as mentioned by Samsung) * Prefer to include, [(K1, K2) = (2,2) for FDD P(S)Cell; (K1, K2) = (2,4) for TDD P(S)Cell]} (motivation given in our contribution. At least one UE vendor seems to be OK to include. Since proposal is for an additional candidate value, UEs do have option to not indicate support)   Some additional comments   * On candidate value set 2, ok to include if it helps to converge * On component 8, it should be included in FG 34-1 as in current moderator proposal (reasoning given in our contribution). If it helps progress, we are OK to include separate FG for UEs that cannot support monitoring DCI formats 0\_1,1\_1,0\_2 (if supported),1\_2 (if supported) on PCell/PSCell USS set(s) * Component 9 candidate values: we propose below update. Hopefully these also address issues/questions raised by other companies   + Update the description for Value1 and Value2 and also include a Note as given below     - Value 1: If UE indicates FG 22-12 and P(S)Cell SCS is 15kHz, PDCCH monitoring occasion(s) for non-fallback DCI formats on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within a single span of any three contiguous OFDM symbols that are within the first four OFDM symbols in a PCell/PSCell slot; otherwise, PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first three OFDM symbols in a PCell/PSCell slot.     - Value 2: The description of Value 1 is not applied     - Note: Regardless of Value 1 or Value2, other UE capability indications related to PDCCH monitoring on P(S)Cell or PDCCH monitoring on sSCell are still applicable. |
| Huawei, HiSilicon | Fine with FL proposal except for Component#9 and its values – for which, Ok with Samsung comment.  Also fine with correction mentioned by Samsung on component#4. |

# Issue 2: FG 34-2

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 34. NR\_DSS | 34-2 | Cross-carrier scheduling from SCell to PCell/PSCell (Type B) | Support of Cross-carrier scheduling (CCS) from sSCell to PCell/PSCell (Type B)   1. Cross-carrier scheduling from sSCell to PCell/PSCell with CIF 2. sSCell USS set(s) (for CCS from sSCell to PCell/PSCell) and search space sets on PCell/PSCell can be configured so that the UE monitors them in overlapping slot of PCell/PSCell and sSCell 3. Configuration of scaling factor α for BD and CCE limit handling and PDCCH overbooking handling on P(S)Cell 4. The number of unicast DCI limits for PCell/PSCell scheduling  * Processing K1 unicast DCI scheduling DL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * Processing K2 unicast DCI scheduling UL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * ~~FFS:~~ N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60)  1. Same numerology between sSCell and P(S)Cell or sSCell SCS is larger than P(S)Cell SCS 2. USS set(s) for DCI format 0\_1,1\_1 configured on sSCell for CCS from sSCell to PCell/PSCell and USS set(s) for DCI format 0\_2,1\_2 configured on sSCell for CCS from sSCell to PCell/PSCell if UE supports FG 11-1 (*dci-Format1-2And0-2-r16*) 3. PDCCH monitoring occasion(s) 4. ~~FFS:~~ frame boundary alignment between PCell/PSCell and sSCell | 6-5 | Yes | N/A | Cross-carrier scheduling from SCell to Pcell/PSCell (Type B) is not supported | Per BC | No | Applicable to FR1 only | No | Candidate value set: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), ~~[~~{30,30}, {30,60},{60,60})~~]~~  ~~[Candidate value set 2: frequency band pair(s) for {Pcell/PSCell, sSCell}]~~  Component 4 candidate values: (K1, K2) = {(1,1) for FDD P(S)Cell; (K1, K2) = (1,2) for TDD P(S)Cell}  Component 7 candidate values:  ~~[~~Value 1: PDCCH monitoring occasion(s) on Pcell/PSCell and on sSCell for cross-carrier scheduling to Pcell/PSCell is within the first 3 OFDM symbols of a Pcell/PSCell slot.  Value 2: PDCCH monitoring occasion(s) on Pcell/PSCell and on sSCell for cross-carrier scheduling to Pcell/PSCell is not restricted to the first 3 OFDM symbols of a Pcell/PSCell slot~~]~~  Note: The CCS from sSCell to Pcell is applicable to FR1 only but there can be other Scells in FR2 configured for the UE  Note: The SCell configured with Cross-carrier scheduling to Pcell/PSCell is referred to as ‘sSCell’ | Optional with capability signalling |

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| ZTE | Fine with the changes. |
| Qualcomm | We are not OK to delete [Candidate value set 2: frequency band pair(s) for {Pcell/PSCell, sSCell}].  It is quite unreasonable if the UE is required to support and tested with cross-carrier scheduling from sSCell to P(S)Cell for all the band pair(s) of CA band combination where DSS is never deployed/operated anywhere in the world. This is a bigger issue if we support {30,30}, {30,60}, {60,60} in the candidate value set 1 – there must be no case where e.g., 100MHz carrier in band n77/78/79 is the P(S)Cell for cross-carrier scheduling from sSCell. We propose to confirm the Candidate value set 2. |
| Vivo | Same view as Qualcomm, it is not reasonable to force UE to support SSP on all band pairs. We suggest confirming value set2. |
| Samsung | #7: As explained in our Tdoc [6], the description for the component and its candidate value should be clarified:  Current formulation is referring the Mos not only ‘on sSCell’ but also ‘on Pcell/PSCell’. However, since the Mos for Type 0/0A/1/2 CSS do not have ‘the first 3 OFDM symbols’ restriction, it should be clarified to avoid unnecessary restriction. Further, it is understood that we are not targeting any symbol positions for ‘Value 2’. For example, in case of 15kHz Pcell and 30kHz sSCell, the intended option would be either within in the first 3 OFDM symbols of the first sSCell slot or within the first 3 OFDM symbols of the second sSCell slot overlapping with the Pcell slot.  We suggest to update component #7 and corresponding candidate values as following:  Component: PDCCH monitoring occasion(s) on sSCell for cross-carrier scheduling to Pcell/PSCell  Candidate values:  ~~[~~Value 1: ~~PDCCH monitoring occasion(s) on Pcell/PSCell and on sSCell for cross-carrier scheduling to Pcell/PSCell is~~ within the first 3 OFDM symbols of sSCell slot overlapping with the first 3 OFDM symbols of ~~a~~ Pcell/PSCell slot.  Value 2: ~~PDCCH monitoring occasion(s) on Pcell/PSCell and on sSCell for cross-carrier scheduling to Pcell/PSCell is not restricted to~~ within the first 3 OFDM symbols of any sSCell slot overlapping with ~~a~~ Pcell/PSCell slot~~]~~ |
| Intel | Fine with the changes |
| Nokia, NSB | Same comment on candidate value set 2 as with Issue #1.  Values for component 7 are not ok. It is very hard to see value 2 being indicated by any UE in the field, given the monitoring occasions are completely unbounded in that case, and we know from R15 and R16 that several FGs have been created to address the needs for increased flexibility in monitoring occasions, with definition of span gaps etc. |
| Ericsson1 | OK with moderator proposal  Some additional comments   * On candidate value set 2, ok to include if it helps to converge * Component 7 candidate values: we propose below update. Hopefully these also address issues/questions raised by other companies   + Update the description for Value1 and Value2 and also include a Note as given below     - Value 1: If UE indicates FG 22-12 and P(S)Cell SCS is 15kHz, PDCCH monitoring occasion(s) for non-fallback DCI formats on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within a single span of any three contiguous OFDM symbols that are within the first four OFDM symbols in a PCell/PSCell slot; otherwise, PDCCH monitoring occasion(s) on PCell/PSCell and on sSCell for cross-carrier scheduling to PCell/PSCell is within the first three OFDM symbols in a PCell/PSCell slot.     - Value 2: The description of Value 1 is not applied     - Note: Regardless of Value 1 or Value2, other UE capability indications related to PDCCH monitoring on P(S)Cell or PDCCH monitoring on sSCell are still applicable. |
| Huawei, HiSilicon | For Component#7 and its values, Ok with Samsung suggestion. |

# Issue 3: FG 35-1

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 35. LTE\_NR\_DC\_enh2 | 35-1 | Aperiodic CSI-RS for tracking for fast SCell activation | 1. Aperiodic CSI-RS for tracking for fast SCell activation is triggered by enhanced SCell activation/deactivation MAC CE 2. Aperiodic CSI-RS for tracking for fast SCell activation is triggered within the BWP indicated by firstActiveDownlinkBWP-Id for the SCell 3. Maximum number of aperiodic CSI-RS resource set configurations for tracking for fast SCell activation that can be configured to UE per CC in a reported band 4. Maximum number of aperiodic CSI-RS resource set configurations for tracking for fast SCell activation that can be configured to UE across CCs in a reported band | 6-5 | Yes | N/A | Aperiodic CSI-RS for tracking for fast SCell activation is not supported | Per band | N/A | N/A | N/A | Component 3 candidate values: {~~[1,]~~ 8,16,32,48,64,128,255}  Component 4 candidate values: {~~[1,]~~ 8,16,32,64,128,256,512,1024}  Note: In component 3, the candidate component values {~~FFS~~ 1,8} do not apply to FR2  Note: In component 4, the candidate component values { ~~FFS~~ 1,8} do not apply to FR2  Note: component 3 and 4 candidate values refer to the number of RS configurations for fast SCell activation that can be indicated by the MAC CE  The NZP-CSI-RS configured as RS for tracking for fast SCell activation are not considered when counting the maximum NZP-CSI-RS configurations of FG2-33 | Optional with capability signalling |

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| ZTE | Since ‘1’ has been deleted, then we can modify the following accordingly (deleting the 1).  Note: In component 3, the candidate component values {~~FFS 1~~,8} do not apply to FR2  Note: In component 4, the candidate component values { ~~FFS 1~~,8} do not apply to FR2 |
| Qualcomm | For components 3 and 4, we think the value “8” is unnecessarily large value especially for FR1. Therefore, instead of deleting [1,], we should put a lower value than “8”.  For the Notes, the value “8” should be applicable to FR2. The candidate values are already quite coarse and there must be cases where value 8 is sufficient.  With this, our proposal is following.  Component 3 candidate values: {~~[1,]~~ *m*, 8,16,32,48,64,128,255}  Component 4 candidate values: {~~[1,]~~ *m*, 8,16,32,64,128,256,512,1024}  Note: the value *m* is 2 for FR1 and is 4 for FR2  ~~Note: In component 3, the candidate component values {FFS 1,8} do not apply to FR2~~  ~~Note: In component 4, the candidate component values { FFS 1,8} do not apply to FR2~~ |
| Nokia, NSB | We support the revisions from ZTE above. In addition, for TDD minimum value should be 64 in order to allow reasonable system operation. |
| Ericsson1 | OK with moderator proposal along with correction mentioned by ZTE |
| Huawei, HiSilicon | Support the proposal. The revisions from ZTE are good. |

# Issue 4: New FG for disabling scaling factor α when sSCell is deactivated/dormant

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Introduce the following new FG**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 34. NR\_DSS | 34-3 | Disabling scaling factor α when sSCell is deactivated | Support of disabling scaling factor α for Cross-carrier scheduling (CCS) from sSCell to PCell/PSCell (Type A or Type B) when sSCell is deactivated (scaling factor α is not applied for PDCCH overbooking/BD/CCE limit computation when sSCell is deactivated) | 34-1 or 34-2 | Yes | N/A | Disabling scaling factor α when sSCell is deactivated is not supported | Per BC | No | Applicable to FR1 only | No |  | Optional with capability signalling |
| 34. NR\_DSS | 34-4 | Disabling scaling factor α when sSCell is dormant | Support of disabling scaling factor α for Cross-carrier scheduling (CCS) from sSCell to PCell/PSCell (Type A or Type B) when sSCell is switched to dormant BWP (scaling factor α is not applied for PDCCH overbooking/BD/CCE limit computation when sSCell is switched to dormant BWP) | 34-1 or 34-2 | Yes | N/A | Disabling scaling factor α when sSCell is dormant is not supported | Per BC | No | Applicable to FR1 only | No |  | Optional with capability signalling |

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| Apple | We are fine |
| OPPO | Support moderator’s proposal. |
| ZTE | We would suggest to merge these two UE features because the UE behavior is the same for them. The only difference is just the triggering, one is scell deactivation and another one is dormant BWP.  Besides, we suggest to change the name of this FG to make it clear, e.g., Disabling scaling factor α for sSCell scheduling P(S)Cell when sSCell is deactivated or dormant |
| Qualcomm | We are fine with the proposal.  We disagree to merge the two capabilities since the agreement explicitly indicates two separate FGs are introduced.  Agreement   * For a UE configured for CCS from sSCell to P(S)Cell, scaling factor is not applied for PDCCH overbooking/BD/CCE limit computation when sSCell is deactivated, or when an activated sSCell is switched to dormant BWP; otherwise scaling factor is applied   + Timing for disabling scaling factor when sSCell is deactivated follows sSCell deactivation timing in current specifications, i.e., no later than the minimum requirement defined in TS 38.133 as captured in 38.213 subclause 4.3   + Timing for disabling scaling factor follows the non-dormant to dormant BWP switching delay in current specifications ( TS 38.133).   + **Introduce separate FG to indicate UE support for disabling scaling factor when sSCell is deactivated**   + **Introduce separate FG to indicate UE support for disabling scaling factor when activated sSCell is switched to dormant BWP**   + Note: It is up to UE implementation whether/when to apply the scaling factor α during sSCell activation and during sSCell BWP switch |
| vivo | Support the proposal |
| Samsung | Fine with moderator’s proposal. |
| Intel | Fine with moderator’s proposal. |
| Ericsson1 | OK with moderator proposal. |
| Huawei, HiSilicon | Ok with the proposal |

# Issue 4: New FG for non-aligned frame boundaries between PCell/PSCell and sSCell

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Introduce the following new FG**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 34. NR\_DSS | 34-5 | Non-aligned frame boundaries between PCell/PSCell and sSCell | CA with non-aligned frame boundaries for PCell/PSCell and sSCell in inter-band CA | 34-1 or 34-2 | Yes | N/A | Non-aligned frame boundaries between Pcell/PSCell and sSCell is not supported | Per BC | No | Applicable to FR1 only | No | Candidate value set 1: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), {30,30}, {30,60}, {60,60})  Candidate value set 2: frequency band pair(s) for {Pcell/PSCell, sSCell} | Optional with capability signalling |

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| Apple | We are fine |
| OPPO | We are fine. |
| ZTE | We have the following comments:  1. The two candidate value sets should be deleted. It seems they are not related to non-aligned frame boundaries.  2. The name can be changed to “Non-aligned frame boundaries between PCell/PSCell and sSCel for sSCell scheduling P(S)Cell”. |
| Qualcomm | We are fine with the proposal.  The two candidate values are necessary. Support of FG34-5, on top of FG34-1 or FG3-42 does not mean the UE supports non-aligned CA between P(S)Cell and sSCell for all the supported configurations in FG34-1/34-2. |
| Vivo | We are fine if both candidate value sets are kept |
| Intel | Fine with moderator’s proposal. |
| Ericsson1 | OK with moderator proposal. |
| Huawei, HiSilicon | Ok with the proposal |

# Issue 4: New FG for additional bandwidths

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Introduce the following new FG**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 35. LTE\_NR\_DC\_enh2 | 35-2 | Aperiodic CSI-RS bandwidth for tracking for fast SCell activation for 10MHz UE channel bandwidth | Indicates the UE supported TRS bandwidths for fast SCell activation, in addition to 52 RBs, for a 10MHz UE channel bandwidth. This only applies for the BWPs configured with 52 RBs size and 15kHz SCS, in FDD bands. | 35-1 | Yes | N/A | Aperiodic CSI-RS bandwidth for tracking for fast SCell activation for 10MHz UE channel bandwidth is not supported | Per band | FDD only | FR1 only | N/A | Candidate values of Set 1: 28, 32, 36, 40, 44, 48 RBs  Candidate values of Set 2: 32, 36, 40, 44, 48 RBs | Optional with capability signalling |

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| Qualcomm | We are fine with the proposal. |
| vivo | We are fine. |
| Intel | Fine with moderator’s proposal. |
| Ericsson1 | OK with moderator proposal. |
| Huawei, HiSilicon | OK. |

# Discussion/Approval Items during RAN1 #109-e — Second Checkpoint

Based on the comments/questions/suggestions received by the first checkpoint, the following are the revised proposals and/or proposed agreements by the moderator. Companies submitted the following views on the moderator’s proposals.

***[Please submit all comments/questions/suggestions here, late comments/questions/suggestions submitted in Section 3 will not be considered]***

**General comments**

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
|  |  |

# Issue 1: FG

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
|  |  |

# Discussion/Approval Items during RAN1 #109-e — Third Checkpoint

Based on the comments/questions/suggestions received by the second checkpoint, the following are the revised proposals and/or proposed agreements by the moderator. Companies submitted the following views on the moderator’s proposals.

***[Please submit all comments/questions/suggestions here, late comments/questions/suggestions submitted in Section 4 will not be considered]***

**General comments**

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
|  |  |

# Issue 1: FG

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
|  |  |

# Summary of Final Proposals for Agreements

This Section summarizes the final proposals for agreement in RAN1 #109-e by email. There are no tables for comments.

***[All comments must be directly made on the RAN1 email reflector]***

Companies can continue to update their comments in the previous Sections, however, these are no longer monitored by the moderator. Any such comments will be for archival purposes only and will not influence the outcome of this email discussion. Any objection to any of the proposals in this Section must be voiced directly on the RAN1 email reflector.

## Final Proposals for Agreement by the First Check Point

**Possible Agreement: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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

## Final Proposals for Agreement by the Second Check Point

**Possible Agreement: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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

# Conclusion

In addition to the agreements in Section 6, that were reached by email during RAN1 #109-e, the following was agreed by GTW during RAN1 #109-e:

# References

1. R1-2202929, Updated RAN1 UE features list for Rel-17 NR after RAN1 #108-e including remaining RAN1 issues, Moderators (AT&T, NTT DOCOMO, INC.)
2. R1-2203103, Rel-17 UE features for DSS and MR-DC, Huawei/HiSilicon
3. R1-2203200, Discussion on Rel-17 UE features for DSS, ZTE
4. R1-2203539, Maintenance on UE features for DSS, vivo
5. R1-2203780, Discussion on UE features for NR DSS, xiaomi
6. R1-2203884, UE features for DSS, Samsung
7. R1-2204007, Discussion on UE features for DSS, OPPO
8. R1-2205150, Views on Rel-17 DSS UE features, Apple
9. R1-2204596, On UE features for DSS and LTE NR DC enhancements, Nokia/Nokia Shanghai Bell
10. R1-2204696, On UE features for DSS, MediaTek Inc.
11. R1-2204964, UE features for DSS, Ericsson
12. R1-2205009, UE features for DSS and LTE\_NR\_DC\_enh2, Qualcomm Incorporated