3GPP TSG-RAN WG2 Meeting #129bis R2-250xxxx

Wuhan, China, April 7th – 11th, 2025

**Agenda item:** 8.9.3

**Source:** MediaTek Inc.

**Title:** Report of [Post129][307][R19 IoT NTN] CB-msg3/CB-msg4 (Mediatek)

**Document for:**  Discussion and decision

# Introduction

This is the report of the following offline discussion from RAN2#129:

* **[Post129][307][R19 IoT NTN] CB-msg3/CB-msg4 (Mediatek)**

 Scope: discuss CB-msg3 resource configuration parameters and CB-msg4 monitoring window and RNTI design

 Intended outcome: summary of the email discussion

Deadline: long

The deadline for long email discussion is March 21st 10:00 UTC.

# Contact Points

Respondents to the email discussion are kindly asked to fill in the following table.

|  |  |  |
| --- | --- | --- |
| Company | Name | Email Address |
| MediaTek (Rapp) | Felix Tsai | chun-fan.tsai@mediatek.com |
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# Discussion

## CB-Msg3 resource configuration parameters

Regarding the CB-Msg3 resource configuration, the following agreements have been reached during the RAN2#129 meeting.

RAN2 #129 Agreements:

1. RAN2 assumes that at least the following will be part of the shared resources configuration for CB-msg3 (FFS on other aspects)

 - Time domain resources for (N)PUSCH occasions: periodicity and start time (e.g., start subframe, start SFN)

 - Frequency domain resources for (N)PUSCH occasions

 - repetition number

 - (N)PDCCH resource

 - MCS

2. For CB-msg3 transmission, for eMTC NTN, up to three separate RSRP thresholds (on top of the minimum RSRP threshold and possibly different from the thresholds for PRACH) can be supported for achieving at most 4 CE levels; for NB-IoT NTN, up to two separate RSRP thresholds (on top of the minimum RSRP threshold possibly different from the thresholds for PRACH) can be supported for achieving at most 3 repetition levels.

3. The CB EDT Config has one minimum RSRP threshold (as agreed in RAN2#128) to use CB EDT.

4. The CB EDT Config has two RSRP thresholds for NB-IoT for the three CE levels.

5. CB EDT Config has three RSRP thresholds for eMTC for the four CE levels.

6. As Signalling design Baseline RAN2 assumes the PUR config and the NPRACH config for shared (N)PUSCH config can be used and some of the parameters can be included in a new CB EDT config.

7. RAN2 consider a new CBEDT-ConfigSIB-NB IE for configuring the CB EDT feature

Working assumption:

1. For CB-MSG3, the Transmission window is configured by the network with a starting point (e.g. H-SFN offset), a window length, and a window periodicity (window length and periodicity could be the same). For k=1 the window length can be equal to 1: same behaviour as today

TP for CB-Msg3 resource parameters for both eMTC and NB-IoT are provided in next two sessions. The TP is based on current agreements and mainly reuse from **PRACH** and **PUR configuration** parameters. In the TP, the IEs that are introduced based on RAN2 agreement or work assumption are marked with green; the IEs copied from PUR configuration are marked with yellow; the IEs copied from PRACH configuration are marked with cyan. The current PRACH and PUR parameters are also copied for reference.

### eMTC

#### – *PUR-Config*

The IE *PUR-Config* is used to specify the PUR configuration.

*PUR-Config* information element

-- ASN1START

PUR-Config-r16 ::= SEQUENCE {

 pur-ConfigID-r16 PUR-ConfigID-r16 OPTIONAL, -- Need OR

 pur-ImplicitReleaseAfter-r16 ENUMERATED {n2, n4, n8, spare} OPTIONAL, -- Need OR

 pur-StartTimeParameters-r16 SEQUENCE {

 periodicityAndOffset-r16 PUR-PeriodicityAndOffset-r16,

 startSFN-r16 INTEGER (0..1023),

 startSubFrame-r16 INTEGER (0..9),

 hsfn-LSB-Info-r16 BIT STRING (SIZE(1))

 } OPTIONAL, --Need ON

 pur-NumOccasions-r16 ENUMERATED {one, infinite},

 pur-RNTI-r16 C-RNTI OPTIONAL, -- Need ON

 pur-TimeAlignmentTimer-r16 INTEGER (1..8) OPTIONAL, -- Need OR

 pur-RSRP-ChangeThreshold-r16 SetupRelease {PUR-RSRP-ChangeThreshold-r16} OPTIONAL, -- Need ON

 pur-ResponseWindowTimer-r16 ENUMERATED {sf240, sf480, sf960, sf1920, sf3840, sf5760, sf7680, sf10240} OPTIONAL, -- Need ON

 pur-MPDCCH-Config-r16 PUR-MPDCCH-Config-r16 OPTIONAL, -- Need ON

 pur-PDSCH-FreqHopping-r16 BOOLEAN,

 pur-PUCCH-Config-r16 PUR-PUCCH-Config-r16 OPTIONAL, -- Need ON

 pur-PUSCH-Config-r16 PUR-PUSCH-Config-r16 OPTIONAL, -- Need ON

 ...,

 [[ pur-PDSCH-maxTBS-r17 BOOLEAN OPTIONAL -- Need ON

 ]]

}

PUR-MPDCCH-Config-r16 ::= SEQUENCE {

 mpdcch-FreqHopping-r16 BOOLEAN,

 mpdcch-Narrowband-r16 INTEGER (1..maxAvailNarrowBands-r13),

 mpdcch-PRB-PairsConfig-r16 SEQUENCE{

 numberPRB-Pairs-r16 ENUMERATED {n2, n4, n6, spare1},

 resourceBlockAssignment-r16 BIT STRING (SIZE(4))

 },

 mpdcch-NumRepetition-r16 ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128, r256},

 mpdcch-StartSF-UESS-r16 CHOICE {

 fdd ENUMERATED {v1, v1dot5, v2, v2dot5, v4, v5, v8, v10},

 tdd ENUMERATED {v1, v2, v4, v5, v8, v10, v20, spare1}

 },

 mpdcch-Offset-PUR-SS-r16 ENUMERATED {zero, oneEighth, oneQuarter,

 threeEighth, oneHalf, fiveEighth,

 threeQuarter, sevenEighth}

}

PUR-PUCCH-Config-r16 ::= SEQUENCE {

 n1PUCCH-AN-r16 INTEGER (0..2047) OPTIONAL, -- Need ON

 pucch-NumRepetitionCE-Format1-r16 ENUMERATED {n1, n2, n4, n8} OPTIONAL -- Need ON

}

PUR-PUSCH-Config-r16 ::= SEQUENCE {

 pur-GrantInfo-r16 CHOICE {

 ce-ModeA SEQUENCE {

 numRUs-r16 BIT STRING (SIZE(2)),

 prb-AllocationInfo-r16 BIT STRING (SIZE(10)),

 mcs-r16 BIT STRING (SIZE(4)),

 numRepetitions-r16 BIT STRING (SIZE(3))

 },

 ce-ModeB SEQUENCE {

 subPRB-Allocation-r16 BOOLEAN,

 numRUs-r16 BOOLEAN,

 prb-AllocationInfo-r16 BIT STRING (SIZE(8)),

 mcs-r16 BIT STRING (SIZE(4)),

 numRepetitions-r16 BIT STRING (SIZE(3))

 }

 } OPTIONAL, -- Need ON

 pur-PUSCH-FreqHopping-r16 BOOLEAN,

 p0-UE-PUSCH-r16 INTEGER (-8..7),

 alpha-r16 Alpha-r12,

 pusch-CyclicShift-r16 ENUMERATED {n0, n6},

 pusch-NB-MaxTBS-r16 BOOLEAN,

 locationCE-ModeB-r16 INTEGER (0..5) OPTIONAL -- Cond SubPRB

}

PUR-RSRP-ChangeThreshold-r16 ::= SEQUENCE {

 increaseThresh-r16 RSRP-ChangeThresh-r16,

 decreaseThresh-r16 RSRP-ChangeThresh-r16 OPTIONAL --Need OP

}

RSRP-ChangeThresh-r16 ::= ENUMERATED {dB4, dB6, dB8, dB10, dB14, dB18, dB22, dB26, dB30, dB34, spare6, spare5, spare4, spare3, spare2, spare1}

-- ASN1STOP

#### – *PRACH-Config*

The IE *PRACH-ConfigSIB* and IE *PRACH-Config* are used to specify the PRACH configuration in the system information and in the mobility control information, respectively.

*PRACH-Config* information elements

-- ASN1START

PRACH-ConfigSIB ::= SEQUENCE {

 rootSequenceIndex INTEGER (0..837),

 prach-ConfigInfo PRACH-ConfigInfo

}

PRACH-ConfigSIB-v1310 ::= SEQUENCE {

 rsrp-ThresholdsPrachInfoList-r13 RSRP-ThresholdsPrachInfoList-r13,

 mpdcch-startSF-CSS-RA-r13 CHOICE {

 fdd-r13 ENUMERATED {v1, v1dot5, v2, v2dot5, v4, v5, v8,

 v10},

 tdd-r13 ENUMERATED {v1, v2, v4, v5, v8, v10, v20, spare}

 } OPTIONAL, -- Cond MP

 prach-HoppingOffset-r13 INTEGER (0..94) OPTIONAL, -- Need OR

 prach-ParametersListCE-r13 PRACH-ParametersListCE-r13

}

PRACH-ConfigSIB-v1530 ::= SEQUENCE {

 edt-PRACH-ParametersListCE-r15 SEQUENCE (SIZE(1..maxCE-Level-r13)) OF EDT-PRACH-ParametersCE-r15

}

PRACH-Config ::= SEQUENCE {

 rootSequenceIndex INTEGER (0..837),

 prach-ConfigInfo PRACH-ConfigInfo OPTIONAL -- Need ON

}

PRACH-Config-v1310 ::= SEQUENCE {

 rsrp-ThresholdsPrachInfoList-r13 RSRP-ThresholdsPrachInfoList-r13 OPTIONAL, -- Cond MP

 mpdcch-startSF-CSS-RA-r13 CHOICE {

 fdd-r13 ENUMERATED {v1, v1dot5, v2, v2dot5, v4, v5, v8,

 v10},

 tdd-r13 ENUMERATED {v1, v2, v4, v5, v8, v10, v20, spare}

 } OPTIONAL, -- Cond MP

 prach-HoppingOffset-r13 INTEGER (0..94) OPTIONAL, -- Need OR

 prach-ParametersListCE-r13 PRACH-ParametersListCE-r13 OPTIONAL, -- Cond MP

 initial-CE-level-r13 INTEGER (0..3) OPTIONAL -- Need OR

}

PRACH-Config-v1430 ::= SEQUENCE {

 rootSequenceIndexHighSpeed-r14 INTEGER (0..837),

 zeroCorrelationZoneConfigHighSpeed-r14 INTEGER (0..12),

 prach-ConfigIndexHighSpeed-r14 INTEGER (0..63),

 prach-FreqOffsetHighSpeed-r14 INTEGER (0..94)

}

PRACH-ConfigSCell-r10 ::= SEQUENCE {

 prach-ConfigIndex-r10 INTEGER (0..63)

}

PRACH-ConfigInfo ::= SEQUENCE {

 prach-ConfigIndex INTEGER (0..63),

 highSpeedFlag BOOLEAN,

 zeroCorrelationZoneConfig INTEGER (0..15),

 prach-FreqOffset INTEGER (0..94)

}

PRACH-ParametersListCE-r13 ::= SEQUENCE (SIZE(1..maxCE-Level-r13)) OF PRACH-ParametersCE-r13

PRACH-ParametersCE-r13 ::= SEQUENCE {

 prach-ConfigIndex-r13 INTEGER (0..63),

 prach-FreqOffset-r13 INTEGER (0..94),

 prach-StartingSubframe-r13 ENUMERATED {sf2, sf4, sf8, sf16, sf32, sf64, sf128,

 sf256} OPTIONAL, -- Need OP

 maxNumPreambleAttemptCE-r13

 ENUMERATED {n3, n4, n5, n6, n7, n8, n10} OPTIONAL, -- Need OP

 numRepetitionPerPreambleAttempt-r13 ENUMERATED {n1,n2,n4,n8,n16,n32,n64,n128},

 mpdcch-NarrowbandsToMonitor-r13 SEQUENCE (SIZE(1..2)) OF

 INTEGER (1..maxAvailNarrowBands-r13),

 mpdcch-NumRepetition-RA-r13 ENUMERATED {r1, r2, r4, r8, r16,

 r32, r64, r128, r256},

 prach-HoppingConfig-r13 ENUMERATED {on,off}

}

EDT-PRACH-ParametersCE-r15 ::= SEQUENCE {

 edt-PRACH-ParametersCE-r15 SEQUENCE {

 prach-ConfigIndex-r15 INTEGER (0..63),

 prach-FreqOffset-r15 INTEGER (0..94),

 prach-StartingSubframe-r15 ENUMERATED {sf2, sf4, sf8, sf16, sf32, sf64, sf128, sf256} OPTIONAL, -- Need OP

 mpdcch-NarrowbandsToMonitor-r15 SEQUENCE (SIZE(1..2)) OF INTEGER (1..maxAvailNarrowBands-r13)

 } OPTIONAL -- Need OR

}

RSRP-ThresholdsPrachInfoList-r13 ::= SEQUENCE (SIZE(1..3)) OF RSRP-Range

PRACH-TxDuration-r17::= SEQUENCE {

 prach-TxDuration-r17 ENUMERATED {n1, n2, n4, n8, n16, n32, n64, n128}

}

-- ASN1STOP

Here is the TP for eMTC CB-Msg3 configuration parameters.

#### – CB-Msg3*-ConfigSIB*

The IE *CB-Msg3-Config* is used to specify the CB-Msg3 configuration.

*CB-Msg3-ConfigSIB* information element

-- ASN1START

CB-Msg3-ConfigSIB-r19 ::= SEQUENCE {

 cb-Msg3-MinRSRP-Threshold-r19 NRSRP-Range OPTIONAL, --Need OR

 cb-Msg3-RSRP-ThresholdList-r19 CB-Msg3-RSRP-ThresholdList-r19 OPTIONAL, --Need OP

 cb-Msg3-ParametersList-r19 CB-Msg3-ParametersList-r19,

 cb-Msg3-ResponseWindowTimer-r19 ENUMERATED {FFS},

}

CB-Msg3-ParametersList-r19 ::= SEQUENCE (SIZE (1.. maxCB-Msg3-Resources-r19)) OF

 CB-Msg3-Parameters-r19

CB-Msg3-Parameters-r19 ::= SEQUENCE {

 cb-Msg3-NumReplicas INTEGER(1..4),

 cb-Msg3-DSATransmissionWindow-r19 SEQUENCE {

 startSFN-19 INTEGER (0.. 1023),

 windowSize-19 ENUMERATED {FFS},

 windowPeriodicity-r19 ENUMERATED {FFS}

 } OPTIONAL, --Need OP

 cb-Msg3-StartTimeParameters-r19 SEQUENCE {

 pusch-periodicity-r19 ENUMERATED {FFS},

 pusch-startTime-r19 INTEGER (0..1023),

 pusch-startSubframe-r19 INTEGER (0..9)

 }

 cb-Msg3-MPDCCH-Config-r19 CB-Msg3-MPDCCH-Config-r19,

 cb-Msg3-PUCCH-Config-r19 CB-Msg3-PUCCH-Config-r19,

 cb-Msg3-PUSCH-Config-r19 CB-Msg3-PUSCH-Config-r19,

 cb-Msg3-PDSCH-Config-r19 CB-Msg3-PDSCH-Config-r19,

 cb-Msg3-TBS-r19 ENUMERATED {FFS},

 ...

}

CB-MSG3-MPDCCH-Config-r19 ::= SEQUENCE {

 mpdcch-FreqHopping-r19 BOOLEAN,

 mpdcch-Narrowband-r19 INTEGER (1..maxAvailNarrowBands-r13),

 mpdcch-PRB-PairsConfig-r19 SEQUENCE{

 numberPRB-Pairs-r19 ENUMERATED {n2, n4, n6, spare1},

 resourceBlockAssignment-r19 BIT STRING (SIZE(4))

 },

 mpdcch-NumRepetition-r19 ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128, r256},

 mpdcch-StartSF-UESS-r19 ENUMERATED {v1, v1dot5, v2, v2dot5, v4, v5, v8, v10},

 mpdcch-Offset-SS-r19 ENUMERATED {zero, oneEighth, oneQuarter,

 threeEighth, oneHalf, fiveEighth,

 threeQuarter, sevenEighth}

}

CB-Msg3-PUCCH-Config-r19 ::= SEQUENCE {

 n1PUCCH-AN-r19 INTEGER (0..2047), OPTIONAL, -- Need ON

 pucch-NumRepetitionCE-Format1-r19 ENUMERATED {n1, n2, n4, n8} OPTIONAL -- Need ON

}

CB-Msg3-PUSCH-Config-r19 ::= SEQUENCE {

 numRUs-r19 BIT STRING (SIZE(2)),

 prb-AllocationInfo-r19 BIT STRING (SIZE(10)),

 mcs-r19 BIT STRING (SIZE(4)),

 numRepetitions-r19 BIT STRING (SIZE(3))

 PUSCH-FreqHopping-r19 BOOLEAN,

 p0-UE-PUSCH-r19 INTEGER (-8..7),

 alpha-r19 Alpha-r12

}

CB-Msg3-PDSCH-Config-r19 ::= SEQUENCE {

 cb-Msg3-PDSCH-FreqHopping-r19 BOOLEAN,

 cb-Msg3-PDSCH-maxTBS-r19 BOOLEAN

}

CB-Msg3-RSRP-ThresholdList-r19 ::= SEQUENCE (SIZE (1..3)) OF RSRP-Range

maxCB-Msg3-Resources-r19 INTEGER ::= 4 -- Maximum number of CB-Msg3 resources

-- ASN1STOP

Notes

* CB-Msg3-ConfigSIB: This IE is assumed to be in **SIB2**.
* cb-Msg3-MinRSRP-Threshold-r19: It is assumed as an optional IE. If it is absent, no minimal threshold is used.
* cb-Msg3-RSRP-ThresholdList-r19: It is assumed as an optional IE. If this IE is absent, the thresholds list of PRACH is used.
* cb-Msg3-DSATransmissionWindow-r19: It is assumed as an optional IE. If the number of the replicas is one, the DSA transmission window is not needed.
	+ startSFN-19 in cb-Msg3-DSATransmissionWindow-r19: Although the term *H-SFN offset* is used in the agreement, the rapporteur believes it should be a SFN offset during the H-SFN duration.
	+ *hsfn-LSB-Info-r16* in PUR-Config: This IE is not used as the periodicity of CB-Msg3 resource is assumed shorted than a H-SFN duration (i.e., 10.24s).
* CB-MSG3-MPDCCH-Config-r19:
	+ mpdcch-StartSF-UESS-r19: The configuration for TDD is not used, as only FDD eMTC is supported for IoT NTN.
	+ Other parameters in are copied from IE *PUR-MPDCCH-Config-r16*.
* CB-Msg3-PUSCH-Config-r19:
	+ According to the RAN1 reply LS [R1-2407548](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_118/Docs/R1-2407548.zip) on TA validation, only CE mode A is confirmed. **Whether the CE mode B is supported is still FFS**. Therefore, only the PUSCH configuration for only CE mode A is introduced for now.
	+ *pusch-CyclicShift-r16*: This parameter is not used because this parameter is specified for PUR only.
	+ *pusch-NB-MaxTBS-r16*: This parameter is not used as a maximum TBS is provided.
	+ *locationCE-ModeB-r16*: This parameter is not used as support of CE mode B is FFS.
* CB-Msg3-PDSCH-Config-r19
	+ Two fields copied from *PUR-PUCCH-Config-r16*. ~~Note it is assumed that the fields are mandatory as there is no dedicated configuration from connected mode in CB-MSG3 procedure~~.
* cb-Msg3-TBS-r19: Whether the maximum TBS is CE level specific is FFS. Rapporteur assumes it is CE level specific.

Companies are invited to provide comments on the above TP including but not limited to below discussion points.

* Which SIB should be used for IE CB-Msg3*-ConfigSIB* ?
* Any parameter is missing in the TP and why this should be added?
* Any parameter should be removed from the TP?
* Most value range of the parameters are copied from PUR parameters, any further change needed?

**Q1: Any comments on the TP of *CB-Msg3-ConfigSIB?***

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| **Company** | **Comments** |
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### NB-IoT part

#### – *PUR-Config-NB*

The IE *PUR-Config-NB* is used to specify PUR configuration.

*PUR-Config-NB* information element

-- ASN1START

PUR-Config-NB-r16 ::= SEQUENCE {

 pur-ConfigID-r16 PUR-ConfigID-NB-r16 OPTIONAL, --Need OR

 pur-TimeAlignmentTimer-r16 INTEGER (1..8) OPTIONAL, --Need OR

 pur-NRSRP-ChangeThreshold-r16 SetupRelease {PUR-NRSRP-ChangeThreshold-NB-r16}

 OPTIONAL, --Need ON

 pur-ImplicitReleaseAfter-r16 ENUMERATED {n2, n4, n8, spare} OPTIONAL, --Need OR

 pur-RNTI-r16 C-RNTI OPTIONAL, --Need ON

 pur-ResponseWindowTimer-r16 ENUMERATED {pp1, pp2, pp3, pp4, pp8, pp16, pp32, pp64}

 OPTIONAL, --Need ON

 pur-StartTimeParameters-r16 SEQUENCE {

 periodicityAndOffset-r16 PUR-PeriodicityAndOffset-NB-r16,

 startSFN-r16 INTEGER (0..1023),

 startSubframe-r16 INTEGER (0..9),

 hsfn-LSB-Info-r16 BIT STRING (SIZE(1))

 } OPTIONAL, --Need ON

 pur-NumOccasions-r16 ENUMERATED {one, infinite},

 pur-PhysicalConfig-r16 SEQUENCE {

 carrierConfig-r16 CarrierConfigDedicated-NB-r13,

 npusch-NumRUsIndex-r16 INTEGER (0..7),

 npusch-NumRepetitionsIndex-r16 INTEGER (0..7),

 npusch-SubCarrierSetIndex-r16 CHOICE {

 khz15 INTEGER (0..18),

 khz3dot75 INTEGER (0..47)

 },

 npusch-MCS-r16 CHOICE {

 singleTone INTEGER (0..10),

 multiTone INTEGER (0..13)

 },

 p0-UE-NPUSCH-r16 INTEGER (-8..7),

 alpha-r16 ENUMERATED {al0, al04, al05, al06,

 al07, al08, al09, al1},

 npusch-CyclicShift-r16 ENUMERATED {n0, n6},

 npdcch-Config-r16 NPDCCH-ConfigDedicated-NB-r13

 } OPTIONAL, -- Need ON

 ...,

 [[

 pur-PhysicalConfig-v1650 SEQUENCE {

 ack-NACK-NumRepetitions-r16 ACK-NACK-NumRepetitions-NB-r13

 } OPTIONAL --Need ON

 ]],

 [[

 pur-PhysicalConfig-v1700 SEQUENCE {

 pur-UL-16QAM-Config-r17 SetupRelease {PUR-UL-16QAM-Config-NB-r17} OPTIONAL, -- Need ON

 pur-DL-16QAM-Config-r17 SetupRelease {NPDSCH-16QAM-Config-NB-r17} OPTIONAL -- Need ON

 } OPTIONAL -- Need ON

 ]]

}

PUR-NRSRP-ChangeThreshold-NB-r16 ::= SEQUENCE {

 increaseThresh-r16 NRSRP-ChangeThresh-NB-r16,

 decreaseThresh-r16 NRSRP-ChangeThresh-NB-r16 OPTIONAL --Need OP

}

PUR-UL-16QAM-Config-NB-r17 ::= SEQUENCE {

 uplinkPowerControlDedicated-r17 UplinkPowerControlDedicated-NB-v1700

}

NRSRP-ChangeThresh-NB-r16 ::= ENUMERATED {dB4, dB6, dB8, dB10, dB14, dB18, dB22, dB26, dB30, dB34, spare6, spare5, spare4, spare3, spare2, spare1}

-- ASN1STOP

#### – *NPRACH-ConfigSIB-NB*

The IE *NPRACH-ConfigSIB-NB* is used to specify the NPRACH configuration for the anchor and non-anchor carriers.

*NPRACH-ConfigSIB-NB* information elements

-- ASN1START

NPRACH-ConfigSIB-NB-r13 ::= SEQUENCE {

 nprach-CP-Length-r13 ENUMERATED {us66dot7, us266dot7},

 rsrp-ThresholdsPrachInfoList-r13 RSRP-ThresholdsNPRACH-InfoList-NB-r13 OPTIONAL, -- Need OR

 nprach-ParametersList-r13 NPRACH-ParametersList-NB-r13

}

NPRACH-ConfigSIB-NB-v1330 ::= SEQUENCE {

 nprach-ParametersList-v1330 NPRACH-ParametersList-NB-v1330

}

NPRACH-ConfigSIB-NB-v1450 ::= SEQUENCE {

 maxNumPreambleAttemptCE-r14 ENUMERATED {n3, n4, n5, n6, n7, n8, n10, spare1}

}

NPRACH-ConfigSIB-NB-v1530 ::= SEQUENCE {

 tdd-Parameters-r15 SEQUENCE {

 nprach-PreambleFormat-r15 ENUMERATED {

 fmt0, fmt1, fmt2, fmt0-a, fmt1-a},

 dummy ENUMERATED {

 n1, n2, n4, n8, n16, n32, n64, n128,

 n256, n512, n1024},

 nprach-ParametersListTDD-r15 NPRACH-ParametersListTDD-NB-r15

 } OPTIONAL, -- Cond TDD

 fmt2-Parameters-r15 SEQUENCE {

 nprach-ParametersListFmt2-r15 NPRACH-ParametersListFmt2-NB-r15 OPTIONAL, -- Need OR

 nprach-ParametersListFmt2EDT-r15 NPRACH-ParametersListFmt2-NB-r15 OPTIONAL -- Cond EDT2

 } OPTIONAL, -- Need OR

 edt-Parameters-r15 SEQUENCE {

 edt-SmallTBS-Subset-r15 ENUMERATED {true} OPTIONAL, -- Need OR

 edt-TBS-InfoList-r15 EDT-TBS-InfoList-NB-r15,

 nprach-ParametersListEDT-r15 NPRACH-ParametersList-NB-r14 OPTIONAL -- Need OR

 } OPTIONAL -- Cond EDT1

}

NPRACH-ConfigSIB-NB-v1550 ::= SEQUENCE {

 tdd-Parameters-v1550 SEQUENCE {

 nprach-ParametersListTDD-v1550 NPRACH-ParametersListTDD-NB-v1550

 }

}

NPRACH-ParametersList-NB-r13 ::= SEQUENCE (SIZE (1.. maxNPRACH-Resources-NB-r13)) OF NPRACH-Parameters-NB-r13

NPRACH-ParametersList-NB-v1330 ::= SEQUENCE (SIZE (1.. maxNPRACH-Resources-NB-r13)) OF NPRACH-Parameters-NB-v1330

NPRACH-Parameters-NB-r13::= SEQUENCE {

 nprach-Periodicity-r13 ENUMERATED {ms40, ms80, ms160, ms240,

 ms320, ms640, ms1280, ms2560},

 nprach-StartTime-r13 ENUMERATED {ms8, ms16, ms32, ms64,

 ms128, ms256, ms512, ms1024},

 nprach-SubcarrierOffset-r13 ENUMERATED {n0, n12, n24, n36, n2, n18, n34, spare1},

 nprach-NumSubcarriers-r13 ENUMERATED {n12, n24, n36, n48},

 nprach-SubcarrierMSG3-RangeStart-r13 ENUMERATED {zero, oneThird, twoThird, one},

 maxNumPreambleAttemptCE-r13 ENUMERATED {n3, n4, n5, n6, n7, n8, n10, spare1},

 numRepetitionsPerPreambleAttempt-r13 ENUMERATED {n1, n2, n4, n8, n16, n32, n64, n128},

 npdcch-NumRepetitions-RA-r13 ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128,

 r256, r512, r1024, r2048,

 spare4, spare3, spare2, spare1},

 npdcch-StartSF-CSS-RA-r13 ENUMERATED {v1dot5, v2, v4, v8, v16, v32, v48, v64},

 npdcch-Offset-RA-r13 ENUMERATED {zero, oneEighth, oneFourth, threeEighth}

}

NPRACH-Parameters-NB-v1330 ::= SEQUENCE {

 nprach-NumCBRA-StartSubcarriers-r13 ENUMERATED {n8, n10, n11, n12, n20, n22, n23, n24,

 n32, n34, n35, n36, n40, n44, n46, n48}

}

NPRACH-ParametersList-NB-r14 ::= SEQUENCE (SIZE (1.. maxNPRACH-Resources-NB-r13)) OF

 NPRACH-Parameters-NB-r14

NPRACH-Parameters-NB-r14 ::= SEQUENCE {

 nprach-Parameters-r14 SEQUENCE {

 nprach-Periodicity-r14 ENUMERATED {ms40, ms80, ms160, ms240,

 ms320, ms640, ms1280, ms2560}

 OPTIONAL, -- NEED OP

 nprach-StartTime-r14 ENUMERATED {ms8, ms16, ms32, ms64,

 ms128, ms256, ms512, ms1024}

 OPTIONAL, -- NEED OP

 nprach-SubcarrierOffset-r14 ENUMERATED {n0, n12, n24, n36, n2, n18, n34, spare1}

 OPTIONAL, -- NEED OP

 nprach-NumSubcarriers-r14 ENUMERATED {n12, n24, n36, n48}

 OPTIONAL, -- NEED OP

 nprach-SubcarrierMSG3-RangeStart-r14 ENUMERATED {zero, oneThird, twoThird, one}

 OPTIONAL, -- NEED OP

 npdcch-NumRepetitions-RA-r14 ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128,

 r256, r512, r1024, r2048,

 spare4, spare3, spare2, spare1}

 OPTIONAL, -- NEED OP

 npdcch-StartSF-CSS-RA-r14 ENUMERATED {v1dot5, v2, v4, v8, v16, v32, v48, v64}

 OPTIONAL, -- NEED OP

 npdcch-Offset-RA-r14 ENUMERATED {zero, oneEighth, oneFourth, threeEighth}

 OPTIONAL, -- NEED OP

 nprach-NumCBRA-StartSubcarriers-r14 ENUMERATED {n8, n10, n11, n12, n20, n22, n23, n24,

 n32, n34, n35, n36, n40, n44, n46, n48}

 OPTIONAL, -- NEED OP

 npdcch-CarrierIndex-r14 INTEGER (1..maxNonAnchorCarriers-NB-r14)

 OPTIONAL, -- Need OP

 ...

 } OPTIONAL -- Need OR

}

NPRACH-ParametersListTDD-NB-r15 ::= SEQUENCE (SIZE (1.. maxNPRACH-Resources-NB-r13)) OF

 NPRACH-ParametersTDD-NB-r15

NPRACH-ParametersTDD-NB-r15 ::= SEQUENCE {

 nprach-Parameters-r15 SEQUENCE {

 nprach-Periodicity-r15 ENUMERATED {ms80, ms160, ms320, ms640,

 ms1280, ms2560, ms5120, ms10240}

 OPTIONAL, -- NEED OP

 nprach-StartTime-r15 ENUMERATED {ms10, ms20, ms40, ms80,

 ms160, ms320, ms640, ms1280,

 ms2560, ms5120, spare6, spare5,

 spare4, spare3, spare2, spare1}

 OPTIONAL, -- NEED OP

 nprach-SubcarrierOffset-r15 ENUMERATED {n0, n12, n24, n36, n2, n18, n34, spare1}

 OPTIONAL, -- NEED OP

 nprach-NumSubcarriers-r15 ENUMERATED {n12, n24, n36, n48}

 OPTIONAL, -- NEED OP

 nprach-SubcarrierMSG3-RangeStart-r15 ENUMERATED {zero, oneThird, twoThird, one}

 OPTIONAL, -- NEED OP

 npdcch-NumRepetitions-RA-r15 ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128,

 r256, r512, r1024, r2048,

 spare4, spare3, spare2, spare1}

 OPTIONAL, -- NEED OP

 npdcch-StartSF-CSS-RA-r15 ENUMERATED {v4, v8, v16, v32, v48, v64, v96, v128}

 OPTIONAL, -- NEED OP

 npdcch-Offset-RA-r15 ENUMERATED {zero, oneEighth, oneFourth, threeEighth}

 OPTIONAL, -- NEED OP

 nprach-NumCBRA-StartSubcarriers-r15 ENUMERATED {n8, n10, n11, n12, n20, n22, n23, n24,

 n32, n34, n35, n36, n40, n44, n46, n48}

 OPTIONAL, -- NEED OP

 ...

 } OPTIONAL -- Need OR

}

NPRACH-ParametersListTDD-NB-v1550 ::= SEQUENCE (SIZE (1.. maxNPRACH-Resources-NB-r13)) OF

 NPRACH-ParametersTDD-NB-v1550

NPRACH-ParametersTDD-NB-v1550 ::= SEQUENCE {

 maxNumPreambleAttemptCE-v1550 ENUMERATED {n3, n4, n5, n6, n7, n8, n10, spare1},

 numRepetitionsPerPreambleAttempt-v1550 ENUMERATED {n1, n2, n4, n8, n16, n32, n64, n128,

 n256, n512, n1024}

}

NPRACH-ParametersListFmt2-NB-r15 ::= SEQUENCE (SIZE (1.. maxNPRACH-Resources-NB-r13)) OF NPRACH-ParametersFmt2-NB-r15

NPRACH-ParametersFmt2-NB-r15 ::= SEQUENCE {

 nprach-Parameters-r15 SEQUENCE {

 nprach-Periodicity-r15 ENUMERATED {ms40, ms80, ms160, ms320,

 ms640, ms1280, ms2560, ms5120}

 OPTIONAL, -- NEED OP

 nprach-StartTime-r15 ENUMERATED {ms8, ms16, ms32, ms64,

 ms128, ms256, ms512, ms1024}

 OPTIONAL, -- NEED OP

 nprach-SubcarrierOffset-r15 ENUMERATED {n0, n36, n72, n108, n6, n54, n102, n42,

 n78, n90, n12, n24, n48, n84, n60, n18}

 OPTIONAL, -- NEED OP

 nprach-NumSubcarriers-r15 ENUMERATED {n36, n72, n108, n144}

 OPTIONAL, -- NEED OP

 nprach-SubcarrierMSG3-RangeStart-r15 ENUMERATED {zero, oneThird, twoThird, one}

 OPTIONAL, -- NEED OP

 npdcch-NumRepetitions-RA-r15 ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128,

 r256, r512, r1024, r2048,

 spare4, spare3, spare2, spare1}

 OPTIONAL, -- NEED OP

 npdcch-StartSF-CSS-RA-r15 ENUMERATED {v1dot5, v2, v4, v8, v16, v32, v48, v64}

 OPTIONAL, -- NEED OP

 npdcch-Offset-RA-r15 ENUMERATED {zero, oneEighth, oneFourth, threeEighth}

 OPTIONAL, -- NEED OP

 nprach-NumCBRA-StartSubcarriers-r15 ENUMERATED {

 n24, n30, n33, n36, n60, n66, n69, n72,

 n96, n102, n105, n108, n120, n132, n138, n144}

 OPTIONAL, -- NEED OP

 npdcch-CarrierIndex-r15 INTEGER (1..maxNonAnchorCarriers-NB-r14)

 OPTIONAL, -- Need OP

 ...

 } OPTIONAL -- Need OR

}

NPRACH-TxDurationFmt01-NB-r17 ::= SEQUENCE {

 nprach-TxDurationFmt01-r17 ENUMERATED {n2, n4, n8, n16, n32, n64}

}

NPRACH-TxDurationFmt2-NB-r17 ::= SEQUENCE {

 nprach-TxDurationFmt2-r17 ENUMERATED {n1, n2, n4, n8, n16}

}

RSRP-ThresholdsNPRACH-InfoList-NB-r13 ::= SEQUENCE (SIZE(1..2)) OF RSRP-Range

EDT-TBS-InfoList-NB-r15 ::= SEQUENCE (SIZE (1.. maxNPRACH-Resources-NB-r13)) OF EDT-TBS-NB-r15

EDT-TBS-NB-r15 ::= SEQUENCE {

 edt-SmallTBS-Enabled-r15 BOOLEAN,

 edt-TBS-r15 ENUMERATED {b328, b408, b504, b584, b680, b808, b936, b1000}

}

-- ASN1STOP

Here is the TP for NB-IoT CB-Msg3 configuration parameters.

#### – *CB-Msg3-ConfigSIB-NB*

The IE *CB-Msg3-ConfigSIB-NB* is used to specify CB-Msg3 configuration.

*CB-Msg3-ConfigSIB-NB* information element

-- ASN1START

CB-Msg3-ConfigSIB-NB-r19 ::= SEQUENCE {

 cb-Msg3-MinRSRP-Threshold-r19 NRSRP-Range-NB-r14 OPTIONAL, --Need OR

 cb-Msg3-RSRP-ThresholdList-r19 CB-Msg3-RSRP-ThresholdList-NB-r19 OPTIONAL, --Need OP

 cb-Msg3-ParametersList-r19 CB-Msg3-ParametersList-NB-r19,

 cb-Msg3-ResponseWindowTimer-r19 ENUMERATED {FFS}

}

CB-Msg3-ParametersList-NB-r19 ::= SEQUENCE (SIZE (1.. maxCB-Msg3-Resources-NB-r19)) OF

 CB-Msg3-Parameters-NB-r19

CB-Msg3-Parameters-NB-r19 ::= SEQUENCE {

 cb-Msg3-NumReplicas INTEGER(1..4),

 cb-Msg3-DSATransmissionWindow-r19 SEQUENCE {

 startSFN-19 INTEGER (0.. 1023),

 windowSize-19 ENUMERATED {FFS},

 windowPeriodicity-r19 ENUMERATED {FFS}

 } OPTIONAL, --Need OP

 cb-Msg3-StartTimeParameters-r19 SEQUENCE {

 npusch-periodicity-r19 ENUMERATED {FFS},

 npusch-startTime-r19 INTEGER (0..1023),

 npusch-startSubframe-r19 INTEGER (0..9)

 }

 cb-Msg3-PhysicalConfig-r19 ::= SEQUENCE {

 npusch-NumRUsIndex-r19 INTEGER (0..7),

 npusch-NumRepetitionsIndex-r19 INTEGER (0..7),

 npusch-SubCarrierIndex-r19 INTEGER (0..47),

 npusch-MCS-r19 INTEGER (0..10),

 p0-UE-NPUSCH-r19 INTEGER (-8..7),

 alpha-r19 ENUMERATED {al0, al04, al05, al06,

 al07, al08, al09, al1},

 npdcch-NumRepetitions-r19 ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128,

 r256, r512, r1024, r2048,

 spare4, spare3, spare2, spare1},

 npdcch-StartSF-CSS-r19 ENUMERATED {v1dot5, v2, v4, v8, v16, v32, v48, v64},

 npdcch-Offset-r19 ENUMERATED {zero, oneEighth, oneFourth, threeEighth}

 npdcch-CarrierIndex-r19 INTEGER (1..maxNonAnchorCarriers-NB-r14)

 OPTIONAL -- Need OP

 }

 cb-Msg3-TBS-NB-r19 ENUMERATED {FFS},

 ...

}

CB-Msg3-RSRP-ThresholdList-NB-r19 ::= SEQUENCE (SIZE(1..2)) OF RSRP-Range

maxCB-Msg3-Resources-NB-r19 INTEGER ::= 3 -- Maximum number of CB-Msg3 resources for NB-IoT

-- ASN1STOP

Notes

* CB-Msg3-ConfigSIB-NB:This IE is used in the **SIB2-NB** for anchor carrier and **SIB22-NB** for non-anchor carrier.
* cb-Msg3-MinRSRP-Threshold-r19: It is assumed as an optional IE. If it is absent, no minimal threshold is used.
* CB-Msg3-RSRP-ThresholdList-NB-r19: It is assumed as an optional IE. If this IE is absent, the thresholds list of PRACH is used.
* cb-Msg3-DSATransmissionWindow-r19: It is assumed as an optional IE. If the number of the replicas is one, the DSA transmission window is not needed.
	+ startSFN-19 in cb-Msg3-DSATransmissionWindow-r19: Although the term *H-SFN offset* is used in the agreement, the rapporteur believes it should be a SFN offset during the H-SFN duration.
	+ *hsfn-LSB-Info-r16* in PUR-Config-NB: This IE is not used as the periodicity of CB-Msg3 resource is assumed shorted than a H-SFN duration (i.e., 10.24s).
* cb-Msg3-PhysicalConfig-r19
	+ npusch-SubCarrierIndex-r19 / npusch-MCS-r19: According to the RAN1 reply LS [R1-2407548](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_118/Docs/R1-2407548.zip) on TA validation, only 3.75kHz SCS is confirmed. **Whether the 15kHz SCS NPUSCH is supported is still FFS**. Therefore, only parameters for 3.75kHz SCS is introduced for now.
	+ p0-UE-NPUSCH-r19, alpha-r19: The parameters for NPUSCH transmission power are assumed as CE level specific.
	+ *npusch-CyclicShift-r16* in PUR-Config-NB: This IE is not used because this parameter is specified for PUR only.
	+ npdcch-NumRepetitions-r19/npdcch-StartSF-CSS-r19/npdcch-Offset-r19: 3 parameters copied from *NPDCCH-ConfigDedicated-NB-r13.* Note hear it should be CSS instead of USS.
	+ npdcch-CarrierIndex-r19: The non-anchor carrier index for monitoring Msg4. If this IE is absent, anchor carrier is assumed to be used.
	+ *ack-NACK-NumRepetitions-r16* in PUR-Config-NB: This IE is not used because the same IE in Msg4 can be used.
* cb-Msg3-TBS-NB-r19: Whether the maximum TBS is CE level specific is FFS. Rapporteur assumes it is CE level specific.

Companies are invited to provide comments on the above TP including but not limited to below discussion points.

* Which SIB should be used for IE CB-Msg3*-ConfigSIB* ?
* Any parameter is missing in the TP and why this should be added?
* Any parameter should be removed from the TP?
* Most value range of the parameters are copied from PUR parameters, any further change needed?

**Q2: Any comments on the TP of *CB-Msg3-ConfigSIB-NB?***

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| **Company** | **Comments** |
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## Msg4 monitoring window and RNTI

Regarding the Msg4 monitoring window and RNTI, the following agreements have been reached:

RAN2#127bis agreement:

1. The RNTI used at least to schedule Msg4 transmission is derived based on the resource associated to the PUSCH occasion used for contention based Msg3 EDT transmission (FFS on the details. FFS how this is impacted by DSA)

RAN2#128 agreement:

1. For SA case (single replica), after the end of all repetition of CB-Msg3 PUSCH transmission, UE starts a window for response reception taking UE-eNB RTT into account. FFS if we need to consider additional delay e.g. for the processing time

2. For DSA case, FFS if we only have one or multiple PDCCH monitoring window(s) (i.e. one window per each replica) for response reception. FFS when the window(s) is/are started (or restarted) and stopped. FFS on the window length. FFS if the UE needs to monitor only one RNTI or multiple RNTIs)

During the online discussion on CB-Msg3 in RAN2#129, it was found that the DSA transmission window, the Msg4 monitoring window, and the RNTI for Msg4 are closely related. An offline discussion was initiated to narrow down the combinations of these three aspects.

* [AT129][306][R19 IoT NTN] TX and RX window for CB-msg3 (Mediatek)

Scope: discuss details of transmission window (e.g. sliding or fixed), monitoring window and whether 1 or multiple RNTIs should be considered for CB-msg3/DSA

      Intended outcome: summary of the offline discussion

      Deadline for companies' feedback:  Thursday 2025-02-20 20:00

      Deadline for rapporteur's summary (in R2-2501420):  Friday 2025-02-21 08:00

As a result of the offline discussion [1], two proposals were submitted as follows:

**Proposal 1: For CB-Msg3 DSA transmission window design, RAN2 to discuss below two options:**

* **Option 1**
	+ **Transmission window is started at the first replica that the UE randomly select from CB-MSG3 occasions. Window length is configured by network via SIB.**
* **Option 2**
	+ **Transmission window is configured by network with a starting point (e.g. H-SFN offset), a window length, and a window periodicity.**
	+ **The UE first selects a nearest DSA transmission window and then randomly select K replicas inside the window.**

**Proposal 2: For CB-Msg3 DSA monitor window and RNTI design, RAN2 to discuss below two options:**

* **Option 1**
	+ **RNTI is calculated for each Replica respectively according to the selected resource (same as SA).**
	+ **After the end of all repetition of CB-Msg3 PUSCH transmission of each replica, UE starts the corresponding monitor window, taking UE-eNB RTT into account.**
	+ **The UE has to monitor multiple RNTIs in multiple monitor windows.**
* **Option 2**
	+ **A single RNTI is used for all replicas and it is calculated based on the location of the selected DSA transmission window.**
	+ **A single monitor window is used for all replicas.**

Regarding proposal 1 (i.e., the DSA transmission window), the following working assumption have been reached.

RAN2#129 Working assumption:

1. For CB-MSG3, the Transmission window is configured by the network with a starting point (e.g. H-SFN offset), a window length, and a window periodicity (window length and periodicity could be the same). For k=1 the window length can be equal to 1: same behaviour as today

 The UE first selects the next DSA transmission window and then randomly select K replicas inside the window.

P2 was briefly discussed, but no conclusion was reached. We will continue our discussion on the Msg4 monitoring window and RNTI in this offline.

Although option 2 is adopted for the DSA transmission window, companies have varied views on the Msg4 monitoring window and RNTI. Some companies mentioned that even with a fixed DSA transmission window, the Msg4 monitoring window can still be multiple. The RNTI design would also be impacted accordingly. Therefore, the rapporteur would like to decouple options on the monitoring window and RNTI.

Companies are invited to provide their views on the following questions:

**Q3: Should there be one Msg4 monitoring window or multiple windows for DSA transmission?**

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| **Company** | **Multiple or Single** | **Comments** |
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**Q4: What should be the start point of Msg4 monitoring window(s) for DSA transmission?**

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| **Company** | **Comments** |
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**Q5: Should there be one RNTI or multiple RNTIs for DSA transmission?**

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| **Company** | **Multiple or Single** | **Comments** |
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**Q6: How is the RNTI derived for DSA transmission?**

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| **Company** | **Comments** |
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# Summary

# References

[1] R2-2501420 Report of [AT129][306][R19 IoT NTN] TX and RX window for CB-msg3 Mediatek