3GPP TSG-RAN WG2 #118-e Tdoc R2-2206822

Electronic meeting, 2022-05-09 - 2022-05-20

Agenda Item: 6.0.1

Source: Ericsson

Title: [Post118-e][023][NR17] RRC (Ericsson)

Document for: Discussion, Decision

# 1 Introduction

This document is to collect comments for this email discussion:

* [Post118-e][023][NR17] RRC (Ericsson)

Scope: Continue [AT118-e][023], take into account P1 from R2-2206567 and other general of cross-WI issues.

Intended outcome: Report if needed. Agreed CR

Deadline: Short

Draft CR “ASN1 review general corrections” and draft report is provided in the following folder:

<https://www.3gpp.org/ftp/Email_Discussions/RAN2/%5BRAN2%23118-e%5D/%5BPost118-e%5D%5B023%5D%5BNR17%5D%20RRC%20(Ericsson)>

This report collects companies’ comments on:

3.1 SI scheduling, resolve H589 and H591

3.2 Leftover from of [AT118-e][024][NR17] RRC II (Nokia)

3.3 Other comments on draft CR “ASN1 review general corrections”

Please respect the respect the Deadline Friday May 27, 1000 UTC.

# 2 Contact Information

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# 3 Discussion

## 3.1 SI scheduling, resolve H589 and H591

As part of TEI17; *schedulingInfoList2* has been introduced which provides the SI Scheduling information for the mapped SIBs/posSIBs that have been added from Rel-17.

In order to provide NW flexibility to allow mapping and scheduling of Rel-15/16 SIBs/posSIBs and Rel-17 SIBs/posSIBs in the same SI, one company proposed two alternative solutions:

1. To allow Rel-17 SIBs in legacy SIB type info (H589)
2. To allow indication of SI windows overlapping in time (i.e same SI-WindowPosition) of the SIs scheduled from *schedulingInfoList/posSchedulingInfoList* and *schedulingInfoList2*.

Alternatively, there is also RIL H591 which proposes that “The network always configures this field in a way which ensures that SI messages scheduled by *schedulingInfoList* and/or *posSchedulingInfoList* do not overlap with SI messages scheduled by *schedulingInfoList2”*

With respect to above RILs , the following 3 options are now under discussion:

**Option 1 (reject H589, agree same SI-WindowPosition Configuration):** Rel-17 SIBs/posSIBs are only scheduled in *schedulingInfoList2* and NW flexibility of overlapping indication as below is agreed:

If the SI window position for the SI message scheduled by *SchedulingInfo* or *PosSchedulingInfo* is the same as the SI window position for the SI message scheduled by *SchedulingInfo2, SchedulingInfo2* provides additional SIBs mapped into the SI message scheduled via *SchedulingInfo* or *PosSchedulingInfo*.

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| ***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*. If the SI window position for the SI message scheduled by *SchedulingInfo* or *PosSchedulingInfo* is the same as the SI window position for the SI message scheduled by *SchedulingInfo2, SchedulingInfo2* provides additional SIBs mapped into the SI message scheduled via *SchedulingInfo* or *PosSchedulingInfo*. |

**Option 2 (agree H589 and H591):** SIBs that were added as part of Rel-17 *SchedulingInfoList2* are also added in the legacy SIB-TypeInfo; *SchedulingInfo/PosSchedulingInfo*.

Note: However, the proposals for SI-Scheduling improvements which were drawn during RAN2-116e email discussion was based upon the principle that the same SIB/posSIB are not allowed to appear in different lists (R2-2200046).

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

}

|  |
| --- |
| ***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 always configures this field in a way which ensures that SI messages scheduled by *schedulingInfoList* and/or *posSchedulingInfoList* do not overlap with SI messages scheduled by *schedulingInfoList2* |

**Option 3 (reject H589, agree H591):** Rel-17 SIBs/posSIBs are only scheduled in *schedulingInfoList2*. As proposed in H591, a constraint in network configuration to ensure that SI messages scheduled by *schedulingInfoList* and/or *posSchedulingInfoList* do not overlap with SI messages scheduled by *schedulingInfoList2*.

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| ***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 always configures this field in a way which ensures that SI messages scheduled by *schedulingInfoList* and/or *posSchedulingInfoList* do not overlap with SI messages scheduled by *schedulingInfoList2* |

**Q3.1: Please provide your comments and preferred option here:**

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| --- | --- | --- |
| Company | Option (1/2/3) | Comments |
| Ericsson | Option 3 | We prefer Option 3 for overall simplicity.   * Option 1 is not clear. It is very difficult to comprehend with the only added sentence. The SI mapping is clarified but SI scheduling impact is not clear. It would be difficult at the implementation stage and can lead to misunderstanding or incorrect implementation. As such the field description should not have the “if” condition. * Option 2 was already ruled out during TEI17 email discussion. It is also cumbersome for spec maintenance as any change/update in SIB has to be performed at two different places; besides the main drawback of added implementation and verification effort. |
| Huawei, HiSilicon | Option 2 or option 1 | Firstly on the note added by the rapporteur: “Note: However, the proposals for SI-Scheduling improvements which were drawn during RAN2-116e email discussion was based upon the principle that the same SIB/posSIB are not allowed to appear in different lists (R2-2200046).” As discussed during the meeting, this might have been an understanding from some companies, but not a common understanding. There is no explicit agreement on this (in contrast to LTE where this was actually discussed and agreed). In our understanding, unless explicitly agreed otherwise, the new SIBs should be added to the legacy SIB list during creation of the first version of the specifications for a new release.  Option 2 should be then the default behaviour, but option 1 can be acceptable if there is a strong requirement to avoid having the same SIBs in two lists as option 1 does not at least limit the SI scheduling flexibility and does not increase the signaling overhead unnecessarily.  Option 3 is too limiting in terms of SI scheduling flexibility and results in unnecessary overhead in most of the deployments.   1. It forces the network to use an additional SI message whenever any of Rel-17 (or beyond) SIBs needs to be broadcasted even in case it would easily fit into the existing SI message. 2. Not adding Rel-17 SIBs (and beyond) to the legacy list implies that if Rel-17 (or beyond) SIBs need to be broadcasted, at least one legacy SI message has to be also always provided (even if not needed), as SI-SchedulingInfo is always needed. This may be relevant, e.g. for MBS.   SI-SchedulingInfo ::=               SEQUENCE {      schedulingInfoList                  SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo,      si-WindowLength                     ENUMERATED {s5, s10, s20, s40, s80, s160, s320, s640, s1280},      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      ...  } |
| Qualcomm Incorporated | Option 3 | At least from our perspective, the introduction of SI offset mechanism itself was acceptable to us with the form of option 3 from the beginning. |
| Lenovo | Modified Option 3 | Both H589 and H591 can be rejected.  On H589: when the new R17 SI scheduling mechanism was agreed in RAN2#116bis-e, it was our understanding that from R17 onwards new SIBs/posSIBs can be scheduled only by the new schedulingInfoList2. Furthermore, the H589 itself is not fully clear to us:   * It is not suggested to allow scheduling of the R17 posSIBs in legacy posSchedulingInfoList-r16. So, for R17 posSIBs the implementation of schedulingInfoList2 seems not an issue. * If H589 gets agreed, then we wonder how much scheduling flexibility we want to allow a NW that supports schedulingInfoList2:   + Normal R17 SIBs can be scheduled only by using schedulingInfoList2.   + Normal R17 SIBs can be scheduled by legacy schedulingInfoList (w/o suffix) and schedulingInfoList2. For instance, SIB15 by legacy schedulingInfoList and SIB16 by schedulingInfoList2. * Overall, our impression is that H589 targets only a very special R17 NW deployment scenario. We think that such special deployment scenarios need not to be addressed in RAN2 specs.   Furthermore, H591 suggests an unnecessary clarification since it is implied by the following in 38.331, subclause 5.2.1:  *Each SI message is associated with an SI-window and the SI-windows of different SI messages do not overlap.* |
| MediaTek | Option 3 | It is also our preference to support option 3 for simplicity. |
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Summary:

Only 5 companies expressed their preference. 4 companies preferred Option 3, one company preferred Option 1 or Option 2.

The rapporteur proposes to agree on Option 3 (which is also covered by the current draft CR):

**Option 3 (reject H589, agree H591):** Rel-17 SIBs/posSIBs are only scheduled in *schedulingInfoList2*. As proposed in H591, a constraint in network configuration to ensure that SI messages scheduled by *schedulingInfoList* and/or *posSchedulingInfoList* do not overlap with SI messages scheduled by *schedulingInfoList2*.

One company identified H591 suggests an unnecessary clarification since it is implied by the existing specification text.

The Rapporteur anyway sympathizes with H591, and suggests potential rewording can be discussed at next RAN2 meeting, based on company input.

1. Agreed to reject H589 and agree H591, and cover this in CR “ASN1 review general corrections”.

## 3.2 Leftover from of [AT118-e][024][NR17] RRC II (Nokia)

R2-2206567 [AT118-e][024][NR17] RRC II (Nokia) Nokia

* [024] P1: The following fields do not require Need S.

DMRS-BundlingPUCCH-Config::pucch-DMRS-Bundling

DMRS-BundlingPUCCH-Config:: pucch-WindowRestart

DMRS-BundlingPUSCH-Config::pusch-DMRS-Bundling

DMRS-BundlingPUSCH-Config:: pusch-WindowRestart

NR-DL-PRS-PDC-ResourceSet::timeGap

TAKE INTO ACCT in RRC General Discussion

The Rapporteur reports that this was not discussed in [AT118-e][023][NR17] RRC (Ericsson).

### 3.2.1 DMRS-BundlingPUCCH-Config

-- ASN1START

-- TAG-DMRS-BUNDLINGPUCCH-CONFIG-START

DMRS-BundlingPUCCH-Config-r17 ::= SEQUENCE {

pucch-DMRS-Bundling-r17 ENUMERATED {enabled} OPTIONAL, -- Need S

pucch-TimeDomainWindowLength-r17 INTEGER (2..8) OPTIONAL, -- Need S

pucch-WindowRestart-r17 ENUMERATED {enabled} OPTIONAL, -- Need S

pucch-FrequencyHoppingInterval-r17 ENUMERATED {s2, s4, s5, s10} OPTIONAL, -- Need S

...

}

-- TAG-DMRS-BUNDLINGPUCCH-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| *DMRS-BundlingPUCCH-Config* field descriptions |
| ***pucch-DMRS-Bundling***  Indicates whether DMRS bundling and time domain window for PUCCH are jointly enabled. If the field is absent, DMRS bundling and time domain window for PUCCH are jointly disabled. |
| ***pucch-FrequencyHoppingInterval***  Configures the number of consecutive slots for the UE to perform inter-slot frequency hopping with inter-slot bundling for PUCCH. When both inter-frequency hopping and DMRS bundling are enabled for PUCCH repetitions, the UE is expected to be configured with at least one *pucch-FrequencyHoppingInterval-r17* and *pucch-TimeDomainWindowLength-r17*. When DMRS bundling for PUCCH is enabled by *pucch-DMRS-Bundling-r17,* PUCCH frequency hopping interval is only determined by the configuration of PUCCH hopping interval if PUCCH hopping interval is configured. If the field is absent, the number of consecutive slots for the UE to perform inter-slot PUCCH frequency hopping is indicated by *pucch-TimeDomainWindowLength-r17.* |
| ***pucch-TimeDomainWindowLength***  Configures the length of a nominal time domain window in slots for DMRS bundling for PUCCH. The value shall not exceed the maximum duration defined in TS 38.101-1 [15] and TS 38.101-2 [39]. If this field is absent, the UE shall apply the default value that is the minimum value in the unit of consecutive slots of the time duration for the transmission of all PUCCH repetitions and the maximum duration defined in TS 38.101-1 [15] and TS 38.101-2 [39]. |
| ***pucch-WindowRestart***  Indicates whether UE bundles PUCCH DMRS remaining in a nominal time domain window after event(s) triggered by DCI or MAC CE that violate power consistency and phase continuity requirements is enabled. If the field is absent, PUCCH DMRS bundling remaining in a bundling window after event(s) triggered by DCI or MAC CE that violate power consistency and phase continuity requirements is disabled.  Note: Events, which are triggered by DCI or MAC CE, but regarded as semi-static events, e.g. frequency hopping, UL beam switching for multi-TRP operation, or other if defined, are excluded. |

The Rapporteur notes that the raised comments have not been reflected in the concerned WI CR (R2-2206410, “Correction for NR coverage enhancements”), agreed at #118e.

Since any potential impacts on not using Need S (but potentially Need R) for the above-list fields seems not have any impact on the ASN.1, the Rapporteur proposes that this is postponed to Aug meeting.

**Q3.2.1: Do you agree that discussion on alternatives to the use of Need S in the fields of DMRS-BundlingPUCCH-Config can be postponed to the RAN2 Aug meeting?**

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| --- | --- | --- |
| Company | Yes/No | Comments |
| Qualcomm Incorporated | Yes | Handling for pucch-DMRS-Bundling-r17 and pucch-WindowRestart-r17, i.e. change it to need R, could be easy one, but we agree it is a bit too late to address these items all together properly without introducing errors. |
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Summary:

One company responded positively to the Rapporteur’s suggestion.

1. Postpone resolving that the following fields do not require Need S to next RAN2 meeting:   
   DMRS-BundlingPUCCH-Config::pucch-DMRS-Bundling  
   DMRS-BundlingPUCCH-Config:: pucch-WindowRestart  
   DMRS-BundlingPUSCH-Config::pusch-DMRS-Bundling  
   DMRS-BundlingPUSCH-Config:: pusch-WindowRestart

### 3.2.2 NR-DL-PRS-PDC-ResourceSet::timeGap

*NR-DL-PRS-PDC-Info* information element

-- ASN1START

-- TAG-NR-DL-PRS-PDC-INFO-START

NR-DL-PRS-PDC-Info-r17 ::= SEQUENCE {

nr-DL-PRS-PDC-ResourceSet-r17 NR-DL-PRS-PDC-ResourceSet-r17 OPTIONAL, -- Need R

...

}

NR-DL-PRS-PDC-ResourceSet-r17 ::= SEQUENCE {

periodicityAndOffset-r17 NR-DL-PRS-Periodicity-and-ResourceSetSlotOffset-r17,

numSymbols-r17 ENUMERATED {n2, n4, n6, n12, spare4, spare3, spare2, spare1},

dl-PRS-ResourceBandwidth-r17 INTEGER (1..63),

dl-PRS-StartPRB-r17 INTEGER (0..2176),

resourceList-r17 SEQUENCE (SIZE (1..maxNrofPRS-ResourcesPerSet-r17)) OF NR-DL-PRS-Resource-r17,

repetitionFactor-r17 ENUMERATED {n2, n4, n6, n8, n16, n32, spare2, spare1} OPTIONAL, -- Need S

timeGap-r17 ENUMERATED {s1, s2, s4, s8, s16, s32, spare2, spare1} OPTIONAL, -- Need S

...

}

|  |
| --- |
| *NR-DL-PRS-PDC-ResourceSet* field descriptions |
| ***dl-PRS-ResourceBandwidth***  This field specifies the number of PRBs allocated for all the DL-PRS Resource (allocated DL-PRS bandwidth) in multiples of 4 PRBs in this resource set. All DL-PRS Resources of the DL-PRS-PDC Resource Set have the same bandwidth. Integer value 1 corresponds to 24 PRBs, value 2 corresponds to 28 PRBs, value 3 corresponds to 32 PRBs and so on. |
| ***dl-PRS-StartPRB***  This field specifies the start PRB index defined as offset with respect to subcarrier 0 in common resource block 0 for the DL-PRS Resource. All DL-PRS Resources of the DL-PRS-PDC Resource Set have the same value of dl-PRS-StartPRB. |
| ***numSymbols***  This field specifies the number of symbols per DL-PRS Resource within a slot. |
| ***periodicityAndOffset***  This field specifies the periodicity of DL-PRS allocation in slots and the slot offset with respect to SFN #0 slot #0 in the PCell where the DL-PRS-PDC Resource Set is configured (i.e., slot where the first DL-PRS Resource of DL-PRS-PDC Resource Set occurs). |
| ***repetitionFactor***  This field specifies how many times each DL-PRS Resource is repeated for a single instance of the DL-PRS Resource Set. It is applied to all resources of the DL-PRS Resource Set. Enumerated values n2, n4, n6, n8, n16, n32 correspond to 2, 4, 6, 8, 16, 32 resource repetitions, respectively. If this field is absent, the value for dl-PRS-*ResourceRepetitionFactor* is 1 (i.e., no resource repetition). |
| ***timeGap***  This field specifies the offset in units of slots between two repeated instances of a DL-PRS Resource corresponding to the same DL-PRS Resource ID within a single instance of the DL-PRS Resource Set. The time duration spanned by one DL-PRS Resource Set containing repeated DL-PRS Resources should not exceed the periodicity configured by *periodicityAndOffset*. The field is mandatory present, if *repetitionFactor* is present. Otherwise, it is not present. |

The Rapporteur notes that Need S can be avoided for the *timeGap-r17* if the *repetitionFactor-r17* and *timeGap-r17* are collected in a separate IE *RepFactorAndTimeGap*, as indicated below. This ensures the two fields are always either both present or both absent.

NR-DL-PRS-PDC-ResourceSet-r17 ::= SEQUENCE {

periodicityAndOffset-r17 NR-DL-PRS-Periodicity-and-ResourceSetSlotOffset-r17,

numSymbols-r17 ENUMERATED {n2, n4, n6, n12, spare4, spare3, spare2, spare1},

dl-PRS-ResourceBandwidth-r17 INTEGER (1..63),

dl-PRS-StartPRB-r17 INTEGER (0..2176),

resourceList-r17 SEQUENCE (SIZE (1..maxNrofPRS-ResourcesPerSet-r17)) OF NR-DL-PRS-Resource-r17,

repFactorAndTimeGap-r17 OPTIONAL, -- Need S

...

}

NR-DL-PRS-PDC-ResourceSet-r17 ::= SEQUENCE {

periodicityAndOffset-r17 NR-DL-PRS-Periodicity-and-ResourceSetSlotOffset-r17,

numSymbols-r17 ENUMERATED {n2, n4, n6, n12, spare4, spare3, spare2, spare1},

dl-PRS-ResourceBandwidth-r17 INTEGER (1..63),

dl-PRS-StartPRB-r17 INTEGER (0..2176),

resourceList-r17 SEQUENCE (SIZE (1..maxNrofPRS-ResourcesPerSet-r17)) OF NR-DL-PRS-Resource-r17,

repFactorAndTimeGap-r17 RepFactorAndTimeGap-r17 OPTIONAL, -- Need S

...

}

RepFactorAndTimeGap-r17 SEQUENCE {

repetitionFactor-r17 ENUMERATED {n2, n4, n6, n8, n16, n32, spare2, spare1},

timeGap-r17 ENUMERATED {s1, s2, s4, s8, s16, s32, spare2, spare1}

}

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| --- |
| *NR-DL-PRS-PDC-ResourceSet* field descriptions |
| ***dl-PRS-ResourceBandwidth***  This field specifies the number of PRBs allocated for all the DL-PRS Resource (allocated DL-PRS bandwidth) in multiples of 4 PRBs in this resource set. All DL-PRS Resources of the DL-PRS-PDC Resource Set have the same bandwidth. Integer value 1 corresponds to 24 PRBs, value 2 corresponds to 28 PRBs, value 3 corresponds to 32 PRBs and so on. |
| ***dl-PRS-StartPRB***  This field specifies the start PRB index defined as offset with respect to subcarrier 0 in common resource block 0 for the DL-PRS Resource. All DL-PRS Resources of the DL-PRS-PDC Resource Set have the same value of dl-PRS-StartPRB. |
| ***numSymbols***  This field specifies the number of symbols per DL-PRS Resource within a slot. |
| ***periodicityAndOffset***  This field specifies the periodicity of DL-PRS allocation in slots and the slot offset with respect to SFN #0 slot #0 in the PCell where the DL-PRS-PDC Resource Set is configured (i.e., slot where the first DL-PRS Resource of DL-PRS-PDC Resource Set occurs). |
| ***repFactorAndTimeGap***  If this field is absent, the value for r*epetitionFactor* is 1 (i.e., no resource repetition). |

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| *RepFactorAndTimeGap* field descriptions |
| ***repetitionFactor***  This field specifies how many times each DL-PRS Resource is repeated for a single instance of the DL-PRS Resource Set. It is applied to all resources of the DL-PRS Resource Set. Enumerated values n2, n4, n6, n8, n16, n32 correspond to 2, 4, 6, 8, 16, 32 resource repetitions, respectively. |
| ***timeGap***  This field specifies the offset in units of slots between two repeated instances of a DL-PRS Resource corresponding to the same DL-PRS Resource ID within a single instance of the DL-PRS Resource Set. The time duration spanned by one DL-PRS Resource Set containing repeated DL-PRS Resources should not exceed the periodicity configured by *periodicityAndOffset*. |

Since the Rapporteur’s proposal have ASN.1 impact, and therefore should be considered with respect to ASN.1 freeze, companies are asked to consider the following

**Q3.2.2: Companies are asked to consider the following options:**

**Option 1: To avoid Need S for *timeGap-r17*, introduce new IE *RepFactorAndTimeGap-r17***

**Option 2: Keep Need S for *timeGap-r17***

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| Company | Option1/Option2 | Comments |
| Qualcomm Incorporated | Option 1 |  |
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Summary: Only one company responded, positively to the Rapporteur’s proposal. The Rapporteur proposes to agree on Option 1.

1. To avoid Need S for timeGap-r17, introduce new IE RepFactorAndTimeGap-r17 in CR “ASN1 review general corrections”.

## 3.3 Other comments

**Q3.3: Please provide other comments on the draft CR, not related to 3.1 or 3.2:**

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| Company | Option (1/2) | Comments |
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Summary:

No other comments were received.

1. Agree CR “ASN1 review general corrections” in R2-2206084.

# 4 Conclusion

As result of this email discussion, the following is proposed

1. Agreed to reject H589 and agree H591, and cover this in CR “ASN1 review general corrections”.
2. Postpone resolving that the following fields do not require Need S to next RAN2 meeting:   
   DMRS-BundlingPUCCH-Config::pucch-DMRS-Bundling  
   DMRS-BundlingPUCCH-Config:: pucch-WindowRestart  
   DMRS-BundlingPUSCH-Config::pusch-DMRS-Bundling  
   DMRS-BundlingPUSCH-Config:: pusch-WindowRestart
3. To avoid Need S for timeGap-r17, introduce new IE RepFactorAndTimeGap-r17 in CR “ASN1 review general corrections”.
4. Agree CR “ASN1 review general corrections” in R2-2206084.