**3GPP TSG-RAN WG4 Meeting # 101bis-e R4-22XXXX**

**Electronic Meeting, January 17-25, 2022**

**Agenda item:** 6.10.2.3

**Source:** Moderator (CATT)

**Title:** Email discussion summary for [101-bis-e][208] NR\_RRM\_enh2\_3

**Document for:** Information

# Introduction

The documents in agenda item 6.10.2.3 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** |
| R4-2200071 | CATT | **Proposal 1: Spatial relation activation would not introduce additional delay time for Tactivation\_time for valid TA case.**  **Proposal 2: For Tactivation\_time , only define requirements for PL-RS known case. The known condition in 8.14.2 in TS 38.133 can be reused.**  **Proposal 3: For Tactivation\_time of PL-RS known case, no extra delay will be introduced.**  **Proposal 4: For the case that PL-RS is unknown, add a general clarification in the spec that longer activation delay is expected.**  **Proposal 5: The PUCCH SCell activation requirements for invalid TA case should be THARQ + Tactivation\_time + TCSI\_Reporting + TPDCCH + T1 + T2 + T3.**  **Proposal 6: TPDCCH is need in the PUCCH SCell activation requirements for invalid TA case.**  **Proposal 7: TCSI\_reporting is also needed in the PUCCH SCell activation requirements for invalid TA case.**  **Proposal 8: T2 is the delay for obtaining a valid TA command from the point that UE transmit PRACH (i.e. end of T1).**  **Proposal 9: The components of Tactivation\_time can be same as normal SCell activation.**  **Proposal 10: Confirm the applicability on interruption as in WF [1].**  **Proposal 11: The PDCCH order should be sent not earlier than THARQ+Tactivation\_time, and using TPDCCH in requirements for calculating delay of PDCCH order receiving.**  **Proposal 12: There is no need to bundle the PUCCH Scell with single/multiple TAGs or intra-/inter band cases.** |
| R4-2200072 | CATT | **Draft CR on PUCCH Scell activation delay requirements with multiple Scell** |
| R4-2200180 | MediaTek Inc. | **Proposal 1: No PUCCH SCell activation/deactivation requirements with unknown condition are defined, if UE does not support the new R17 RAN1-introduced UE capability.**  **Proposal 2: For the PUCCH SCell activation in FR1, PL-RS activation command should be considered except that only one SSB indicating by ‘ssb-PositionInBurst’ is actually transmitted.**  **Proposal 3: For Tactivation\_time, spatial relation indication will not introduce additional delay time.**  **Proposal 4: For Tactivation\_time, additional five samples for PL-RS indication should be considered when PL-RS is non-maintained.**  **Proposal 5: For Tactivation\_time, longer activation time is expected if the PL-RS is unknown.**  **Proposal 6: For the activation with known condition, the SSB associated to PL-RS indication, TCI state switch and spatial relation is the same.**  **Proposal 7: For the activation with unknown condition, the SSB or CSI-RS associated to PL-RS indication, TCI state switch and spatial relation is the same.**  **Proposal 8: For the applicability on PDCCH order receiving,**   * **UE is only required to receive a PDCCH order to initiate RA procedure on the PUCCH Scell no earlier than n+THARQ + Tactivation\_time; otherwise, the longer PUCCH SCell activation time is expected.** * **A delay uncertainty for reception of PDCCH order shall be accounted for in the activation timeline. The delay uncertainty for reception of PDCCH order starts from end of n + THARQ + Tactivation\_time until reception of PDCCH order.**   **Proposal 9: For PUCCH SCell activation in invalid TA case, the TCSI\_reporting is needed in the PUCCH SCell activation requirements.**  **Proposal 10: For the applicability on PDCCH order receiving, the PUCCH Scell activation requirements for invalid TA case is defined as THARQ + Tactivation\_time + TPDCCH + T1 + T2 + T3 + TCSI\_Reporting**  **Proposal 11: For PUCCH SCell activation in invalid TA case, T2 is the delay for obtaining a valid TA command from the point that UE transmits PRACH.**  **Proposal 12: For the applicability on interruption,**   * **PUCCH SCell activation requirements are applied when no interruption occurs in same FR as the target PUCCH Scell during the PUCCH Scell activation procedure if UE supports per-FR MG, otherwise the PUCCH Scell activation delay can be extended, and** * **PUCCH SCell activation requirements are applied when no interruption occurs during the PUCCH 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 13: There is no needed to bundle the PUCCH Scell with single/multiple TAGs. FFS: intra-/inter band cases.** |
| R4-2200181 | MediaTek Inc. | **Draft CR for PUCCH SCell deactivation delay requirements** |
| R4-2200291 | Apple | ***Proposal 1: RAN4 to introduce new R17 UE capability of CSI reporting cross PUCCH groups.***  ***Proposal 2: RAN4 to not specify PUCCH SCell activation requirement for the scenarios in which beam information needs to be reported to network but UE cannot support CSI reporting cross PUCCH groups.***  ***Proposal 3: For Tactivation\_time in FR2 PUCCH SCell activation requirement, spatial relation activation would not introduce additional delay time.***  ***Proposal 4:***  ***For Tactivation\_time in FR2 PUCCH SCell activation requirement, only define detailed requirement for PL-RS known case, and 5 samples of PL-RS measurement time shall be considered.***  ***If the PL-RS of PUCCH on target SCell is unknown, in spec it can be clarified that “longer activation time is expected if the pathloss reference signal is unknown.”***  ***Proposal 5: Regarding the PUCCH SCell activation requirements for invalid TA case,***   * ***If UE does not have the valid TA on the PUCCH Scell being activated, an additional UL synchronization procedure to obtain the valid TA comparing to ( THARQ + Tactivation\_time +TCSI\_Reporting) 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)***   ***Proposal 6: In NR PUCCH SCell activation delay requirement with invalid TA, T2 is the delay from slot n + (THARQ + Tactivatation\_time +T1)/NR slot length until UE has obtained a valid TA command for the target PUCCH Scell being activated. Tactivatation\_time is defined in TS38.133 section 8.3.2. slot n is the slot when UE received PUCCH Scell activation MAC CE.***  ***Proposal 7:*** ***Applicability on interruption is:***   * ***PUCCH SCell activation requirements are applied when no interruption occurs in same FR as the target PUCCH Scell during the PUCCH Scell activation procedure if UE supports per-FR MG, otherwise the PUCCH Scell activation delay can be extended, and*** * ***PUCCH SCell activation requirements are applied when no interruption occurs during the PUCCH 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 8: Applicability on PDCCH order receiving is:***   * ***UE needs to receive a PDCCH order to initiate RA procedure on the PUCCH Scell no earlier than n+THARQ + Tactivation\_time, otherwise the longer PUCCH SCell activation time is expected.*** * ***A delay uncertainty for reception of PDCCH order shall be accounted for in the activation timeline. The delay uncertainty for reception of PDCCH order shall be the time from end of n+THARQ + Tactivation\_time until reception of PDCCH order.***     ***Proposal 9:***   * ***RAN4 to only define the PUCCH SCell activation only for the case when target PUCCH SCell and existing active serving cells belong to the different TAGs.*** * ***There is no need to bundle the PUCCH Scell with intra-/inter band cases.*** |
| R4-2200352 | NTT DOCOMO, INC. | **Proposal 1: For Tactivation\_time, spatial relation activation would not introduce additional delay time, including UL beam and transmit power level determination.**  **Proposal 2:**  **The extra delay time of PL-RS determination for Tactivation\_time,**   * **Only define detailed requirement for PL-RS known case**   + **The condition of “known PL-RS” means that SSB to be used for DL synchronization and so on for the PUCCH SCell activation shall be associated with PL-RS configured for the to-be activated PUCCH SCell.** * **If PL-RS is maintained, no additional time shall be granted for determining pathloss i.e. NM=0 shall be applied in requirement in TS 38.133 clause 8.14.3.** * **If PL-RS is not maintained, 5 samples of PL-RS measurement time shall be considered.**   **Proposal 3:**   * **If UE does not have the valid TA on the PUCCH Scell being activated, an additional UL synchronization procedure to obtain the valid TA comparing to ( THARQ + Tactivation\_time + TCSI\_Reporting ) 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)** * **Whether TCSI\_Reporting is needed for invalid TA case shall depend upon the CSI measurement configuration used in the PUCCH SCell.**   **Proposal 4:**   * **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 (i.e. ( THARQ + Tactivation\_time +TCSI\_Reporting)/ NR slot length). Slot n is the slot when UE received PUCCH Scell activation MAC CE.**   **Whether TCSI\_Reporting is needed for invalid TA case shall depend upon the CSI measurement configuration used in the PUCCH SCell.** |
| R4-2200390 | vivo | **Proposal 1:For Tactivation\_time, spatial relation will not introduce extra delay time for known and unknown case when the TA is valid.**  **Proposal 2: Issue 1-3-2b: For Tactivation\_time, whether the PL-RS will introduce extra delay time, suggest to use option 1.**  **Proposal 3: Using option 2 as the baseline for PUCCH Scell activation delay requirement for invalid TA case**  **Proposal 4: for T2 definition, suggest to use option 2.**  **Proposal 5: For issue 1-6-2, fine with option 4 and 3.**  **Proposal 6: For issue how to indicate the beam information for PUCCH Scell activation for unknown cell, suggest to use option 1. Ok with option 2.** |
| R4-2200418 | Qualcomm Incorporated | **Proposal 1**: RAN4 to add the following statement to clarify the timeline for downlink actions as a part of PUCCH SCell activation with invalid TA:   * + UE shall be capable to perform downlink actions related to the SCell activation command as specified in TS38.321 for the SCell being activated on the PUCCH SCell from slot n+(T\_HARQ+T\_activation\_time)/(NR slot length) at the latest.   + FFS on multiple SCell activation with PUCCH SCell.   **Proposal 2**: Unknown PUCCH SCell activation requirements are defined and applied to UE supporting a new Rel-17 UE capability of CSI report across PUCCH groups.  **Proposal 3**: PUCCH SCell activation delay requirements are defined as follows:   * + If UE has a valid TA for the PUCCH SCell,     - T\_activation\_time for PUCCH SCell is the same as legacy T\_activation\_time for SCell activation.   + If UE does not have a valid TA for the PUCCH SCell,     - T\_activation\_time for PUCCH SCell is legacy T\_activation\_time for SCell activation plus ‘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 to which the Scell configured with PUCCH belongs       * T3: the delay for applying the received TA for uplink transmission     - And T\_CSI\_reporting is updated as below assuming CSI measurement can be carried out in parallel with UL TA acquisition (T1-T3):       * T\_CSI\_reporting is the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource after T\_activation\_time, UE processing time for CSI reporting and uncertainty in acquiring the first available CSI reporting resources after T3 as specified in TS 38.331   + For FR2 PUCCH SCell activation, 4 additional SSB samples (4\*T\_rs) are added for PL-RS measurement. And the following are assumed     - PL-RS switch command is received together with PUCCH SCell activation command.     - SSB to be used for DL time/frequency synchronization for the PUCCH SCell activation shall be associated with PL-RS configured for the to-be activated PUCCH SCell.     - One SSB sample is used for both fine time/frequency synchronization and PL-RS measurement.   + For unknown PUCCH SCell with L1-RSRP based TCI activation procedure, if UE does not have a valid TA, the max function in requirements can be further modified to consider the case where semi-persistent or periodic CSI-RS resource set activation or configuration procedure can be carrier out in parallel with PDCCH order based RA procedure if needed. |
| R4-2200533 | Intel Corporation | **Proposal 1: Don’t define PUCCH SCell activation requirement for the unknown cell.**  **Proposal 2: For option 1, it’s better to clarify that 5 samples are still needed if it’s not maintained by UE. If it’s maintained by UE, there is no extra delay.**  **Proposal 3: T2 is the delay from slot n + (THARQ + Tactivatation\_time +T1)/NR slot length until UE has obtained a valid TA command for the target PUCCH Scell being activated.**  **Proposal 4:** **Tactivation\_time will only be defined for known cell.**  **Proposal 5: For applicability on PDCCH order receiving, support option 4.** |
| R4-2200639 | CMCC | ***Proposal 1: TCSI\_reporting is needed in the PUCCH SCell activation requirements for invalid TA case***  ***Proposal 2: for the case of SCell activation for deactivated PUCCH SCell with invalid TA, the SCell activation delay is: except THARQ + Tactivation\_time +TCSI\_Reporting, additional delay including following parts need to be considered:***   * ***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)***   ***Proposal 3: T2 is the delay from slot n + (THARQ + Tactivatation\_time +T1)/NR slot length until UE has obtained a valid TA command for the target PUCCH Scell being activated. Tactivatation\_time is defined in TS38.133 section 8.3.2. Slot n is the slot when UE received PUCCH Scell activation MAC CE*** |
| R4-2200674 | Xiaomi | **Proposal 1: 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 (T1);** 2. **the delay for obtaining a valid TA command for the sTAG to which the SCell configured with PUCCH belongs (T2);** 3. **the delay for applying the received TA for uplink transmission (T3).**   **Where:**   * **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;** * **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;** * **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 2: RAN4 not to consider TPDCCH in the PUCCH SCell activation requirements for invalid TA case.**  **Proposal 3: TCSI\_reporting is needed in the PUCCH SCell activation requirements for invalid TA case.**  **Proposal 4: The applicability on PUCCH SCell activation delay requirement is defined as:**   * **PUCCH SCell activation requirements are applied when no interruption occurs in same FR as the target PUCCH Scell during the PUCCH Scell activation procedure if UE supports per-FR MG, otherwise the PUCCH Scell activation delay can be extended, or** * **PUCCH SCell activation requirements are applied when no interruption occurs during the PUCCH Scell activation procedure if UE does not support per-FR MG, otherwise the PUCCH Scell activation delay can be extended.**   **Proposal 5: The delay requirement for PUCCH SCell activation is applied provided that the UE has received a PDCCH order to initiate RA procedure on the PUCCH SCell within slot n+(THARQ+Tactivation\_time+TCSI\_Reporting)/(NR slot length), otherwise additional delay to activate the SCell is expected.** |
| R4-2200741 | ZTE Corporation | **Proposal 1: Take option 2 in WF[1].**  **If UE does not have the valid TA on the PUCCH Scell being activated, an additional UL synchronization procedure to obtain the valid TA comparing to ( THARQ + Tactivation\_time +TCSI\_Reporting) 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)**   **Proposal 2:**   * **TPDCCH is not needed in the PUCCH SCell activation requirements for invalid TA case.** * **TCSI\_reporting is needed in the PUCCH SCell activation requirements for invalid TA case.**   **Proposal 3: Take option 2 in WF[1].**   * + **T2 is the delay from slot n + (THARQ + Tactivatation\_time +T1)/NR slot length until UE has obtained a valid TA command for the target PUCCH Scell being activated. Tactivatation\_time is defined in TS38.133 section 8.3.2. slot n is the slot when UE received PUCCH Scell activation MAC CE.** |
| R4-2200893 | Nokia, Nokia Shanghai Bell | **Proposal 1: A relaxation margin [X] needs to be introduced to the PUCCH SCell activation delay, to reflect the potential CSI processing timeline relaxation. The value of [X] can be set based on RAN1 discussion.**  **Proposal 2: The relaxation margin [X] applies when the beam information of the PUCCH SCell needs to be indicated on any active serving cells belonging to primary PUCCH group in the following cases:**   * **unknown FR2 PUCCH SCell activation with a valid TA** * **unknown FR1 PUCCH SCell activation without a valid TA** * **unknown FR2 PUCCH SCell activation without a valid TA**   **Proposal 3: 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 for the SCell being activated on the PUCCH SCell no later than in slot , where**  **- THARQ (in ms) is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3]**  **- Tactivation\_time is the SCell activation delay as defined in section 8.3.2.**  **- TCSI\_Reporting is specified in clause 8.3.2.**  **- [X] is the relaxation margin for reporting L1-RSRP of the target being-activated PUCCH SCell on any active serving cells belonging to primary PUCCH group, when the PUCCH SCell is unknown in FR2. Otherwise, it is set to 0.**  **Proposal 4: The downlink actions can be performed immediately after Tactivation\_time and should not be deferred by TCSI\_reporting.**  **Proposal 5: 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 .**  **Proposal 6: If the UE does not have a valid TA, the activation delay requirement for PUCCH SCell shall be defined assuming no dedicated time for CSI measurements and UE processing of CSI reporting.**  **Proposal 7: 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**   * **Tdelay\_PUCCH\_SCell = Tactivation\_time + [X] + T1 + T2 + T3, and** * **TCSI\_Reporting\_PUCCH is the time uncertainty in acquiring the first available CSI reporting resources after RACH completion.**   **Proposal 8: T2 is defined as the delay from slot n + (THARQ + Tactivation\_time +[X]+T1)/NR slot length until UE has obtained a valid TA command for the target PUCCH SCell being activated.** |
| R4- 2200894 | Nokia, Nokia Shanghai Bell | **draftCR on PUCCH SCell activation delay requirements** |
| R4-2201136 | OPPO | ***Proposal 1: A unified TCSI\_Reporting could be definedbased on the relaxed CSI processing delay requirements for UEs capable of cross-CG CSI reporting.***  ***Proposal 2: For Tactivation\_time, spatial relation activation would not introduce additional delay time.***  ***Proposal 3: Only define detailed requirement for PL-RS known case, and 5 samples of PL-RS measurement time shall be considered. If the PL-RS of PUCCH on target SCell is unknown, in spec it can be clarified that “longer activation time is expected if the pathloss reference signal is unknown.”***  ***Proposal 4: The additional delay for NR PUCCH SCell activation with invalid TA should be considered:***   * ***T1: the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell, 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*** * ***T2 is the delay from slot n + (THARQ + Tactivatation\_time +T1)/NR slot length until UE has obtained a valid TA command for the target PUCCH SCell being activated. Tactivatation\_time is defined in TS38.133 section 8.3.2. 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****.* |
| R4-2201204 | Huawei, HiSilicon | **Proposal 1: Requirements for unknown PUCCH SCell activation applies to UE supporting the Rel-17 capability of cross PUCCH group CSI reporting provided that UE has been configured with L1-RSRP reporting of the target PUCCH SCell on SpCell.**  **Proposal 2: Wait RAN2 to determine whether to define requirements for unknown PUCCH SCell activation for UE not supporting cross PUCCH group CSI reporting.**  **Observation 1: According to RAN1 specification about PUCCH power control, UE doesn’t need to wait for the PL-RS activation MAC CE to determine the PL-RS.**  **Proposal 3：There is no need to consider uncertainty of MAC CE for PL-RS activation in PUCCH SCell activation delay requirements.**  **Proposal 4: 5 samples of PL-RS measurement time shall be considered provided that PL-RS is based on latest L3 measurement report for known PUCCH SCell and latest L1 measurement report for unknown PUCCH SCell; otherwise, longer delay is expected.**  **Proposal 5:**  **If UE does not have the valid TA on the PUCCH Scell being activated, an additional UL synchronization procedure to obtain the valid TA comparing to ( THARQ + Tactivation\_time +TCSI\_Reporting) 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)**   **Proposal 6: There is no need to have applicability statement of interruption for PUCCH SCell activation requirements.**  **Proposal 7a: The UE has received a PDCCH order to initiate RA procedure on the PUCCH SCell within THARQ+ Tactivation\_timeotherwise additional delay to activate the SCell is expected;**  **Proposal 7b:**  **UE needs to receive a PDCCH order to initiate RA procedure on the PUCCH Scell no earlier than n+THARQ + Tactivation\_time, otherwise the longer PUCCH SCell activation time is expected.**  **A delay uncertainty for reception of PDCCH order shall be accounted for in the activation timeline. The delay uncertainty for reception of PDCCH order shall be the time from end of n+THARQ + Tactivation\_time until reception of PDCCH order.**  **Proposal 8: Not to define applicability of single/multiple TAGs or intra-/inter band for PUCCH activation requirements.**  **Observation 2: No PUCCH Scell requirements for NR-DC according to RAN2 restiction on numebr of PUCCH group in each cell group.** |
| R4-2201205 | Huawei, HiSilicon | **Draft CR on interruption of PUCCH SCell activation** |
| R4-2201382 | Ericsson | **Proposal 1: When DL-RS associated with UL beam to use for random access is known to UE, no additional time shall be granted for determining transmit power level.**  **Proposal 2: For Tactivation\_time, spatial relation activation would not introduce any additional delay time.**  **Proposal 3: When DL-RS configured as PL-RS is known to UE, no additional time shall be granted for determining pathloss i.e., NM=0 shall be applied in requirement in TS 38.133 clause 8.14.3.**  **Proposal 4: RAN4 to agree that UL synchronisation (T1, T2, T3) and CSI measurement and reporting (TCSI\_Reporting) are performed in parallel.**  **Proposal 5: RAN4 to agree on following.**   * **T1 is the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell after slot n + (THARQ + Tactivatation\_time)/NR slot length.** * **T2 is the delay from slot n + (THARQ + Tactivatation\_time +T1)/NR slot length until UE has obtained a valid TA command for the target PUCCH SCell being activated. Tactivatation\_time is defined in TS38.133 section 8.3.2. slot n is the slot when UE received PUCCH SCell activation MAC CE.** * **T3: the delay for applying the received TA for uplink transmission. Start time of T3 is slot n + (THARQ + Tactivatation\_time +T1 + T2)/NR slot length.**   **Proposal 6: A delay uncertainty for reception of PDCCH order shall be accounted for in the activation timeline. When PDCCH order is received within Tactivation\_time, the net effect on the timeline shall be an added delay of 0. When PDCCH order is received after Tactivation\_time, the net effect shall be an added delay that represents the time from end of Tactivation\_time until reception of PDCCH order.** |
| R4-2201383 | Ericsson | **Draft CR on Interruption requirements to LTE serving cell** |
| R4-2200286 | Apple | **Initial views on R17 feature list** |

## Open issues summary

### Sub-topic 1-1 PUCCH SCell activation requirements for unknown cell

RAN1 reply LS (R4-2200049)

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| **Q1:** Whether UE can report CSI (e.g. L1-RSRP) of the target being-activated PUCCH SCell belonging to secondary PUCCH group by configuring CSI report setting (e.g. CSI-ReportConfig) on any active serving cells belonging to primary PUCCH group  **Answer**: There is **no restriction** in the current RAN1 specification that would not allow UE to report CSI of a SCell belonging to secondary/primary PUCCH group by PUSCH or PUCCH of active serving cells belonging to primary/secondary PUCCH group. But there is no RAN1 consensus on whether all UEs supporting NR-CA with dual PUCCH-groups for the BC support such CSI report in Rel-15 and Rel-16. Support of such CSI report is indicated in **Rel-17 with a new UE capability**. Potential CSI processing timeline relaxation for UEs reporting the new UE capability can be discussed.  **Q2:** Whether the above observation is correct, i.e. the identified four cases are not supported by the current RAN1 and RAN2 specification.  **Answer**: RAN1 is not able to answer the question on whether the identified four cases are supported or not by current RAN1 specification.  **Q3:** Whether the above identified cases can be supported by RAN1 and RAN2 spec updates within Rel-17 timeframe.  **Answer**: RAN1 is not able to answer the question. However, RAN1 expects that reporting CSI (e.g. L1-RSRP) of the target being-activated PUCCH SCell belonging to secondary PUCCH group by configuring CSI report setting (e.g. *CSI-ReportConfig*) on any active serving cells belonging to primary PUCCH group supports the identified four cases. |

**Issue 1-1-1: Whether to define PUCCH SCell activation requirements for unknown cell case for UE supporting the Rel-17 capability of cross PUCCH group CSI reporting?**

Proposals

* Option 1: (vivo, Qualcomm, Huawei, Nokia, OPPO)
  + Yes
* Option 1a: (vivo)
  + The downlink beam information of PUCCH Scell can only be indicated via SpCell by UE before PUCCH Scell activation for unknown cell case.
* Option 1b: (Qualcomm, Huawei)
  + Unknown PUCCH SCell activation requirements are defined and applied to UE supporting a new Rel-17 UE capability of CSI report across PUCCH groups.
* Option 1c: (Nokia)
  + A relaxation margin [X] needs to be introduced to the PUCCH SCell activation delay, to reflect the potential CSI processing timeline relaxation. The value of [X] can be set based on RAN1 discussion.
  + The relaxation margin [X] applies when the beam information of the PUCCH SCell needs to be indicated on any active serving cells belonging to primary PUCCH group in the following cases:
    - unknown FR2 PUCCH SCell activation with a valid TA
    - unknown FR1 PUCCH SCell activation without a valid TA
    - unknown FR2 PUCCH SCell activation without a valid TA
* Option 1d: (OPPO)
  + A unified TCSI\_Reporting could be definedbased on the relaxed CSI processing delay requirements for UEs capable of cross-CG CSI reporting.
* Option 2: (Intel, vivo)
  + Don’t define PUCCH SCell activation requirement for the unknown cell.
* Recommended WF
  + *Need more discussion*

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| **Issue 1-1-1: Whether to define PUCCH SCell activation requirements for unknown cell case for UE supporting the Rel-17 capability of cross PUCCH group CSI reporting?** | |
| **Company** | **Comments** |
| Huawei | Support option 1.  For option 1b, it is not our original motivation. At least we can say **for UE supporting Rel-17 cross PUCCH group CSI reporting, unknown PUCCH SCell activation applies provided that UE has been configured with L1-RSRP reporting of the target PUCCH SCell on SpCell.**  For UE not supporting this capability, whether to define unknown requirements are discussed in next issue. |
| Mediatek | Support option 1. If UE supports the cross PUCCH group reporting, then the PUCCH SCell should be no problem. |
| Apple | Support option 1. For option 1b, there could be one case that unknown PUCCH SCell activation doesn’t need beam indication to network, and therefore the requirement could still be defined without UE capability of cross PUCCH group CSI reporting, e.g., the following agreed cases:  If the target PUCCH Scell is unknown cell in FR2:   * 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 the target PUCCH Scell is unknown cell in FR1:   * If 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. |
| Ericsson | Support option 1. |
| QC | Support Option 1. |

**Issue 1-1-2: Whether to define PUCCH SCell activation requirements for unknown cell case for UE not supporting the Rel-17 capability of cross PUCCH group CSI reporting?**

Proposals

* Option 1a: (Intel, vivo)
  + Don’t define PUCCH SCell activation requirement for the unknown cell.
* Option 1b: (MTK)
  + No PUCCH SCell activation/deactivation requirements with unknown condition are defined, if UE does not support the new R17 RAN1-introduced UE capability.
* Option 1c: (Apple)
  + RAN4 to introduce new R17 UE capability of CSI reporting cross PUCCH groups.
  + RAN4 to not specify PUCCH SCell activation requirement for the scenarios in which beam information needs to be reported to network but UE cannot support CSI reporting cross PUCCH groups
* Option 2: (Huawei)
  + Wait RAN2 to determine whether to define requirements for unknown PUCCH SCell activation for UE not supporting cross PUCCH group CSI reporting.
* Recommended WF
  + *Need more discussion*

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| **Issue 1-1-2: Whether to define PUCCH SCell activation requirements for unknown cell case for UE not supporting the Rel-17 capability of cross PUCCH group CSI reporting?** | |
| **Company** | **Comments** |
| Huawei | We support option 2. RAN2 will discuss whether RAN2 solutions are needed based on RAN1 LS reply (this meeting). If RAN2 agreed no other RAN2 impact, than we can agree not to have unknown requirements for UE not supporting this capability. |
| MediaTek | We are ok to option2. To wait for the confirm from RAN2. |
| Apple | Option 1c. For some special unknown Scell cases, requirement could still be applied without capability of cross PUCCH CSI reporting, like followings:  If the target PUCCH Scell is unknown cell in FR2:   * 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 the target PUCCH Scell is unknown cell in FR1:   * If 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.   Thus we propose: “RAN4 to not specify PUCCH SCell activation requirement for the scenarios in which beam information needs to be reported to network but UE cannot support CSI reporting cross PUCCH groups” |
| Ericsson | We agree with Apple analysis and ok with option 1c. |
| QC | Apple’s comment looks okay with us. Anyway, the key here is whether CSI reporting across PUCCH group is needed to activate PUCCH SCell rather than known vs. unknown. |

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

*Agreements in GTW (11.3) in last meeting:*

* + No additional delay time is needed if UL spatial relation and PL-RS activation command and TCI activation command are received in the same MAC PDU.
  + For both valid TA and invalid TA cases in FR2 PUCCH SCell activation, the uncertainty for receiving UL spatial relation and PL-RS activation command and TCI activation command could be defined as below,
    - Tuncertainty\_MAC is the time period between reception of the last activation command for PDCCH TCI, PDSCH TCI (when applicable), UL spatial relation and PL-RS relative to
      * SCell activation command for known case;
      * First valid L1-RSRP reporting for unknown case.

**Issue 1-2-1: Whether to consider the time uncertainty of MAC CE for PL-RS activation?**

* Option 1: (MTK)
  + For the PUCCH SCell activation in FR1, PL-RS activation command should be considered except that only one SSB indicating by ‘ssb-PositionInBurst’ is actually transmitted.
* Option 2: (Huawei)
  + There is no need to consider uncertainty of MAC CE for PL-RS activation in PUCCH SCell activation delay requirements.
* Recommended WF
  + *Need more discussion*

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| **Issue 1-2-1: Whether to consider the time uncertainty of MAC CE for PL-RS activation?** | |
| **Company** | **Comments** |
| Huawei: | Support option 2.  As analysis in our paper, according RAN1spec, it seems there is no need to waiting for MAC CE for PL-RS only. We didn’t see other cases apart from the listed ones where UE needs additional MAC CE for PL-RS:   * If the UE is not provided pathlossReferenceRSs * If the UE is provided pathlossReferenceRSs and PUCCH-SpatialRelationInfo * If the UE is provided pathlossReferenceRSs and is not provided PUCCH-SpatialRelationInfo * If the UE is not provided pathlossReferenceRSs, and is not provided PUCCH-SpatialRelationInfo, and is provided enableDefaultBeamPL-ForPUCCH |
| MediaTek | Thanks for the analysis, more time is needed to check the necessity of the PL-RS indication for PUCCH SCell activation. We also want to hear other companies’ view on this issue. |
| Apple | We would like to keep the last meeting agreement unchanged.  For option 1, if CSI-RS is used for RL-RS, UE still needs to be indicated to perform measurement on CSI-RS rather than that one SSB. Even though the SSB is associated/QCLed with CSI-RS, but the PL measurement result based on SSB and CSI-RS might not be exactly the same due to different beam types (e.g., CSI-RS with fine beam, SSB with rough beam).  For option 2, RAN1 defined some cases without *pathlossReferenceRS* for active BWP on a primary cell but it cannot directly apply for the being activated SCell in RAN4 case. In FR2 the Tx power is important to be aligned with the Tx beam used for PUCCH transmission, but UE has no idea which DL RS could be the PL-RS for power estimation associated with such uplink spatial relation, and therefore it would be reasonable for network to indicate such information to UE to avoid any ambiguity. |
| Ericsson | We tend agree with Apple comments that RAN1 text is primarily for primary cell and not sure if it is applicable for secondary cell also. Need more time to check internally. |
| QC | Share the same comment as Ericsson that the RAN1 text is primarily for PCell.  And we do not think RAN4 needs to go into this level of details. The parameter can be simply set to zero when not applicable or received together with SCell activation command. |

**Issue 1-2-2: For Tactivation\_time, whether spatial relation will introduce extra delay time?**

* Option 1: (CATT, MTK, Apple, DOCOMO, vivo, OPPO, Ericsson)
  + For Tactivation\_time, spatial relation activation would not introduce additional delay time.
* Recommended WF
  + *Agree on option 1.*

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| **Issue 1-2-2: For Tactivation\_time, whether spatial relation will introduce extra delay time?** | |
| **Company** | **Comments** |
| Huawei | Support recommended WF. |
| MediaTek | Option 1. |
| Apple | Option 1 |
| Ericsson | Option 1 |

**Issue 1-2-3: For Tactivation\_time, whether the PL-RS will introduce extra delay time?**

* Option 1: (CATT)
  + Only define requirements for PL-RS known case. The known condition in 8.14.2 in TS 38.133 can be reused.
  + For PL-RS known case, no extra delay will be introduced
  + For PL-RS unknown case, add a general clarification in the spec that longer activation delay is expected.
* Option 2: (MTK)
  + For Tactivation\_time, additional five samples for PL-RS indication should be considered when PL-RS is non-maintained.
  + For Tactivation\_time, longer activation time is expected if the PL-RS is unknown.
* Option 3: (Apple, vivo, OPPO)
  + For Tactivation\_time in FR2 PUCCH SCell activation requirement, only define detailed requirement for PL-RS known case, and 5 samples of PL-RS measurement time shall be considered.
  + If the PL-RS of PUCCH on target SCell is unknown, in spec it can be clarified that “longer activation time is expected if the pathloss reference signal is unknown.”
* Option 4: (DOCOMO, Intel)
  + Only define detailed requirement for PL-RS known case:
    - If PL-RS is maintained, no additional time shall be granted for determining pathloss i.e. NM=0 shall be applied in requirement in TS 38.133 clause 8.14.3.
    - If PL-RS is not maintained, 5 samples of PL-RS measurement time shall be considered.
* Option 4a: (DOCOMO)
  + - The condition of “known PL-RS” means that SSB to be used for DL synchronization and so on for the PUCCH SCell activation shall be associated with PL-RS configured for the to-be activated PUCCH SCell.
* Option 5: (Qualcomm)
  + 4 additional SSB samples (4\*T\_rs) are added for PL-RS measurement. And the following are assumed
    - PL-RS switch command is received together with PUCCH SCell activation command.
    - SSB to be used for DL time/frequency synchronization for the PUCCH SCell activation shall be associated with PL-RS configured for the to-be activated PUCCH SCell.
    - One SSB sample is used for both fine time/frequency synchronization and PL-RS measurement.
* Option 6: (Huawei)
  + 5 samples of PL-RS measurement time shall be considered provided that PL-RS is based on latest L3 measurement report for known PUCCH SCell and latest L1 measurement report for unknown PUCCH SCell; otherwise, longer delay is expected.
* Option 7: (Ericsson)
  + When DL-RS configured as PL-RS is known to UE, no additional time shall be granted for determining pathloss i.e., NM=0 shall be applied in requirement in TS 38.133 clause 8.14.3.
* Recommended WF
  + For Tactivation\_time in FR2 PUCCH SCell activation requirement, only define detailed requirement when PL-RS of target PUCCH SCell is known.
  + If the PL-RS of target PUCCH SCell is unknown, clarify that “longer activation time is expected if the pathloss reference signal is unknown.” in the spec.
  + FFS the known condition of PL-RS.
  + FFS the detailed requirements when PL-RS of target PUCCH SCell is known.

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| **Issue 1-2-3: For Tactivation\_time, whether the PL-RS will introduce extra delay time?** | |
| **Company** | **Comments** |
| Huawei | Agree with the recommended WF  The known conditions are suggested to be defined as option 6 based on the agreement in last meeting that:   * + For known PUCCH SCell,     - TCI sate, PL-RS and spatial relation indication are assumed to be based on the L3 measurement.   + For unknown PUCCH SCell,     - TCI sate, PL-RS and spatial relation indication are assumed to be based on L1-RSRP measurement.   And 5 samples time are always needed as it can not be assumed that the PL-RS is maintained before the SCell is activated. |
| MediaTek | Agree with recommended WF.  Besides, five samples are needed for PUCCH SCell activation as HW’s comments. |
| Apple | Support Option 3 and agree with recommended WF.  Known condition of PL-RS could be similar as in legacy PL-RS switching requirement, but only replace the L1-RSRP measurement report of PL-RS by “L3 measurement report of PL-RS”. We are open to further discuss on details of this known condition. |
| Ericsson | We are OK with recommended WF.  Regarding the known condition and unknown condition, HW suggested proposal is OK.  However, we prefer specifying requirement for both maintained and not maintained case for known PUCCH SCell. |
| QC | We are okay with 5 SSB samples. |

**Issue 1-2-4: Relation between the associated RS for TCI state, PL-RS and spatial relation indication?**

* Option 1: (MTK)
  + For the activation with known condition, the SSB associated to PL-RS indication, TCI state switch and spatial relation is the same.
  + For the activation with unknown condition, the SSB or CSI-RS associated to PL-RS indication, TCI state switch and spatial relation is the same..
* Recommended WF
  + *Need more discussion*

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| **Issue 1-2-4: Relation between the associated RS for TCI state, PL-RS and spatial relation indication?** | |
| **Company** | **Comments** |
| Huawei | Probably option 1 is valid in real scenarios. But we are wondering whether such restriction is needed in spec, as there is no such restrictions in RAN1/RAN2 spec. |
| MediaTek | Support option 1.  To our understanding, during the activation procedure, network only can indicate the TCI state, PL-RS and spatial relation based on L1/L3 measurement report. We do not think network has the intention to indicate the RS having highest RSRP to TCI state and RS having 2nd high RSRP to PL-RS or spatial relation.  Besides, for no such restriction defined in RAN1/2, because, after the activation, UE is allowed to switch the TCI state, PL-RS and spatial relation based on other RS, e.g., SRS can be used for spatial relation. |
| Apple | We can agree with option 1 for simplicity but also need to check network vendor’s view if it could be a common case. |
| Ericsson | Observation may be fine but we do not think such restrictions are needs to be captured in spec. Especially with unified TCI state indication framework introduced in Rel-17. |
| QC | Okay with Option 1. |

**Issue 1-2-5: How to consider the Tx power of target PUCCH in PUCCH SCell activation requirement?**

* Option 1: (Ericsson)
  + When DL-RS associated with UL beam to use for random access is known to UE, no additional time shall be granted for determining transmit power level.
* Recommended WF
  + *Need more discussion*

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| **Issue 1-2-5: How to consider the Tx power of target PUCCH in PUCCH SCell activation requirement?** | |
| **Company** | **Comments** |
| Apple | Need more discussion. DL RS is known but UE has no idea if this DL-RS would be used as PL-RS before network indication, so after network indicates this DL RS to be the PL-RS to UE, UE still needs to perform measurement on it to determine the Tx power, like in the legacy PL-RS switching requirement(in current spec, known PL-RS means UE report L1-RSRP on that DL RS before the switching command, but UE still needs 5 samples for measurement on this DL RS after receiving the PL-RS switching command). |
| Ericsson | In RAN4#100e it was agreed that *Tx power of target PUCCH should be considered in PUCCH SCell activation requirement*. This agreement is somewhat vague as it does not state how, if at all, to account for it in the activation timeline. we would like to clarify it. |
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**Issue 1-2-6: The PUCCH Scell activation delay requirements for valid TA case?**

* Option 1: (Nokia)
  + 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 for the SCell being activated on the PUCCH SCell no later than in slot , where
    - THARQ (in ms) is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3]
    - Tactivation\_time is the SCell activation delay as defined in section 8.3.2.
    - TCSI\_Reporting is specified in clause 8.3.2.
    - [X] is the relaxation margin for reporting L1-RSRP of the target being-activated PUCCH SCell on any active serving cells belonging to primary PUCCH group, when the PUCCH SCell is unknown in FR2. Otherwise, it is set to 0.
* Option 2: (QC)
  + Tactivation\_time for PUCCH SCell is the same as legacy Tactivation\_time for SCell activation.
* Recommended WF
  + *Need more discussion*

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| **Issue 1-2-6: The PUCCH Scell activation delay requirements for valid TA case?** | |
| **Company** | **Comments** |
| Huawei | Fine with option 1 and option 2. |
| MediaTek | For option 1, we are open to discuss.  For option 2, it is unclear to us. Does that mean we do not consider the PL-RS related procedures in valid TA case? |
| Apple | Agree to use option 1 as starting point but some bullet needs to be revised/clarified.  Based on the following agreements in RAN4 #100e and #101e, the Tactivation\_time in option 1 needs to be revised to take into account the “time uncertainty of the single MAC CE for both UL spatial relation and PL-RS activation of PUCCH in target being-activated Scell” for FR2. And for [X], we need to check if L1-RSRP measurement/report time inside legacy Tactivation\_time is sufficient or not.   * 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 single MAC CE for both UL spatial relation and PL-RS activation of PUCCH in target being-activated Scell shall be considered in the baseline Tactivation\_time.   + For Tactivation\_time,     - TCI state indication would not introduce additional delay time     - For known PUCCH SCell,       * TCI sate, PL-RS and spatial relation indication are assumed to be based on the L3 measurement.     - For unknown PUCCH SCell,       * TCI sate, PL-RS and spatial relation indication are assumed to be based on L1-RSRP measurement. |
| Ericsson | Though both options look same, option 1 considers cross group PUCCH CSI reporting, hence option 1 can be considered for further discussion.  Our view is X can be captured with in Tactivation\_time just like legacy SCell activation L1-RSRP reporting. |
| QC | Response to MTK’s comment: When you look at our proposal (Proposal 3 in our contribution), “same as legacy” is for FR1, and it was proposed to add 4 additional SSB samples for FR2.  We do not support ‘the relaxation margin’ in Option 1. If UE supports a new capability of supporting CSI report across PUCCH group, there is no need to relax requirements compared to the legacy. Therefore, we support Option 2 with a clarification that additional [5] SSB samples are added for FR2 PL-RS measurement. |

### 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: (CATT, MTK)
  + The PUCCH SCell activation requirements for invalid TA case is defined as THARQ + Tactivation\_time + TCSI\_Reporting + TPDCCH + T1 + T2 + T3
* Option 2: (Apple, DOCOMO, vivo, CMCC, Xiaomi, ZTE, OPPO, Huawei, Ericsson)
  + If UE does not have the valid TA on the PUCCH Scell being activated, an additional UL synchronization procedure to obtain the valid TA comparing to ( THARQ + Tactivation\_time +TCSI\_Reporting) 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 2a: (DOCOMO)
  + Whether TCSI\_Reporting is needed for invalid TA case shall depend upon the CSI measurement configuration used in the PUCCH SCell.
* Option 2b: (Ericsson)
  + RAN4 to agree that UL synchronisation (T1, T2, T3) and CSI measurement and reporting (TCSI\_Reporting) are performed in parallel.
* Option 3: (Qualcomm)
  + 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 .
  + And TCSI\_reporting is updated as below assuming CSI measurement can be carried out in parallel with UL TA acquisition (T1-T3):
    - TCSI\_reporting is the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource after Tactivation\_time, UE processing time for CSI reporting and uncertainty in acquiring the first available CSI reporting resources after T3 as specified in TS 38.331
  + For unknown PUCCH SCell with L1-RSRP based TCI activation procedure, if UE does not have a valid TA, the max function in requirements can be further modified to consider the case where semi-persistent or periodic CSI-RS resource set activation or configuration procedure can be carrier out in parallel with PDCCH order based RA procedure if needed.
  + FFS on multiple SCell activation with PUCCH SCell.
* Option 4: (Nokia)
  + 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 .
  + 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
    - Tdelay\_PUCCH\_SCell = Tactivation\_time + [X] + T1 + T2 + T3, and
    - TCSI\_Reporting\_PUCCH is the time uncertainty in acquiring the first available CSI reporting resources after RACH completion.
  + The downlink actions can be performed immediately after Tactivation\_time and should not be deferred by TCSI\_reporting.
  + If the UE does not have a valid TA, the activation delay requirement for PUCCH SCell shall be defined assuming no dedicated time for CSI measurements and UE processing of CSI reporting.
* Recommended WF
  + 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 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 .
  + FFS: whether [X] which is the relaxation margin for unknown cell case is needed.
  + FFS: whether [] which is the delay uncertainty for PDCCH order receiving is needed.
  + FFS: whether [] is needed and FFS the definition of [] if applicable.

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| **Issue 1-3-1: The PUCCH SCell activation requirements for invalid TA case** | |
| **Company** | **Comments** |
| Huawei | Fine with recommended WF. And for Tcsi\_reporting, we are fine with the revision from QC in option 3. |
| MediaTek | Fine with the recommended WF |
| Apple | Option 2, and agree to clarify the DL/UL action as in recommended WF. We can also compromise to consider TPDCCH in option 2 as we proposed in issue 1-5-2. |
| Ericsson | OK with recommended WF with slight change. As commented in previous issue, X can be captured in activation time. |
| Xiaomi | Option 2. Prefer to use option 2 as baseline, and the remaining issues can be discussed case-by-case. |
| QC | We do not support the idea of having non-zero [x]. And we don’t think T\_PDCCH needs to be additionally defined.  Option 2 and Option 3 look sufficient to us. |

**Issue 1-3-2: 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: (CATT, MTK)
  + T2 is the delay for obtaining a valid TA command from the point that UE transmit PRACH (i.e. end of T1).
* Option 2: (Apple, vivo, Intel, CMCC, ZTE, Ericsson, Xiaomi)
  + T2 is the delay from slot n + (THARQ + Tactivatation\_time +T1)/NR slot length until UE has obtained a valid TA command for the target PUCCH Scell being activated. Tactivatation\_time is defined in TS38.133 section 8.3.2. slot n is the slot when UE received PUCCH Scell activation MAC CE.
* Option 2a: (Nokia)
  + T2 is defined as the delay from slot n + (THARQ + Tactivation\_time +[X]+T1)/NR slot length until UE has obtained a valid TA command for the target PUCCH SCell being activated.
* Option 3: (DOCOMO)
  + 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 (i.e. ( THARQ + Tactivation\_time +TCSI\_Reporting)/ NR slot length). slot n is the slot when UE received PUCCH SCell activation MAC CE.
* Option 3a: (DOCOMO)
  + Whether TCSI\_Reporting is needed for invalid TA case shall depend upon the CSI measurement configuration used in the PUCCH SCell.
* Recommended WF
  + *Moderator: The starting point of T2 is related to the discussing in issue 1-3-1, please check whether the following definition can be accepted i.e. not mention the detailed formula of starting point which does not impact the definition of T2 and can be reflected in the final requirements.* 
    - T2 is the delay for obtaining a valid TA command for the target PUCCH SCell being activated from the point that UE transmit PRACH (i.e. end of T1).

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| **Issue 1-3-2: the delay for obtaining a valid TA command for the sTAG to which the SCell configured with PUCCH belongs (i.e. T2)** | |
| **Company** | **Comments** |
| MediaTek | Fine with the recommended WF |
| Apple | Agree Option 2 and recommended WF. |
| Ericsson | Ok with recommended WF. |
| Xiaomi | Support option 2 and fine with the recommended WF |
| QC | Support Recommended WF. |

**Issue 1-3-3: The components of Tactivatation\_time**

Proposals

* Option 1: (CATT, Qualcomm)
  + The components of Tactivation\_time can be same as normal SCell activation.
* Option 2: (Intel)
  + Tactivation\_time will only be defined for known cell
* Recommended WF
  + *Included in the discussion of sub-topic 1-2.*

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| **Issue 1-3-3: The components of Tactivatation\_time** | |
| **Company** | **Comments** |
| Huawei | Not very clear about the issue. Option 2 we believe is related to issue 1-1-1. |
| MediaTek | Same view as HW. |
| Apple | Option 1 needs to revised to contain the following agreements in RAN4#100e.  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 single MAC CE for both UL spatial relation and PL-RS activation of PUCCH in target being-activated Scell shall be considered in the baseline Tactivation\_time. |
| Ericsson | Single MAC-CE may be enough to trigger PUCCH SCell activation, PL-RS activation, UL spatial relation switch for known PUCCH SCell case.  For unknown PUCCH SCell case, based on the capability (for UE supports cross PUCCH reporting and other cases where L1-RSRP reporting is not needed), existing requirements can be reused.  We do not see additional components are needed, and option 1 looks fine. |
| Xiaomi | The same views as Apple. |
| QC | For clarification: We agree to what Apple pointed out, and that is in line with what we wrote in our proposal. But unfortunately, some details are missing here.  So perhaps, Option 1 should be clarified as follows;  The components of Tactivation\_time can be same as normal SCell activation except that time uncertainty of the single MAC CE for both UL spatial relation and PL-RS activation of PUCCH in target being-activated Scell shall be additionally considered for FR2. |

**Issue 1-3-4: The TPDCCH**

Proposals

* Option 1: (Xiaomi)
  + RAN4 not to consider TPDCCH in the PUCCH SCell activation requirements for invalid TA case.
* Recommended WF

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| **Issue 1-3-4: The TPDCCH** | |
| **Company** | **Comments** |
| MediaTek | Disagree with option 1. Suggest to consider the TPDCCH in activation procedure. |
| Apple | Up to the discussion in issue 1-5-2. We need to check if the uncertainty of PDCCH order reception (PDCCH is received after UE complete the DL actions on target SCell) shall be considered additionally. |
| Ericsson | Agree with Apple. Uncertainty of PDCCH reception may not be considered in T1. Need to check if it is needed in the delay requirement. |
| Xiaomi | This issue can be discussed in issue 1-5-2. |
| QC | Support Option 1. With clarification on downlink action timing, we don’t think T\_PDCCH needs to be additionally captured. That will be part of T1. |

**Issue 1-3-5: The TCSI-RS\_reporting**

Proposals

* Option 1: (Xiaomi)
  + TCSI\_reporting is needed in the PUCCH SCell activation requirements for invalid TA case.
* Recommended WF

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| **Issue 1-3-5: The TCSI-RS\_reporting** | |
| **Company** | **Comments** |
| MediaTek | Agree with option 1. |
| Apple | fine with option 1 |
| Ericsson | Ok with option 1 |
| Xiaomi | Support option 1 |
| QC | Option 1. |

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

**Issue 1-4-1: The scenarios of interruption requirements for PUCCH SCell activation?**

Proposals

* Option 1: (Huawei)
  + No PUCCH Scell requirements for NR-DC according to RAN2 restiction on numebr of PUCCH group in each cell group.
* Recommended WF
  + *Need more discussion*

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| --- | --- |
| **Issue 1-4-1: The scenarios of interruption requirements for PUCCH SCell activation?** | |
| **Company** | **Comments** |
| Huawei | Support option 1. According to RAN2 restriction, it seems there is no needed to considered PUCCH SCell in NR-DC. |
| MediaTek | Support option 1. |
| Apple | Agree with option 1. |
| Xiaomi | Fine with option 1 |
| QC | Option 1. |

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

**Issue 1-5-1 Applicability on interruption:**

Proposals

* Option 1: (CATT, MTK, Apple, Xiaomi)
  + PUCCH SCell activation requirements are applied when 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
  + PUCCH SCell activation requirements are applied when 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: (Huawei)
  + There is no need to have applicability statement of interruption for PUCCH SCell activation requirements.
* Recommended WF
  + *Agree on option 1. FFS whether to capture it in the spec.*

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| **Issue 1-5-1 Applicability on interruption:** | |
| **Company** | **Comments** |
| Huawei | We support option 2.  We would like to ask the following questions regarding option 1:  If capture such statements for PUCCH SCell activation in spec, what about normal SCell activation? Are we also going to add such statement in normal SCell activation? If so, what about all other RRM requirements which don’t have such applicability rules currently? |
| Apple | Option 1, same justification as for LTE requirement. |
| Ericsson | Agree with Huawei and support option 2 |
| Xiaomi | Fine with option 1, but we also agree with HW’s comments, should RAN4 need to add such applicability for other RRM requirements? |

**Issue 1-5-2: Applicability on PDCCH order receiving:**

Proposals

* Option 1: (CATT, MTK, Apple, vivo, Intel, Huawei)
  + UE is only required to receive a PDCCH order to initiate RA procedure on the PUCCH Scell no earlier than n+THARQ + Tactivation\_time; otherwise, the longer PUCCH SCell activation time is expected.
  + A delay uncertainty for reception of PDCCH order shall be accounted for in the activation timeline. The delay uncertainty for reception of PDCCH order starts from end of n + THARQ + Tactivation\_time until reception of PDCCH order.
* Option 2: (Xiaomi)
  + The delay requirement for PUCCH SCell activation is applied provided that the UE has received a PDCCH order to initiate RA procedure on the PUCCH SCell within slot n+(THARQ+Tactivation\_time+TCSI\_Reporting)/(NR slot length), otherwise additional delay to activate the SCell is expected.
* Option 4: (Ericsson)
  + A delay uncertainty for reception of PDCCH order shall be accounted for in the activation timeline. When PDCCH order is received within Tactivation\_time, the net effect on the timeline shall be an added delay of 0. When PDCCH order is received after Tactivation\_time, the net effect shall be an added delay that represents the time from end of Tactivation\_time until reception of PDCCH order.
* Option 5: (QC)
  + 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 .
* Recommended WF
  + UE is only required to receive a PDCCH order to initiate RA procedure on the PUCCH Scell no earlier than n+THARQ + Tactivation\_time; otherwise, the longer PUCCH SCell activation time is expected.
  + A delay uncertainty for reception of PDCCH order shall be accounted for in the activation timeline. The delay uncertainty for reception of PDCCH order starts from end of n + THARQ + Tactivation\_time until reception of PDCCH order.
  + FFS whether and how to capture the delay uncertainty for reception of PDCCH order in the PUCCH Scell activation delay requirements (which can be included in issue 1-3-1).

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| **Issue 1-5-2: Applicability on PDCCH order receiving:** | |
| **Company** | **Comments** |
| Huawei | Fine with Recommended WF. |
| MediaTek | Fine with the recommended WF. |
| Apple | Agree with option 1 and recommended WF. UE is required to be ready on DL no later than n+THARQ + Tactivation\_time, but network has no idea how fast UE could complete the DL action and therefore the PDCCH transmission shall be assumed to be not earlier than n+THARQ + Tactivation\_time. |
| Ericsson | May be a clarification question.  When gNB schedules PDCCH order before the activation time, UE may receive it or may not receive it. If it does not receive it, we may not need sentence “otherwise, the longer PUCCH SCell activation time is expected.”, as UE anyway did not receive PDCCH order or know that PDCCH order is sent.  If it does receive PDCCH order, delay uncertainty for PDCCH order is not required. Our understanding is UE can only receive PDCCH order if PDCCH order is not overlapping with any RS required for SCell activation. In this case too extra delay for PUCCH SCell activation is not required.  Considering above, we still feel option 4 is reasonable. |
| Xiaomi | Fine with the recommended WF. |
| QC | In terms of wording, we support Option 5. It should not be said that ‘UE is only required to XXX no earlier than YYY”. It should be “UE shall XXXX no later than YYY”.  Regarding the second and third bullets of the recommended WF, we do not want to create more parameters. |

**Issue 1-5-3: Applicability on use cases:**

Proposals

* Option 1: (CATT, MTK, Huawei)
  + There is no needed to bundle the PUCCH Scell with single/multiple TAGs or intra-/inter band cases.
* Option 2: (Apple)
  + RAN4 to only define the PUCCH SCell activation only for the case when target PUCCH SCell and existing active serving cells belong to the different TAGs.
  + There is no need to bundle the PUCCH Scell with intra-/inter band cases.
* Recommended WF
  + *Need more discussion*

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| **Issue 1-5-3: Applicability on use cases:** | |
| **Company** | **Comments** |
| Huawei | Support option 1. |
| MediaTek | Support option 1. |
| Apple | Support option 2. RAN2 defined that the PUCCH would be released on active serving cell if *timeAlignmentTimer* expires, and then it would cause problem for UE to report CSI for being-activated SCell. If target PUCCH SCell is in pTAG with PCell, there is problematic to test invalid TA case for PUCCH SCell.  1> when a *timeAlignmentTimer* expires:  2> if the *timeAlignmentTimer* is associated with the PTAG:  3> flush all HARQ buffers for all Serving Cells;  3> notify RRC to release PUCCH for all Serving Cells, if configured;  3> notify RRC to release SRS for all Serving Cells, if configured;  3> clear any configured downlink assignments and configured uplink grants;  3> clear any PUSCH resource for semi-persistent CSI reporting;  3> consider all running *timeAlignmentTimer*s as expired;  3> maintain NTA (defined in TS 38.211 [8]) of all TAGs.  2> else if the *timeAlignmentTimer* is associated with an STAG, then for all Serving Cells belonging to this TAG:  3> flush all HARQ buffers;  3> notify RRC to release PUCCH, if configured;  3> notify RRC to release SRS, if configured;  3> clear any configured downlink assignments and configured uplink grants;  3> clear any PUSCH resource for semi-persistent CSI reporting;  3> maintain NTA (defined in TS 38.211 [8]) of this TAG. |
| Ericsson | Support option 1.  Apple mentioned procedures are for activated serving cells. Once the PUCCH SCell is activated UE behaviour is defined as mentioned by Apple. If TAT expires, existing procedures can take place and if needed gNB can further add PUCCH SCell and activate at later stage. |

### Sub-topic 1-6 UE feature list for PUCCH Scell activation/deactivation requirements

**Issue 1-6-1: The UE feature for support of RRM requirement of PUCCH SCell activation.**

Proposals

* Option 1: (Apple, Intel)

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| Index | Feature group | Components | Prerequisite feature groups | Need for the gNB to know if the feature is supported | Applicable to the capability signalling exchange between UEs (V2X WI only)”. | Consequence if the feature is not supported by the UE | Type | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Capability interpretation for mixture of FDD/TDD and/or FR1/FR2 | Note | Mandatory/Optional |
| x-1 | PUCCH SCell activation | 1) Support of RRM requirement of PUCCH SCell activation |  | Yes | N/A | Network cannot know the PUCCH SCell activation delay and corresponding interruption length for this UE. There will be performance degradation when PUCCH SCell activation is commanded. | Per UE | No | No | N/A | Functionality of PUCCH SCell activation has already been supported since R15. RRM requirement is expected to be introduced in R17. Thus, R17 UE shall meet corresponding RRM requirement. | Optional with capability signalling |

* Recommended WF
  + *Need more discussion*

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| --- | --- |
| **Issue 1-6-1: The UE feature for support of RRM requirement of PUCCH SCell activation.** | |
| **Company** | **Comments** |
| Huawei | As also commented in other thread. We prefer not to define dedicated UE capability to indicate whether UE can support certain requirement. |
| MediaTek | Same view as HW. |
| Apple | Option 1. |
| Ericsson | Same views as HW, MTK. As agreed in Rel-16, our understanding is requirements cannot be optional once the UE supports feature. |
| Xiaomi | The same view as HW. |
| QC | Share the same view as HW. |

**Issue 1-6-2: The UE feature for support of CSI reporting cross PUCCH groups.**

Proposals

* Option 1: (Apple)

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| Index | Feature group | Components | Prerequisite feature groups | Need for the gNB to know if the feature is supported | Applicable to the capability signalling exchange between UEs (V2X WI only)”. | Consequence if the feature is not supported by the UE | Type | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Capability interpretation for mixture of FDD/TDD and/or FR1/FR2 | Note | Mandatory/Optional |
| x-2 | CSI reporting cross PUCCH groups | 1) Support reporting CSI of a SCell belonging to secondary/primary PUCCH group by PUSCH or PUCCH of active serving cells belonging to primary/secondary PUCCH group |  | Yes | N/A | Network cannot know which serving cell could be used for CSI reporting of SCell belonging to secondary/primary PUCCH group. There will be performance degradation or activation failure when CSI reporting of being-activated SCell is configured during the PUCCH SCell activation. | Per UE | No | No | N/A | The capability is to indicate whether UE could support reporting CSI of a being activated SCell belonging to secondary/primary PUCCH group by PUSCH or PUCCH of active serving cells belonging to primary/secondary PUCCH group during the PUCCH SCell activation. | Optional with capability signalling |

* Recommended WF
  + *Need more discussion*

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| **Issue 1-6-2: The UE feature for support of CSI reporting cross PUCCH groups.** | |
| **Company** | **Comments** |
| Huawei | According to RAN1 LS reply, we agree that there will be a new UE capability for cross PUCCH group reporting. But from my understanding, RAN 1 is more responsible to define the details of the capability. |
| MediaTek | We would like to clarify that such cross PUCCH group CSI reporting is only used during activation or it can be used after activation? |
| Apple | Option 1. |
| Ericsson | Agree with HW |
| QC | It should be discussed/defined in a different working group. |

## Companies views’ collection for 1st round

### Open issues

### CRs/TPs comments collection

*For close-to-finalize WIs and maintenance work, comments collections can be arranged for TPs and CRs. For ongoing WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2200072 (CATT)  (draft CR for PUCCH Scell activation delay with multiple cell) | Company A |
| Company B |
|  |
| R4-2200181 (MTK)  (draft CR for PUCCH Scell deactivation delay) | Company A |
| Company B |
|  |
| R4- 2200894 (Nokia)  (draft CR for PUCCH Scell activation delay) | MediaTek: Suggest to wait for the conclusion in open issues summary. |
|  |
|  |
| R4-2201205 (Huawei)  (Draft CR on interruption of PUCCH SCell activation in 38.133) | MediaTek: Suggest to wait for the RAN1’s reply LS. |
|  |
|  |
| R4-2201383 (Ericsson)  (Draft CR on Interruption requirements to LTE serving cell in 36.133) | MediaTek: Suggest to wait for the RAN1’s reply LS. |
|  |
|  |

## Summary for 1st round

### Open issues

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic 1-1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |
| **Sub-topic 1-2** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |
| **Sub-topic 1-3** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |
| **Sub-topic 1-4** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |
| **Sub-topic 1-5** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

### CRs/TPs

## Discussion on 2nd round (if applicable)

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on … | YYY |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-2200072 | draft CR for PUCCH Scell activation delay with multiple cell | CATT |  |  |
| R4-2200181 | draft CR for PUCCH Scell deactivation delay | MTK |  |  |
| R4- 2200894 | draft CR for PUCCH Scell activation delay | Nokia |  |  |
| R4-2201205 | Draft CR on interruption of PUCCH SCell activation in 38.133 | Huawei |  |  |
| R4-2201383 | Draft CR on Interruption requirements to LTE serving cell in 36.133 | Ericsson |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

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** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |

Notes:

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

# Annex

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Note:

1. Please add your contact information in above table once you make comments on this email thread.
2. If multiple delegates from the same company make comments on single email thread, please add you name as suffix after company name when make comments i.e. Company A (XX, XX)