**3GPP TSG-RAN WG2 Meeting #131R2-250xxxx**

**﻿Bengaluru, Indian, August 25 – 29, 2025**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  | **38.321** | **CR** | **2104** | **rev** | **1**  | **Current version:** | **18.6.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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|  |
| ***Title:***  | Introduction of AI/ML for Air Interface to TS 38.321 |
|  |  |
| ***Source to WG:*** | Apple (Rapporteur) |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NR\_AIML\_Air-Core  |  | ***Date:*** | 2025-09-01 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-19 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
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| ***Reason for change:*** | Introduction of Rel-19 AI/ML for PHY to TS 38.321 |
|  |  |
| ***Summary of change:*** | Implementation of agreements of Rel-19 AI/ML for PHY. |
|  |  |
| ***Consequences if not approved:*** | Release-19 AI/ML for PHY is not supported |
|  |  |
| ***Clauses affected:*** | 5.9, 5.15.1, 5.18.6 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 38.331 CR 5437TS 38.300 CR 1006TS 38.214 CR 0672TS 38.306 CR 1321 |
| ***affected:*** |  | **X** |  Test specifications |  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications |  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | RAN2#131: initial version in R2-2505501.Revision 1: Updated based on wording suggestion received from companies. |

====================================CHAGNE BEGINS===================================

## 5.9 Activation/Deactivation of SCells

If the MAC entity is configured with one or more SCells, the network may activate and deactivate the configured SCells. Upon configuration of an SCell, the SCell is deactivated unless the parameter *sCellState* is set to *activated* for the SCell by upper layers.

The configured SCell(s) is activated and deactivated by:

- receiving the SCell Activation/Deactivation MAC CE described in clause 6.1.3.10;

- receiving the Enhanced SCell Activation/Deactivation MAC CE described in clause 6.1.3.55;

- configuring *sCellDeactivationTimer* timer per configured SCell (except the SCell configured with PUCCH, if any): the associated SCell is deactivated upon its expiry;

- configuring *sCellState* per configured SCell: if configured, the associated SCell is activated upon SCell configuration;

- receiving *scg-State*: the SCells of SCG are deactivated.

The MAC entity shall for each configured SCell:

1> if an SCell is configured with *sCellState* set to *activated* upon SCell configuration, or an SCell Activation/Deactivation MAC CE or an Enhanced SCell Activation/Deactivation MAC CE is received activating the SCell:

2> if the SCell was deactivated prior to receiving this Enhanced SCell Activation/Deactivation MAC CE and a TRS is indicated for this SCell:

3> indicate to lower layers the information regarding the TRS.

2> if the SCell was deactivated prior to receiving this SCell Activation/Deactivation MAC CE or this Enhanced SCell Activation/Deactivation MAC CE; or

2> if the SCell is configured with *sCellState* set to *activated* upon SCell configuration:

3> if *firstActiveDownlinkBWP-Id* is not set to dormant BWP:

4> activate the SCell according to the timing defined in TS 38.213 [6] for MAC CE activation and according to the timing defined in TS 38.133 [11] for direct SCell activation; i.e. apply normal SCell operation including:

5> SRS transmissions on the SCell;

5> CSI reporting for the SCell;

5> CSI logging for the SCell, if configured;

5> PDCCH monitoring on the SCell;

5> PDCCH monitoring for the SCell;

5> PUCCH transmissions on the SCell, if configured.

3> else (i.e. *firstActiveDownlinkBWP-Id* is set to dormant BWP):

4> stop the *bwp-InactivityTimer* of this Serving Cell, if running.

3> activate the DL BWP and UL BWP indicated by *firstActiveDownlinkBWP-Id* and *firstActiveUplinkBWP-Id* respectively.

2> start or restart the *sCellDeactivationTimer* associated with the SCell according to the timing defined in TS 38.213 [6] for MAC CE activation and according to the timing defined in TS 38.133 [11] for direct SCell activation;

2> if the active DL BWP is not the dormant BWP:

3> (re-)initialize any suspended configured uplink grants of configured grant Type 1 associated with this SCell according to the stored configuration, if any, and to start in the symbol according to rules in clause 5.8.2;

3> trigger PHR according to clause 5.4.6.

1> else if an SCell Activation/Deactivation MAC CE or an Enhanced SCell Activation/Deactivation MAC CE is received deactivating the SCell; or

1> if the *sCellDeactivationTimer* associated with the activated SCell expires; or

1> if the SCG associated with the activated SCell is deactivated:

2> deactivate the SCell according to the timing defined in TS 38.213 [6];

2> stop the *sCellDeactivationTimer* associated with the SCell;

2> stop the *bwp-InactivityTimer* associated with the SCell;

2> deactivate any active BWP associated with the SCell;

2> clear any configured downlink assignment and any configured uplink grant Type 2 associated with the SCell respectively;

2> clear any PUSCH resource for semi-persistent CSI reporting associated with the SCell;

2> suspend any configured uplink grant Type 1 associated with the SCell;

2> flush all HARQ buffers associated with the SCell;

2> cancel, if any, triggered consistent LBT failure for the SCell.

1> if PDCCH on the activated SCell indicates an uplink grant or downlink assignment; or

1> if PDCCH on the Serving Cell scheduling the activated SCell indicates an uplink grant or a downlink assignment for the activated SCell; or

1> if a MAC PDU is transmitted in a configured uplink grant and LBT failure indication is not received from lower layers; or

1> if a MAC PDU is received in a configured downlink assignment:

2> restart the *sCellDeactivationTimer* associated with the SCell.

1> if the SCell is deactivated:

2> not transmit SRS on the SCell;

2> not report CSI for the SCell;

2> not log CSI for the SCell;

2> not transmit on UL-SCH on the SCell;

2> not transmit on RACH on the SCell;

2> not monitor the PDCCH on the SCell;

2> not monitor the PDCCH for the SCell;

2> not transmit PUCCH on the SCell;

2> if the SCell is configured as a scheduled cell in *MC-DCI-SetOfCells* and with the search space for DCI to schedule multiple cells (as specified in TS 38.213 [6]) of the same *searchSpaceId* as the serving cell in which *MC-DCI-SetOfCells* containing the SCell is configured:

3> not monitor the PDCCH for scheduling multiple cells (as specified in TS 38.213 [6]) for the set of cells in *MC-DCI-SetOfCells* including the SCell.

When the measurement reporting for fast unknown SCell activation is configured by RRC, the MAC entity shall:

1> if SCell Activation/Deactivation MAC CE or an Enhanced SCell Activation/Deactivation MAC CE is received activating the SCell(s):

2> if SCell(s) was deactivated prior to receiving this SCell Activation/Deactivation MAC CE or this Enhanced SCell Activation/Deactivation MAC CE:

3> indicate to upper layers SCell(s) activation indication.

HARQ feedback for the MAC PDU containing SCell Activation/Deactivation MAC CE or Enhanced SCell Activation/Deactivation MAC CE shall not be impacted by PCell, PSCell and PUCCH SCell interruptions due to SCell activation/deactivation in TS 38.133 [11].

When SCell is deactivated, the ongoing Random Access procedure on the SCell, if any, is aborted.

=====================================NEXT CHANGE===================================

## 5.15 Bandwidth Part (BWP) operation

### 5.15.1 Downlink and Uplink

In addition to clause 12 of TS 38.213 [6], this clause specifies requirements on BWP operation.

A Serving Cell may be configured with one or multiple BWPs, and the maximum number of BWP per Serving Cell is specified in TS 38.213 [6].

The BWP switching for a Serving Cell is used to activate an inactive BWP and deactivate an active BWP at a time. The BWP switching is controlled by the PDCCH indicating a downlink assignment or an uplink grant, by the *bwp-InactivityTimer*, by RRC signalling, or by the MAC entity itself upon initiation of Random Access procedure or upon detection of consistent LBT failure on SpCell. Upon RRC (re-)configuration of *firstActiveDownlinkBWP-Id* and/or *firstActiveUplinkBWP-Id* for SpCell except for PSCell when SCG is deactivated (see clause 5.29) or activation of an SCell, the DL BWP and/or UL BWP indicated by *firstActiveDownlinkBWP-Id* and/or *firstActiveUplinkBWP-Id* respectively (as specified in TS 38.331 [5]) is active without receiving PDCCH indicating a downlink assignment or an uplink grant. Upon RRC (re-)configuration of *firstActiveDownlinkBWP-Id* for PSCell when SCG is deactivated, the DL BWP is switched to the *firstActiveDownlinkBWP-Id* as specified in TS 38.331 [5]. The active BWP for a Serving Cell is indicated by either RRC or PDCCH (as specified in TS 38.213 [6]). For unpaired spectrum, a DL BWP is paired with a UL BWP, and BWP switching is common for both UL and DL.

For each SCell a dormant BWP may be configured with *dormantBWP-Id* by RRC signalling as described in TS 38.331 [5]. Entering or leaving dormant BWP for SCells is done by BWP switching per SCell or per dormancy SCell group based on instruction from PDCCH (as specified in TS 38.213 [6]). The dormancy SCell group configurations are configured by RRC signalling as described in TS 38.331 [5]. Upon reception of the PDCCH indicating leaving dormant BWP, the DL BWP indicated by *firstOutsideActiveTimeBWP-Id* or by *firstWithinActiveTimeBWP-Id* (as specified in TS 38.331 [5] and TS 38.213 [6]) is activated. Upon reception of the PDCCH indicating entering dormant BWP, the DL BWP indicated by *dormantBWP-Id* (as specified in TS 38.331 [5]) is activated. The dormant BWP configuration for SpCell or PUCCH SCell is not supported.

BWP for SRS for positioning Tx frequency hopping can be configured for a Serving Cell in TS 38.331 [5]. BWP for SRS Tx frequency hopping is considered as activated when it is configured. BWP switching is not applicable for BWP for SRS Tx frequency hopping.

For each activated Serving Cell configured with a BWP, the MAC entity shall:

1> if a BWP is activated and the active DL BWP for the Serving Cell is not the dormant BWP and the Serving Cell is not the PSCell of deactivated SCG:

2> transmit on UL-SCH on the BWP;

2> transmit on RACH on the BWP, if PRACH occasions are configured;

2> monitor the PDCCH on the BWP;

2> transmit PUCCH on the BWP, if configured;

2> report CSI for the BWP;

2> log CSI for the BWP, if configured;

2> transmit SRS on the BWP, if configured;

2> receive DL-SCH on the BWP;

2> (re-)initialize any suspended configured uplink grants of configured grant Type 1 on the active BWP according to the stored configuration, if any, and to start in the symbol according to rules in clause 5.8.2;

2> if *lbt-FailureRecoveryConfig* is configured:

3> stop the *lbt-FailureDetectionTimer*, if running;

3> set *LBT\_COUNTER* to 0;

3> monitor LBT failure indications from lower layers as specified in clause 5.21.2.

1> if a BWP is activated and the active DL BWP for the Serving Cell is dormant BWP:

2> stop the *bwp-InactivityTimer* of this Serving Cell, if running.

2> not monitor the PDCCH on the BWP;

2> not monitor the PDCCH for the BWP;

2> not receive DL-SCH on the BWP;

2> not report CSI on the BWP, report CSI except aperiodic CSI for the BWP;

2> not log CSI for the BWP;

2> not transmit SRS on the BWP;

2> not transmit on UL-SCH on the BWP;

2> not transmit on RACH on the BWP;

2> not transmit PUCCH on the BWP;

2> clear any configured downlink assignment and any configured uplink grant Type 2 associated with the SCell respectively;

2> suspend any configured uplink grant Type 1 associated with the SCell;

2> if configured, perform beam failure detection and beam failure recovery for the SCell if beam failure is detected;

2> if the SCell is configured as a scheduled cell in *MC-DCI-SetOfCells* and with the search space for DCI to schedule multiple cells (as specified in TS 38.213 [6]) of the same *searchSpaceId* as the serving cell in which *MC-DCI-SetOfCells* containing the SCell is configured:

3> not monitor the PDCCH for scheduling multiple cells (as specified in TS 38.213 [6]) for the set of cells in *MC-DCI-SetOfCells* including the SCell.

1> if a BWP is deactivated or the Serving Cell is PSCell of deactivated SCG:

2> not transmit on UL-SCH on the BWP;

2> not transmit on RACH on the BWP;

2> not monitor the PDCCH on the BWP;

2> not transmit PUCCH on the BWP;

2> not report CSI for the BWP;

2> not log CSI for the BWP;

2> not transmit SRS on the BWP;

2> not receive DL-SCH on the BWP;

2> clear any configured downlink assignment and configured uplink grant of configured grant Type 2 on the BWP;

2> suspend any configured uplink grant of configured grant Type 1 on the inactive BWP.

Upon initiation of the Random Access procedure on a Serving Cell, after the selection of carrier for performing Random Access procedure as specified in clause 5.1.1, the MAC entity shall for the selected carrier of this Serving Cell:

1> if PRACH occasions are not configured for the active UL BWP:

2> if the UE is an (e)RedCap UE; and

2> if *initialUplinkBWP-RedCap* is configured:

3> switch the active UL BWP to BWP indicated by *initialUplinkBWP-RedCap*.

2> else:

3> switch the active UL BWP to BWP indicated by *initialUplinkBWP*.

2> if the Serving Cell is an SpCell:

3> if the UE is an (e)RedCap UE; and

3> if *initialDownlinkBWP-RedCap* is configured:

4> switch the active DL BWP to BWP indicated by *initialDownlinkBWP-RedCap*.

3> else:

4> switch the active DL BWP to BWP indicated by *initialDownlinkBWP*.

1> else:

2> if the Serving Cell is an SpCell:

3> if the active DL BWP does not have the same *bwp-Id* as the active UL BWP:

4> switch the active DL BWP to the DL BWP with the same *bwp-Id* as the active UL BWP.

1> stop the *bwp-InactivityTimer* associated with the active DL BWP of this Serving Cell, if running.

1> if the Serving Cell is SCell:

2> stop the *bwp-InactivityTimer* associated with the active DL BWP of SpCell, if running.

1> perform the Random Access procedure on the active DL BWP of SpCell and active UL BWP of this Serving Cell.

If the MAC entity receives a PDCCH for BWP switching of a Serving Cell, the MAC entity shall:

1> if there is no ongoing Random Access procedure associated with this Serving Cell; or

1> if the ongoing Random Access procedure associated with this Serving Cell is successfully completed upon reception of this PDCCH addressed to C-RNTI (as specified in clauses 5.1.4, 5.1.4a, and 5.1.5):

2> cancel, if any, triggered consistent LBT failure for this Serving Cell;

2> perform BWP switching to a BWP indicated by the PDCCH.

If the MAC entity receives a PDCCH for BWP switching for a Serving Cell(s) or a dormancy SCell group(s) while a Random Access procedure associated with that Serving Cell is ongoing in the MAC entity, it is up to UE implementation whether to switch BWP or ignore the PDCCH for BWP switching, except for the PDCCH reception for BWP switching addressed to the C-RNTI for successful Random Access procedure completion (as specified in clauses 5.1.4, 5.1.4a, and 5.1.5) in which case the UE shall perform BWP switching to a BWP indicated by the PDCCH. Upon reception of the PDCCH for BWP switching other than successful contention resolution, if the MAC entity decides to perform BWP switching, the MAC entity shall stop the ongoing Random Access procedure and initiate a Random Access procedure after performing the BWP switching; if the MAC decides to ignore the PDCCH for BWP switching, the MAC entity shall continue with the ongoing Random Access procedure on the Serving Cell.

Upon reception of RRC (re-)configuration for BWP switching for a Serving Cell while a Random Access procedure associated with that Serving Cell is ongoing in the MAC entity, the MAC entity shall stop the ongoing Random Access procedure and initiate a Random Access procedure after performing the BWP switching.

Upon reception of RRC (re-)configuration for BWP switching for a Serving Cell, cancel any triggered consistent LBT failure in this Serving Cell.

The MAC entity shall for each activated Serving Cell configured with *bwp-InactivityTimer*:

1> if the *defaultDownlinkBWP-Id* is configured, and the active DL BWP is not the BWP indicated by the *defaultDownlinkBWP-Id*, and the active DL BWP is not the BWP indicated by the *dormantBWP-Id* if configured; or

1> if the UE is neither a RedCap nor an eRedCap UE, and if the *defaultDownlinkBWP-Id* is not configured, and the active DL BWP is not the *initialDownlinkBWP*, and the active DL BWP is not the BWP indicated by the *dormantBWP-Id* if configured; or

1> if the UE is an (e)RedCap UE, and if the *defaultDownlinkBWP-Id* is not configured, and *initialDownlinkBWP-RedCap* is not configured, and the active DL BWP is not the *initialDownlinkBWP*; or

1> if the UE is an (e)RedCap UE, and if the *defaultDownlinkBWP-Id* is not configured, and *initialDownlinkBWP-RedCap* is configured, and the active DL BWP is not the *initialDownlinkBWP-RedCap*:

2> if a PDCCH addressed to C-RNTI or CS-RNTI indicating downlink assignment or uplink grant is received on the active BWP; or

2> if a PDCCH addressed to G-RNTI or G-CS-RNTI configured for multicast indicating downlink assignment is received on the active BWP; or

2> if a PDCCH addressed to C-RNTI or CS-RNTI indicating downlink assignment or uplink grant is received for the active BWP; or

2> if a MAC PDU is transmitted in a configured uplink grant and LBT failure indication is not received from lower layers; or

2> if a MAC PDU is received in a configured downlink assignment for unicast or MBS multicast:

3> if there is no ongoing Random Access procedure associated with this Serving Cell; or

3> if the ongoing Random Access procedure associated with this Serving Cell is successfully completed upon reception of this PDCCH addressed to C-RNTI (as specified in clauses 5.1.4, 5.1.4a and 5.1.5):

4> start or restart the *bwp-InactivityTimer* associated with the active DL BWP.

2> if the *bwp-InactivityTimer* associated with the active DL BWP expires:

3> if the *defaultDownlinkBWP-Id* is configured:

4> perform BWP switching to a BWP indicated by the *defaultDownlinkBWP-Id*.

3> else:

4> if the UE is a (e)RedCap UE; and

4> if *initialDownlinkBWP-RedCap* is configured:

5> perform BWP switching to the *initialDownlinkBWP-RedCap*.

4> else:

5> perform BWP switching to the *initialDownlinkBWP*.

NOTE: If a Random Access procedure is initiated on an SCell, both this SCell and the SpCell are associated with this Random Access procedure.

1> if a PDCCH for BWP switching is received, and the MAC entity switches the active DL BWP:

2> if the *defaultDownlinkBWP-Id* is configured, and the MAC entity switches to the DL BWP which is not indicated by the *defaultDownlinkBWP-Id* and is not indicated by the *dormantBWP-Id* if configured; or

2> if the UE is neither a RedCap nor an eRedCap UE, and if the *defaultDownlinkBWP-Id* is not configured, and the MAC entity switches to the DL BWP which is not the *initialDownlinkBWP* and is not indicated by the *dormantBWP-Id* if configured; or

2> if the UE is an (e)RedCap UE, and if the *defaultDownlinkBWP-Id* is not configured, and *initialDownlinkBWP-RedCap* is not configured, and the MAC entity switches to the DL BWP which is not the *initialDownlinkBWP*; or

2> if the UE is an (e)RedCap UE, and if the *defaultDownlinkBWP-Id* is not configured, and *initialDownlinkBWP-RedCap* is configured, and the MAC entity switches to the DL BWP which is not the *initialDownlinkBWP-RedCap*:

3> start or restart the *bwp-InactivityTimer* associated with the active DL BWP.

Upon initiation of the Random Access procedure, after selection of the carrier for performing Random Access procedure as specified in clause 5.1.1, if the UE is an (e)RedCap UE in RRC\_IDLE or RRC\_INACTIVE mode, the MAC entity shall:

1> if *initialUplinkBWP-RedCap* is configured for the selected carrier:

2> perform the Random Access procedure as specified in clause 5.1 by using the BWP configured by *initialUplinkBWP-RedCap*.

1> else:

2> perform the Random Access procedure as specified in clause 5.1 by using the BWP configured by *initialUplinkBWP*.

1> if *initialDownlinkBWP-RedCap* is configured:

2> if the Random Access procedure was initiated for SI request (as specified in TS 38.331 [5]) and the Random Access Resources for SI request have been explicitly provided by RRC, and if the selected carrier is SUL carrier:

3> monitor the PDCCH on the BWP configured by *initialDownlinkBWP*.

2> else:

3> monitor the PDCCH on the BWP configured by *initialDownlinkBWP-RedCap*.

1> else:

2> monitor the PDCCH on the BWP configured by *initialDownlinkBWP*.

=====================================NEXT CHANGE===================================

### 5.18.6 Activation/Deactivation of Semi-persistent CSI reporting on PUCCH

The network may activate and deactivate the configured Semi-persistent CSI reporting on PUCCH of a Serving Cell by sending the SP CSI reporting on PUCCH Activation/Deactivation MAC CE described in clause 6.1.3.16 or the Enhanced SP CSI reporting on PUCCH Activation/Deactivation MAC CE described in clause 6.1.3.80. For each Semi-persistent CSI reporting on PUCCH configuration configured with measurement prediction, the network may activate and deactivate it by sending the SP CSI reporting on PUCCH Activation/Deactivation MAC CE, considering the applicability reported from UE as specified in TS38.331 [5]. The network may activate and deactivate at least one of the configured sub-configuration of a configured Semi-Persistent CSI reporting on PUCCH of a Serving Cell by sending the Enhanced SP CSI reporting on PUCCH Activation/Deactivation MAC CE described in clause 6.1.3.80. For each Semi-persistent CSI reporting on PUCCH configuration configured with *csi-ReportSubConfigToAddModList*, the network may deactivate all configured sub-configurations by sending the SP CSI reporting on PUCCH Activation/Deactivation MAC CE. The configured Semi-persistent CSI reporting on PUCCH is initially deactivated upon (re-)configuration by upper layers and after reconfiguration with sync.

The MAC entity shall:

1> if the MAC entity receives an SP CSI reporting on PUCCH Activation/Deactivation MAC CE or an Enhanced SP CSI reporting on PUCCH Activation/Deactivation MAC CE on a Serving Cell:

2> indicate to lower layers the information regarding the SP CSI reporting on PUCCH Activation/Deactivation MAC CE or the Enhanced SP CSI reporting on PUCCH Activation/Deactivation MAC CE.

===============================CHANGE ENDS=========================================