**3GPP TSG-RAN WG2 Meeting #125** **R2-2400328**

**Athens, Greece, 26th Feb. – 1st Mar., 2024**

**Title: [H501] [H505] [H815] Modelling on-demand SI request with msg1 repetition as RACH feature**

**Source: Huawei, HiSilicon**

**Agenda item: 7.21.2**

**Document for: Discussion and Decision**

# Background

This paper discusses how to configure RACH resources for on-demand SI request with msg1 repetition, which can potentially reduce the spec impacts.

# 2 On-demand SI request for Coverage enhancement

## 2.1 Issues with the current spec for on-demand SI request with msg1 repetition

For the current RRC spec, the following has been configured for coverage enhancement by supporting repetition of msg1 by configuring it as a RACH feature under the legacy R17 RACH partitioning framework.



And then, for on-demand SI request by msg1 repetition, separate RACH resource is configured under *SI-SchedulingInfo* and *posSI-SchedulingInfo* for normal and positioning system information respective.







From the above RACH configuration, it can be seen that separate RACH resource can be configured for on-demand SI request. While the issue is that there is only time/frequency/code configuration and there are no other RACH configurations that are necessary for RACH transmission within *RACH-configCommon*, such as *rsrp-ThresholdSSB* for SSB selection, root sequence index for preamble root sequence generation, etc.

**Issue#1, some necessary RACH parameters are missing in the current spec within SI-RequestConfigRepetition-r18**

Besides, the above RACH configuration provides dedicated RACH resource for on-demand SI request with msg1 repetition. However, RACH resource is repeating in time/freq domain periodically for a cell, which consumes a large amount of resource. Only use the RACH resource for SI request may result in waste of resources.

**Issue#2, Dedicated configuration of RACH resource only for on-demand SI request with msg1 repetition may result in resource waste.**

Then, the current spec also allows the network not to configure separate RACH resources by rach-OccasionSI-r18,. But to reuse the RACH resource in the initial UL BWP, by the using the following NOTE within *SI-RequestConfig* (WHICH IS NOT UNEDR *si-RequestConfigRepetition*)



While for the RACH resource for initial BWP, it is already used for initial access procedure such as CBRA, CFRA, and on-demand SI request without repetition. The configuration in RACH-ConfigCommon does not have RO indication by mask index, which means that RACH occasions for each SSB need to be allocated with preambles for on-demand posSI/SI request with msg1 repetition, when SSB/RACH occasion factor is smaller than 1. With the above reasons, there might not be enough space to configure additional RACH resources for on-demand SI request with msg1 repetition for RACH-configCommon in initial UL BWP

**Issue#3, there might not be enough space for configuring RACH resource for on-demand SI/posSI request with different msg1 repetitions for RACH-configCommon in initial UL BWP**

With the newly introduced type *si-requestConfigRepetition,* compared with the legacy type *si-RequestConfig*, it can be seen that there are quite a lot of duplicated fields. With the current modelling, a lot of duplications are introduced on top of the legacy spec, which should be avoided as much as possible.

**Issue#4: adding the new IE *si-RequestConfigRepetition* in the current spec introduces duplication compared with legacy field *si-ReuqestConfig***

Then, for the current MAC spec, in the section of selection of the set of RACH resources, on-demand SI request is modelled as a separate category from CBRA and CFRA as follows:



## 2.2 Proposed solution

From our point of view, we think that the RACH resource for on-demand SI request can also be configured under the framework of RACH partition introduced in R17. While for REDCAP, the RACH resource can be configured in combination with the feature of “RedCap” or “eRedCap”.

With the consideration above, for example, for the on-demand SI request resource for (e)REDCAP UE with msg1 repetition, it can be defined as a RACH resource configured with feature combination (msg1 rep, (e)REDCAP, on-demandSI req).

**Observation1: msg1-based repetition for on-demand SI request can be configured as a feature combination of “msg1-repetition”, “on-demand SI request for posSI/SI” and redcap/eRedCap.**

For both positioning SI and normal SI, if the RACH resource is configured under RACH-configCommon, Then naturally, separate RACH resource can be configured for NUL and SUL.

**Observation2: RACH resource for on-demand SI request can be automatically supported for NUL and SUL, if it is configured under RACH-configCommon. No change is needed.**

Hence, we propose the following

***Proposal1*: From RRC point of view, configure RACH resource for on-demand SI resource by RACH partitioning.**

Furthermore, the current spec defines 3 categories of RACH, as CBRA, CFRA and on-demand SI request. We understand the intention that on-demand SI request is not quite CFRA in that the resource is not dedicated for a certain UE; it is not CBRA neither since the notion of “contention” does not apply here (one UE can be happy if the other UE takes his resource and request the same SI message). However, from the procedure point of view, we think the on-demand SI request can be the same as that for CBRA that the time/freq/code resource is indicated by the network, but beam selection is still performed by the UE itself.

***Proposal2*: From MAC procedure point of view, specify selection of the RACH resource set for on-demand SI request with msg1 repetition by the legacy procedure for CBRA.**

# 3 Conclusions

We first list the issues with the current RACH configurations:

**Issue#1, some necessary RACH parameters are missing in the current spec within SI-RequestConfigRepetition-r18**

**Issue#2, Dedicated configuration of RACH resource only for on-demand SI request with msg1 repetition may result in resource waste.**

**Issue#3, there might not be enough space for configuring RACH resource for on-demand SI/posSI request with different msg1 repetitions for *RACH-configCommon* in initial UL BWP**

**Issue#4: adding the new IE *si-RequestConfigRepetition* in the current spec introduces duplication compared with legacy field *si-ReuqestConfig***

Then, we propose the following:

***Proposal1*: From RRC point of view, configure RACH resource for on-demand SI resource by RACH partitioning.**

***Proposal2*: From MAC procedure point of view, specify selection of the RACH resource set for on-demand SI request with msg1 repetition by the legacy procedure for CBRA.**

# Annex A: Text proposal for RRC spec

==================================START OF CHANGE===================================

5.2.2.3.3 Request for on demand system information

The UE shall, while SDT procedure is not ongoing:

1> if *SIB1* includes at set of Random Access resoruces with feature combination with *onDemandSI-Req* and *msg1-Repetition* and criteria to select supplementary uplink as defined in TS 38.321[3], clause 5.1.1 is met and if criteria to apply MSG1 repetition as defined in TS 38.321[3], clause 5.1.1e for the concerned Random Access resource set is met:

2> trigger the lower layer to initiate the Random Access procedure on supplementary uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) associated with the applicable MSG1 repetition number corresponding to the SI message(s) that the UE requires to operate within the cell, and for which *si-BroadcastStatus* is set to *notBroadcasting*;

2> if acknowledgement for SI request is received from lower layers:

3> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

1> else if the UE is a RedCap UE and if *initialUplinkBWP-RedCap* is configured in *UplinkConfigCommonSIB* and if *SIB1* includes Random Access resource set with feature combination with *onDemandSI-req* and *redcap* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met and if criteria to apply MSG1 repetition as defined in TS 38.321[3], clause 5.1.1e for the concerned Random Access resource set is met:

2> trigger the lower layer to initiate the Random Access procedure on normal uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) associated with the applicable MSG1 repetition numbercorresponding to the SI message(s) that the UE requires to operate within the cell, and for which *si-BroadcastStatus* is set to *notBroadcasting*;

2> if acknowledgement for SI request is received from lower layers:

3> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

1> else if *SIB1* includes *si-SchedulingInfo* containing *si-RequestConfigSUL* and criteria to select supplementary uplink as defined in TS 38.321[3], clause 5.1.1 is met:

2> trigger the lower layer to initiate the Random Access procedure on supplementary uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) in *si-RequestConfigSUL* corresponding to the SI message(s) that the UE requires to operate within the cell, and for which *si-BroadcastStatus* is set to *notBroadcasting*;

2> if acknowledgement for SI request is received from lower layers:

3> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

1> else if the UE is an (e)RedCap UE and if *initialUplinkBWP-RedCap* is configured in *UplinkConfigCommonSIB* and if *SIB1* includes *si-SchedulingInfo* containing *si-RequestConfigRedCap* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met:

2> trigger the lower layer to initiate the Random Access procedure on normal uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) in *si-RequestConfigRedcap* corresponding to the SI message(s) that the UE requires to operate within the cell, and for which *si-BroadcastStatus* is set to *notBroadcasting*;

2> if acknowledgement for SI request is received from lower layers:

3> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

1> else:

2> if the UE is not a RedCap UE and if *SIB1* includes Random Access resource set with feature combination with *onDemandSI-Req* and criteria to select normal uplink and to apply MSG1 repetition as defined in TS 38.321[3], clause 5.1.1e for the concerned Random Access resource set are met; or

2> if the UE is a RedCap UE and if *initialUplinkBWP-RedCap* is not configured in *UplinkConfigCommonSIB* and if *SIB1* includes Random Access resource set with feature combination with *onDemandSI-Req* and *redcap* and criteria to select normal uplink and to apply MSG1 repetition as defined in TS 38.321[3], clause 5.1.1e for the concerned Random Access resource setare met:

3> trigger the lower layer to initiate the Random Access procedure on normal uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) associated with the applicable MSG1 repetition number in corresponding to the SI message(s) that the UE requires to operate within the cell, and for which *si-BroadcastStatus* is set to *notBroadcasting*;

3> if acknowledgement for SI request is received from lower layers:

4> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

2> else if the UE is neither a RedCap nor an eRedCap UE and if *SIB1* includes *si-SchedulingInfo* containing *si-RequestConfig* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met; or

2> if the UE is an (e)RedCap UE and if *initialUplinkBWP-RedCap* is not configured in *UplinkConfigCommonSIB* and if *SIB1* includes *si-SchedulingInfo* containing *si-RequestConfig* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met:

3> trigger the lower layer to initiate the Random Access procedure on normal uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) in *si-RequestConfig* corresponding to the SI message(s) that the UE requires to operate within the cell, and for which *si-BroadcastStatus* is set to *notBroadcasting*;

3> if acknowledgement for SI request is received from lower layers:

4> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

2> else:

3> apply the default L1 parameter values as specified in corresponding physical layer specifications except for the parameters for which values are provided in *SIB1*;

3> apply the default MAC Cell Group configuration as specified in 9.2.2;

3> apply the *timeAlignmentTimerCommon* included in *SIB1*;

3> apply the CCCH configuration as specified in 9.1.1.2;

3> initiate transmission of the *RRCSystemInfoRequest* message with *rrcSystemInfoRequest* in accordance with 5.2.2.3.4;

3> if acknowledgement for *RRCSystemInfoRequest* message with *rrcSystemInfoRequest* is received from lower layers:

4> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

1> if cell reselection occurs while waiting for the acknowledgment for SI request from lower layers:

2> reset MAC;

2> if SI request is based on *RRCSystemInfoRequest* message with *rrcSystemInfoRequest*:

3> release RLC entity for SRB0.

NOTE: After RACH failure for SI request it is up to UE implementation when to retry the SI request.

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

5.2.2.3.3a Request for on demand positioning system information

The UE shall, while SDT procedure is not ongoing:

1> if *SIB1* includes Random Access resource set with feature combination with *onDemandPosSI-Req* and criteria to select supplementary uplink as defined in TS 38.321[3], clause 5.1.1 is met and if criteria to apply MSG1 repetition as defined in TS 38.321[3], clause 5.1.1e for the concerned Random Access resource set is met:

2> trigger the lower layer to initiate the Random Access procedure on supplementary uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) associated with the applicable MSG1 repetition number corresponding to the SI message(s) that the UE requires to operate within the cell, and for which *si-BroadcastStatus* is set to *notBroadcasting*;

2> if acknowledgement for SI request is received from lower layers:

3> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

1> else if the UE is a RedCap UE and if *initialUplinkBWP-RedCap* is configured in *UplinkConfigCommonSIB* and if *SIB1* includes Random Access resource set with feature combination with *onDemandPosSI-Req* and *redcap* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met and if criteria to apply MSG1 repetition as defined in TS 38.321[3], clause 5.1.1e for the concerned Random Access resource set is met:

2> trigger the lower layer to initiate the Random Access procedure on normal uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) associated with the applicable MSG1 repetition number corresponding to the SI message(s) that the UE requires to operate within the cell, and for which *si-BroadcastStatus* is set to *notBroadcasting*;

2> if acknowledgement for SI request is received from lower layers:

3> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

1> else if *SIB1* includes *posSI-SchedulingInfo* containing *posSI-RequestConfigSUL* and criteria to select supplementary uplink as defined in TS 38.321[3], clause 5.1.1 is met:

2> trigger the lower layer to initiate the Random Access procedure on supplementary uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) in *posSI-RequestConfigSUL* corresponding to the SI message(s) that the UE upper layers require for positioning operations, and for which *posSI-BroadcastStatus* is set to *notBroadcasting*;

2> if acknowledgement for SI request is received from lower layers:

3> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

1> else if the UE is an (e)RedCap UE and if *initialUplinkBWP-RedCap* is configured in *UplinkConfigCommonSIB* and if *SIB1* includes *posSI-SchedulingInfo* containing *posSI-RequestConfigRedCap* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met:

2> trigger the lower layer to initiate the Random Access procedure on normal uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) in *posSI-RequestConfigRedCap* corresponding to the SI message(s) that the UE upper layers require for positioning operations, and for which *posSI-BroadcastStatus* is set to *notBroadcasting*;

2> if acknowledgement for SI request is received from lower layers:

3> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

1> else:

2> if the UE is not a RedCap UE and if *SIB1* includes Random Access resource set with feature combination with *onDemandPosSI-Req*  and criteria to select normal uplink and to apply MSG1 repetition as defined in TS 38.321[3], clause 5.1.1e for the concerned Random Access resource set are met; or

2> if the UE is a RedCap UE and if *initialUplinkBWP-RedCap* is not configured in *UplinkConfigCommonSIB* and if *SIB1* includes Random Access resource set with feature combination with *onDemandPosSI-Req* and *redcap* and criteria to select normal uplink and to apply MSG1 repetition as defined in TS 38.321[3], clause 5.1.1e for the concerned Random Access resource set are met:

3> trigger the lower layer to initiate the Random Access procedure on normal uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) associated with the applicable MSG1 repetition number corresponding to the SI message(s) that the UE requires to operate within the cell, and for which *si-BroadcastStatus* is set to *notBroadcasting*;

3> if acknowledgement for SI request is received from lower layers:

4> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

2> else if the UE is not an (e)RedCap UE and if *SIB1* includes *posSI-SchedulingInfo* containing *posSI-RequestConfig* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met; or

2> if the UE is an (e)RedCap UE and if *initialUplinkBWP-RedCap* is not configured in *UplinkConfigCommonSIB* and if *SIB1* includes *posSI-SchedulingInfo* containing *posSI-RequestConfig* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met:

3> trigger the lower layer to initiate the Random Access procedure on normal uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) in *posSI-RequestConfig* corresponding to the SI message(s) that the UE upper layers require for positioning operations , and for which *posSI-BroadcastStatus* is set to *notBroadcasting*;

3> if acknowledgement for SI request is received from lower layers:

4> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

2> else:

3> apply the default L1 parameter values as specified in corresponding physical layer specifications except for the parameters for which values are provided in *SIB1*;

3> apply the default MAC Cell Group configuration as specified in 9.2.2;

3> apply the *timeAlignmentTimerCommon* included in *SIB1*;

3> apply the CCCH configuration as specified in 9.1.1.2;

3> initiate transmission of the *RRCSystemInfoRequest* message with *rrcPosSystemInfoRequest* in accordance with 5.2.2.3.4;

3> if acknowledgement for *RRCSystemInfoRequest* message with *rrcPosSystemInfoRequest* is received from lower layers:

4> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

1> if cell reselection occurs while waiting for the acknowledgment for SI request from lower layers:

2> reset MAC;

2> if SI request is based on *RRCSystemInfoRequest* message with *rrcPosSystemInfoRequest*:

3> release RLC entity for SRB0.

NOTE: After RACH failure for SI request it is up to UE implementation when to retry the SI request.

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

– *SIB1*

*SIB1* contains information relevant when evaluating if a UE is allowed to access a cell and defines the scheduling of other system information.It also contains radio resource configuration information that is common for all UEs and barring information applied to the unified access control.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channels: BCCH

Direction: Network to UE

***SIB1* message**

-- ASN1START

-- TAG-SIB1-START

SIB1 ::= SEQUENCE {

 cellSelectionInfo SEQUENCE {

 q-RxLevMin Q-RxLevMin,

 q-RxLevMinOffset INTEGER (1..8) OPTIONAL, -- Need S

 q-RxLevMinSUL Q-RxLevMin OPTIONAL, -- Need R

 q-QualMin Q-QualMin OPTIONAL, -- Need S

 q-QualMinOffset INTEGER (1..8) OPTIONAL -- Need S

 } OPTIONAL, -- Cond Standalone

 cellAccessRelatedInfo CellAccessRelatedInfo,

 connEstFailureControl ConnEstFailureControl OPTIONAL, -- Need R

 si-SchedulingInfo SI-SchedulingInfo OPTIONAL, -- Need R

 servingCellConfigCommon ServingCellConfigCommonSIB OPTIONAL, -- Need R

 ims-EmergencySupport ENUMERATED {true} OPTIONAL, -- Need R

 eCallOverIMS-Support ENUMERATED {true} OPTIONAL, -- Need R

 ue-TimersAndConstants UE-TimersAndConstants OPTIONAL, -- Need R

 uac-BarringInfo SEQUENCE {

 uac-BarringForCommon UAC-BarringPerCatList OPTIONAL, -- Need S

 uac-BarringPerPLMN-List UAC-BarringPerPLMN-List OPTIONAL, -- Need S

 uac-BarringInfoSetList UAC-BarringInfoSetList,

 uac-AccessCategory1-SelectionAssistanceInfo CHOICE {

 plmnCommon UAC-AccessCategory1-SelectionAssistanceInfo,

 individualPLMNList SEQUENCE (SIZE (2..maxPLMN)) OF UAC-AccessCategory1-SelectionAssistanceInfo

 } OPTIONAL -- Need S

 } OPTIONAL, -- Need R

 useFullResumeID ENUMERATED {true} OPTIONAL, -- Need R

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension SIB1-v1610-IEs OPTIONAL

}

SIB1-v1610-IEs ::= SEQUENCE {

 idleModeMeasurementsEUTRA-r16 ENUMERATED{true} OPTIONAL, -- Need R

 idleModeMeasurementsNR-r16 ENUMERATED{true} OPTIONAL, -- Need R

 posSI-SchedulingInfo-r16 PosSI-SchedulingInfo-r16 OPTIONAL, -- Need R

 nonCriticalExtension SIB1-v1630-IEs OPTIONAL

}

SIB1-v1630-IEs ::= SEQUENCE {

 uac-BarringInfo-v1630 SEQUENCE {

 uac-AC1-SelectAssistInfo-r16 SEQUENCE (SIZE (2..maxPLMN)) OF UAC-AC1-SelectAssistInfo-r16

 } OPTIONAL, -- Need R

 nonCriticalExtension SIB1-v1700-IEs OPTIONAL

}

SIB1-v1700-IEs ::= SEQUENCE {

 hsdn-Cell-r17 ENUMERATED {true} OPTIONAL, -- Need R

 uac-BarringInfo-v1700 SEQUENCE {

 uac-BarringInfoSetList-v1700 UAC-BarringInfoSetList-v1700

 } OPTIONAL, -- Cond MINT

 sdt-ConfigCommon-r17 SDT-ConfigCommonSIB-r17 OPTIONAL, -- Need R

 redCap-ConfigCommon-r17 RedCap-ConfigCommonSIB-r17 OPTIONAL, -- Need R

 featurePriorities-r17 SEQUENCE {

 redCapPriority-r17 FeaturePriority-r17 OPTIONAL, -- Need R

 slicingPriority-r17 FeaturePriority-r17 OPTIONAL, -- Need R

 msg3-Repetitions-Priority-r17 FeaturePriority-r17 OPTIONAL, -- Need R

 sdt-Priority-r17 FeaturePriority-r17 OPTIONAL -- Need R

 } OPTIONAL, -- Need R

 si-SchedulingInfo-v1700 SI-SchedulingInfo-v1700 OPTIONAL, -- Need R

 hyperSFN-r17 BIT STRING (SIZE (10)) OPTIONAL, -- Need R

 eDRX-AllowedIdle-r17 ENUMERATED {true} OPTIONAL, -- Need R

 eDRX-AllowedInactive-r17 ENUMERATED {true} OPTIONAL, -- Cond EDRX-RC

 intraFreqReselectionRedCap-r17 ENUMERATED {allowed, notAllowed} OPTIONAL, -- Need S

 cellBarredNTN-r17 ENUMERATED {barred, notBarred} OPTIONAL, -- Need S

 nonCriticalExtension SIB1-v1740-IEs OPTIONAL

}

SIB1-v1740-IEs ::= SEQUENCE {

 si-SchedulingInfo-v1740 SI-SchedulingInfo-v1740 OPTIONAL, -- Need R

 nonCriticalExtension SIB1-v1800-IEs OPTIONAL

}

SIB1-v1800-IEs ::= SEQUENCE {

 ncr-Support-r18 ENUMERATED {true} OPTIONAL, -- Need S

 mt-SDT-ConfigCommonSIB-r18 MT-SDT-ConfigCommonSIB-r18 OPTIONAL, -- Need R

 musim-CapRestrictionAllowed-r18 ENUMERATED {true} OPTIONAL, -- Need R

 featurePriorities-v1800 SEQUENCE {

 msg1-Repetitions-Priority-r18 FeaturePriority-r17 OPTIONAL, -- Need R

 eRedCapPriority-r18 FeaturePriority-r17 OPTIONAL, -- Need R

 onDemandSI-Req-Priority-r18 FeaturePriority-r17 OPTIONAL, -- Need R

 onDemandPosSI-Req-Priority-r18 FeaturePriority-r17 OPTIONAL -- Need R

 } OPTIONAL, -- Need R

 cellBarredATG-r18 ENUMERATED {barred, notBarred} OPTIONAL, -- Need S

 cellBarredNES-r18 ENUMERATED {notBarred} OPTIONAL, -- Need R

 mobileIAB-Cell-r18 ENUMERATED {true} OPTIONAL, -- Need R

 eDRX-AllowedInactive-r18 ENUMERATED {true} OPTIONAL, -- Cond EDRX-RC

 intraFreqReselection-eRedCap-r18 ENUMERATED {allowed, notAllowed} OPTIONAL, -- Need S

 nonServingCellMII-r18 ENUMERATED {true} OPTIONAL, -- Need R

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

UAC-AccessCategory1-SelectionAssistanceInfo ::= ENUMERATED {a, b, c}

UAC-AC1-SelectAssistInfo-r16 ::= ENUMERATED {a, b, c, notConfigured}

SDT-ConfigCommonSIB-r17 ::= SEQUENCE {

 sdt-RSRP-Threshold-r17 RSRP-Range OPTIONAL, -- Need R

 sdt-LogicalChannelSR-DelayTimer-r17 ENUMERATED { sf20, sf40, sf64, sf128, sf512, sf1024, sf2560, spare1} OPTIONAL, -- Need R

 sdt-DataVolumeThreshold-r17 ENUMERATED {byte32, byte100, byte200, byte400, byte600, byte800, byte1000, byte2000, byte4000,

 byte8000, byte9000, byte10000, byte12000, byte24000, byte48000, byte96000},

 t319a-r17 ENUMERATED { ms100, ms200, ms300, ms400, ms600, ms1000, ms2000,

 ms3000, ms4000, spare7, spare6, spare5, spare4, spare3, spare2, spare1}

}

RedCap-ConfigCommonSIB-r17 ::= SEQUENCE {

 halfDuplexRedCapAllowed-r17 ENUMERATED {true} OPTIONAL, -- Need R

 cellBarredRedCap-r17 SEQUENCE {

 cellBarredRedCap1Rx-r17 ENUMERATED {barred, notBarred},

 cellBarredRedCap2Rx-r17 ENUMERATED {barred, notBarred}

 } OPTIONAL, -- Need R

 ...,

 [[

 cellBarredRedCap-r18 SEQUENCE {

 cellBarred-eRedCap1Rx-r18 ENUMERATED {barred, notBarred},

 cellBarred-eRedCap2Rx-r18 ENUMERATED {barred, notBarred}

 } OPTIONAL -- Need R

 ]]

}

FeaturePriority-r17 ::= INTEGER (0..7)

MT-SDT-ConfigCommonSIB-r18 ::= SEQUENCE {

 sdt-RSRP-ThresholdMT-r18 RSRP-Range OPTIONAL, -- Need S

 sdt-LogicalChannelSR-DelayTimer-r18 ENUMERATED { sf20, sf40, sf64, sf128, sf512, sf1024, sf2560, spare1} OPTIONAL, -- Cond MT-SDT1

 t319a-r18 ENUMERATED { ms100, ms200, ms300, ms400, ms600, ms1000, ms2000,

 ms3000, ms4000, spare7, spare6, spare5, spare4,

 spare3, spare2, spare1} OPTIONAL -- Cond MT-SDT2

}

-- TAG-SIB1-STOP

-- ASN1STOP

|  |
| --- |
| ***SIB1* field descriptions** |
| ***cellBarredATG***Value *barred* means that the cell is barred for connectivity to ATG, as defined in TS 38.304 [20]. Value *notBarred* means that the cell is allowed for connectivity to ATG. If not present, the UE considers the cell is not allowed for connectivity to ATG, as defined in TS 38.304 [20]. This field is only applicable to ATG-capable UEs. |
| ***cellBarred-eRedCap1Rx***Value *barred* means that the cell is barred for an eRedCap UE with 1 Rx branch, as defined in TS 38.304 [20]. This field is ignored by non-eRedCap UEs. |
| ***cellBarred-eRedCap2Rx***Value *barred* means that the cell is barred for an eRedCap UE with 2 Rx branches, as defined in TS 38.304 [20]. This field is ignored by non-eRedCap UEs. |
| ***cellBarredNES***The presence of this field indicates that the cell is allowed for UEs supporting NES cell DTX/DRX. |
| ***cellBarredNTN***Value *barred* means that the cell is barred for connectivity to NTN, as defined in TS 38.304 [20]. Value *notBarred* means that the cell is allowed for connectivity to NTN. If not present, the UE considers the cell is not allowed for connectivity to NTN, as defined in TS 38.304 [20]. This field is only applicable to NTN-capable UEs. |
| ***cellBarredRedCap1Rx***Value *barred* means that the cell is barred for a RedCap UE with 1 Rx branch, as defined in TS 38.304 [20]. This field is ignored by non-RedCap UEs. |
| ***cellBarredRedCap2Rx***Value *barred* means that the cell is barred for a RedCap UE with 2 Rx branches, as defined in TS 38.304 [20]. This field is ignored by non-RedCap UEs. |
| ***cellSelectionInfo***Parameters for cell selection related to the serving cell. |
| ***eCallOverIMS-Support***Indicates whether the cell supports eCall over IMS services as defined in TS 23.501 [32]. If absent, eCall over IMS is not supported by the network in the cell. |
| ***eDRX-AllowedIdle***The presence of this field indicates that extended DRX for CN paging is allowed in the cell for UEs in RRC\_IDLE or RRC\_INACTIVE. The UE shall stop using extended DRX for CN paging in RRC\_IDLE or RRC\_INACTIVE if *eDRX-AllowedIdle* is not present. |
| ***eDRX-AllowedInactive***The presence of *eDRX-AllowedInactive-r17* this field indicates that extended DRX cycle equal to or shorter than 10.24 s for RAN paging is allowed in the cell for UEs in RRC\_INACTIVE. The UE shall stop using extended DRX cycle equal to or shorter than 10.24 s for RAN paging in RRC\_INACTIVE if *eDRX-AllowedInactive-r17* is not present. The presence of *eDRX-AllowedInactive-r18* indicates that extended DRX cycle longer than 10.24 s for RAN paging is allowed in the cell for UEs in RRC\_INACTIVE. The UE shall stop using extended DRX cycle longer than 10.24 s for RAN paging in RRC\_INACTIVE if *eDRX-AllowedInactive-r18* is not present. |
| ***featurePriorities***Indicates priorities for features, such as (e)RedCap, Slicing, SDT, MSG1-Repetitions and MSG3-Repetitions for Coverage Enhancements. These priorities are used to determine which *FeatureCombinationPreambles* the UE shall use when a feature maps to more than one *FeatureCombinationPreambles*, as specified in TS 38.321 [3]. A lower value means a higher priority. The network does not signal the same priority for more than one feature. The network signals a priority for all feature that map to at least one *FeatureCombinationPreambles*. |
| ***halfDuplexRedCap-Allowed***The presence of this field indicates that the cell supports half-duplex FDD (e)RedCap UEs. |
| ***hsdn-Cell***This field indicates this is a HSDN cell as specified in TS 38.304 [20]. |
| ***hyperSFN***Indicates hyper SFN which increments by one when the SFN wraps around. This field is excluded when determining changes in system information, i.e. changes of hyper SFN should not result in system information change notifications. |
| ***idleModeMeasurementsEUTRA***This field indicates that a UE that is configured for EUTRA idle/inactive measurements shall perform the measurements while camping in this cell and report availability of these measurements when establishing or resuming a connection in this cell. If absent, a UE is not required to perform EUTRA idle/inactive measurements. |
| ***idleModeMeasurementsNR***This field indicates that a UE that is configured for NR idle/inactive measurements shall perform the measurements while camping in this cell and report availability of these measurements when establishing or resuming a connection in this cell. If absent, a UE is not required to perform NR idle/inactive measurements. |
| ***ims-EmergencySupport***Indicates whether the cell supports IMS emergency bearer services for UEs in limited service mode. If absent, IMS emergency call is not supported by the network in the cell for UEs in limited service mode. |
| ***intraFreqReselection-eRedCap***Controls cell selection/reselection to intra-frequency cells for eRedCap UEs when this cell is barred, or treated as barred by the eRedCap UE, as specified in TS 38.304 [20]. If not present, an eRedCap UE treats the cell as barred, i.e., the UE considers that the cell does not support eRedCap. |
| ***intraFreqReselectionRedCap***Controls cell selection/reselection to intra-frequency cells for RedCap UEs when this cell is barred, or treated as barred by the RedCap UE, as specified in TS 38.304 [20]. If not present, a RedCap UE treats the cell as barred, i.e.,the UE considers that the cell does not support RedCap. |
| ***mobileIAB-Cell***The presence of this field indicates that this is a mobile IAB cell. |
| ***musim-CapRestrictionAllowed***Indicates the UE is allowed to send the *musim-CapRestrictionInd* in *RRCSetupComplete* and *RRCResumeComplete* messages. |
| ***ncr-Support***This field combines both the support of NCR and the cell status for NCR. If the field is present, the cell supports NCR and the cell is also considered as a candidate for cell (re)selection for NCR-node; if the field is absent, the cell does not support NCR and/or the cell is barred for NCR-node. |
| ***nonServingCellMII***Indicates whether the *MBSInterestIndication* message for MBS broadcast reception on a non-serving cell is allowed to be transmitted to the serving gNB. |
| ***q-QualMin***Parameter "Qqualmin" in TS 38.304 [20], applicable for serving cell. If the field is absent, the UE applies the (default) value of negative infinity for Qqualmin.  |
| ***q-QualMinOffset***Parameter "Qqualminoffset" in TS 38.304 [20]. Actual value Qqualminoffset = field value [dB]. If the field is absent, the UE applies the (default) value of 0 dB for Qqualminoffset.Affects the minimum required quality level in the cell. |
| ***q-RxLevMin***Parameter "Qrxlevmin" in TS 38.304 [20], applicable for serving cell. |
| ***q-RxLevMinOffset***Parameter "Qrxlevminoffset" in TS 38.304 [20]. Actual value Qrxlevminoffset = field value \* 2 [dB]. If absent, the UE applies the (default) value of 0 dB for Qrxlevminoffset*.* Affects the minimum required Rx level in the cell. |
| ***q-RxLevMinSUL***Parameter "Qrxlevmin" in TS 38.304 [20], applicable for serving cell. |
| ***sdt-DataVolumeThreshold***Data volume threshold used to determine whether SDT can be initiated, as specified in TS 38.321 [3]. Value *byte32* corresponds to 32 bytes, value *byte100* corresponds to 100 bytes, and so on. |
| ***sdt-LogicalChannelSR-DelayTimer***The value of *logicalChannelSR-DelayTimer* applied during SDT for logical channels configured with SDT, as specified in TS 38.321 [3]. Value in number of subframes. Value *sf20* corresponds to 20 subframes, *sf40* corresponds to 40 subframes, and so on. If *sdt-LogicalChannelSR-DelayTimer-r18* is absent and *sdt-LogicalChannelSR-DelayTimer-r17* is present then, the UE applies the value configured in *sdt-LogicalChannelSR-DelayTimer-r17* for this field. If this field is not configured, then logicalChannelSR-DelayTimer is not applied for SDT logical channels. |
| ***sdt-RSRP-Threshold***RSRP threshold used to determine whether SDT procedure can be initiated, as specified in TS 38.321 [3]. |
| ***sdt-RSRP-ThresholdMT***RSRP threshold used to determine whether MT-SDT procedure can be initiated, as specified in TS 38.321 [3]. If the field is absent, and the field *sdt-RSRP-Threshold* is present, the UE applies the value in the field *sdt-RSRP-Threshold*. |
| ***servingCellConfigCommon***Configuration of the serving cell. |
| ***t319a***Initial value of the timer T319a used for detection of SDT failure. Value *ms100* corresponds to 100 milliseconds, value *ms200* corresponds to 200 milliseconds and so on. If *t319a-r18* is absent, the UE applies the value configured in *t319a-r17.* |
| ***uac-AccessCategory1-SelectionAssistanceInfo***Information used to determine whether Access Category 1 applies to the UE, as defined in TS 22.261 [25]. If *plmnCommon* is chosen, the *UAC-AccessCategory1-SelectionAssistanceInfo* is applicable to all the PLMNs and SNPNs in *plmn-IdentityInfoList* and *npn-IdentityInfoList*. If *individualPLMNList* is chosen, the 1st entry in the list corresponds to the first network within all of the PLMNs and SNPNs across the *plmn-IdentityList* and the *npn-IdentityInfoList*, the 2nd entry in the list corresponds to the second network within all of the PLMNs and SNPNs across the *plmn-IdentityList* and the *npn-IdentityInfoList* and so on. If *uac-AC1-SelectAssistInfo-r16* is present, the UE shall ignore the *uac-AccessCategory1-SelectionAssistanceInfo*. |
| ***uac-AC1-SelectAssistInfo***Information used to determine whether Access Category 1 applies to the UE, as defined in TS 22.261 [25]. The 1st entry in the list corresponds to the first network within all of the PLMNs and SNPNs across the *plmn-IdentityList* and *npn-IdentityInfoList*, the 2nd entry in the list corresponds to the second network within all of the PLMNs and SNPNs across the *plmn-IdentityList* and the *npn-IdentityInfoList* and so on. Value *notConfigured* indicates that Access Category1 is not configured for the corresponding PLMN/SNPN. |
| ***uac-BarringForCommon***Common access control parameters for each access category. Common values are used for all PLMNs/SNPNs, unless overwritten by the PLMN/SNPN specific configuration provided in *uac-BarringPerPLMN-List*. The parameters are specified by providing an index to the set of configurations (*uac-BarringInfoSetList*). UE behaviour upon absence of this field is specified in clause 5.3.14.2. |
| ***ue-TimersAndConstants***Timer and constant values to be used by the UE. The cell operating as PCell always provides this field. |
| ***useFullResumeID***Indicates which resume identifier and Resume request message should be used. UE uses *fullI-RNTI* and *RRCResumeRequest1* if the field is present, or *shortI-RNTI* and *RRCResumeRequest* if the field is absent. |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *EDRX-RC* | The field is optionally present, Need R, in a cell that enables *eDRX-AllowedIdle*, otherwise it is absent. |
| *MINT* | The field is optionally present, Need R, in a cell that provides a configuration for disaster roaming, otherwise it is absent, Need R. |
| *MT-SDT1* | This field is optionally present, Need S, in a cell that supports MT-SDT if *sdt-ConfigCommon-r17* is not present, otherwise it is absent. |
| *MT-SDT2* | This field is mandatory present in a cell that supports MT-SDT if *sdt-ConfigCommon-r17* is not present, otherwise it is absent. |
| *Standalone* | The field is mandatory present in a cell that supports standalone operation, otherwise it is absent. |

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

– *PosSI-SchedulingInfo*

-- ASN1START

-- TAG-POSSI-SCHEDULINGINFO-START

PosSI-SchedulingInfo-r16 ::= SEQUENCE {

 posSchedulingInfoList-r16 SEQUENCE (SIZE (1..maxSI-Message)) OF PosSchedulingInfo-r16,

 posSI-RequestConfig-r16 SI-RequestConfig OPTIONAL, -- Cond MSG-1

 posSI-RequestConfigSUL-r16 SI-RequestConfig OPTIONAL, -- Cond SUL-MSG-1

 ...,

 [[

 posSI-RequestConfigRedCap-r17 SI-RequestConfig OPTIONAL -- Cond REDCAP-MSG-1

 ]]

}

PosSchedulingInfo-r16 ::= SEQUENCE {

 offsetToSI-Used-r16 ENUMERATED {true} OPTIONAL, -- Need R

 posSI-Periodicity-r16 ENUMERATED {rf8, rf16, rf32, rf64, rf128, rf256, rf512},

 posSI-BroadcastStatus-r16 ENUMERATED {broadcasting, notBroadcasting},

 posSIB-MappingInfo-r16 PosSIB-MappingInfo-r16,

 ...

}

PosSIB-MappingInfo-r16 ::= SEQUENCE (SIZE (1..maxSIB)) OF PosSIB-Type-r16

PosSIB-Type-r16 ::= SEQUENCE {

 encrypted-r16 ENUMERATED { true } OPTIONAL, -- Need R

 gnss-id-r16 GNSS-ID-r16 OPTIONAL, -- Need R

 sbas-id-r16 SBAS-ID-r16 OPTIONAL, -- Cond GNSS-ID-SBAS

 posSibType-r16 ENUMERATED { posSibType1-1, posSibType1-2, posSibType1-3, posSibType1-4, posSibType1-5, posSibType1-6,

 posSibType1-7, posSibType1-8, posSibType2-1, posSibType2-2, posSibType2-3, posSibType2-4,

 posSibType2-5, posSibType2-6, posSibType2-7, posSibType2-8, posSibType2-9, posSibType2-10,

 posSibType2-11, posSibType2-12, posSibType2-13, posSibType2-14, posSibType2-15,

 posSibType2-16, posSibType2-17, posSibType2-18, posSibType2-19, posSibType2-20,

 posSibType2-21, posSibType2-22, posSibType2-23, posSibType3-1, posSibType4-1,

 posSibType5-1,posSibType6-1, posSibType6-2, posSibType6-3,... },

 areaScope-r16 ENUMERATED {true} OPTIONAL -- Need S

}

GNSS-ID-r16 ::= SEQUENCE {

 gnss-id-r16 ENUMERATED{gps, sbas, qzss, galileo, glonass, bds, ..., navic-v1760},

 ...

}

SBAS-ID-r16 ::= SEQUENCE {

 sbas-id-r16 ENUMERATED { waas, egnos, msas, gagan, ...},

 ...

}

-- TAG-POSSI-SCHEDULINGINFO-STOP

-- ASN1STOP

|  |
| --- |
| ***PosSI-SchedulingInfo* field descriptions** |
| ***areaScope***Indicates that a posSIB is area specific. If the field is absent, the posSIB is cell specific. |
| ***encrypted***The presence of this field indicates that the *pos-sib-type* is encrypted as specified in TS 37.355 [49]. |
| ***gnss-id***The presence of this field indicates that the positioning SIB type is for a specific GNSS. Indicates a specific GNSS (see also TS 37.355 [49]) |
| ***posSI-BroadcastStatus***Indicates if the SI message is being broadcasted or not. Change of *posSI-BroadcastStat*us should not result in system information change notifications in Short Message transmitted with P-RNTI over DCI (see clause 6.5). The value of the indication is valid until the end of the BCCH modification period when set to *broadcasting*.If *si-SchedulingInfo-v1700* is present, the network ensures that the total number of SI messages with *posSI-BroadcastStatus*and *si-BroadcastStatus*set to *notBroadcasting* in the concatenated list of SI messages configured by *posSchedulingInfoList* in *posSI-SchedulingInfo* and SI messages containing type2 SIB configured by *schedulingInfoList2* in *si-SchedulingInfo-v1700* does not exceed the limit of *maxSI-Message* when *posSI-RequestConfig* or *posSI-RequestConfigRedCap* or *posSI-RequestConfigSUL* is configured. |
| ***posSI-RequestConfig***Configuration of Msg1 resources that the UE uses for requesting SI-messages for which *posSI-BroadcastStatus* is set to notBroadcasting. |
| ***posSI-RequestConfigMSG1-Repetition***Configuration of Msg1 repetition resources on NUL that the UE uses for requesting SI-messages for which posSI-BroadcastStatus is set to *notBroadcasting*. This field is only applicable when Msg1 repetition resources can be used for requesting SI-messages. |
| ***posSI-RequestConfigRedCap***Configuration of Msg1 resources for *initialUplinkBWP-RedCap*that the (e)RedCap UE uses for requesting SI-messages for which *posSI-BroadcastStatus* is set to *notBroadcasting*. |
| ***posSI-RequestConfigRedCap-MSG1-Repetition***Configuration of Msg1 repetition resources for *initialUplinkBWP-RedCap*that the RedCap UE uses for requesting SI-messages for which *posSI-BroadcastStatus* is set to *notBroadcasting*. This field is only applicable when Msg1 repetition resources can be used for requesting SI-messages. |
| ***posSI-RequestConfigSUL***Configuration of Msg1 resources that the UE uses for requesting SI-messages for which *posSI-BroadcastStatus* is set to notBroadcasting. |
| ***posSI-RequestConfigSUL-MSG1-Repetition***Configuration of Msg1 repetition resources on SUL that the UE uses for requesting SI-messages for which *posSI-BroadcastStatus* is set to *notBroadcasting*. This field is only applicable when Msg1 repetition resources can be used for requesting SI-messages. |
| ***posSIB-MappingInfo***List of the posSIBs mapped to this *SystemInformation* message. |
| ***posSibType***The positioning SIB type is defined in TS 37.355 [49]. |
| ***posSI-Periodicity***Periodicity of the SI-message in radio frames, such that rf8 denotes 8 radio frames, rf16 denotes 16 radio frames, and so on. If the *offsetToSI-Used* is configured, the *posSI-Periodicity* of rf8 cannot be used. |
| ***offsetToSI-Used***This field, if present indicates that all the SI messages in *posSchedulingInfoList* are scheduled with an offset of 8 radio frames compared to SI messages in *schedulingInfoList*. *offsetToSI-Used* may be present only if the shortest configured SI message periodicity for SI messages in *schedulingInfoList* is 80ms. If SI offset is used, this field is present in each of the SI messages in the *posSchedulingInfoList*. |
| ***sbas-id***The presence of this field indicates that the positioning SIB type is for a specific SBAS. Indicates a specific SBAS (see also TS 37.355 [49]). |

| **Conditional presence** | **Explanation** |
| --- | --- |
| *GNSS-ID-SBAS* | The field is mandatory present if *gnss-id* is set to *sbas*. It is absent otherwise. |
| *MSG-1* | The field is optionally present, Need R, if *posSI-BroadcastStatus* is set to *notBroadcasting* for any SI-message included in *posSchedulingInfoList* or if *si-BroadcastStatus* is set to *notBroadcasting* for any SI-message containing type2 SIB included in *schedulingInfoList2*. It is absent otherwise. |
| *SUL-MSG-1* | The field is optionally present, Need R, if *supplementaryUplink* is configured in *ServingCellConfigCommonSIB,* and if *posSI-BroadcastStatus* is set to *notBroadcasting* for any SI-message included in *posSchedulingInfoList* or if *si-BroadcastStatus* is set to *notBroadcasting* for anySI-message containing type2 SIB included in *schedulingInfoList2*. It is absent otherwise. |
| *REDCAP-MSG-1* | The field is optionally present, Need R, if *initialUplinkBWP-RedCap* is configured in *UplinkConfigCommonSIB,* and if *posSI-BroadcastStatus* is set to *notBroadcasting* for any SI-message included in *posSchedulingInfoList* or if *si-BroadcastStatus* is set to *notBroadcasting* for anySI-message containing type2 SIB included in *schedulingInfoList2*. It is absent otherwise. |

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

– *SI-SchedulingInfo*

The IE *SI-SchedulingInfo* contains information needed for acquisition of SI messages.

***SI-SchedulingInfo* information element**

-- ASN1START

-- TAG-SI-SCHEDULINGINFO-START

SI-SchedulingInfo ::= SEQUENCE {

 schedulingInfoList SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo,

 si-WindowLength ENUMERATED {s5, s10, s20, s40, s80, s160, s320, s640, s1280, s2560-v1710, s5120-v1710 },

 si-RequestConfig SI-RequestConfig OPTIONAL, -- Cond MSG-1

 si-RequestConfigSUL SI-RequestConfig OPTIONAL, -- Cond SUL-MSG-1

 systemInformationAreaID BIT STRING (SIZE (24)) OPTIONAL, -- Need R

 ...

}

SchedulingInfo ::= SEQUENCE {

 si-BroadcastStatus ENUMERATED {broadcasting, notBroadcasting},

 si-Periodicity ENUMERATED {rf8, rf16, rf32, rf64, rf128, rf256, rf512},

 sib-MappingInfo SIB-Mapping

}

SI-SchedulingInfo-v1700 ::= SEQUENCE {

 schedulingInfoList2-r17 SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo2-r17,

 dummy SI-RequestConfig OPTIONAL

}

SI-SchedulingInfo-v1740 ::= SEQUENCE {

 si-RequestConfigRedCap-r17 SI-RequestConfig OPTIONAL -- Cond REDCAP-MSG-1

}

SchedulingInfo2-r17 ::= SEQUENCE {

 si-BroadcastStatus-r17 ENUMERATED {broadcasting, notBroadcasting},

 si-WindowPosition-r17 INTEGER (1..256),

 si-Periodicity-r17 ENUMERATED {rf8, rf16, rf32, rf64, rf128, rf256, rf512},

 sib-MappingInfo-r17 SIB-Mapping-v1700

}

SIB-Mapping ::= SEQUENCE (SIZE (1..maxSIB)) OF SIB-TypeInfo

SIB-Mapping-v1700 ::= SEQUENCE (SIZE (1..maxSIB)) OF SIB-TypeInfo-v1700

SIB-TypeInfo ::= SEQUENCE {

 type ENUMERATED {sibType2, sibType3, sibType4, sibType5, sibType6, sibType7, sibType8, sibType9,

 sibType10-v1610, sibType11-v1610, sibType12-v1610, sibType13-v1610,

 sibType14-v1610, spare3, spare2, spare1,... },

 valueTag INTEGER (0..31) OPTIONAL, -- Cond SIB-TYPE

 areaScope ENUMERATED {true} OPTIONAL -- Need S

}

SIB-TypeInfo-v1700 ::= SEQUENCE {

 sibType-r17 CHOICE {

 type1-r17 ENUMERATED {sibType15, sibType16, sibType17, sibType18, sibType19, sibType20, sibType21,

 sibType22-v1800, sibType23-v1800 ,sibType24-v1800, sibType25-v1800,

 spare5, spare4, spare3, spare2, spare1,...},

 type2-r17 SEQUENCE {

 posSibType-r17 ENUMERATED {posSibType1-9, posSibType1-10, posSibType2-24, posSibType2-25,

 posSibType6-4, posSibType6-5, posSibType6-6, posSibType2-17a-v1770,

 posSibType2-18a-v1770, posSibType2-20a-v1770, posSibType1-11-v1800,

 posSibType1-12-v1800, posSibType2-26-v1800, posSibType2-27-v1800,

 spare2, spare1,...},

 encrypted-r17 ENUMERATED { true } OPTIONAL, -- Need R

 gnss-id-r17 GNSS-ID-r16 OPTIONAL, -- Need R

 sbas-id-r17 SBAS-ID-r16 OPTIONAL -- Cond GNSS-ID-SBAS

 }

 },

 valueTag-r17 INTEGER (0..31) OPTIONAL, -- Cond NonPosSIB

 areaScope-r17 ENUMERATED {true} OPTIONAL -- Need S

}

-- TAG-SI-SCHEDULINGINFO-STOP

-- ASN1STOP

|  |
| --- |
| ***SchedulingInfo* field descriptions** |
| ***areaScope***Indicates that a SIB is area specific. If the field is absent, the SIB is cell specific. |
| ***si-BroadcastStatus***Indicates if the SI message is being broadcasted or not. Change of *si-BroadcastStat*us should not result in system information change notifications in Short Message transmitted with P-RNTI over DCI (see clause 6.5). The value of the indication is valid until the end of the BCCH modification period when set to *broadcasting.* When *SIB19* is scheduled in an NTN cell, the *si-BroadcastStatus* for the mapped *SIB19* is set to *broadcasting*.If *si-SchedulingInfo-v1700* is present, the network ensures that the total number of SI messages with *si-BroadcastStatus* set to *notBroadcasting* in the list of concatenated SI messages configured by *schedulingInfoList* in *si-SchedulingInfo* and SI messages containing type1 SIB configured by *schedulingInfoList2* in *si-SchedulingInfo-v1700* does not exceed the limit of *maxSI-Message* when *si-RequestConfig*, *si-RequestConfigRedCap* or *si-RequestConfigSUL* is configured. |
| ***si-Periodicity***Periodicity of the SI-message in radio frames. Value *rf8* corresponds to 8 radio frames, value *rf16* corresponds to 16 radio frames, and so on. |

|  |
| --- |
| ***SI-SchedulingInfo* field descriptions** |
| ***dummy***This field is not used in this specification. If received, it is ignored by the UE. |
| ***si-RequestConfig***Configuration of Msg1 resources that the UE uses for requesting SI-messages for which *si-BroadcastStatus* is set to *notBroadcasting*. |
| ***si-RequestConfigMSG1-Repetition***Configuration of Msg1 repetition resources on NUL that the UE uses for requesting SI-messages for which *si-BroadcastStatus* is set to *notBroadcasting*. This field is only applicable when Msg1 repetition resources can be used for requesting SI-messages. |
| ***si-RequestConfigRedCap***Configuration of Msg1 resources for *initialUplinkBWP-RedCap*that the (e)RedCap UE uses for requesting SI-messages for which *si-BroadcastStatus* is set to *notBroadcasting*. |
| ***si-RequestConfigRedCap-MSG1-Repetition***Configuration of Msg1 repetition resources for *initialUplinkBWP-RedCap*that the RedCap UE uses for requesting SI-messages for which *si-BroadcastStatus* is set to *notBroadcasting*. This field is only applicable when Msg1 repetition resources can be used for requesting SI-messages. |
| ***si-RequestConfigSUL***Configuration of Msg1 resources that the UE uses for requesting SI-messages for which *si-BroadcastStatus* is set to *notBroadcasting*. |
| ***si-RequestConfigSUL-MSG1-Repetition***Configuration of Msg1 repetition resources on SUL that the UE uses for requesting SI-messages for which *si-BroadcastStatus* is set to *notBroadcasting*. This field is only applicable when Msg1 repetition resources can be used for requesting SI-messages. |
| ***si-WindowLength***The length of the SI scheduling window. Value *s5* corresponds to 5 slots, value *s10* corresponds to 10 slots and so on. The network always configures *si-WindowLength* to be shorter than or equal to the *si-Periodicity*. The values *s2560-v1710* and *s5120-v1710* are only applicable for SCS 480 kHz. |
| ***systemInformationAreaID***Indicates the system information area that the cell belongs to, if any. Any SIB with *areaScope* within the SI is considered to belong to this *systemInformationAreaID*. The systemInformationAreaID is unique within a PLMN/SNPN. |

|  |
| --- |
| ***SchedulingInfo2* field descriptions** |
| ***encrypted***The presence of this field indicates that the pos-sib-type is encrypted as specified in TS 37.355 [49]. |
| ***gnss-id***The presence of this field indicates that the positioning SIB type is for a specific GNSS. Indicates a specific GNSS (see also TS 37.355 [49]) |
| ***posSibType***The posSIBs as defined in TS 37.355 [49] mapped to SI for scheduling using*schedulingInfoList2*.  |
| ***sbas-id***The presence of this field indicates that the positioning SIB type is for a specific SBAS. Indicates a specific SBAS (see also TS 37.355 [49]). |
| ***si-WindowPosition***This field indicates the SI window position of the associated SI-message. The network provides *si-WindowPosition* in an ascending order, i.e. *si-WindowPosition* in the subsequent entry in *schedulingInfoList2* has always value higher than in the previous entry of *schedulingInfoList2*. The network configures this field in a way that ensures that SI messages scheduled by *schedulingInfoList* and/or *posSchedulingInfoList* do not overlap with SI messages scheduled by *schedulingInfoList2*. |
| ***sib-MappingInfo***Indicates which SIBs or posSIBs are contained in the SI message. |
| ***sibType***The type of SIB(s) mapped to SI for scheduling using*schedulingInfoList2*. Value *type1* indicates SIBs and value *type2* indicates posSIBs. |

| **Conditional presence** | **Explanation** |
| --- | --- |
| *GNSS-ID-SBAS* | The field is mandatory present if *gnss-id* is set to *sbas*. It is absent otherwise. |
| *MSG-1* | The field is optionally present, Need R, if *si-BroadcastStatus* is set to *notBroadcasting* for any SI-message included in *schedulingInfoList* oranySI-message containing type1 SIB included in *schedulingInfoList2*. It is absent otherwise. |
| *SIB-TYPE* | The field is mandatory present if the SIB type is different from *SIB6*, *SIB7* or *SIB8*. For *SIB6*, *SIB7* and *SIB8* it is absent. |
| *NonPosSIB* | The field is mandatory present if the SIB type is *type1*. For *type2* it is absent. |
| *SUL-MSG-1* | The field is optionally present, Need R, if *supplementaryUplink* is configured in *ServingCellConfigCommonSIB* and if *si-BroadcastStatus* is set to *notBroadcasting* for any SI-message included in *schedulingInfoList* oranySI-message containing type1 SIB included in *schedulingInfoList2*. It is absent otherwise. |
| *REDCAP-MSG-1* | The field is optionally present, Need R, if *initialUplinkBWP-RedCap* is configured in *UplinkConfigCommonSIB* and if *si-BroadcastStatus* is set to *notBroadcasting* for any SI-message included in *schedulingInfoList* oranySI-message containing type1 SIB included in *schedulingInfoList2*. It is absent otherwise. |

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

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

– *FeatureCombination*

The IE *FeatureCombination* indicates a feature or a combination of features to be associated with a set of Random Access resources (i.e. an instance of *FeatureCombinationPreambles*).

***FeatureCombination* information element**

-- ASN1START

-- TAG-FEATURECOMBINATION-START

FeatureCombination-r17 ::= SEQUENCE {

 redCap-r17 ENUMERATED {true} OPTIONAL, -- Need R

 smallData-r17 ENUMERATED {true} OPTIONAL, -- Need R

 nsag-r17 NSAG-List-r17 OPTIONAL, -- Need R

 msg3-Repetitions-r17 ENUMERATED {true} OPTIONAL, -- Need R

 msg1-Repetitions-r18 ENUMERATED {true} OPTIONAL, -- Need R

 eRedCap-r18 ENUMERATED {true} OPTIONAL, -- Need R

 onDemandSI-Req-r18 OnDemandSI-ReqMSG1-Repetition-r18 OPTIONAL, -- Need R

 onDemandPosSI-Req-r18 OnDemandSI-ReqMSG1-Repetition-r18 OPTIONAL -- Need R

}

NSAG-List-r17 ::= SEQUENCE (SIZE (1.. maxSliceInfo-r17)) OF NSAG-ID-r17

OnDemandSI-ReqMSG1-Repetition-r18 ::= SEQUENCE (SIZE (1..maxSI-Message)) OF MSG1-ReptitionNumber-r18

MSG1-RepetitionNumber-r18 ::= SEQUENCE {

 repNumber-r18 BIT STRING (SIZE (3)),

 ...

}

-- TAG-FEATURECOMBINATION-STOP

-- ASN1STOP

|  |
| --- |
| ***FeatureCombination* field descriptions** |
| ***eRedCap***If present, this field indicates that eRedCap is part of this feature combination. The fields *redCap* and *eRedCap* shall not be both set to *true*. If the UE is an eRedCap UE and there is no set of configured RA resources with *eRedCap* set to *true* among all sets of configured RA resources, the UE considers *redCap* to be applicable for random access procedure. This field is not configured in a set of preambles that is configured with 2-step random-access type. |
| ***msg1-Repetitions***If present, this field indicates that signalling of msg1 repetition is part of this feature combination. This field is not configured in a set of preambles that is configured with 2-step random-access type. |
| ***msg3-Repetitions***If present, this field indicates that signalling of msg3 repetition is part of this feature combination. This field is not configured in a set of preambles that is configured with 2-step random-access type. |
| ***nsag***If present, this field indicates NSAG(s) that are part of this feature combination. |
| ***redCap***If present, this field indicates that RedCap is part of this feature combination. |
| ***smallData***If present, this field indicates that Small Data is part of this feature combination. |
| ***onDemandSI-Req, onDemandPosSI-Req***If present, these field indicate that on-demand SI request for SI message or positioning SI message is part of this feature combination. In this release of the specification, these field is present only when the field *msg1-Repetitions* is configured. Feature combination of on-demandSI-req and redcap/eRedcap or on-demandPosSI-req and redcap/eRedcap cannot be configured for the RACH resource configured on SUL.If there is only one entry in the list, the configuration is used for all the SI messages or posSI messages for which *si-BroadcastStatus* or *posSI-BroadcastStatus* is set to *notBroadcasting*. Otherwise:* If *si*-*SchedulingInfo*-v1700 is not present, the 1st entry in the list corresponds to the first SI message in *schedulingInfoList* or *posSchedulingInfoList* for which si-*BroadcastStatus* or *posSI*-*BroadcastStatus* is set to *notBroadcasting*, 2nd entry in the list corresponds to the second SI message in *schedulingInfoList* or *posSchedulingInfoList* for which *si*-*BroadcastStatus* or *posSI*-*BroadcastStatus* is set to *notBroadcasting* and so on
* If si-SchedulingInfo-v1700 is present, for the field *on-demandSI-Req*
	+ The UE generates a list of concatenated SI messages by appending the SI messages containing type1 SIB configured by schedulingInfoList2 in *si*-*SchedulingInfo*-v1700 to the SI messages configured by *schedulingInfoList* in *si*-*SchedulingInfo*. The 1st entry in the list corresponds to the first SI message for which *si*-*BroadcastStatus* is set to *notBroadcasting*, 2nd entry in the list corresponds to the second SI message for which *si-BroadcastStatus* is set to *notBroadcasting* and so on
* If *si-ScheudlingInfo-v1700* is present, for the field *on-demandPosSI-Req*
	+ The UE generates a list of concatenated positioning SI messages by appending the positioning SI messages containing type2 SIB configured by *schedulingInfoList2* in *si-SchedulingInfo-v1700* to the positioning SI messages configured by *schedulingInfoList* in *si*-*SchedulingInfo*. The 1st entry in the list corresponds to the first positioning SI message for which *posSI-BroadcastStatus* is set to *notBroadcasting*, 2nd entry in the list corresponds to the second positioning SI message for which *posSI-BroadcastStatus* is set to *notBroadcasting* and so on
 |
| ***repNumber***This field indicates the number of message 1 repetitions. The first bit indicates that RACH resource with Msg1 repetition number equalling to 2 is configured for the SI/posSI message; the second bit indicates that RACH resource with Msg1 repetition number equalling to 4 is configured for the SI/posSI, and so on. |

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

# Annex B: Text proposal for MAC spec

==================================CHANGE BEGINS====================================

5.1.1b Selection of the set of Random Access resources for the Random Access procedure

The MAC entity shall:

1> if the BWP selected for Random Access procedure is configured with both set(s) of Random Access resources with *msg3-Repetitions* set to *true* and set(s) of Random Access resources without *msg3-Repetitions* set to *true* and the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdMsg3*; or

1> if the BWP selected for Random Access procedure is only configured with the set(s) of Random Access resources with *msg3-Repetitions* set to *true*:

2> assume Msg3 repetition is applicable for the current Random Access procedure.

1> else:

2> assume Msg3 repetition is not applicable for the current Random Access procedure.

1> if contention-free Random Access Resources have been provided for this Random Access procedure and a Msg1 repetition number is indicated in *rach-ConfigDedicated*:

2> assume Msg1 repetition is applicable and Msg1 repetition number applicable for the current Random Access procedure is the Msg1 repetition number indicated in *rach-ConfigDedicated*.

1> else if contention free Random Access Resources have not been provided for this Random Access procedure and the BWP selected for the Random Access procedure is configured with set(s) of Random Access resources with *msg1-Repetitions* set to *true* and set(s) of Random Access resources without *msg1-Repetitions* set to *true*:

2> if the BWP selected for the Random Access procedure is configured with set(s) of Random Access resources associated with Msg1 repetition number 8 and the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdMsg1-RepetitionNum8*:

3> assume Msg1 repetition is applicable and Msg1 repetition number applicable for the current Random Access procedure includes 8.

2> if the BWP selected for the Random Access procedure is configured with set(s) of Random Access resources associated with Msg1 repetition number 4 and the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdMsg1-RepetitionNum4*:

3> assume Msg1 repetition is applicable and Msg1 repetition number applicable for the current Random Access procedure includes 4.

2> if the BWP selected for the Random Access procedure is configured with set(s) of Random Access resources associated with Msg1 repetition number 2 and the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdMsg1-RepetitionNum2*:

3> assume Msg1 repetition is applicable and Msg1 repetition number applicable for the current Random Access procedure includes 2.

2> else if the RSRP of the downlink pathloss reference is not less than any configured *rsrp-ThresholdMsg1-RepetitionNumX*:

3> assume Msg1 repetition is not applicable for the current Random Access procedure.

1> else ifthe BWP selected for Random Access procedure is configured only with Random Access resources with *msg1-Repetitions* set to *true*:

2> assume Msg1 repetition is applicable for the current Random Access procedure;

2> if at least one of *rsrp-ThresholdMsg1-RepetitionNumX* is configured:

3> if *rsrp-ThresholdMsg1-RepetitionNum8* is configured and the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdMsg1-RepetitionNum8*;

4> assume Msg1 repetition number applicable for the current Random Access procedure includes 8.

3> if *rsrp-ThresholdMsg1-RepetitionNum4* is configured and the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdMsg1-RepetitionNum4*:

4> assume Msg1 repetition number applicable for the current Random Access procedure includes 4.

3> if *rsrp-ThresholdMsg1-RepetitionNum2* is configured and the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdMsg1-RepetitionNum2*:

4> assume Msg1 repetition number applicable for the current Random Access procedure includes 2.

3> else if the RSRP of the downlink pathloss reference is not less than any configured *rsrp-ThresholdMsg1-RepetitionNumX*:

4> assume Msg1 repetition number applicable for the current Random Access procedure is the lowest Msg1 repetition number configured for this BWP.

2> else (none of *rsrp-ThresholdMsg1-RepetitionNumX* is configured):

3> assume Msg1 repetition number applicable for the current Random Access procedure is the Msg1 repetition number that configured for this BWP.

NOTE 1: Void.

1> if neither contention-free Random Access Resources nor Random Access Resources for SI request without Msg1 repetition have been provided for this Random Access procedure and one or more of the features including (e)RedCap and/or Slicing and/or SDT and/or MSG3 repetition and/or MSG1 repetition and/or on-demand SI request and/or on-demand positioning SI request is applicable for this Random Access procedure:

NOTE 2: The applicability of SDT is determined by MAC entity according to clause 5.27. The applicability of *NSAG-ID* is determined by upper layers when the Random Access procedure is initiated. The applicability of (e)RedCap is also determined by upper layers when Random Access procedure is initiated and it is applicable to the Random Access procedures initiated by PDCCH orders and any Random Access procedure initiated by the MAC entity.

NOTE 3: SDT is not applicable for the Random Access procedure initiated by upper layers for MT-SDT.

2> if none of the sets of Random Access resources are available for any feature applicable to the current Random Access procedure (as specified in clause 5.1.1c):

3> select the set(s) of Random Access resources that are not associated with any feature indication (as specified in clause 5.1.1c) for this Random Access procedure.

2> else if there is one set of Random Access resources available which can be used for indicating all features triggering this Random Access procedure:

3> select this set of Random Access resources for this Random Access procedure.

2> else if there are more than one set of Random Access resources available which can be used for indicating all features triggering this Random Access procedure and Msg1 repetition is applicable for this Random Access procedure:

3> select the set of Random Access resources that associated with highest repetition number among the sets of Random Access resources.

2> else (i.e. there are one or more sets of Random Access resources available that are configured with indication(s) for a subset of all features triggering this Random Access procedure):

3> select a set of Random Access resources from the available set(s) of Random Access resources based on the priority order indicated by upper layers as specified in clause 5.1.1d for this Random Access Procedure.

1> else if contention-free Random Access Resources with Msg1 repetition have been provided for this Random Access procedure and Msg1 repetition number is indicated in *rach-ConfigDedicated*, and RedCap is applicable for the current Random Access procedure:

2> select the set of Random Access resources that is only configured with RedCap indication and Msg1 repetition indication and associated with the indicated Msg1 repetition number for this Random Access procedure.

1> else if contention-free Random Access Resources have been provided for this Random Access procedure and RedCap is applicable for the current Random Access procedure and there is one set of Random Access resources available that is only configured with RedCap indication; or

1> else if contention-free Random Access Resources have been provided for this Random Access procedure and eRedCap is applicable for the current Random Access procedure and there is one set of Random Access resources available that is only configured with eRedCap indication; or

1> else if contention-free Random Access Resources have been provided for this Random Access procedure and eRedCap is applicable for the current Random Access procedure and there is no set of Random Access resources available that is only configured with eRedCap indication and there is one set of Random Access resources available that is only configured with RedCap indication:

2> select this set of Random Access resources for this Random Access procedure.

1> else:

2> if the Random Access procedure is initiated by PDCCH order with DCI *PRACH association indicator* field set to 1 and *SSB-MTC-AdditionalPCI* is configured by upper layers, as specified in clause 7.3.1.2.1 of TS 38.212 [9]:

3> select the set of Random Access resources corresponding to the active *additionalPCI*.

2> else if contention-free Random Access Resources with Msg1 repetition have been provided for this Random Access procedure, and Msg1 repetition number is indicated in *rach-ConfigDedicated*:

3> select the set of Random Access resources that is only configured with Msg1 repetition indication and associated with the indicated Msg1 repetition number for this Random Access procedure.

2> else:

3> select the set of Random Access resources that are not associated with any feature indication (as specified in clause 5.1.1c) for the current Random Access procedure.

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

5.1.1c Availability of the set of Random Access resources

The MAC entity shall for each set of configured Random Access resources for 4-step RA type and for each set of configured Random Access resources for 2-step RA type:

1> if *eRedCap* is set to *true* for a set of Random Access resources:

2> consider the set of Random Access resources as not available for a Random Access procedure for which eRedCap is not applicable.

1> if *redCap* is set to *true* for a set of Random Access resources configured for 4-step RA type, but not for 2-step RA type:

2> consider the set of Random Access resources as not available for a Random Access procedure for which RedCap is not applicable.

1> if *redCap* is set to *true* for a set of Random Access resources configured for 2-step RA type regardless of whether it is also configured for 4-step RA type:

2> consider the set of Random Access resources as not available for a Random Access procedure for which (e)RedCap is not applicable;

2> consider eRedCap as both eRedCap and RedCap in the following procedure in clause 5.1.1c and 5.1.1d.

1> if *smallData* is set to *true* for a set of Random Access resources:

2> consider the set of Random Access resources as not available for the Random Access procedure which is not triggered for RA-SDT by MO-SDT as specified in TS 38.331 [5].

1> if *NSAG-List* is configured for a set of Random Access resources:

2> consider the set of Random Access resources as not available for the Random Access procedure unless it is triggered for any one of the *NSAG-ID*(s) in the *NSAG-List*.

1> if *msg3-Repetitions* is set to *true* for a set of Random Access resources:

2> consider the set of Random Access resources as not available for the Random Access procedure if Msg3 repetition is not applicable.

1> if *msg1-Repetitions* is set to *true* for a set of Random Access resources:

2> if Msg1 repetition is not applicable to the current Random Access procedure; or

2> if the set of Random Access resources is not associated with any of the Msg1 repetition number that is applicable to the current Random Access procedure:

3> consider the set of Random Access resources as not available for the Random Access procedure.

1> if *onDemandSI-Req* is set to *true* for a set of the Random Access resources:

2> consider the set of Random Access resources as not available for the Random Access procedure unless it is triggered for on-demand SI request for any one of the SI messages with a certain Msg1 repetition number.

1> if *onDemandPosSI-Req* is set to *true* for a set of Random Access resources:

2> consider the set of Random Access resources as not available for the Random Access procedure unless it is triggered for on-demand positioning SI request for any one of the posSI messages with a certain Msg1 repetition number.

1> if a set of Random Access resources is not configured with *FeatureCombination*:

2> consider the set of Random Access resources to not associated with any feature.

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