[100b-e-NR-5G\_V2X\_NRSL-PHYstructure-03]

Email discussion/approval regarding signaling of resource pool

[100b-e-NR-5G\_V2X\_NRSL-PHYstructure-03] Email discussion/approval regarding signaling of resource pool
   - A. Periodicity of resource pool bitmap, length of the bitmap, excluded slots, reserved slots

till 4/24, with potential TP till 4/29 – Jeongho (SS)

This document has the following questions.

A. What is the periodicity of resource pool bitmap?

B. What is the length of the bitmap for resource pool configuration?

C. How to obtain the excluded slots?

D. Is the reserved slot needed?

# **A. What is the periodicity of resource pool bitmap?**

Based on the submitted contributions, there are the following alternatives and supporting companies.

* Alt A-1. 10240 ms, i.e., 10240×2^μ slots
	+ ~~[Huawei, HiSilicon],~~ [ZTE, Sanechips], [vivo], [OPPO], [LGE], [TCL], [CATT], [Apple], [Panasonic], [Sharp], [Qualcomm]
* Alt A-2. 20 ms
	+ [CMCC]
* Alt A-3. Depending on TDD UL/DL patterns
	+ [Spreadtrum], [NEC], [Huawei, HiSilicon]
* Alt A-4. 10240 slots
	+ [NEC]

Based on the contributions, the following proposal can be made.

*Proposal 1. For the periodicity of resource pool bitmap, 10240 ms is used.*

Please share your views if Proposal 1 is agreeable or, if not, please share your views on the reason why it is not workable.

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| **Company** | **Views** |
| Huawei, HiSilicon | No, and our paper does not state Alt A-1. We clarify in relation to A-3 here:* When SL is transmitted in a UL carrier, If NR sidelink is defined on a SFN period, it implies that *TDD-UL-DL-ConfigCommon* does not change or rarely changes within a SFN period, and this is not the assumption in NR Uu design. Instead, to accommodate NR Uu design rather than LTE-V design in a NR shared carrier, there should be a bitmap which applies once per period of *TDD-UL-DL-ConfigCommon* with a slot-by-slot mapping (combined periodicity is applied if pattern1 and pattern2 are both configured) to indicate which UL slots are used for SL, after exclusion of SLSS slots and slots not having at least Y-th, (Y+1)-th, ....., (Y+X-1)-th symbols in a slot for UL.
* When SL is transmitted on ITS carrier, LTE-V solution can be reused, e.g. period can be $10240∙2^{μ}$.
 |
| LG | Yes. Considering that the periodicity of S-SSB, the periodicity of resource pool bitmap needs to be larger than at least 160ms. Otherwise, it is unclear how to apply the bitmap for the slot duration containing S-SSB slot. For instance, the periodicity of resource pool bitmap is the same as that of TDD-UL-DL-ConfigCommon, and the number of UL slots available for SL is N. Then, the bitmap length could be set to N. In this case, when the period of TDD-UL-DL-ConfigCommon includes one S-SSB slot, then the number of slots available for SL is changed into N-1. In this case, N-1 slots would be reserved slots.  |
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# **B. What is the length of the bitmap for resource pool configuration?**

Based on the submitted contributions, there are the following alternatives and supporting companies.

* Alt B-1. 8, 16, 32, 64
	+ [ZTE, Sanechips]
* Alt B-2. 16, 32, 64, 128, 256, 512
	+ [vivo]
* Alt B-3. 10, 16, 20, 30, 40 ,50, 60, 100
	+ [OPPO]
* Alt B-4. [1], 2, 3, 4,…, 160
	+ [LGE]
* Alt B-5. Different value depending on SCS
	+ [TCL], [CATT], [Apple]
* Alt B-6. 20 ms
	+ [CMCC]
* Alt B-7. Different value depending on TDD UL/DL patterns
	+ [Spreadtrum], [Panasonic](also for 160 ms), [Sharp]

The values proposed are quite diverging. Please share your views on this issue and the reason of your views on why some specific values are needed.

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| **Company** | **Views** |
| Huawei, HiSilicon | * When SL is transmitted in a UL carrier, the bitmap has the same length as the number of slots in the periodicity of *TDD-UL-DL-ConfigCommon*, excluding SLSS slots and slots not having at least Y-th, (Y+1)-th, ....., (Y+X-1)-th symbols in a slot for UL.
* In case that SL is transmitted on ITS carrier, bitmap and its length can reuse that of LTE-V.
 |
| LG | First of all, it needs to clarify what is the reference SCS for resource pool bitmap. In other words, each bit of the bitmap is associated with which slot duration. For simplicity, it can be considered that the SCS of SL BWP is used for the reference SCS for resource pool bitmap. We think this clarification needs to be confirmed before discussing the bitmap length. In our understanding, whether S-SSB is present in a carrier is up to network choice as in LTE V2X. In other words, S-SSB slot would not always exists in a SL carrier. According to LTE V2X, the bitmap length is determined by frame structure type and TDD configuration without a consideration of SLSS slots. To be specific, the bitmap length is the number of UL subframes within 100ms. For configuration flexibility, the minimum bitmap length is set to be 10, which is used for TDD UL-DL configuration 5. In this case, the number of UL subframes within 100ms is 10. In this case, when SLSS is not configured, the bitmap can be applied to the multiple of TDD periods. Similarly, we are supportive to reuse the LTE principle. In NR, the TDD pattern will be repeated at least every 20ms. Considering SCS of 120kHz, there are 160 slots within 20ms. Considering TDD UL-DL-ConfigCommon, the slot available sidelink would have granularity of 1 slot. In that point of view, the possible bitmap length would be 1, 2, …, 160. Considering configuration flexibility, the minimum length of the bitmap could be large (e.g. 8 or 16).  |
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# **C. How to obtain the excluded slots?**

Based on the submitted contributions, there are the following alternatives and supporting companies.

For “slots not having at least Y-th, (Y+1)-th, ....., (Y+X-1)-th symbols in a slot semi-statically for UL as indicated in TDD-UL-DL-ConfigCommon ”,

* Alt C-1. Replace TDD-UL-DL-ConfigCommon by SL-TDD-Config in PSBCH
	+ [vivo]
* Alt C-2. Confirm WA
	+ [OPPO], [Nokia, NSB], [Panasonic]
* Alt C-3. Use TDD-UL-DL-ConfigCommon or PSBCH
	+ [CMCC]
* Alt C-4. Use different configurations according to in-coverage or out-of-coverage
	+ [LGE]

Please share your views on this issue and the reason of your views with necessity of each alternative.

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| **Company** | **Views** |
| Huawei, HiSilicon |  Confirm the WA (as indicated in our paper) |
| LG | We are supportive of C-1 and modification of WA for the purpose of enabling the same understanding on the set of UL slots available for SL between in-coverage UE and out-of-coverage for partial coverage scenario. Due to the signaling overhead of PSBCH, TDD pattern indicated by PSBCH is not always the same as TDD pattern provided by TDD-UL-DL-ConfigCommon. For instance, when two pattern is used with periodicity of 10ms, even though the reference SCS of TDD-UL-DL-ConfigCommon is 60kHz, the reference SCS of TDD pattern in PSBCH could be 15kHz. In this case, four slots of TDD-UL-DL configuration will be overlapped with a slot of TDD pattern in PSBCH. In this case, when last two slots of TDD-UL-DL-ConfigCommon overlapping with a slot of TDD pattern in PSBCH are available for SL, these four slots of TDD-UL-DL-ConfigCommon needs to be excluded slots as shown in following Figure. Another simple approach is that the in-coverage UE is configured with TDD-Config which can be used for PSBCH contents.  |
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# **D. Is the reserved slot needed?**

Based on the submitted contributions, there are the following alternatives and supporting companies.

* Alt A-1. No need to define.
	+ [ZTE, Sanechips], [vivo]
* Alt A-2. Use reserved slot similarly as defined LTE-V2X procedure.

Please share your views on this issue and the reason of your views with necessity of each alternative.

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| **Company** | **Views** |
| Huawei, HiSilicon | * In case that SL is transmitted in a UL carrier, it is not needed, since a slot-by-slot bitmap with the *TDD-UL-DL-ConfigCommon* period can provide directly the UL-to-SL mapping.
* In case that SL is transmitted on ITS carrier, reserved slots are defined same way as LTE-V.
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| LG | We are supportive of A-2. Considering configuration flexibility compared with LTE V2X, we think that large bitmap length (e.g. 100) is needed. In this case, it is up to network implementation whether or not to allow the existence of reserved slots.  |
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