3GPP TSG RAN WG2 Meeting #109bis-e R2-200xxxx

**Electronic, 20th – 30th April 2020**

**Agenda item:** 6.0.1

**Source:** Huawei, HiSilicon

**Title:** Report from email discussion [AT109bis-e][066][NR RIL] DiscMail2

**Document for:**  Discussion and decision

# Introduction

This contribution summarizes the discussion and result of the email discussion below that took place during RAN2#109bis-e:

* [AT109bis-e][066][NR RIL] DiscMail2 (Huawei)

Scope: Discussion and implementation of review issues.

Wanted outcome: a) Agreed RIL Status update in the email discussion report b) Agreed ASN.1/procedure text proposal included in the email discussion report.  
After email discussion report is agreed, the TPs will be included in the ASN.1 Review file, for the continued ASN.1 review.

Deadline: Email discussion Stop at EOM, April 30 (short extension 1 week could be considered if needed).

In detail, the following issues from [1] and [2] were discussed in the email discussion:

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| --- | --- | --- |
| **RIL #** | **Issue** | **WI** |
| H232 | Extending the contents of IEs without extension markers used in a list using ToAddModList | Gen |
| I669 | It looks like a stored configuration in the UE and hence cannot be Need N. Use Need R or setupRelease with Need M if delta signalling is useful considering also future extensions. |  |
| H226 | searchSpaceGroupIdList-r16 in SearchSpace | NR-U |
| Z106 | Extension of SearchSpace.  Related to H232 | IIOT |
| O802 | controlResourceSetId-r16 should not be used when searchSpaceType is set to dci-Format2-6-r16 | Power Saving |
| S018 | The fields 'dci-Format2-5-v16xy' and 'mt-Specific-v16xy' cannot be added, as no extension marker is present.  Related to H232 | IAB |
| E087 | Add OPTIONAL –Need R for dci-Format2-5-v16xy. | IAB |
| E088 | Add OPTIONAL –Need R for mt-specific-v16xy. | IAB |
| I658 | These are present in different elements of a list and can’t be present in together. Not clear what this sentence is trying to say and doesn’t seem needed. See also I657 as the relative usage of the two versions of SearchSpace is not clear.  Related to H232 | URLLC |
| I659 | This is not the right place to capture the relationship between the two. Should be captured in the fields where the IEs are used. See also I657.  Related to H232 |  |

In this list, the WI field is set as in [1] and [2].

# Discussion

## RIL I657, I658, I659, S018, Extension of SearchSpace

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| **RIL #** | **Description** | **Proposed Change** |
| I657 | Similar issue above - is this part of the same list with total number of entries of both combined equal to 10? It has a common releaselist which seems to imply they are part of the same list. | Clarify how the legacy and new list work together. |
| I658 | These are present in different elements of a list and can’t be present in together. Not clear what this sentence is trying to say and doesn’t seem needed. See also I657 as the relative usage of the two versions of SearchSpace is not clear. | Delete sentence. |
| I659 | This is not the right place to capture the relationship between the two. Should be captured in the fields where the IEs are used. See also I657. | Remove condition. And clarify the relationship as captured in I657. |
| S018 | The fields 'dci-Format2-5-v16xy' and 'mt-Specific-v16xy' cannot be added, as no extension marker is present. | Instead, new SearchSpace IE (i.e. with '-v16xy' suffix) including searchSpaceType (only) has to be defined, and then parallel list of searchSpacesToAddModList and commonSearchSpaceList can be added under PDCCH-Config and PDCCH-ConfigCommon, respectively. |

The proposal in issue S018 is to create SearchSpace-v16xy to add there 'dci-Format2-5-v16xy' and 'mt-Specific-v16xy', but these fields are already in SearchSpace-v16xy, so there may actually not be anything to do.

In [3], there are possible changes in 2.1.1 to address the issues I657/I658/I58:

I657

|  |
| --- |
| ***searchSpacesToAddModList, searchSpacesToAddModList-r16***  List of UE specifically configured Search Spaces to add or modify. The configuration of a Search Space includes all parameters configured using *searchSpacesToAddModList* (without suffix) and/or using *searchSpacesToAddModList-r16* with the same value of *searchSpaceId*. The network configures at most 10 Search Spaces per BWP per cell (including UE-specific and common Search Spaces). |
| ***searchSpacesToReleaseList***  List of UE specifically configured Search Spaces to release. When a *searchSpaceId* is included in this field, the whole configuration of this Search Space is released. |

I658

|  |
| --- |
| ***controlResourceSetId***  The CORESET applicable for this SearchSpace. Value 0 identifies the common CORESET#0 configured in MIB and in *ServingCellConfigCommon*. Values 1..*maxNrofControlResourceSets-1* identify CORESETs configured in System Information or by dedicated signalling. The CORESETs with *non-zero controlResourceSetId* are configured in the same BWP as this *SearchSpace*. If the field *controlResourceSetId-r16* is configured in *SearchSpace-v16xy* for this SearchSpace, the UE shall ignore the *controlResourceSetId* (without suffix) in *SearchSpace*. |

I659

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| --- |
| ***searchSpaceType***  Indicates whether this is a common search space (present) or a UE specific search space as well as DCI formats to monitor for. For each Search Space, the network always configures either *searchSpaceType* (without suffix) or *searchSpaceType-r16*, (but not both). |

**Q1) Do you agree that there is no need to address S018?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
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**Q2) Do you agree that the above changes can accurately address I657/I658/I659?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
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## RIL H232, Z106 Extension of SearchSpace

In [3], in section 2.1.2, an alternative is shown so that only one structure, SearchSpace-r16 could be used to configure as SearchSpace, including all the legacy options and the new extensions. That structure could also include the missing extension markers. In such cases, the field shown above would be as follows:

|  |
| --- |
| ***searchSpacesToAddModList, searchSpacesToAddModList-r16***  List of UE specifically configured Search Spaces to add or modify. A *SearchSpace* added using *searchSpacesToAddModList* (without suffix) can only be modified using *searchSpacesToAddModList* (without suffix). A *SearchSpace* added using *searchSpacesToAddModList-r16* can only be modified using *searchSpacesToAddModList-r16*. The network configures at most 10 Search Spaces - taking into account Search Spaces configured using both versions of this field - per BWP per cell (including UE-specific and common Search Spaces). |
| ***searchSpacesToReleaseList***  List of UE specifically configured Search Spaces to release. This field can be used to release Search Spaces configured using *searchSpacesToAddModList* (without suffix) and/or using *searchSpacesToAddModList-r16*. |

|  |
| --- |
| ***controlResourceSetId***  The CORESET applicable for this SearchSpace. Value 0 identifies the common CORESET#0 configured in MIB and in *ServingCellConfigCommon*. Values 1..*maxNrofControlResourceSets-1* identify CORESETs configured in System Information or by dedicated signalling. The CORESETs with *non-zero controlResourceSetId* are configured in the same BWP as this *SearchSpace*. |

A simplified view of the structure (omittingvalues) is shown below

**SearchSpace-r16** ::= SEQUENCE {

searchSpaceId SearchSpaceId,

controlResourceSetId -r16 ControlResourceSetId-r16 OPTIONAL, -- Cond SetupOnly

monitoringSlotPeriodicityAndOffset CHOICE {} OPTIONAL, -- Cond Setup

duration INTEGER (2..2559) OPTIONAL, -- Need R

monitoringSymbolsWithinSlot BIT STRING (SIZE (14)) OPTIONAL, -- Cond Setup

nrofCandidates SEQUENCE {} OPTIONAL, -- Cond Setup

searchSpaceType CHOICE {

common SEQUENCE {

dci-Format0-0-AndFormat1-0 SEQUENCE {...} OPTIONAL, -- Need R

dci-Format2-0 SEQUENCE {...} OPTIONAL, -- Need R

dci-Format2-1 SEQUENCE {...} OPTIONAL, -- Need R

dci-Format2-2 SEQUENCE {...} OPTIONAL, -- Need R

dci-Format2-3 SEQUENCE {...} OPTIONAL, -- Need R

...

},

ue-Specific SEQUENCE {

dci-Formats ENUMERATED {},

dci-FormatsSL-r16 ENUMERATED {} OPTIONAL, -- Need R

dci-FormatsExt-r16 ENUMERATED {} OPTIONAL, -- Need N

searchSpaceGroupIdList-r16 SEQUENCE {} OPTIONAL, -- Need R

freqMonitorLocations-r16 BIT STRING () OPTIONAL, -- Need R

...

},

common-r16 SEQUENCE {

dci-Format2-4-r16 SEQUENCE {...},

dci-Format2-5-v16xy SEQUENCE {...},

dci-Format2-6-r16 SEQUENCE {...} OPTIONAL, -- Need R

...

},

mt-Specific-v16xy SEQUENCE {

dci-Formats-r16 ENUMERATED {formats2-0-And-2-5},

...

},

...

**}** OPTIONAL, -- Cond Setup

...

}

As explained in [3], compared with the non-critical extension method:

- it not possible to do delta signalling when switching from SearchSpace to SearchSpace-r16 for a given search space.

- the advantages would be that:

- it is generally simpler to specify, i.e. field description in the SearchSpace IE don't need any text to deal with interactions between the two fields

- it is possible to insert all extensions for Rel-16 in SearchSpace-r16 (instead of some extensions in SearchSpace and other extensions in SearchSpace-v16xy)

- it is possible to add the missing extension markers to make it possible to place future non-critical extensions directly in SearchSpace-r16, which is generally more readable and easier to maintain

Another flavour is proposed in Z106 below:

[**RIL]**: Z106 **[Delegate]**: Z(GY) **[WI]**:IIOT **[Class]**:2 **[Status]**: DiscMailWI **[TDoc]**: None **[Proposed Conclusion]**:   
**[Description]**: If we following the current structure, when adding search space with R16 specific search space type, both the SearchSpace and the SearchSpace-v16xy should be added with the searchSpaceId set to the same value. Another option is to introduce a SearchSpaceExt-r16, in which only the R16 specific configuration is included so that there is no need to repeat the searchSpaceId.

**[Proposed Change]**:   
(1)Introduce *SearchSpaceExt-v16xy*

SearchSpaceExt-v16xy ::= SEQUENCE {

controlResourceSetId-r16 ControlResourceSetId-r16 OPTIONAL, -- Cond SetupOnly2

searchSpaceType-r16 CHOICE {

common-r16 SEQUENCE {

dci-Format2-4-r16 SEQUENCE {

nrofCandidates-CI-r16 SEQUENCE {

aggregationLevel1 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel2 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel4 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel8 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel16 ENUMERATED {n1, n2} OPTIONAL -- Need R

},

...

},

dci-Format2-5-v16xy SEQUENCE {

nrofCandidates-IAB-r16 SEQUENCE {

aggregationLevel1-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel2-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel4-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel8-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel16-r16 ENUMERATED {n1, n2} OPTIONAL -- Need R

},

...

},

dci-Format2-6-r16 SEQUENCE {

...

} OPTIONAL, -- Need R

...

},

mt-Specific-v16xy SEQUENCE {

dci-Formats-r16 ENUMERATED {formats2-0-And-2-5},

...

}

} OPTIONAL -- Cond Setup2

}

(2)Change the presence condition for controlResourceSetId-16 from SetupOnly into Setuponly2:

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *Setup* | This field is mandatory present upon creation of a new *SearchSpace*. It is optionally present, Need M, otherwise. |
| *Setup2* | Either of searchSpaceType (without suffix) or searchSpaceType-r16 field is mandatory present upon creation of a new SearchSpace. The fields are optionally present, Need M, otherwise. |
| *SetupOnly* | This field is mandatory present upon creation of a new *SearchSpace*. It is absent, Need M, otherwise. |
| *SetupOnly2* | Either of *controlResourceSetId* (without suffix) or *controlResourceSetId* *-r16* field is mandatory present upon creation of a new *SearchSpace*. The fields are optionally present, Need M, otherwise. |

(3) Introduce *searchSpaceExtsToAddModList-r16* instead of *searchSpacesToAddModList-r16*:   
searchSpaceExtsToAddModList-r16 SEQUENCE(SIZE (1..10)) OF SearchSpaceExt-v16xy OPTIONAL, -- Need N

One noticeable difference is that this structure cannot be used to configure the legacy fields, i.e. is necessary to use the legacy structure for this.

Besides, the proposal (2) contradicts with I659, so it would need to be changed.

**Q3) Do you agree that the two above alternatives are technically feasible?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
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**Q4) Do you prefer to use non-critical extensions, as currently in 38.331 v16.0.0, possibly with corrections as in Q2, or do you prefer critical extensions as in one of the two above options?**

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| **Company** | **Critical/Non-critical** | **Additional comments** |
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**Q5) For critical extension, which of the two options above do you prefer? Option 1: SearchSpace-r16 can be used for any search space, Option 2: SearchSpaceExt-r16 is only for certain types of search spaces.**

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| --- | --- | --- |
| **Company** | **Option 1/Option 2** | **Additional comments** |
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## RIL I669

The issue is as below

SearchSpace ::= SEQUENCE {

-- Irrelevant fields skipped

searchSpaceType CHOICE {

common SEQUENCE {

dci-Format0-0-AndFormat1-0 SEQUENCE {

...

} OPTIONAL, -- Need R

dci-Format2-0 SEQUENCE {

nrofCandidates-SFI SEQUENCE {

aggregationLevel1 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel2 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel4 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel8 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel16 ENUMERATED {n1, n2} OPTIONAL -- Need R

},

...

} OPTIONAL, -- Need R

dci-Format2-1 SEQUENCE {

...

} OPTIONAL, -- Need R

dci-Format2-2 SEQUENCE {

...

} OPTIONAL, -- Need R

dci-Format2-3 SEQUENCE {

dummy1 ENUMERATED {sl1, sl2, sl4, sl5, sl8, sl10, sl16, sl20} OPTIONAL, -- Cond Setup

dummy2 ENUMERATED {n1, n2},

...

} OPTIONAL -- Need R

},

ue-Specific SEQUENCE {

dci-Formats ENUMERATED {formats0-0-And-1-0, formats0-1-And-1-1},

...,

[[

dci-FormatsSL-r16 ENUMERATED {formats0-0-And-1-0, formats0-1-And-1-1, formats3-0, formats3-1,

formats3-0-And-3-1} OPTIONAL, -- Need R

dci-FormatsExt-r16 ENUMERATED {formats0-1-And-1-1, formats0-2-And-1-2, formats0-1-And-1-1And-0-2-And-1-2}

OPTIONAL, -- Need N

searchSpaceGroupIdList-r16 SEQUENCE (SIZE (1.. 2)) OF INTEGER (0..1) OPTIONAL, -- Need R

freqMonitorLocations-r16 BIT STRING (SIZE (5)) OPTIONAL -- Need R

]]

}

} OPTIONAL -- Cond Setup2

}

**Q6) Do you agree to change the Need code to "Need R" or do you prefer a SetupRelease structure?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
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Issues #Z101, Z102 are related to the description of SIB1 reception and definition for selected NPN, see highlighted part in the procedure text of 5.2.2.4.2 below. The description of the issues is shown below.

## RIL O802 controlResourceSetId-r16 should not be used when searchSpaceType is set to dci-Format2-6-r16

The comment is as below:

SearchSpace-v16xy ::= SEQUENCE {

searchSpaceId SearchSpaceId,

controlResourceSetId-r16 ControlResourceSetId-r16 OPTIONAL, -- Cond SetupOnly

searchSpaceType-r16 CHOICE {

common-r16 SEQUENCE {

dci-Format2-4-r16 SEQUENCE {

nrofCandidates-CI-r16 SEQUENCE {

aggregationLevel1 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel2 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel4 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel8 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel16 ENUMERATED {n1, n2} OPTIONAL -- Need R

},

...

},

dci-Format2-5-v16xy SEQUENCE {

nrofCandidates-IAB-r16 SEQUENCE {

aggregationLevel1-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel2-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel4-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel8-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel16-r16 ENUMERATED {n1, n2} OPTIONAL -- Need R

},

...

},

dci-Format2-6-r16 SEQUENCE {

...

} OPTIONAL, -- Need R

...

},

mt-Specific-v16xy SEQUENCE {

dci-Formats-r16 ENUMERATED {formats2-0-And-2-5},

...

}

} OPTIONAL -- Cond Setup2

}

The difference between controlResourceSetId and controlResourceSetId-r16 is the range, 0 to 11 or 0 to 15. The comments seem to say that if searchSpaceType is set to dci-Format2-6-r16, then the range of controlResourceSetId should be 0 to 11.

If this is common understanding, this could be captured via a presence condition, in case SearchSpace-v16xy or SearchSpaceExt-r16 is used, or via a statement in the field description in case SearchSpace-r16 is used (depending on previous questions), so it is not proposed here to agree on a detailed solution.

**Q7) Do you agree that when searchSpaceType dci-Format2-6-r16, the range of controlResourceSet should be 0 to 11, i.e. the legacy range?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
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## RIL E87, E88

SearchSpace-v16xy ::= SEQUENCE {

searchSpaceId SearchSpaceId,

controlResourceSetId-r16 ControlResourceSetId-r16 OPTIONAL, -- Cond SetupOnly

searchSpaceType-r16 CHOICE {

common-r16 SEQUENCE {

dci-Format2-4-r16 SEQUENCE {

nrofCandidates-CI-r16 SEQUENCE {

aggregationLevel1 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel2 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel4 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel8 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel16 ENUMERATED {n1, n2} OPTIONAL -- Need R

},

...

},

dci-Format2-5-v16xy SEQUENCE {

nrofCandidates-IAB-r16 SEQUENCE {

aggregationLevel1-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel2-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel4-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel8-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R

aggregationLevel16-r16 ENUMERATED {n1, n2} OPTIONAL -- Need R

},

...

},

dci-Format2-6-r16 SEQUENCE {

...

} OPTIONAL, -- Need R

...

},

mt-Specific-v16xy SEQUENCE {

dci-Formats-r16 ENUMERATED {formats2-0-And-2-5},

...

}

} OPTIONAL -- Cond Setup2

}

The proposal is to add "OPTIONAL Need -R" for the two above fields dci-Format2-5-v16xy and mt-Specific-v16xy.

**Q8) Do you agree that to add "OPTIONAL Need -R" for the two above fields dci-Format2-5-v16xy and mt-Specific-v16xy?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
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## RIL H226 searchSpaceGroupIdList-r16 in SearchSpace

In the rapporteur's understanding, this is handled in NR-U discussions, so it is proposed not to discuss this her.

**Q8) Do you agree to leave this issue to the NR-U session?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
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# Conclusion

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# Reference

[1] R2-2003309, TS 38.331 Rel-16 ASN.1 review file, phase 1, Ericsson

[2] R2-2003310, RIL list TS 38.331 Rel-16 ASN.1 review file, phase 1, Ericsson

[3] R2-2003716, [H232] Extension to the contents of items of a list using ToAddMostList in absence of extension markers, Huawei, HiSilicon