**3GPP TSG-RAN WG4 Meeting # 98-bis-e R4-2105687**

**Electronic Meeting, 12th – 20th April, 2021**

**Agenda item:** 8.4.2.3

**Source:** Moderator (CATT)

**Title:** Email discussion summary for [98-bis-e][217] NR\_RRM\_enh2\_2

**Document for:** Information

# Introduction

The documents in agenda item 8.4.2.3 focus on the following topic

* Topic #1: PUCCH SCell activation/deactivation requirements

# Topic #1: PUCCH SCell activation/deactivation requirements

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2104564 | MediaTek Inc. | **Proposal 1: For the valid TA case of PUCCH SCell activation, the Rel-15 SCell activation requirement can be reused.**  **Proposal 2: For the PUCCH SCell without valid TA, the activation requirement shall be Tactivate\_basic + T1 + T2 + T3, where**  ***Tactivate\_basic: the normal SCell activation delay in TS38.133 section 8.3.2.***  ***T1:*** ***the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell. T1 is up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].***  ***T2:*** ***the delay from slot n + (Tactivate\_basic +T1)/(NR slot length) until UE has obtained a valid TA command for the target PUCCH SCell being activated. Slot n is the slot when UE received PUCCH SCell activation MAC CE.***  ***T3: the delay for applying the received TA for uplink transmission on target PUCCH SCell being activated, and greater than or equal to k+1 slot, where k is defined in clause 4.2 in TS 38.213.***  **Proposal 3: UE is only required to send the L1-RSRP and CQI report through the SpCell before the PUCCH SCell is successfully activated.**  **Proposal 4: No need to discuss spatial relation for PUCCH SCell activation if UE is only required to transmit the CSI report on SpCell before PUCCH SCell is activated.**  **Proposal 5: The known and unknown condition for SCell activation can be reused for PUCCH SCell.**  **Proposal 6: For the activation/deactivation of the PUCCH SCell with valid TA, the interruption requirement of PUCCH SCell can reuse the existing requirement for SCell in Rel-15.**  **Proposal 7: For the activation of PUCCH SCell without valid TA, the interruption requirement of PUCCH SCell shall include the existing requirement for SCell in Rel-15.**  **Proposal 8: For the deactivation of the PUCCH SCell without valid TA, the interruption requirement of PUCCH SCell can reuse the existing requirement for SCell in Rel-15.** |
| R4-2104633 | vivo | **Proposal 1: CSI report of PUCCH SCell is transmitted on PUCCH SCell to be activated**  **Proposal 2: For the unknown case, the beam information of the PUCCH SCell being activated should be indicated to NW. For the known case, this indication of this information can be omitted.**  **Proposal 3: For PUCCH SCell with a valid TA, the activation/deactivation delay requirements for deactivated/activated SCell of different scenarios can be reused for PUCCH SCell activation/deactivation**  **Proposal 4: For the PUCCH Scell activation delay requirement under invalid TA scenairo, suggest to reuse the corresponding principles of legacy Rel-15 requirements for the extra delay, i.e., option 1.**  **Proposal 5: investigate multiple Scell case after most issues for PUCCH Scell activation delay requirement for single Scell case are solved.**  **Proposal 6: reuse the interruption requirement of normal SCell activation/deactivation for PUCCH Scell activation/deactivation, at least for valid TA case.** |
| R4-2104686 | Xiaomi | **Proposal 1: The RRM requirements for PUCCH SCell activation and deactivation are defined provided that the CSI report of PUCCH SCell is transmitted on PSCell.**  **Proposal 2: The beam information of the PUCCH SCell being activated is not needed to be indicated to NW.**  **Proposal 3: If UE has the valid TA on the PUCCH SCell being activated, the basic SCell activation delay defined in section 8.3.2 in TS38.133 can be reused for PUCCH SCell activation.**  **Proposal 4: If UE does not have the valid TA on the PUCCH SCell being activated, an additional UL synchronization procedure to obtain the valid TA shall be considered which including the following factors:**   1. **the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell;** 2. **the delay for obtaining a valid TA command for the sTAG to which the SCell configured with PUCCH belongs;** 3. **the delay for applying the received TA for uplink transmission** |
| R4-2104760 | CATT | **Observation 1: CSI report of PUCCH SCell can be scheduled on PCell or PUCCH SCell.**  **Observation 2: If TA is not valid, CSI report may not be used to** determine **PUCCH SCell activation, but PRACH transmission can be used.**  **Proposal 1: If the TA is valid, the legacy requirement for SCell activation can be reused, i.e. the UE transmit valid CSI report on PUCCH SCell. If the TA is not valid, the ending point of PUCCH SCell activation should be defined at the point UE transmit PRACH on PUCCH SCell.**  **Proposal 2: The time for reading beam information should not be considered specially in PUCCH SCell activation delay requirements for contention random access. Whether and how to indicate the beam information of the PUCCH SCell being activated for non-contention random access procedure needs more study.**  **Proposal 3: The UL spatial relation should not be considered for defining PUCCH SCell activation delay requirement.**  **Proposal 4: The PUCCH SCell activation delay can be same as normal SCell activation delay in TS38.133 when TA of target PUCCH SCell is valid.**  **Proposal 5: PUCCH SCell activation delay with invalid TA is only replacing the waiting time for valid CSI report with waiting time for PRACH occasion based on normal SCell activation delay.**  **Proposal 6: Only T1 (The delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell) need to be considered.**  **Proposal 7: Option 1 for issue 1-2-8 in WF [1] should be adopted.**  **Proposal 8: Reuse the SCell deactivation delay requirement for activated SCell with multiple downlink SCells specified in section 8.3.8 of TS 38.133, which is (( THARQ + 3ms)/ NR slot length).**  **Proposal 9: Reuse the interruption requirement of normal SCell activation/deactivation.** |
| R4-2104833 | Apple | ***Proposal 1: RAN4 defines the PUCCH SCell activation requirement for the scenario that CSI report of PUCCH SCell is transmitted on PUCCH SCell to be activated.***  ***Proposal 2: The beam information for network to determine the associated SSB for PDCCH triggered RACH occasion shall consider both FR1 and FR2 cases.***  ***Proposal 3:***  ***If the being-activated PUCCH SCell is known, no need to indicate the beam information to network for determining the associated SSB in PDCCH order for RA, i.e., no additional SSB based beam measurement is needed.***  ***If the being-activated PUCCH SCell is unknown:***   * ***if target SCell belongs to FR2 and if there is at least one active serving cell on that FR2 band: following the same conditions in TS38.133 section 8.3.2 for intra-band FR2 SCell activation, no need to indicate the beam information to network for determining the associated SSB in PDCCH order for RA.*** * ***if target SCell belongs to FR2 and if there is no active serving cell on that FR2 band: need to indicate the beam information to network for determining the associated SSB in PDCCH order for RA.*** * ***if target SCell belongs to FR1 and it is contiguous to an active serving cell in the same band: following the same conditions in TS38.133 section 8.3.2 for intra-band contiguous FR1 SCell activation, no need to indicate the beam information to network for determining the associated SSB in PDCCH order for RA.*** * ***if target SCell belongs to FR1 and if there is no contiguous active serving cell on that FR1 band: need to indicate the beam information to network for determining the associated SSB in PDCCH order for RA.***   ***Proposal 4: the UL spatial relation of PUCCH on target being-activated SCell should be considered for PUCCH SCell activation in FR2 only.***  ***Proposal 5: the time uncertainty of the MAC CE for UL spatial relation activation of PUCCH in target being-activated SCell shall be defined in the baseline FR2 SCell activation delay part (Tactivate\_basic). Details are FFS.***  ***Proposal 6: when the TA associated with target PUCCH SCell is valid,***   * ***the PUCCH SCell activation delay in FR1 could be same as the normal SCell activation delay in TS38.133 section 8.3.2 which is (( THARQ + Tactivation\_time +TCSI\_Reporting)/ NR slot length);*** * ***the PUCCH SCell activation delay in FR2 could use normal SCell activation delay (i.e., (( THARQ + Tactivation\_time +TCSI\_Reporting)/ NR slot length);) in TS38.133 section 8.3.2 as baseline, but the time uncertainty of the MAC CE for UL spatial relation activation of PUCCH in target being-activated SCell shall be considered in the baseline Tactivation\_time.***   ***Proposal 7: The following three additional delay parts (T1/T2/T3) in LTE PUCCH SCell activation with invalid TA could be reused for NR PUCCH SCell activation with invalid TA.***   * ***the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell*** * ***the delay for obtaining a valid TA command for the sTAG*** * ***the delay for applying the received TA for upling transmission***   ***The values for T1/T2/T3 might be revisited for NR PUCCH SCell activation.***  ***Proposal 8: In NR PUCCH SCell activation delay requirement with invalid TA, T1 is the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell. T1 is up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].***  ***Proposal 9: In NR PUCCH SCell activation delay requirement with invalid TA, T2 is the delay from slot n + (Tactivate\_basic +T1)/NR slot length until UE has obtained a valid TA command for the target PUCCH SCell being activated. Tactivate\_basic is the normal SCell activation delay in TS38.133 section 8.3.2. slot n is the slot when UE received PUCCH SCell activation MAC CE.***  ***Proposal 10: In NR PUCCH SCell activation delay requirement with invalid TA, T3 is the delay for applying the received TA for uplink transmission on target PUCCH SCell being activated, and greater than or equal to k+1 slot, where k is defined in clause 4.2 in TS 38.213.***  ***Proposal 11:*** ***The PUCCH SCell activation delay requirement shall apply provided that,***   * + ***The UE has received a PDCCH order to initiate RA procedure on the PUCCH SCell within Tactivate\_basic otherwise additional delay to activate the SCell is expected; and***   + ***No interruption occurs in same FR as the target PUCCH SCell during the SCell activation procedure if UE supports per-FR MG, otherwise the PUCCH SCell activation delay can be extended, and***   + ***No interruption occurs during the SCell activation procedure if UE does not support per-FR MG, otherwise the PUCCH SCell activation delay can be extended.***   ***The above interruption is caused by factor defined in TS38.133 section 8.2.1.1 for EN-DC, in TS38.133 section 8.2.2.1 for NR SA, in TS38.133 section 8.2.3.1 for NE-DC and*** ***in TS38.133 section 8.2.4.1 for NR-DC.***  ***Proposal 12: reuse the interruption requirement of normal SCell activation/deactivation to the interruption requirement of PUCCH SCell activation/deactivation.*** |
| R4-2104944 | CMCC | ***Proposal 1: except CSI report of PUCCH SCell can be transmitted on PUCCH SCell, it is better for RAN4 to have consensus on whether CSI report of PUCCH SCell can be transmitted on PCell, which will have impact on the specification of SCell activation delay requirement.***  ***Proposal 2: If it is agreed that CSI report of PUCCH SCell can be transmitted on PCell, for this case, TA is valid and the activation delay requirements for this scenario is the same as the normal SCell activation delay requirements (specified in section 8.3.2 of TS 38.133), which is (( THARQ + Tactivation\_time +TCSI\_Reporting)/ NR slot length).***  ***Proposal 3: for the case of SCell activation for deactivated PUCCH SCell with valid TA, the SCell activation delay requirement for deactivated SCell specified in section 8.3.2 of TS 38.133 can be reused, which is* (( THARQ + Tactivation\_time +TCSI\_Reporting)/ NR slot length).**  ***Proposal 4: for the case of SCell activation for deactivated PUCCH SCell with invalid TA,***   * ***the SCell activation delay requirement in DL:* (( THARQ + Tactivation\_time +TCSI\_Reporting)/ NR slot length)** * ***the SCell activation delay requirement in UL: except THARQ + Tactivation\_time +TCSI\_Reporting, additional delay including following parts need to be considered for the SCell activation delay requirements specification:*** * ***the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell*** * ***the delay for obtaining a valid TA command for the sTAG*** * ***the delay for applying the received TA for upling transmission***   SCell Deactivation Delay Requirement for Activated PUCCH Scell  ***Proposal 5: for the case of SCell deactivation for activated PUCCH SCell, the SCell deactivation delay requirement for activated SCell specified in section 8.3.3 of TS 38.133 can be reused, which is (( THARQ + 3ms)/ NR slot length).*** |
| R4-2104981 | NEC | **Proposal 1: RAN4 to agree that CSI reporting can be transmitted on PCell for PUCCH SCell activation and TA acquisition should be performed before CSI reporting.**  **Proposal 2: For an unknown FR1 SCell activation where CSI reporting is transmitted on PCell, RAN4 to consider including L1-RSRP/beam reporting as part of the SCell activation procedure.**  **Proposal 3: RAN4 to agree that CSI reporting can be transmitted on SCell for PUCCH SCell activation and TA acquisition should be performed before CSI reporting.**  **Proposal 4: For an unknown FR1 SCell activation where CSI reporting is transmitted on SCell, RAN4 to consider including L1-RSRP/beam reporting as part of the SCell activation procedure.**  **Proposal 5: For known/unknown FR1/2 SCell activation where CSI reporting is transmitted on SCell, RAN4 to agree that SCell activation procedure includes UL spatial relation info for PUCCH.**  **Proposal 6: PUCCH SCell activation delay (TDelay\_PUCCH\_SCell) is defined as: TDelay\_PUCCH\_SCell=TBasic\_SCell\_activation\_delay + TL1-RSRP + TTA\_delay + TUL\_spatial\_relationInfo; where:**   * **TBasic\_SCell\_activation\_delay is SCell activation delay as described in clause 8.3.2 of TS 38.133;** * **TL1-RSRP: L1-RSRP measuring and reporting delay. This is zero for FR1/2 known SCells and FR2 unknown SCells;** * **TTA\_delay: Delay required for TA command acquisition and application. Exact delay is FFS; and** * **TUL\_spatial\_relationInfo: Delay uncertainty for receiving UL spatial relation info MAC CE and UL spatial relation info application delay. Exact delay is FFS. This is applicable only when CSI report of to be activated SCell is transmitted on SCell.**   **Proposal 7: RAN4 to agree that timing command acquisition and application delay (TTA\_delay) when the TA is invalid is defined as: TTA\_delay = T1 + T2 + T3; where,**   * **T1: delay uncertainty in acquiring next available PRACH occasion in the PUCCH SCell;** * **T2: delay for obtaining a valid TA command for the TAG to which the SCell configured with PUCCH belongs;** * **T3: delay for applying the received TA for uplink transmission.**   **Proposal 8: RAN 4 to reuse the SCell deactivation requirement of clause 8.3.8 for SCell Deactivation requirements of Activated PUCCH SCell with multiple SCells.** |
| R4-2105104 | NTT DOCOMO, INC. | **Observation 1: The CSI reporting has not to be transmitted on PUCCH SCell if the UE has a valid TA.**  **Observation 2: The CSI reporting shall be transmitted on PUCCH SCell if the UE does not have a valid TA.**  **Proposal 1: Whether CSI report of PUCCH SCell is transmitted on PCell or PUCCH SCell to be activated shall be specified in the case of the UE not having a valid TA.**  **Proposal 2: CSI report of PUCCH SCell shall be transmitted on PUCCH SCell to be activated in the case of the UE not having a valid TA.**  **Observation 3: In some cases, NW has to know the beam information of the PUCCH SCell being activated.**  **Proposal 3: If the SCell being activated is known and belongs to FR2 and if there is no active serving cell on that FR2 band provided that PCell or PSCell is in FR1 or in FR2, the beam information is needed to be indicated to NW.**  **Proposal 4: If the PCell/PSCell and the target SCell are configured as FR1-FR2 CA or if the PCell/PSCell and the target SCell are in a FR2 band pair with independent beam management, and the target SCell is unknown, the beam information is needed to be indicated to NW.**  **Proposal 5: The UL spatial relation shall be considered for PUCCH SCell activation in the case of the UE not having a valid TA**  **Proposal 6: The PUCCH SCell activation delay when TA of target PUCCH SCell is valid is same as the normal SCell activation delay in TS38.133 section 8.3.2 which is ((THARQ + Tactivation\_time +TCSI\_Reporting)/ NR slot length)**  **Proposal 7: The following three additional delay parts (T1/T2/T3) in LTE PUCCH SCell activation with invalid TA could be reused for NR PUCCH SCell activation with invalid TA.**   * **the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell (T1)** * **the delay for obtaining a valid TA command for the sTAG (T2)** * **the delay for applying the received TA for uplink transmission (T3)**   **Observation 4: The maximum duration is 160ms (1 occasion every 16SFN) for FR1 both paired/unpaired spectrumthe and 151ms (slot #4,9,14,19,24,29,34,39 every 16SFN) value.**  **Proposal 8: T1 is the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell. T1 is up to 160ms for FR1 and 151ms for FR2 and the actual value of T1 shall depend upon the PRACH configuration used in the PUCCH SCell.**  **Proposal 9: The value of T2 and T3 shall include the effect of SCS configuration.**  **Proposal 10: T2 is the delay for obtaining a valid TA command for the sTAG to which the SCell configured with PUCCH belongs. T2 is up to 13ms / (μ+1) where μ is the SCS configuration index.**  **Proposal 11: T3 is the delay for applying the received TA for upling transmission. T3 is 6ms / (μ+1) where μ is the SCS configuration index.** |
| R4-2106408 | Nokia, Nokia Shanghai Bell | **Observation #1: In LTE PUCCH SCell activation, the UE is required to be able to transmit valid CSI report on the PUCCH SCell within the activation delay requirement. Only the second scenario is considered in LTE.**  **Proposal1: If the PUCCH SCell is in FR1, the UE is not required to indicate the beam information. The UE shall transmit CSI report of PUCCH SCell on the PUCCH SCell at the end of the activation.**  **Proposal2: If the PUCCH SCell is known in FR2, the UE does not need to indicate the beam information during the activation period. The UE shall transmit CSI report on the PUCCH SCell at the end of the activation.**  **Proposal3: If the PUCCH SCell is unknown in FR2, the UE may need to indicate the beam information before network can initiate the PDCCH order. The UE may need to transmit a valid CSI report of PUCCH SCell on the PCell before network initiating the PDCCH order.**  **Proposal4: If RAN4 agrees to send beam information on PCell, we propose sending LS to RAN1/2 asking for the feasibility and potential solutions of transmitting CSI report of PUCCH SCell on the PCell.**  **Proposal5: If the UE has a valid TA for transmitting on the PUCCH SCell in NR, the activation delay requirement is the same as the activation delay for activating a non-PUCCH SCell i.e. Tactivation\_time as defined in TS 38.133 section 8.3.2.**  **Proposal6: If the UE does not have a valid TA for transmitting on the PUCCH SCell in NR, the activation delay shall be defined for downlink and uplink actions separately.**  **Proposal7: If the UE does not have a valid TA for transmitting on an SCell, the UE shall be capable to perform downlink actions related to the SCell activation command for the SCell being activated on the PUCCH SCell no later than in slot .**  **Proposal8: The activation delay requirement for PUCCH SCell shall be defined assuming no dedicated time period for CSI measurements and reporting.**  **Proposal9: If the UE does not have a valid TA for transmitting on an SCell, the UE shall be capable to perform uplink actions related to the SCell activation command for the SCell being activated on the PUCCH SCell no later than in slot , where TRACH is the delay to perform RACH procedure and apply the TA.** |
| R4-2106534 | OPPO | **Observation 1: Minimum requirements of delay should be considered assuming PUCCH Scell should be ready for uplink transmission.**  **Proposal 1：Specify the same RRM requirement for both case 1 and case 2.**  **Proposal 2: The beam information of the PUCCH SCell being activated is not always essential to be indicated to NW.**  **Proposal 3: The PUCCH SCell activation delay with valid TA should be the same as the normal SCell activation delay in TS38.133 section 8.3.2 which is (( THARQ + Tactivation\_time +TCSI\_Reporting)/ NR slot length).**  **Proposal 4: The additional delay for NR PUCCH SCell activation with invalid TA should be defined, considering at least the following 3 components:**   * **the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell** * **the delay for obtaining a valid TA command for the sTAG** * **the delay for applying the received TA for uplink transmission**   **Proposal 5: For SCell deactivation delay requirement for activated PUCCH SCell with multiple Scells, the requirements for activated normal SCell with multiple SCells are reused, which is (( THARQ + 3ms)/ NR slot length).**  **Proposal 6: For PUCCH SCell activation/deactivation with valid TA case, the interruption requirement of normal SCell activation/deactivation for valid TA case can be reused. For PUCCH SCell activation/deactivation with invalid TA cases, FFS the interruption requirements after the additional delay are clearly defined.** |
| R4-2106883 | Ericsson | **Proposal 1:** RAN4 to derive requirements for the scenario where CSI for PUCCH SCell is reported via PUCCH SCell, as the other scenario with reporting vis spCell is not different from existing activation procedure for SCell with uplink belonging to secondary TAG.  **Proposal 2:** RAN4 to focus on deriving PUCCH SCell activation requirements for the scenario where the beam index to provide in the PDCCH order is known to NW beforehand.  **Proposal 3:** RAN4 shall consider spatial relation information in the PUCCH SCell activation procedure.  **Proposal 4:** Delay requirements for PUCCH SCell activation shall account for additional time when PDCCH order is received outside Tactivate\_basic. The additional time shall be accounted for by an expression and/or a delay component, e.g. max(Tactivate\_basic, TPDCCH\_order).  **Proposal 5:** Delay requirement for PUCCH SCell activation shall allow for extended time when there are additional interruptions during the activation procedure. The extended time shall be in proportion to the impact the interruption has on the activation procedure. The extended time can be captured on a general level in a sentence.  **Proposal 6:** In activation of multiple SCells with one PUCCH SCell, activation delay requirement shall apply at least for the PUCCH SCell in the event that one or more SCells have configurations that render parallel activation impossible for the UE. FFS on whether activation delay requirement also is to apply for SCells that are compatible with parallel activation with PUCCH SCell.  **Proposal 7:** Existing interruption requirements for non-PUCCH SCell activation are applied to PUCCH SCell activation. Constraints on PUSCH/PUCCH/SRS transmission on CCs in same band when CFRA is carried out are already covered in TS 38.213. |
| R4-2106988 | Huawei, HiSilicon | **Observation 1: CSI reporting of PUCCH SCell on PUCCH PCell is not preferred for the following reason:**   * **NW cannot know when the UL of PUCCH SCell is ready.** * **Resource wasting as NW has to reserve PUCCH in PCell for the PUCCH SCell** * **Reconfiguration is needed to remove the CSI reporting on the PUCCH in PCell after the SCell is activated every time.**   **Proposal 1: Define SCell activation requirements at least for CSI reporting on PUCCH SCell to be activated.**  **Observation 2: The beam information is not needed for LTE and NW could indicate a CFRA RACH via PDCCH order directly.**  **Observation 3: It is beneficial to allow CBRA for PUCCH SCell activation when the Cell is unknown and TA is invalid. The procedure for beam indication and PDCCH order and the corresponding delay are saved.**  **Proposal 2: Send LS to RAN2 to inform the observation from RAN4 about the benefits of allowing CBRA activation and ask whether it is feasible to CBRA for PUCCH SCell.**  **Proposal 3: Further discuss the suitable way for beam information indication if the CBRA on PUCCH SCell is not feasible.** |
| R4-2107290 | Qualcomm Incorporated | **Proposal 1: PUCCH SCell activation requirements are applicable only to the following cases:**   * + **the PUCCH SCell is in a different band from SpCell band**   + **for invalid TA, UEs capable of more than one TAG**   + **for unknown PUCCH SCell, TA shall be assumed invalid**   **Proposal 2: For UEs not supporting one of the following capabilities, FR2 PUCCH SCell (de)activation requirements are not defined.**   * + **beamCorrespondenceWithoutUL-BeamSweeping**   + **beamCorrespondenceSSB-based-r16**   **Proposal 3: For known PUCCH SCell with a valid TA, the single SCell activation requirements in terms of activation delay and interruption are the same as respective legacy SCell activation requirements except that CSI of the PUCCH SCell is reported on the SCell.**  **Proposal 4: For known PUCCH SCell with an invalid TA, the single SCell activation requirements in terms of activation delay and interruption are defined as follows:**   * + **Starting point of interruption window is the same as legacy SCell activation requirement**   + **Activation delay = legacy SCell activation delay + T1 + T2 + T3, where**     - **T1: the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell**     - **T2: the delay for obtaining a valid TA command for the sTAG**     - **T3: the delay for applying the received TA for uplink transmission**   + **CSI of the PUCCH SCell is reported on the SCell after T3**   + **For FR1, the above requirement also applies to “unknown PUCCH SCell with invalid TA” if one of the following conditions is met:**     - **‘ssb-PositionInBurst’ indicates only one SSB is being actually transmitted, or**     - **‘ssb-PositionInBurst’ indicates multiple SSBs and TCI indication is provided in same MAC PDU with SCell activation**   + **For FR2, if L1-RSRP report is followed by RRC reconfiguration for PUCCH-SpatialRelationInfo update based on the report during the activation procedure, an additional delay is expected**   **Proposal 5: For unknown PUCCH SCell with an invalid TA, the single SCell activation requirements in terms of activation delay and interruption are defined as follows:**   * + **Starting point of interruption window is the same as legacy SCell activation requirement**   + **Activation delay = T0 + T1 + T2 + T3, where**     - **T0:**        * **If semi-persistent CSI-RS is used for CSI reporting,**       * **If periodic CSI-RS is used for CSI reporting,**     - **T1: the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell**     - **T2: the delay for obtaining a valid TA command for the sTAG**     - **T3: the delay for applying the received TA for uplink transmission**   + **PDCCH triggering CF-RA shall be after UE finishes processing the last activation command for TCI**   + **CSI of the PUCCH SCell is reported on the SCell after T3**   + **For FR2, if L1-RSRP report is followed by RRC reconfiguration for PUCCH-SpatialRelationInfo update based on the report during the activation procedure, an additional delay is expected**   + **For FR1, the above requirement applies only when none of the following conditions is met:**     - **‘ssb-PositionInBurst’ indicates only one SSB is being actually transmitted, or**     - **‘ssb-PositionInBurst’ indicates multiple SSBs and TCI indication is provided in same MAC PDU with SCell activation** |

## Open issues summary

### Sub-topic 1-1 General

**Issue 1-1-1: The ending point of PUCCH SCell activation?**

* Proposals
  + Option 1: (CATT)
    - For valid TA case, the ending point of PUCCH SCell activation should be the point when UE transmit valid CSI report on PUCCH SCell
    - For invalid TA case, the ending point of PUCCH SCell activation should be the point when UE transmit PRACH on PUCCH SCell
  + Option 2:
    - The ending point of PUCCH SCell activation is the point when UE transmit valid CSI report on a certain cell (SpCell or PUCCH SCell or others) for both valid and invalid TA cases.
* Recommended WF
  + *Need more discussion*

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| **Issue 1-1-1: The ending point of PUCCH SCell activation?** | |
| **Company** | **Comments** |
| Apple | Propose option 3: The ending point of PUCCH SCell activation is the point when UE transmit valid CSI report on target PUCCH SCell for both valid and invalid TA cases. |
| Huawei | We prefer the option 3 proposed by Apple. |
| Xiaomi | Support option 3 proposed by Apple  In TS36.133, the PUCCH SCell activation delay requirement is defined as follows:  “*If the UE does not have a valid TA for transmitting on an SCell then the UE shall be capable to perform downlink actions related to the SCell activation command as specified in [17] for the SCell being activated on the PUCCH SCell no later than in subframe n+Tactivate\_basic and shall be capable to perform uplink actions related to the SCell activation command as specified in [17] for the SCell being activated on the PUCCH SCell no later than in subframe n+Tdelay\_PUCCH SCell and shall transmit valid CSI report for the SCell being activated on the PUCCH SCell no later than in subframe n+Tdelay\_PUCCH SCell, where*:”  So, the ending point should be the valid CSI reporting for invalid TA cases. |
| ZTE | We support Option 3 proposed by Apple, similar as that in LTE. |
| Qualcomm | Support Option 3 proposed by Apple. If there are cases where CSI can’t be reported to the target PUCCH SCell due to a so-called chicken-and-egg problem without RAN1/2 updates, we would like not to define requirements for those cases. |
| OPPO | Support Option 3 proposed by Apple, similar as that in LTE. |
| CMCC | One consideration is that whether the CSI reporting is transmitted on PCell or SCell is up to network configuration. If we go with option 3, what’s the UE behavior for the case that network configure CSI reporting via PCell PUCCH? No requirements applied? or clearly say in the spec that normal requirements can be reused (considering TA is valid for this scenario)? |
| Ericsson | Support Option 3 by Apple. |
| NTT DOCOMO, INC. | We propose option 4:  For valid TA case, the ending point of PUCCH SCell activation is the point when UE can transmit valid CSI report on a certain cell (SpCell or PUCCH SCell or others). For invalid TA case, the ending point of PUCCH SCell activation is the point when UE transmit valid CSI report on target PUCCH SCell.  According to the existing LTE specification, the different wording is used between valid TA case and invalid TA case as follows:  *If the UE has a valid TA for transmitting on an SCell then the UE shall be able to transmit valid CSI report and apply actions related to the SCell activation command as specified in [17] for the SCell being activated on the PUCCH SCell no later than in subframe n+Tactivate\_basic*  *If the UE does not have a valid TA for transmitting on an SCell then the UE shall be capable to perform downlink actions related to the SCell activation command as specified in [17] for the SCell being activated on the PUCCH SCell no later than in subframe n+Tactivate\_basic and shall be capable to perform uplink actions related to the SCell activation command as specified in [17] for the SCell being activated on the PUCCH SCell no later than in subframe n+Tdelay\_PUCCH SCell and shall transmit valid CSI report for the SCell being activated on the PUCCH SCell no later than in subframe n+Tdelay\_PUCCH SCell*  In the case of UE having valid TA case, the specification does not require CSI report transmission, just saying “able to transmit”. On the other hand in the case of UE not having valid TA case, it is clearly stated that UE shall transmit CSI report on the PUCCH SCell. |
| vivo | Support option 3 from apple. |
| Nokia | We think this depends on if the UE has transmitted the CSI reporting e.g. to inform network the beam information during the activation period. If the CSI reporting has been sent, regardless of on PCell or PUCCH SCell, it seems no need to retransmit the CSI report in the end of the activation procedure. We suggest focusing on the activation procedure to better understand the UE behavior. |
| MediaTek | Support option 3 proposed by Apple |
| NEC | We support Option 2. May be before deciding this we should agree whether CSI report on PCell and SCell is considered. |
| CATT | Support option 1.  Ending points of delay requirement for the other procedures in NR are defined in TS38.133 [2] as:   * UE transmit PRACH on PCell for handover delay requirement; * UE transmit PRACH on PSCell for PSCell addition delay requirement;   It can be seen that the ending point for unlink procedure in NR is the first transmission of PRACH. Although the ending point for PUCCH SCell activation delay requirement is defined valid CSI-RS report on PUCCH SCell in LTE RRM, we think the criterion in NR specification should be adopted. Also in our understanding, when UE can transmit PRACH, the SCell can be regarded as activated and can already have interaction with gNB. The following procedure such as uplink synchronization can be performed by SCell individually after it is activated. |

**Issue 1-1-2:** **Which cell is the CSI reporting transmitted for PUCCH SCell activation?**

* Proposals
  + Option 1: (MTK)
    - UE is only required to send the L1-RSRP and CQI report through the SpCell before the PUCCH SCell is successfully activated.
  + Option 2: (vivo, Apple, Ericsson, Huawei, Qualcomm)
    - CSI report of PUCCH SCell is transmitted on PUCCH SCell to be activated
  + Option 2a: (NTT DOCOMO)
    - CSI report of PUCCH SCell is transmitted on PUCCH SCell to be activated in the case of the UE not having a valid TA.
  + Option 3: (Xiaomi)
    - CSI report of PUCCH SCell is transmitted on PSCell
  + Option 4: (Nokia)
    - CSI report of PUCCH SCell is transmitted on PUCCH SCell to be activated if the PUCCH SCell is in FR1 or known cell in FR2.
    - A valid CSI report of PUCCH SCell is transmitted on the PCell before network initiating the PDCCH order if the PUCCH SCell is unknown in FR2.
  + Option 5: (NEC)
    - CSI reporting can be transmitted on PCell or SCell and TA acquisition should be performed before CSI reporting.
  + Option 6: (OPPO)
    - Specify the same RRM requirement for the cases when CSI reporting is transmitted in PCell or PUCCH SCell to be activated.
  + Option 7: (CATT)
    - Not needed
* Recommended WF
  + *Need more discussion*

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| **Issue 1-1-2: Which cell is the CSI reporting transmitted for PUCCH SCell activation?** | |
| **Company** | **Comments** |
| Apple | We prefer option 2 which is as same as in LTE PUCCH SCell activation. |
| Huawei | We support option 2. IN this way, NW could know when the UL is ready of the PUCCH SCell. And it is also not the typical case that UE is configured to report CSI of a Cell with PUCCH using the PUCCH of SPCell. |
| Xiaomi | Support option 2, in our original proposal (option 3), the PScell means the SCell with PUCCH transmission. |
| ZTE | We support Option 2. It is an indication of readiness of the target PUCCH SCell being activated by delivering a valid CSI report on PUCCH of the target PUCCH SCell. |
| Qualcomm | Option 2. Based on the statement below (excerpt from Section 7.5 in TS36.300), CSI of PUCCH SCell can’t be reported to other cells than the PUCCH SCell once the PUCCH SCell is configured by RRC. And there was not change on this principle in NR.    Besides, according to UE procedures described in Clause 9 of TS38.213, UE behavior for PUCCH SCell follows DC where CSI report across CG is not supported. Therefore, CSI report across PUCCH group is not allowed. |
| OPPO | Support option 6 and option 2. One set of requirements should be defined based on CSI report of PUCCH SCell is transmitted on PUCCH SCell to be activated |
| Ericsson | Option 2. |
| NTT DOCOMO, INC. | Support option 2a |
| vivo | We support option 2 |
| Nokia | Probably it would be better to clarify what CSI reporting means exactly. For FR2 unknown case, the UE needs to transmit L1-RSRP which we understood is also sent via CSI reporting. For PUCCH SCell activation, if there is no valid TA, the PUCCH on PUCCH SCell is not usable before RACH completion thus the UE may have to transmit the L1-RSRP via PCell/PSCell. This issue is also relevant to Issue 1-1-3 which can be discussed together. |
| MediaTek | We support option 2. In our proposal, i.e., option 1, our thinking is that UE may transmit the invalid CSI-reporting on PCell before UE transmit the valid CSI-reporting on PUCCH SCell to be activated. |
| NEC | We support option 5. |
| CATT | Depending on issue 1-1-1, if the ending point is defined as the point when UE transmit PRACH, this issue is not needed. |

**Issue 1-1-3: Whether the beam information (SSB index) of PUCCH Scell is needed to be indicated to NW?**

* Proposals
  + Option 1: (vivo)
    - For the unknown case, the beam information of the PUCCH Scell being activated should be indicated to NW.
    - For the known case, this indication of this information can be omitted.
  + Option 2: (NEC)
    - Needed for unknown FR1 Scell activation
      * For an unknown FR1 Scell activation where CSI reporting is transmitted on Scell, RAN4 to consider including L1-RSRP/beam reporting as part of the Scell activation procedure.
  + Option 3: (Nokia)
    - Needed for unknown PUCCH Scell in FR2.
    - Not needed for PUCCH Scell in FR1 or known PUCCH Scell in FR2.
    - If RAN4 agrees to send beam information on Pcell, send LS to RAN1/2 asking for the feasibility and potential solutions of transmitting CSI report of PUCCH Scell on the Pcell.
  + Option 4: (Apple)
    - If the being-activated PUCCH Scell is known, no need to indicate the beam information to network for determining the associated SSB in PDCCH order for RA, i.e., no additional SSB based beam measurement is needed.
    - If the being-activated PUCCH Scell is unknown:
      * if target Scell belongs to FR2 and if there is at least one active serving cell on that FR2 band: following the same conditions in TS38.133 section 8.3.2 for intra-band FR2 Scell activation, no need to indicate the beam information to network for determining the associated SSB in PDCCH order for RA.
      * if target Scell belongs to FR2 and if there is no active serving cell on that FR2 band: need to indicate the beam information to network for determining the associated SSB in PDCCH order for RA.
      * if target Scell belongs to FR1 and it is contiguous to an active serving cell in the same band: following the same conditions in TS38.133 section 8.3.2 for intra-band contiguous FR1 Scell activation, no need to indicate the beam information to network for determining the associated SSB in PDCCH order for RA.
      * if target Scell belongs to FR1 and if there is no contiguous active serving cell on that FR1 band: need to indicate the beam information to network for determining the associated SSB in PDCCH order for RA.
  + Option 5: (NTT DOCOMO)
    - If the Scell being activated is known and belongs to FR2 and if there is no active serving cell on that FR2 band provided that Pcell or PSCell is in FR1 or in FR2, the beam information is needed to be indicated to NW.
    - If the Pcell/PSCell and the target Scell are configured as FR1-FR2 CA or if the Pcell/PSCell and the target Scell are in a FR2 band pair with independent beam management, and the target Scell is unknown, the beam information is needed to be indicated to NW.
  + Option 6: (Ericsson)
    - RAN4 to focus on deriving PUCCH Scell activation requirements for the scenario where the beam index to be provided in the PDCCH order is known to NW beforehand.
  + Option 7: (Huawei)
    - Send LS to RAN2 to inform the observation from RAN4 about the benefits of allowing CBRA activation and ask whether it is feasible to CBRA for PUCCH Scell.
    - Further discuss the suitable way for beam information indication if the CBRA on PUCCH Scell is not feasible.
  + Option 8: (Xiaomi)
    - No
  + Option 9: (CATT)
    - Not needed for contention random access. Needed for non-contention random access.
* Recommended WF
  + *Need more discussion*

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| **Issue 1-1-3: Whether the beam information (SSB index) of PUCCH Scell is needed to be indicated to NW?** | |
| **Company** | **Comments** |
| Apple | We support option 4. If the target PUCCH is unknown, that means UE has reported the L3 measurement back to network and network could know which associated SSB could be used for RACH in PDCCH order. If the target PUCCH Scell is unknown, for both FR1 and FR2, network needs to know which beam to receive RACH, and therefore SSB measurement report is needed for network to determine the associated SSB in the PDCCH order for RACH. Option 1 is also fine to us, but option 4 just provided detailed conditions. |
| Huawei | We generally fine with the common observation that the beam information is needed for unknown cases. The questions is “how” to indicate it to NW. We would like companies to consider whether it is possible to support CBRA for PUCCH Scell. Currently, UE need to report the beam information to NW first (the approach is not clear yet), then NW indicate a PDCCH order using the beam information, and then UE trigger the RA according to the PDCCH order. It is complex to both UE and NW side, a lot work to design the exact point for certain signal and it will also lead to extra delay. If UE is allowed to use CBRA for the unknown case, UE will transmit PRACH with the beam information associated without redundant interactions, which is more efficiency and easy for both UE and NW side. |
| Xiaomi | Support option 8, there is no need to indicate the beam information to NW, as the PDCCH order will be indicated to UE via Pcell. And the SSB/PBCH index will be indicated in the PDCCH order which is used to determine the RACH occasion for the PRACH transmission. |
| ZTE | Option 1 or Option 4 are fine with us. |
| Qualcomm | Option 4 with a clarification that “need to indicate the beam information to network for determining the associated SSB in PDCCH order for RA” doesn’t necessarily mean it is always possible for all cases, i.e. there can be cases where DL beam (SSB index) indication can’t be reported to the serving cell due to UE behavior for PUCCH grouping specified by RAN1/2.  As for Huawei’s comment, the requirement should be developed based on Rel-15 RAN1/2 spec as per WID, hence, no CBRA based PUCCH SCell activation.  As for Xiaomi’s comment, in our understanding, cross-carrier based PDCCH order PRACH trigger is not supported since there is no carrier-indicator for the PRACAH transmission other than SUL indicator. |
| NTT DOCOMO, INC. | We are fine with option 4 |
| OPPO | Option 4 is fine. |
| vivo | We support option 1. |
| Nokia | We support Option 3.  In Option4, we don’t think this case is valid “if target Scell belongs to FR2 and if there is at least one active serving cell on that FR2 band”. According to current spec, “SCell is known in FR2” is defined only for the first SCell in one band. If “there is at least one active serving cell on that FR2 band”, the SCell should be FR2 known instead of unknown.  *For the first SCell activation in FR2 bands, the SCell is known if it has been meeting the following conditions:…*  In addition, for the FR1 unknown case, it has been specified in TS38.133 as below. As the UE in FR1 is assumed receiving using omni-directional antenna, we understood network is able to identify the beam hence transmit the PDCCH order. Therefore, we don’t think there is need to transmit the beam information.  The requirements for FR1 unknown SCell activation specified in this clause apply when one of the following conditions is met  - ‘ssb-PositionInBurst’ indicates only one SSB is being actually transmitted, or  - ‘ssb-PositionInBurst’ indicates multiple SSBs and TCI indication is provided in same MAC PDU with SCell activation. |
| MediaTek | Share the similar view as Huawei. The fundamental question is how to indicate the beam information to network.  We just want to share another possible way to complete the PUCCH activation. To avoid large change in specification, we may allow UE to transmit the invalid CSI reporting or L3 measurement report on SpCell before the PUCCH SCell is activated, i.e., the beam information for PUCCH SCell could be transmitted to network via SpCell.  Thus, the possible ways for PUCCH SCell activation with valid and invalid TA cases are provided as follows.  The valid case:   1. UE may measure the quality of the PUCCH SCell and report the beam information to network via SpCell. 2. Network transmits the downlink signals via the beam reported by UE and UE can transmit the uplink signals with valid TA.   The invalid case:   1. UE may measure the quality of the PUCCH SCell and report the beam information to network via SpCell. 2. Network will indicate the PDCCH order to UE and then UE will trigger the random access procedure for obtaining the TA command. 3. After UE obtain the valid TA, UE may transmit the CSI-reporting on its own PUCCH resource. |
| NEC | We support option 2. As for other cases beam information is already known or part of SCell activation procedure. |
| CATT | For contention based random access, the beam indication is not needed. For NW initiated PRACH, we agree that the beam information is needed for unknown cell. But this indication need to be performed in PCell and the procedure is complex. |

**Issue 1-1-4: Which cell is the L1-RSRP reporting transmitted for PUCCH SCell activation?**

* Proposals
  + Option 1:
    - L1-RSRP report is transmitted on the PUCCH SCell to be activated.
  + Option 2:
    - L1-RSRP report is transmitted on the SpCell.
  + Others.

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| **Issue 1-1-4: Which cell is the L1-RSRP reporting transmitted for PUCCH SCell activation?** | |
| **Company** | **Comments** |
| Apple | Prefer option 2 as baseline, because L1-RSRP report is an intermediate step during the PUCCH SCell activation procedure and the result of L1-RSRP report is to determine the SSB index of PDCCH order for RACH or the UL spatial relation for PUCCH on SCell. |
| Huawei | For option 1, we think now the UL may not ready now for L1-RSRP report. The L1-RSRP is exactly the information needed from NW to enabling the UL for PUCCH SCell. However, option 2 is also not feasible way. We believe it is not a typical case to configure CSI report (L1-RSRP) for a PUCCH SCell on the SpCell. It means NW will reserve the PUCCH resource for PUCCH SCell even it is already configured with PUCCH. Each time the when UE is activated, NW may need to remove the CSI report in SpCell by a RRC reconfiguration message to save resource, and when the PUCCH SCell is deactivated, NW need to add the CSI report in SpCell again before it is activated. |
| Xiaomi | From our understanding, L1-RSRP report is not needed as the PDCCH order for PUCCH SCell activation is indicated by PCell, and in the PDCCH order, the SSB/PBCH index will be indicated used to determine the RACH occasion for the PRACH transmission. |
| ZTE | Option 2. L1-RSRP report is not able to be transmitted on the PUCCH SCell since it is not activated yet. |
| Qualcomm | As L1-RSRP is not a part of CSI, it is a bit unclear if the restriction we mentioned in Issue 1-1-2 shall apply here. If it is not and confirmed by RAN1 and/or RAN2, Option 1 will resolve convoluted issues for unknown PUCCH SCell cases. |
| Ericsson | In this case the UE cannot transmit on UL before completing RA, so L1-RSRP for determining beam would have to be configured for reporting via spCell. |
| OPPO |  |
| Nokia | Probably the Issue could be clarified by adding “if the UE is required to perform L1-RSRP measurement and reporting during activation” as we understood this is needed only for FR2 unknown case. With this clarification, we think only Option 2 is feasible as there is no UL available in PUCCH SCell before RACH completion (assuming here is discussing the invalid TA case). |
| MediaTek | Support option 2. In our understanding, in order to avoid the big change in specification, the procedure said by Huawei is inevitable |
| NEC | We see only option that is Option 2. It can’t transmit on SCell before acquiring TA from the SCell. Even if TA is valid, to avoid further split of requirements we prefer Option 2. |
| CATT | Firstly we think this issue is to address the beam information indication in issue 1-1-3 and should only be considered for invalid TA case. Then if L1-RSRP report is needed in the activation procedure, it can only be reported in SpCell since the PUCCH SCell is not ready for uplink transmission. |

**Issue 1-1-5: Whether the UL spatial relation is needed for PUCCH SCell activation?**

* Proposals
  + Option 1: (MTK, CATT)
    - No.
  + Option 2: (NEC, Ericsson)
    - Needed if CSI report of PUCCH SCell is transmitted on PUCCH SCell to be activated
  + Option 3: (NTT DOCOMO)
    - Shall be considered in the case of invalid TA.
  + Option 4: (Apple)
    - The UL spatial relation of PUCCH on target being-activated SCell should be considered for PUCCH SCell activation in FR2 only.
      * the time uncertainty of the MAC CE for UL spatial relation activation of PUCCH in target being-activated SCell shall be defined in the baseline FR2 SCell activation delay part (Tactivate\_basic). Details are FFS
* Recommended WF
  + *Need more discussion*

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| **Issue 1-1-5: Whether the UL spatial relation is needed for PUCCH SCell activation?** | |
| **Company** | **Comments** |
| Apple | Option 4. Based on the RAN2 MAC spec, UE shall be ready to use PUCCH after the activation, and therefore the UL spatial relation of the PUCCH on target SCell shall be activated during SCell activation for FR2 regardless of TA is valid or not and regardless of where CSI report is sent. It’s very much like PDCCH on target SCell, UE has to be ready to use such PDCCH and PUCCH once PUCCH SCell is activated. Thus, the UL spatial relation is always needed for FR2 PUCCH SCell.  Graphical user interface, text, application, email  Description automatically generated |
| Huawei | Prefer option 4. If the ending point is the valid CSI transmission on PUCCH SCell, the UL spatial is always needed. |
| Xiaomi | We are fine with either option 1 or option 4. As the existing Rel-15 SCell activation delay requirement is not consider the UL spatial relation, if RAN4 decide to consider the UL spatial relation, then the additional activation delay should be considered based on the existing Rel-15 SCell activation delay requirement. |
| ZTE | Option 4. |
| Qualcomm | Option 4. Share the same understanding as Apple. |
| Ericsson | Option 4 is fine. |
| NTT DOCOMO, INC. | We are fine with option 4. |
| OPPO | Fine with Option 4. |
| Nokia | We share the view in Option 1.  In our understanding, the UE is able to identify which UL beam to use for transmitting RA preamble based on the SSB index indicated in PDCCH order. What additions are needed on UL spatial relation？ |
| MediaTek | For the valid case, prefer option 4.  The spatial relation may need for PUCCH SCell to transmit the valid CSI-report on PUCCH SCell.  For the invalid case, more discussion is needed.  The spatial relation may not need to discuss because the spatial relation of the valid CSI-reporting for PUCCH SCell activation may follow the same direction as msg.1 and msg.3. |
| NEC | OK with option 4. |
| CATT | Support option 1. It may also be related to the conclusion of issue 1-1-1 and issue 1-1-2. We think the UL spatial information is not needed for transmitting PRACH. But if the CSI report needs to be transmitted in PUCCH SCell, UE need to choose the UL beam (e.g. by beam sweeping etc.) used for reporting before CSI report. |

**Issue 1-1-6: Known/unknown condition for PUCCH SCell activation?**

* Proposals
  + Option 1: (MTK)
    - The known and unknown condition for Scell activation can be reused for PUCCH Scell.
* Recommended WF
  + *Need more discussion*

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| **Issue 1-1-6: Known/unknown condition for PUCCH Scell activation?** | |
| **Company** | **Comments** |
| Apple | We are fine with option 1. |
| Huawei | We are fine with option 1. |
| Xiaomi | Option 1 |
| ZTE | We are fine with Option 1. |
| Qualcomm | Okay with Option 1. So far, we haven’t considered other options. |
| CMCC | We are OK with option 1. |
| Ericsson | Fine with Option 1. |
| NTT DOCOMO, INC. | We are fine with option 1. |
| OPPO | Fine with Option 1. |
| vivo | Ok with option 1 |
| Nokia | Fine with Option 1. |
| MediaTek | Support option 1. |
| NEC | OK with option 1. |
| CATT | Fine with option 1. |

**Issue 1-1-7: UE capability for FR2 PUCCH SCell (de)activation requirements?**

* Proposals
  + Option 1: (Qualcomm)
    - For UEs not supporting one of the following capabilities, FR2 PUCCH SCell (de)activation requirements are not defined.
      * beamCorrespondenceWithoutUL-BeamSweeping
      * beamCorrespondenceSSB-based-r16.
* Recommended WF
  + *Need more discussion*

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| **Issue 1-1-7: UE capability for FR2 PUCCH SCell (de)activation requirements?** | |
| **Company** | **Comments** |
| Apple | Need more discussion on this capability. Based on the definition in TS38.306 and current RAN4 requirement of uplink spatial relation switch, if UE cannot support “*beamCorrespondenceWithoutUL-BeamSweeping*”, no requirement could be applied for uplink spatial relation switching/activation. So, we need to further check if we only need to consider “*beamCorrespondenceWithoutUL-BeamSweeping*” as the capability condition in requirement. |
| Huawei | The relation between these two capability and the applicability of PUCCH SCell activation requirements is not very clear. More explanations are needed. |
| ZTE | The association between the UE capabilities discussed in this issue seems not clear to us, more clarification would be appreciated. |
| Qualcomm | For those UEs not supporting the two features in Option 1, UL beam sweeping may have to be additionally carried out for PUCCH spatial relation configuration/activation, i.e. L1-RSRP report based TCI association may not work for UL beam association, which incurs a non-trivial latency. And in RAN4 SCell activation, known vs. unknown condition doesn’t take into account separately whether UL beam is known or not. In addition, as mentioned by Apple, no uplink spatial relation switching/activation requirement is defined. Unless there is a specific request for this with a technical justification, RAN4 can define the FR2 PUCCH SCell requirements only for the UEs capable of the two features. |
| NTT DOCOMO, INC. | We support option 1 as a baseline. FFS whether FR2 PUCCH SCell (de)activation requirements should be defined in Rel-17 or not. |
| OPPO | Need more discussion |
| vivo | Need more time for discussion |
| Nokia | This can be discussed after the UE behavior during activation gets clarified. |
| MediaTek | More discussion is needed. |
| CATT | Can be FFS. |

### Sub-topic 1-2 PUCCH Scell activation delay requirement for valid TA case

* Proposals
  + Option 1: (MTK, vivo, Xiaomi, CATT, CMCC, NTT DOCOMO, Nokia, OPPO, Qualcomm)
    - Reuse the Rel-15 SCell activation delay requirement which is (( THARQ + Tactivation\_time +TCSI\_Reporting)/ NR slot length).
  + Option 2: (Apple)
    - In FR1, reuse the Rel-15 SCell activation delay requirement which is (( THARQ + Tactivation\_time +TCSI\_Reporting)/ NR slot length).
    - In FR2, use normal SCell activation delay (i.e., (( THARQ + Tactivation\_time +TCSI\_Reporting)/ NR slot length);) in TS38.133 section 8.3.2 as baseline, but the time uncertainty of the MAC CE for UL spatial relation activation of PUCCH in target being-activated SCell shall be considered in the baseline Tactivation\_time.
  + Option 3: (NEC)
    - PUCCH SCell activation delay (TDelay\_PUCCH\_SCell) is defined as: TDelay\_PUCCH\_SCell=TBasic\_SCell\_activation\_delay + TL1-RSRP + TTA\_delay + TUL\_spatial\_relationInfo; where:
      * TBasic\_SCell\_activation\_delay is SCell activation delay as described in clause 8.3.2 of TS 38.133;
      * TL1-RSRP: L1-RSRP measuring and reporting delay. This is zero for FR1/2 known SCells and FR2 unknown SCells;
      * TTA\_delay: Delay required for TA command acquisition and application. Exact delay is FFS; and
      * TUL\_spatial\_relationInfo: Delay uncertainty for receiving UL spatial relation info MAC CE and UL spatial relation info application delay. Exact delay is FFS. This is applicable only when CSI report of to be activated SCell is transmitted on SCell.
      * TTA\_delay = 0
* Recommended WF
  + *Need more discussion*

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| **Sub-topic 1-2 PUCCH Scell activation delay requirement for valid TA case** | |
| **Company** | **Comments** |
| Apple | Option 2. For FR2, the time uncertainty for receiving MAC CE to activate uplink spatial relation of PUCCH on target being-activated SCell shall be added into the R15 legacy activation delay equation for this PUCCH SCell activation. |
| Huawei | Support Option 2. |
| Xiaomi | Support option 1, if UL spatial relation activation is considered in FR2, option 2 is also fine with us. |
| ZTE | Option 2. |
| Qualcomm | Option 2, but whether “a separate operation/procedure for UL spatial relation activation of the PUCCH” is needed or not for valid TA case needs to be separately discussed, i.e. we propose to add a sub-bullet “FFS on whether the separate UL spatial relation activation is needed” to Option 2. |
| OPPO | Support option 1, FFS UL spatial relation activation is considered in FR2 |
| CMCC | For option 2, we have one question for clarification. In normal SCell activation delay requirements for FR2, the time uncertainty of the MAC CE for UL spatial relation activation of PUCCH is not considered. We would like to know why it is considered for PUCCH Scell activation? |
| Ericsson | Option 1. |
| NTT DOCOMO, INC. | Support option 1. |
| vivo | Ok with option 1 |
| Nokia | We support Option 1. |
| MediaTek | Wait for the conclusion in Issue 1-1-5 |
| NEC | Depends on other issues conclusion. Can be FFS for now. |
| CATT | Support option 1. And it depends on the discussion in issue 1-1-5. |

### Sub-topic 1-3 PUCCH Scell activation delay requirement for invalid TA case

**Issue 1-3-1: The PUCCH SCell activation requirements for invalid TA case**

* Proposals
  + Option 1: (MTK, vivo, Xiaomi, Apple, CMCC, NTT DOCOMO, OPPO)
    - If UE does not have the valid TA on the PUCCH SCell being activated, an additional UL synchronization procedure to obtain the valid TA shall be considered which including the following factors:
      * the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell (T1);
      * the delay for obtaining a valid TA command for the sTAG to which the SCell configured with PUCCH belongs (T2);
      * the delay for applying the received TA for uplink transmission (T3)
  + Option 2: (CATT)
    - Only T1 (The delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell) need to be considered
  + Option 3: (NEC)
    - PUCCH SCell activation delay (TDelay\_PUCCH\_SCell) is defined as: TDelay\_PUCCH\_SCell=TBasic\_SCell\_activation\_delay + TL1-RSRP + TTA\_delay + TUL\_spatial\_relationInfo; where:
      * TBasic\_SCell\_activation\_delay is SCell activation delay as described in clause 8.3.2 of TS 38.133;
      * TL1-RSRP: L1-RSRP measuring and reporting delay. This is zero for FR1/2 known SCells and FR2 unknown SCells;
      * TTA\_delay: Delay required for TA command acquisition and application. Exact delay is FFS; and
      * TUL\_spatial\_relationInfo: Delay uncertainty for receiving UL spatial relation info MAC CE and UL spatial relation info application delay. Exact delay is FFS. This is applicable only when CSI report of to be activated SCell is transmitted on SCell.
      * TTA\_delay = T1 + T2 + T3
  + Option 4: (Nokia)
    - If the UE does not have a valid TA for transmitting on an SCell,
      * the activation delay shall be defined for downlink and uplink actions separately.
      * the UE shall be capable to perform downlink actions related to the SCell activation command for the SCell being activated on the PUCCH SCell no later than in slot .
      * The activation delay requirement for PUCCH SCell shall be defined assuming no dedicated time period for CSI measurements and reporting.
      * the UE shall be capable to perform uplink actions related to the SCell activation command for the SCell being activated on the PUCCH SCell no later than in slot , where TRACH is the delay to perform RACH procedure and apply the TA.
  + Option 5: (Ericsson)
    - Delay requirements for PUCCH SCell activation shall account for additional time when PDCCH order is received outside Tactivate\_basic. The additional time shall be accounted for by an expression and/or a delay component, e.g. max(Tactivate\_basic, TPDCCH\_order).
  + Option 6: (Qualcomm)
    - For known PUCCH SCell with an invalid TA, the single SCell activation requirements in terms of activation delay and interruption are defined as follows:
      * Starting point of interruption window is the same as legacy SCell activation requirement
      * Activation delay = legacy SCell activation delay + T1 + T2 + T3, where
        + T1: the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell
        + T2: the delay for obtaining a valid TA command for the sTAG
        + T3: the delay for applying the received TA for uplink transmission
      * CSI of the PUCCH SCell is reported on the SCell after T3
      * For FR1, the above requirement also applies to “unknown PUCCH SCell with invalid TA” if one of the following conditions is met:
        + ‘ssb-PositionInBurst’ indicates only one SSB is being actually transmitted, or
        + ‘ssb-PositionInBurst’ indicates multiple SSBs and TCI indication is provided in same MAC PDU with SCell activation
      * For FR2, if L1-RSRP report is followed by RRC reconfiguration for PUCCH-SpatialRelationInfo update based on the report during the activation procedure, an additional delay is expected
    - For unknown PUCCH SCell with an invalid TA, the single SCell activation requirements in terms of activation delay and interruption are defined as follows:
      * Starting point of interruption window is the same as legacy SCell activation requirement
      * Activation delay = T0 + T1 + T2 + T3, where
        + T0:

If semi-persistent CSI-RS is used for CSI reporting,

If periodic CSI-RS is used for CSI reporting,

* + - * + T1: the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell
        + T2: the delay for obtaining a valid TA command for the sTAG
        + T3: the delay for applying the received TA for uplink transmission
      * PDCCH triggering CF-RA shall be after UE finishes processing the last activation command for TCI
      * CSI of the PUCCH SCell is reported on the SCell after T3
      * For FR2, if L1-RSRP report is followed by RRC reconfiguration for PUCCH-SpatialRelationInfo update based on the report during the activation procedure, an additional delay is expected
      * For FR1, the above requirement applies only when none of the following conditions is met:
        + ‘ssb-PositionInBurst’ indicates only one SSB is being actually transmitted, or
        + ‘ssb-PositionInBurst’ indicates multiple SSBs and TCI indication is provided in same MAC PDU with SCell activation
* Recommended WF
  + *Need more discussion*

**Issue 1-3-2: the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell (i.e. T1)**

* Proposals
  + Option 1: (MTK, Apple)
    - T1 is up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213.
  + Option 2: (NTT DOCOMO)
    - T1 is up to 160ms for FR1 and 151ms for FR2 and the actual value of T1 shall depend upon the PRACH configuration used in the PUCCH SCell.
* Recommended WF
  + *Need more discussion*

**Issue 1-3-3: the delay for obtaining a valid TA command for the sTAG to which the SCell configured with PUCCH belongs (i.e. T2)**

* Proposals
  + Option 1: (MTK, Apple)
    - T2 is the delay from slot n + (Tactivate\_basic +T1)/(NR slot length) until UE has obtained a valid TA command for the target PUCCH SCell being activated. Slot n is the slot when UE received PUCCH SCell activation MAC CE.
  + Option 2: (NTT DOCOMO)
    - T2 is the delay for obtaining a valid TA command for the sTAG to which the SCell configured with PUCCH belongs. T2 is up to 13ms / (μ+1) where μ is the SCS configuration index.
  + Option 3: (CATT)
    - Not needed
* Recommended WF
  + *Need more discussion*

**Issue 1-3-4: the delay for applying the received TA for uplink transmission on target PUCCH SCell being activated (i.e. T3)**

* Proposals
  + Option 1: (MTK, Apple)
    - T3 is the delay for applying the received TA for uplink transmission on target PUCCH SCell being activated, and greater than or equal to k+1 slot, where k is defined in clause 4.2 in TS 38.213.
  + Option 2: (NTT DOCOMO)
    - T3 is the delay for applying the received TA for upling transmission. T3 is 6ms / (μ+1) where μ is the SCS configuration index.
  + Option 3: (CATT)
    - Not needed
* Recommended WF
  + *Need more discussion*

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| **Sub-topic 1-3 PUCCH Scell activation delay requirement for invalid TA case** | |
| **Company** | **Comments** |
| Apple | Issue 1-3-1: support option 1. This issue depends on the conclusions from the previous issues.  Issue 1-3-2: Support option 1. We think option 2 was just using the maximum possible value for the RO uncertainty. However, in legacy RRM requirement, e.g., HO, the RO uncertainty was defined based on {the real SSB to PRACH occasion association period + 10ms} rather than the maximum value. We prefer to keep this requirement as same as the existing RO uncertainty in other RRM requirements(e.g. HO).  Issue 1-3-3: support option 1.  Issue 1-3-4: Support option 1. |
| Huawei | Issue 1-3-1: Slightly prefer the structure in option 2, but we also agree that is may depend on the conclusions of other issues. |
| Xiaomi | Issue 1-3-1: Option 1  Issue 1-3-2: Option 1  Issue 1-3-3: Option 1  Issue 1-3-4: Option 1 |
| ZTE | Issue 1-3-1: We support Option 6.  Issue 1-3-2: We support Option 1  Issue 1-3-3: We support Option 1  Issue 1-3-4: We support Option 1 |
| Qualcomm | Issue 1-3-1: Before detailed PUCCH SCell activation sequences are clarified and other relevant issues are resolved, e.g. BC capability, a separate PUCCH spatial relation activation, L1-RSRP report, etc, we cannot confidently say even the high-level description provided in Option 1 is correct. We’d like companies to discuss activation sequences in detail. We believe once we establish a common understanding of the activation sequences, the corresponding requirements can be defined in a very straightforward manner.  Issue 1-3-2: Can be discussed later. RAN4 should first discuss PUCCH SCell activation sequences for different scenarios.  Issue 1-3-3: Same comment as Issue 1-3-2.  Issue 1-3-4: Same comment as Issue 1-3-2. |
| OPPO | Issue 1-3-1: Option 1  Issue 1-3-2: Option 1  Issue 1-3-3: Option 1  Issue 1-3-4: Option 1 |
| CMCC | **Issue 1-3-1: The PUCCH SCell activation requirements for invalid TA case**  For UL, we are OK with option 1. And we think that activation delay shall be defined for downlink actions and uplink actions separately, same way as we used in LTE PUCCH SCell activation. For DL, the delay requirements is suggested as:(( THARQ + Tactivation\_time +TCSI\_Reporting)/ NR slot length)  **Issue 1-3-2: the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell (i.e. T1)**  We are OK with option 1. The delay uncertainty in acquiring the first available PRACH occasion is specified in HO requirements and PSCell addition delay requirements, which is option 1, and we think it can be reused for PUCCH Scell activation. |
| Ericsson | Detailed delay requirements depend on conclusions for other issues. Prefer to come back on the details once we have agreed on the overall procedure. |
| NTT DOCOMO, INC. | Issue 1-3-1: Support option 1  Issue 1-3-2: Support option 1  Issue 1-3-3: Support option 1  Issue 1-3-4: Support option 1 |
| vivo | Issue 1-3-1: Option 1  Issue 1-3-2: Option 1  Issue 1-3-3: Option 1  Issue 1-3-4: Option 1 |
| Nokia | Issue 1-3-1: We think this depends on the discussion in Sub-topic 1-1. We need first conclude on if beam information needs to be transmitted and then if this would extend the activation delay. Afterwards, it is possible to check each step and identify the activation delay.  Issue 1-3-2: We would like to understand better the exact UE behavior. How long does it take for PRACH occasion association? And why additional SSB is counted here?  Issue 1-3-3: This can be discussed later after concluding the UE behavior in sub-topic 1-1.  Issue 1-3-4: This can be discussed later after concluding the UE behavior in sub-topic 1-1. |
| MediaTek | Issue 1-3-1: support option 1. Following the similar logic as LTE.  Issue 1-3-2: Support option 1.  Issue 1-3-3: support option 1.  Issue 1-3-4: Support option 1. |
| NEC | Can be FFS based on other issues conclusions. |
| CATT | Issue 1-3-1: Support option 2. And it depends on the discussion in sub-topic 1-1.  Issue 1-3-2: Fine with option 1.  Issue 1-3-3: Support option 3. And it depends on the discussion in sub-topic 1-1.  Issue 1-3-4: Support option 3. And it depends on the discussion in sub-topic 1-1. |

### Sub-topic 1-4 Interruption requirements for PUCCH SCell activation

**Issue 1-4-1: Interruption requirements for PUCCH Scell activation in valid TA case**

* Proposals
  + Option 1: (MTK, vivo, CATT, Apple, OPPO, Ericsson, Qualcomm)
    - Reuse the existing requirement for Scell activation in Rel-15.
* Recommended WF
  + *Agree on option 1.*

**Issue 1-4-2: Interruption requirements for PUCCH Scell activation in invalid TA case**

* Proposals
  + Option 1: (MTK)
    - The interruption requirement shall include the existing requirement for Scell activation in Rel-15.
    - FFS whether to introduce interruption by PRACH transmission due to different SCS.
  + Option 2: (CATT, Apple, Ericsson)
    - Reuse the interruption requirement of normal Scell activation.
  + Option 3: (OPPO)
    - FFS after the additional delay are clearly defined
* Recommended WF
  + *Need more discussion*

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| **Sub-topic 1-4 Interruption requirements for PUCCH Scell activation** | |
| **Company** | **Comments** |
| Apple | Issue 1-4-1: Support recommended WF.  Issue 1-4-2: we can use option 2 as starting point, and we are fine to further study the possible additional interruption as mentioned in option1. Based on RAN1 definition on power allocation prioritization, the Scell RACH has the lower priority than the other data/control channels, but we may need to consider whether this rule could be applied here or not. If the Scell RACH is deprioritized, there is no additional interruption to other serving cell. |
| Huawei | Issue 1-4-1: We are fine with the recommended WF.  Issue 1-4-2: Prefer option 3 at current stage. |
| Xiaomi | Issue 1-4-1: fine with the recommended WF  Issue 1-4-2: Option 2, and we think the existing interruption requirement for Scell activation in Rel-15 can be applied to both valid TA case and invalid TA case. |
| ZTE | Issue 1-4-1: We are fine with Moderator’s recommendation.  Issue 1-4-2: Option 2. No additional uncertainties are identified at this stage to relax this requirement. |
| Qualcomm | Issue 1-4-1: Option 1.  Issue 1-4-2: Revisit the issue after discussion/conclusion on PUCCH SCell activation sequences.  As for Apple’s comment about channel/signal prioritization rule, is the interruption (no additional interruption to other serving cell) only to UL serving cells or to all serving cells? |
| OPPO | Issue 1-4-1: Support recommended WF.  Issue 1-4-2: Prefer option 3. Come back to this issue after conclusion on PUCCH SCell activation sequences. |
| CMCC | **Issue 1-4-1: Interruption requirements for PUCCH Scell activation in valid TA case**  We are OK with option 1 |
| Ericsson | Issue 1-4-1: Option 1  Issue 1-4-2: Prefer Option 2 |
| Nokia | Issue 1-4-1: We support Option1.  Issue 1-4-2: We support Option 2. |
| MediaTek | Issue 1-4-1: Agree with the recommended WF.  Issue 1-4-2: support option 1. |
| NEC | Issue 1-4-1: Option 1 is OK.  Issue 1-4-2: we support Option 2 |
| CATT | Issue 1-4-1: Support the recommended WF.  Issue 1-4-2: Support Option 2. |

### Sub-topic 1-5 Applicability of PUCCH Scell activation requirements

* Proposals
  + Option 1: (CATT, Apple)
    - The PUCCH Scell activation delay requirement shall apply provided that,
      * The UE has received a PDCCH order to initiate RA procedure on the PUCCH Scell within Tactivate\_basic otherwise additional delay to activate the Scell is expected; and
      * No interruption occurs in same FR as the target PUCCH Scell during the Scell activation procedure if UE supports per-FR MG, otherwise the PUCCH Scell activation delay can be extended, and
      * No interruption occurs during the Scell activation procedure if UE does not support per-FR MG, otherwise the PUCCH Scell activation delay can be extended.
      * The above interruption is caused by factor defined in TS38.133 section 8.2.1.1 for EN-DC, in TS38.133 section 8.2.2.1 for NR SA, in TS38.133 section 8.2.3.1 for NE-DC and in TS38.133 section 8.2.4.1 for NR-DC.
  + Option 2: (Qualcomm)
    - PUCCH Scell activation requirements are applicable only to the following cases:
      * the PUCCH Scell is in a different band from SpCell band
      * for invalid TA, Ues capable of more than one TAG
      * for unknown PUCCH Scell, TA shall be assumed invalid
  + Option 3: (Ericsson)
    - Delay requirements for PUCCH Scell activation shall account for additional time when PDCCH order is received outside Tactivate\_basic. The additional time shall be accounted for by an expression and/or a delay component, e.g. max(Tactivate\_basic, TPDCCH\_order).
    - Delay requirement for PUCCH Scell activation shall allow for extended time when there are additional interruptions during the activation procedure. The extended time shall be in proportion to the impact the interruption has on the activation procedure. The extended time can be captured on a general level in a sentence.
    - In activation of multiple Scells with one PUCCH Scell, activation delay requirement shall apply at least for the PUCCH Scell in the event that one or more Scells have configurations that render parallel activation impossible for the UE. FFS on whether activation delay requirement also is to apply for Scells that are compatible with parallel activation with PUCCH Scell.
* Recommended WF
  + *Need more discussion*

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| **Sub-topic 1-5 Applicability of PUCCH Scell activation requirements** | |
| **Company** | **Comments** |
| Apple | Support option 1. There are many possible interruptions from other UE activities on other CCs, and we prefer to use generic side conditions to cover all possible cases, and this description is like an existing requirement of LTE. Regarding option 2, we are not sure if different PUCCH could only be configured for an inter-band CA, since there is no hard limitation on the capability definition of “twoPUCCH-Group” in TS38.306; and for unknown PUCCH Scell with valid TA, the requirement applies when two PUCCH serving cells are in one TAG, but we need to check if the two PUCCH CCs could be in one TAG or not (so far we did not see any limitation on it). |
| Huawei: | Suggest to have further discussion before we have clear understanding of the framework. For option 1, we think we should carefully consider the relation between per-FR gap capabilities with other requirements in Rel-17, as the overloading issue has already been discussed since Rel-16. For Option 2, more explanation is needed. Perhaps it is the typical cases, but not sure whether it is the only feasible scenario. |
| Xiaomi | In general, we think both option 1 and option 2 should be considered when defining the applicability rules. |
| ZTE | Option 1, but the extension of the activation delay for per-FR gap capable or incapable UE with interruption should be clarified respectively. |
| Qualcomm | For Option 1, we have the same comment as Huawei. For Option 2, we provided the background for each bullet in our contribution. We can further discuss it based on other working groups’ feedback if needed. |
| OPPO | Slightly prefer option 1. And the cases in option 2 can be further discussed. |
| Ericsson | Option 3. We are open to discuss any of the other options, but would like that in case multiple SCell scenarios are defined where requirements are not possible to fulfill due to incompatible SCell configurations etc, activation of the PUCCH SCell shall be prioritized. The reason is that CFRA hogs resources, and we do not want this to extend over time. There may also be other dependencies by other SCells being activated with the same command since they might be in the same PUCCH group as the PUCCH SCell. |
| vivo | Option 1 is ok |
| Nokia | We understood this issue includes several aspects e.g.   * + - Shall we define the requirement if the UE received a PDCCH order beyond Tactivate\_basic?     - Does interruption apply dependent on the UE per-FR or per-UE gaps?   The conditions for applying the requirements needs to be discussed separately and can be discussed after the basic activation procedure is concluded. And multiple SCell scenario can be discussed after single PUCCH SCell activation is somehow concluded. |
| CATT | Support option 1.  For option 2, we think it is related to a different aspects, it is more like the pre-condition of this feature, can be further study.  For option 3, in our understanding, the 1st and 2nd bullet are aligned with option 1. The difference for the 1st bullet is try to calculate the additional delay when PDCCH order is received outside Tactivate\_basic. We think this may be not necessary. The third bullet is about the multiple SCell case and should be discussed after single PUCCH SCell activation has some conclusions. |

### Sub-topic 1-6 Interruption requirements for PUCCH SCell deactivation

* Proposals
  + Option 1: (MTK, vivo, CATT, Apple, OPPO)
    - Reuse the existing requirement for Scell deactivation in Rel-15.
* Recommended WF
  + *Agree option 1.*

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| **Sub-topic 1-6 Interruption requirements for PUCCH Scell deactivation** | |
| **Company** | **Comments** |
| Apple | Support recommended WF. |
| Huawei | Fine with recommended WF. |
| Xiaomi | Fine with recommended WF. |
| ZTE | Fine with Moderator’s recommendation. |
| Qualcomm | Okay with Option 1. |
| OPPO | Support recommended WF. |
| CMCC | OK with the recommended WF. |
| Ericsson | Option 1 is fine. |
| vivo | Ok with option 1 |
| Nokia | Fine with Option 1. |
| MediaTek | Agree with recommended WF. |
| NEC | OK with option 1 |
| CATT | Support recommended WF. |

### Sub-topic 1-7 PUCCH SCell deactivation delay requirement for activated PUCCH SCell with multiple Scells

* Proposals
  + Option 1: (CATT, NEC, OPPO)
    - Reuse the SCell deactivation delay requirement for activated SCell with multiple downlink SCells specified in section 8.3.8 of TS 38.133, which is (( THARQ + 3ms)/ NR slot length).
* Recommended WF
  + *Need more discussion.*

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| **Sub-topic 1-7 PUCCH SCell deactivation delay requirement for activated PUCCH SCell with multiple Scells** | |
| **Company** | **Comments** |
| Apple | Agree with option 1. |
| Xiaomi | Support option 1 |
| ZTE | Fine with Option 1. |
| Qualcomm | Okay with Option 1, but we want to consider multiple SCell scenarios after single SCell scenario is complete. |
| OPPO | Support option 1 |
| CMCC | OK with option 1 |
| Ericsson | Option 1 is fine. |
| Nokia | We would suggest discussing the multiple SCells scenarios after concluding on the single PUCCH SCell activation. |
| MediaTek | Support option 1. |
| NEC | Support option 1 |
| CATT | Support option 1. |

## Companies views’ collection for 1st round

### Open issues

### CRs/TPs comments collection

## Summary for 1st round

### Open issues

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|  | **Status summary** |
| **Sub-topic 1-1** | **Issue 1-1-1: The ending point of PUCCH SCell activation?**  *Tentative agreements: None*  *Candidate options:*   * Option 1: (CATT)   + For valid TA case, the ending point of PUCCH SCell activation should be the point when UE transmit valid CSI report on PUCCH SCell   + For invalid TA case, the ending point of PUCCH SCell activation should be the point when UE transmit PRACH on PUCCH SCell * Option 2: (NEC)   + The ending point of PUCCH SCell activation is the point when UE transmit valid CSI report on a certain cell (SpCell or PUCCH SCell or others) for both valid and invalid TA cases. * Option 3: (Apple, Huawei, Xiaomi, ZTE, Qualcomm, OPPO, Ericsson, vivo, MTK)   + The ending point of PUCCH SCell activation is the point when UE transmit valid CSI report on target PUCCH SCell for both valid and invalid TA cases. * Option 4: (NTT DOCOMO)   + For valid TA case, the ending point of PUCCH SCell activation is the point when UE can transmit valid CSI report on a certain cell (SpCell or PUCCH SCell or others). For invalid TA case, the ending point of PUCCH SCell activation is the point when UE transmit valid CSI report on target PUCCH SCell. * Option 5: (CMCC)   + Whether the CSI reporting is transmitted on PCell or SCell is up to network configuration. * Option 6: (Nokia)   + Depends on if the UE has transmitted the CSI reporting e.g. to inform network the beam information during the activation period.   *Recommendations for 2nd round: Need further discussion.*  **Issue 1-1-2: Which cell is the CSI reporting transmitted for PUCCH SCell activation?**  *Tentative agreements: None*  *Candidate options:*   * Option 2: (Apple, Huawei, Xiaomi, ZTE, Qualcomm, OPPO, Ericsson, vivo, MTK, )   + CSI report of PUCCH SCell is transmitted on PUCCH SCell to be activated * Option 2a: (NTT DOCOMO)   + CSI report of PUCCH SCell is transmitted on PUCCH SCell to be activated in the case of the UE not having a valid TA. * Option 3: (Nokia)   + Relevant to issue 1-1-3, and need to clarify what CSI reporting means exactly (e.g. including L1-RSRP or not). * Option 4: (CATT)   + Depending on issue 1-1-1 and is not needed if option 1 in issue 1-1-1 is adopted. * Option 5: (NEC)   + CSI reporting can be transmitted on PCell or SCell and TA acquisition should be performed before CSI reporting.   *Recommendations for 2nd round: No more discussing in 2nd round. Can be included in issue 1-1-1.*  **Issue 1-1-3: Whether the beam information (SSB index) of PUCCH Scell is needed to be indicated to NW?**  *Tentative agreements: None*  *Candidate options:*   * Option 1: (vivo, Apple, ZTE)   + For the unknown case, the beam information of the PUCCH Scell being activated should be indicated to NW.   + For the known case, this indication of this information can be omitted. * Option 2: (NEC)   + Needed for unknown FR1 Scell activation     - For an unknown FR1 Scell activation where CSI reporting is transmitted on Scell, RAN4 to consider including L1-RSRP/beam reporting as part of the Scell activation procedure. * Option 3: (Nokia)   + Needed for unknown PUCCH Scell in FR2.   + Not needed for PUCCH Scell in FR1 or known PUCCH Scell in FR2.   + If RAN4 agrees to send beam information on Pcell, send LS to RAN1/2 asking for the feasibility and potential solutions of transmitting CSI report of PUCCH Scell on the Pcell. * Option 4: (Apple, Huawei, ZTE, NTT DOCOMO, OPPO)   + If the being-activated PUCCH Scell is known, no need to indicate the beam information to network for determining the associated SSB in PDCCH order for RA, i.e., no additional SSB based beam measurement is needed.   + If the being-activated PUCCH Scell is unknown:     - if target Scell belongs to FR2 and if there is at least one active serving cell on that FR2 band: following the same conditions in TS38.133 section 8.3.2 for intra-band FR2 Scell activation, no need to indicate the beam information to network for determining the associated SSB in PDCCH order for RA.     - if target Scell belongs to FR2 and if there is no active serving cell on that FR2 band: need to indicate the beam information to network for determining the associated SSB in PDCCH order for RA.     - if target Scell belongs to FR1 and it is contiguous to an active serving cell in the same band: following the same conditions in TS38.133 section 8.3.2 for intra-band contiguous FR1 Scell activation, no need to indicate the beam information to network for determining the associated SSB in PDCCH order for RA.     - if target Scell belongs to FR1 and if there is no contiguous active serving cell on that FR1 band: need to indicate the beam information to network for determining the associated SSB in PDCCH order for RA. * Option 6: (Ericsson)   + RAN4 to focus on deriving PUCCH Scell activation requirements for the scenario where the beam index to be provided in the PDCCH order is known to NW beforehand. * Option 8: (Xiaomi)   + No need to indicate the beam information to NW, and the SSB/PBCH index will be indicated in the PDCCH order which is used to determine the RACH occasion for the PRACH transmission * Option 9: (CATT)   + Not needed for contention based random access. Needed for unknown cell in contention-free random access.   *Recommendations for 2nd round: Need further discussion.*  **Issue 1-1-4: Which cell is the L1-RSRP reporting transmitted for PUCCH SCell activation?**  *Tentative agreements: None*  *Candidate options:*   * Option 1: (QC)   + L1-RSRP report is transmitted on the PUCCH SCell to be activated. * Option 2: (Apple, ZTE, Ericsson, Nokia, MTK, NEC, CATT)   + L1-RSRP report is transmitted on the SpCell if L1-RSRP report is needed. * Option 3: (Xiaomi)   + L1-RSRP report is not needed.   *Recommendations for 2nd round: Need further discussion.*  **Issue 1-1-5: Whether the UL spatial relation is needed for PUCCH SCell activation?**  *Tentative agreements: None*  *Candidate options:*   * Option 1: (CATT, Xiaomi, Nokia)   + No. * Option 4: (Apple, Huawei, Xiaomi, ZTE, QC, Ericsson, NTT DOCOMO, OPPO, NEC)   + The UL spatial relation of PUCCH on target being-activated SCell should be considered for PUCCH SCell activation in FR2 only.     - the time uncertainty of the MAC CE for UL spatial relation activation of PUCCH in target being-activated SCell shall be defined in the baseline FR2 SCell activation delay part (Tactivate\_basic). Details are FFS * Option 5: (MTK)   + For valid TA case, the UL spatial relation is needed for PUCCH SCell   + For invalid TA case, FFS   *Recommendations for 2nd round: Need further discussion.*  **Issue 1-1-6: Known/unknown condition for PUCCH SCell activation?**  *Tentative agreements:*  The known and unknown condition for Scell activation can be reused for PUCCH Scell.  *Candidate options: None*  *Recommendations for 2nd round: No more discussion.*  **Issue 1-1-7: UE capability for FR2 PUCCH SCell (de)activation requirements?**  *Tentative agreements: None*  *Candidate options:*   * Option 1: (Qualcomm, NTT DOCOMO)   + For UEs not supporting one of the following capabilities, FR2 PUCCH SCell (de)activation requirements are not defined.     - beamCorrespondenceWithoutUL-BeamSweeping     - beamCorrespondenceSSB-based-r16. * Option 2: (Apple, Huawei, ZTE, OPPO, vivo, Nokia, MTK, CATT)   + Need more discussion   *Recommendations for 2nd round: No more discussion in 2nd round. Defer to next meeting.* |
| **Sub-topic 1-2** | **Sub-topic 1-2 PUCCH Scell activation delay requirement for valid TA case**  *Tentative agreements: None*  *Candidate options:*   * Option 1: (Xiaomi, OPPO, CMCC, Ericsson, NTT DOCOMO, vivo, Nokia, CATT)   + Reuse the Rel-15 SCell activation delay requirement which is (( THARQ + Tactivation\_time +TCSI\_Reporting)/ NR slot length). * Option 2: (Apple, Huawei, Xiaomi, ZTE, QC)   + In FR1, reuse the Rel-15 SCell activation delay requirement which is (( THARQ + Tactivation\_time +TCSI\_Reporting)/ NR slot length).   + In FR2, use normal SCell activation delay (i.e., (( THARQ + Tactivation\_time +TCSI\_Reporting)/ NR slot length);) in TS38.133 section 8.3.2 as baseline, but the time uncertainty of the MAC CE for UL spatial relation activation of PUCCH in target being-activated SCell shall be considered in the baseline Tactivation\_time. * Option 3: (MTK, NEC)   + Wait for the conclusions of other open issues.   *Recommendations for 2nd round: No more discussion in 2nd round. Focus on the procedure discussion in sub-topic 1-1.* |
| **Sub-topic 1-3** | **Issue 1-3-1: The PUCCH SCell activation requirements for invalid TA case**  *Tentative agreements: None*  *Candidate options:*   * Option 1: (Apple, Xiaomi, OPPO, CMCC, NTT DOCOMO, vivo, MTK)   + If UE does not have the valid TA on the PUCCH SCell being activated, an additional UL synchronization procedure to obtain the valid TA shall be considered which including the following factors:     - the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell (T1);     - the delay for obtaining a valid TA command for the sTAG to which the SCell configured with PUCCH belongs (T2);     - the delay for applying the received TA for uplink transmission (T3) * Option 2: (Huawei, CATT)   + Only T1 (The delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell) need to be considered * Option 5: (Ericsson, Nokia, NEC)   + Depending on the conclusions of other open issues. FFS. * Option 6: (Qualcomm, ZTE)   + For known PUCCH SCell with an invalid TA, the single SCell activation requirements in terms of activation delay and interruption are defined as follows:     - Starting point of interruption window is the same as legacy SCell activation requirement     - Activation delay = legacy SCell activation delay + T1 + T2 + T3, where       * T1: the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell       * T2: the delay for obtaining a valid TA command for the sTAG       * T3: the delay for applying the received TA for uplink transmission     - CSI of the PUCCH SCell is reported on the SCell after T3     - For FR1, the above requirement also applies to “unknown PUCCH SCell with invalid TA” if one of the following conditions is met:       * ‘ssb-PositionInBurst’ indicates only one SSB is being actually transmitted, or       * ‘ssb-PositionInBurst’ indicates multiple SSBs and TCI indication is provided in same MAC PDU with SCell activation     - For FR2, if L1-RSRP report is followed by RRC reconfiguration for PUCCH-SpatialRelationInfo update based on the report during the activation procedure, an additional delay is expected   + For unknown PUCCH SCell with an invalid TA, the single SCell activation requirements in terms of activation delay and interruption are defined as follows:     - Starting point of interruption window is the same as legacy SCell activation requirement     - Activation delay = T0 + T1 + T2 + T3, where       * T0:         + If semi-persistent CSI-RS is used for CSI reporting,         + If periodic CSI-RS is used for CSI reporting,       * T1: the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell       * T2: the delay for obtaining a valid TA command for the sTAG       * T3: the delay for applying the received TA for uplink transmission     - PDCCH triggering CF-RA shall be after UE finishes processing the last activation command for TCI     - CSI of the PUCCH SCell is reported on the SCell after T3     - For FR2, if L1-RSRP report is followed by RRC reconfiguration for PUCCH-SpatialRelationInfo update based on the report during the activation procedure, an additional delay is expected     - For FR1, the above requirement applies only when none of the following conditions is met:       * ‘ssb-PositionInBurst’ indicates only one SSB is being actually transmitted, or       * ‘ssb-PositionInBurst’ indicates multiple SSBs and TCI indication is provided in same MAC PDU with SCell activation   *Recommendations for 2nd round: No more discussion in 2nd round. Focus on the procedure discussion in sub-topic 1-1.*  **Issue 1-3-2: the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell (i.e. T1)**  *Tentative agreements: None*  *Candidate options:*   * Option 1: (Apple, Xiaomi, ZTE, OPPO, CMCC, NTT DOCOMO, vivo, MTK, CATT)   + T1 is up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213. * Option 2: (QC, Ericsson, Nokia, NEC)   + FFS   *Recommendations for 2nd round: No more discussion in 2nd round. Focus on the procedure discussion in sub-topic 1-1.*  **Issue 1-3-3: the delay for obtaining a valid TA command for the sTAG to which the SCell configured with PUCCH belongs (i.e. T2)**  *Tentative agreements: None*  *Candidate options:*   * Option 1: (Apple, Xiaomi, ZTE, OPPO, NTT DOCOMO, vivo, MTK)   + T2 is the delay from slot n + (Tactivate\_basic +T1)/(NR slot length) until UE has obtained a valid TA command for the target PUCCH SCell being activated. Slot n is the slot when UE received PUCCH SCell activation MAC CE. * Option 2: (QC, Ericsson, Nokia, NEC)   + FFS * Option 3: (CATT)   + Not needed   *Recommendations for 2nd round: No more discussion in 2nd round. Focus on the procedure discussion in sub-topic 1-1.*  **Issue 1-3-4: the delay for applying the received TA for uplink transmission on target PUCCH SCell being activated (i.e. T3)**  *Tentative agreements: None*  *Candidate options:*   * Option 1: (Apple, Xiaomi, ZTE, OPPO, NTT DOCOMO, vivo, MTK)   + T3 is the delay for applying the received TA for uplink transmission on target PUCCH SCell being activated, and greater than or equal to k+1 slot, where k is defined in clause 4.2 in TS 38.213. * Option 2: (QC, Ericsson, Nokia, NEC)   + FFS * Option 3: (CATT)   + Not needed   *Recommendations for 2nd round: No more discussion in 2nd round. Focus on the procedure discussion in sub-topic 1-1.* |
| **Sub-topic 1-4** | **Issue 1-4-1: Interruption requirements for PUCCH Scell activation in valid TA case**  *Tentative agreements:*  Reuse the existing requirement for Scell activation in Rel-15.  *Candidate options: None*  *Recommendations for 2nd round: No more discussion.*  **Issue 1-4-2: Interruption requirements for PUCCH Scell activation in invalid TA case**  *Tentative agreements: None*  *Candidate options:*   * Option 1: (MTK)   + The interruption requirement shall include the existing requirement for Scell activation in Rel-15.   + FFS whether to introduce interruption by PRACH transmission due to different SCS. * Option 2: (Apple, Xiaomi, ZTE, Ericsson, Nokia, NEC, CATT)   + Reuse the interruption requirement of normal Scell activation. * Option 3: (Huawei, QC, OPPO)   + FFS after the additional delay are clearly defined   *Recommendations for 2nd round: No more discussion in 2nd round. Focus on the procedure discussion in sub-topic 1-1.* |
| **Sub-topic 1-5** | **Sub-topic 1-5 Applicability of PUCCH Scell activation requirements**  *Tentative agreements: None*  *Candidate options:*   * Option 1: (Apple, Xiaomi, ZTE, OPPO, vivo, CATT)   + The PUCCH Scell activation delay requirement shall apply provided that,     - The UE has received a PDCCH order to initiate RA procedure on the PUCCH Scell within Tactivate\_basic otherwise additional delay to activate the Scell is expected; and     - No interruption occurs in same FR as the target PUCCH Scell during the Scell activation procedure if UE supports per-FR MG, otherwise the PUCCH Scell activation delay can be extended, and     - No interruption occurs during the Scell activation procedure if UE does not support per-FR MG, otherwise the PUCCH Scell activation delay can be extended.     - The above interruption is caused by factor defined in TS38.133 section 8.2.1.1 for EN-DC, in TS38.133 section 8.2.2.1 for NR SA, in TS38.133 section 8.2.3.1 for NE-DC and in TS38.133 section 8.2.4.1 for NR-DC. * Option 2: (Xiaomi, Qualcomm)   + PUCCH Scell activation requirements are applicable only to the following cases:     - the PUCCH Scell is in a different band from SpCell band     - for invalid TA, Ues capable of more than one TAG     - for unknown PUCCH Scell, TA shall be assumed invalid * Option 3: (Ericsson)   + Delay requirements for PUCCH Scell activation shall account for additional time when PDCCH order is received outside Tactivate\_basic. The additional time shall be accounted for by an expression and/or a delay component, e.g. max(Tactivate\_basic, TPDCCH\_order).   + Delay requirement for PUCCH Scell activation shall allow for extended time when there are additional interruptions during the activation procedure. The extended time shall be in proportion to the impact the interruption has on the activation procedure. The extended time can be captured on a general level in a sentence.   + In activation of multiple Scells with one PUCCH Scell, activation delay requirement shall apply at least for the PUCCH Scell in the event that one or more Scells have configurations that render parallel activation impossible for the UE. FFS on whether activation delay requirement also is to apply for Scells that are compatible with parallel activation with PUCCH Scell. * Option 4: (Huawei, QC, Nokia)   + FFS after we have clear understanding on the framework.   *Recommendations for 2nd round:* *No more discussion in 2nd round. Focus on the procedure discussion in sub-topic 1-1.* |
| **Sub-topic 1-6** | **Sub-topic 1-6 Interruption requirements for PUCCH Scell deactivation**  *Tentative agreements:*  Reuse the existing requirement for Scell deactivation in Rel-15.  *Candidate options: None*  *Recommendations for 2nd round: No more discussion.* |
| **Sub-topic 1-7** | **Sub-topic 1-7 PUCCH SCell deactivation delay requirement for activated PUCCH SCell with multiple Scells**  *Tentative agreements:*  Reuse the SCell deactivation delay requirement for activated SCell with multiple downlink SCells specified in section 8.3.8 of TS 38.133, which is (( THARQ + 3ms)/ NR slot length).  *Candidate options: None*  *Recommendations for 2nd round: No more discussion.* |

### CRs/TPs

## Discussion on 2nd round (if applicable)

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on further RRM enhancement for NR and MR-DC - PUCCH SCell activation/deactivation requirements | CATT |  |
|  |  |  |
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**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
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Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
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Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
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3. Do not include hyper-links in the documents