3GPP TSG-RAN WG2 #109bis-e R2-2004075

Electronic Meeting, April 20th – 30th 2020

Agenda Item: 6.4.2.1

Source: OPPO(Rapporteur)

Title: [AT109bis-e][704][V2X] SIB12/28 (OPPO)

Document for: Discussion, Decision

# 1 Introduction

This document is to kick off the following email discussion:

* [AT109bis-e][704][V2X] SIB12/28 (OPPO)

Scope: To discuss and conclude SIB12/28 size issues, i.e. whether the current SIB12 can work or not, if not work how to reduce the overhead (including CR R2-2002652/2653).

Expected outputs: Proposals and summary in R2-2004075 (and the updated draft 38.331 CR in R2-2004076 and 36.331 CR in R2-2004077 if needed)

Deadline: 4/24 10:00 for companies’ feedback and 4/27 10:00 for rapporteur version (UTC)

# 2 Discussion

The size of SIB12 is mainly affected by those IEs which are either too big or repeated many times or both. How many times an IE will be repeated depends on either the length of the list or how deep the IE is buried within the whole IE structures. Taking IE SL-QoS-Profile-r16 for example, it will be repeated NrofSLRB-r16\* NrofSL-QFIs-r1 times (Note1). For IE SL-Priority-TxConfigIndex-r16 it will be repeated NrofFreqSL-r16\* NrofSL-BWPs-r16\*( NrofTXPool-r16+1)\*8.

*Note1: the parameter e.g.* **NrofSLRB-r16** *in the paper is the configured length of the IE list whose maximum number is* ***max*NrofSLRB-r16***. The same assumption is taken for other similar parameters.*



Figure 2-1 IE structure of SIB12 (partial IEs)

In Figure2-1 the IEs which impacts SIB12 size mostly are listed. And the following table show the IEs, their repeated factors and estimated size:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **level 1 IE list** | **level n IE list** | **Size of IE list(bit)** | **Repeated factors** | **Minimum factors** | **Typical factors** |
| sl-FreqInfoList-r16 | IE size of sl-FreqInfoList-r16 except for below 5 IEs | 297 | 1 | 1 | 1 |
| 　 | SL-SyncConfig-r16 | 90 | NrofFreqSL-r16\*SL-SyncConfig-r16 | 1 | 4 |
|  | **SL-ResourcePool-r16(TX) except for** **sl-CBR-Priority-TxConfigList-r16** **and sl-ThresPSSCH-RSRP-List-r16** | **433** | **NrofFreqSL-r16\* NrofSL-BWPs-r16\*( NrofTXPool-r16+1)** | **2** | **5** |
|  | **sl-CBR-Priority-TxConfigList-r16** | **448** | **NrofFreqSL-r16\* NrofSL-BWPs-r16\*( NrofTXPool-r16+1)** | **2** | **5** |
|  | **sl-ThresPSSCH-RSRP-List-r16** | **496(Note2)** | **NrofFreqSL-r16\* NrofSL-BWPs-r16\*( NrofTXPool-r16+1)** | **2** | **5** |
| 　 | **SL-ResourcePool-r16(RX)** | **436** | **NrofFreqSL-r16\* NrofSL-BWPs-r16\*NrofRXPool-r16** | **1** | **1** |
| sl-UE-SelectedConfig-r16 | IE size of sl-UE-SelectedConfig-r16 except for below 3 IEs | 11 | 1 | 1 | 1 |
| 　 | sl-PSSCH-TxConfigList-r16  | 69 | PSSCH-TxConfig-r1 | 1 | 8 |
| 　 | sl-CBR-RangeConfigList-r16 | 7 | CBR-Config-r16\*CBR-Level-r16 | 1 | 64 |
| 　 | sl-CBR-PSSCH-TxConfigList-r16 | 46 | TxConfig-r16 | 1 | 16 |
| sl-NR-AnchorCarrierFreqList-r16 | 　 | 22 | FreqSL-NR-r16 | 1 | 1 |
| sl-EUTRA-AnchorCarrierFreqList-r16 | 　 | 14 | FreqSL-EUTRA-r16 | 1 | 1 |
| sl-RadioBearerConfigList-r16 | IEs except for below 2 IEs | 17 | NrofSLRB-r16 | 1 | 12 |
| 　 | **SL-QoS-Profile-r16**  | **129** | **NrofSLRB-r16\*NrofSL-QFIs-r1** | **1** | **48** |
| 　 | sl-PDCP-Config-r16  | 34 | NrofSLRB-r16 | 1 | 12 |
| SL-RLC-BearerConfig-r16 | 　 | 59 | SL-LCID-r16 | 1 | 12 |
| sl-MeasConfigCommon-r16 | 　 | 98 | NrofSL-ObjectId-r16 | 1 | 1 |
| sl-CSI-Acquisition -r16 | 　 | 1 | 1 | 1 | 1 |
| sl-ZoneConfig-r16 | 　 | 11 | 1 | 1 | 1 |
| sl-OffsetDFN-r16 | 　 | 11 | 1 | 1 | 1 |
| t400  | 　 | 4 | 1 | 1 | 1 |

Table2-1

*Note2: the size is calculated assuming CBR-Level-r16=8 (maxCBR-Level-r16=16)*

### 2.1 Minimum SIB12 size issue

In order to assess whether current SIB12 can fit a single NR SIB or LTE SIB, it is valuable to estimate a minimum size of SIB12. To do so all the parameters impacting repeated factors can be set to be 1. In this case all the IE sizes are the same as listed in table 2-1 except for IE sl-ThresPSSCH-RSRP-List-r16 which is 160 bits. Based on this assumption, the repeated factors are listed in the column” minimum factors” in table 2-1. Based on this assumption the SIB12 is **3438 bits**. Obviously the SIB12 can’t fit into a single NR or LTE SIB considering following size limitation:

* the size limitation of NR SIB **i.e. 2976bits**
* the size limitation of LTE SIB28 **i.e.2216 bits.**

**Observation1: the minimum size of SIB12 can’t fit into a single NR or LTE SIB**

**Question1: Do you agree with this observation1? If not, please give your detail reason.**

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| --- | --- | --- |
| Company | Agree/Disagree | Comments |
| Ericsson | Partially yes | The observation is not entirely true. We believe that the impact factor of whether the SIB it fits in the SIB limitation or not is given by the number of SLRB that the network configures. Now, this is not simple to understand and if we consider a worst case scenario, we agree that the V2X SIB may not fit into the NR or LTE SIB. However, in the other extreme (network configuring only 1 SLRB) there are no problem with the V2X SIB size. |
| CATT | Agree | From our perspective, the extreme case of only configuring one set of SLRB is not preferred from the perspective of flexibility. Hence, we think SIB12 cannot fit into a single NR or LTE SIB. |
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### 2.2 Solution to resolve minimum SIB12 size issue

In order to fit into either NR or LTE single SIB the straight way to tackle this issue is to introduce SIB segmentation in RRC layer as proposed in paper [2] for both NR and LTE system.

**Question2: Do you agree to introduce SIB segmentation in RRC layer for SIB12 in both NR and LTE system? If not, please give your detail reason.**

|  |  |  |
| --- | --- | --- |
| Company | Agree/Disagree | Comments |
| Ericsson | Agree | If something needs to be done, the segmentation is the only solution to solve this. As shown in OPPO paper in R2-2002651, even optimizing the size of the SIB there is no guarantee that the V2X SIB will not exceed the NR or LTE SIB size. |
| CATT | No | From our point of view, there are two options to solve the SIB size issue.* Option 1: SIB segmentation;
* Option 2: For the SLRB configuration of RRC\_IDLE/INACTIVE UE, using pre-configuration instead of SIB configuration.

Regarding to option 1, we have below concerns:If option 1 is adopted, it will bring specification efforts, e.g., whether fixed segment, e.g., ETWS and CMAS SIBs or flexible segment, e.g., *DLDedicatedMessageSegment* should be discussed first. If fixed segment is supported, it should further discuss how to perform the fixed segment. If flexible segment is supported, different part of the SIB will be transmitted in different SI message, which will cause more reception latency. It cannot guarantee the reliability of receiving SIB12, due to UE may lose part of the SIB12.Moreover, the benefit of SIB-configured QoS flow/SLRB mapping is unclear compared with pre-configuration. Hence, option 2 is slightly preferred considering the R16 NR V2X deadline. |
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### 2.3 Optimization of SIB12 size issue

A big SIB12 means big signalling overhead for broadcast. Based on the analysis listed in table 2-1, it seems that the IEs marked with **bold red** can be used to evaluate the SIB12 size. In order to assess the effect following parameters affecting repeated factors are assumed:

|  |  |
| --- | --- |
| **Configured** parameters | Typical values |
| NrofFreqSL-r16 | 1 |
| NrofSL-BWPs-r16 | 1 |
| NrofTXPool-r16 | 4 |
| NrofRXPool-r16 | 1 |
| NrofSLRB-r16 | 12 |
| NrofSL-QFIs-r1 | 4 |
| SL-LCID-r16 | 12 |

The corresponding repeated factors are listed in the column “typical factors” of table 2-1. Based on this assumption SIB12 is estimated as **17413** bits. If some measures e.g. proposal 1/2/3 from paper [2] or proposal 6 from paper [4] are taken then the SIB 12 size will be reduced. Take proposal1/2/3 from paper [2] as example, the SIB size can be reduced to be **8839** based assumption that IE SL-QoS-Profile-r16 is 81bits and table+index approach is taken for IE SL-QoS-Profile-r16 where the length of the table is 16.

**Observation2: it is necessary to optimize SIB12 size to reduce signalling overhead**

**Question3: Do you agree with observation2? If not, please give your detail reason.**

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| --- | --- | --- |
| Company | Agree/Disagree | Comments |
| Ericsson | No | If something needs to be done, the segmentation is the only solution to solve this. As shown in OPPO paper in R2-2002651, even optimizing the size of the SIB there is no guarantee that the V2X SIB will not exceed the NR or LTE SIB size.Therefore, what’s the point to specify two solutions (index+table) when we know that one it may not work anyway? |
| CATT | No | Optimizing the SIB12 size cannot change the truth that the SIB12 size is oversized compared with the NR/LTE SI message size restriction. |
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### 2.4 Potential solutions to optimize SIB12 size

If you agree observation2 here are alternatives to resolve the problem assuming it is there:

Option1: To introduce size optimization e.g. proposal1/2/3 from paper [2]

Option2: To pre-configure some of the heavy parameters e.g. proposal6 from paper [4]

Option3: Rely only of the SIB segmentation (no optimization of SIB12)

**Question4: which option(s) do you prefer?**

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| --- | --- | --- |
| Company | Agree/Disagree | Comments |
| Ericsson | Option 3 | If something needs to be done, the segmentation is the only solution to solve this. As shown in OPPO paper in R2-2002651, even optimizing the size of the SIB there is no guarantee that the V2X SIB will not exceed the NR or LTE SIB size.Therefore, what’s the point to specify two solutions (index+table) when we know that one it may not work anyway? |
| CATT | Option 2 with comment | It is our belief that at least the heavier parameters can be preconfigured. In addition, if we do not want to introduce specification effort, the simplest way is to allow all the SLRB related parameters to be pre-configured. |
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### 2.5 Solution details following option1 in section 2.4

Assuming you choosed option1, which options you would choose for size optimization:

Option 1: To introduce table + index approach for IE SL-QoS-Profile-r16

Option 2: To adjust the granularity for sl-GFBR-r16, sl-MFBR-r16 from linear increment to be power of 2

Option 3: sl-CBR-Priority-TxConfigList-r16 and sl-ThresPSSCH-RSRP-List-r16 is configured as cell level IEs instead of per cell per frequency per BWP per resource pool.

**Question5: which option(s) do you prefer?**

Note, these 3 options are not exclusive with each other, so you can choose more than one options.

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| --- | --- | --- |
| Company | Agree/Disagree | Comments |
| Ericsson | None | If something needs to be done, the segmentation is the only solution to solve this. As shown in OPPO paper in R2-2002651, even optimizing the size of the SIB there is no guarantee that the V2X SIB will not exceed the NR or LTE SIB size.Therefore, what’s the point to specify two solutions (index+table) when we know that one it may not work anyway? |
| CATT | None | Refer to our comments in Q3, from our point of view, after the above optimization, the SIB size is still exceed the NR or LTE SIB size. Thus, such optimization effort is useless. |
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### 2.6 Solution details following option2 in section 2.4

**Question6: If you choose option2 in section2.4, which IE(s) do you prefer to be pre-configured?**

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| --- | --- | --- |
| Company | Agree/Disagree | Comments |
| CATT | See comments | We think the simplest way is to allow all the SLRB related parameters to be pre-configured. |
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# Conclusion

# References

[1] R2-2002622 Draft-CR on RRC open issues of 38.331 [N001,N002,N005] OPPO draftCR Rel-16 38.331 16.0.0 B 5G\_V2X\_NRSL-Core

[2] R2-2002651 Open issues on system information OPPO discussion Rel-16 5G\_V2X\_NRSL-Core

[3] R2-2002653 36331\_CRyyyy\_(REL-16)\_ Correct on SIB28 message for NR V2X OPPO draftCR Rel-16 36.331 16.0.0 F 5G\_V2X\_NRSL-Core

[4] R2-2002828 Further Discussion on RRC Remaining Issues CATT