**3GPP TSG RAN WG1 #114** **R1-230xxxx**

**Toulouse, France, August 21st – 25th, 2023**

**Agenda item:** 9.17

**Source:** Samsung

**Title:** Summary of email discussions [114-R18-38.213-NR\_SL\_enh2]

**Document for:** Discussion and decision

# Introduction

The purpose of this document is to collect inputs/comments on the draft CR for TS 38.213 [draftCR\_38213 SL](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_114/Inbox/drafts/9.17%28Other%29/%5B38.213%20draft%20CRs%5D/NR_SL_enh2/R1-230xxxx%20draftCR_38213%20SL.docx) on the introduction of NR sidelink evolution. If a comment on a particular aspect has been made by another company, please do not repeat it until, if needed, after a response.

The first checkpoint is on September 5, UTC 13:00.

# First Round Discussion

Please provide your comments on the draft CR for TS 38.213 [draftCR\_38213 SL](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_114/Inbox/drafts/9.17%28Other%29/%5B38.213%20draft%20CRs%5D/NR_SL_enh2/R1-230xxxx%20draftCR_38213%20SL.docx).

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| Company | Comments |
| LGE | On 16.2.0, according to the following text in the agreement, the definition of P\_CMAX would need to be updated accordingly. For instance, we can add “and is determined for all the S-SSB repetitions, if applicable” for the P\_CMAX part. * For above Alts, $P\_{CMAX}$ is determined according to TS 38.101-1 for transmission of all S-SSB repetitions on all used RB sets

As we know, the value of P\_CMAX could be different based on the assumption on the transmission structure. On 16.2.3, it would be necessary to update the PSFCH power control as per the following agreement.AgreementRel-16/17 PSFCH power control and PSFCH TX/TX prioritization rule are performed across carriers for all PSFCH transmissions over all the aggregated SL carriers at the same time.* The UE does not expect to be provided with a (pre)configuration that would result in different transmit power per PSFCH on different carriers.

For instance, following updates can be considered:A UE with $N\_{sch,Tx,PSFCH}$ scheduled PSFCH transmissions for HARQ-ACK information and conflict information, and capable of transmitting a maximum of $N\_{max,PSFCH}$ PSFCHs, determines a number $N\_{Tx,PSFCH}$ of simultaneous PSFCH transmissions and a power $P\_{PSFCH,k}(i)$ for a PSFCH transmission $k$, $1\leq k\leq N\_{Tx,PSFCH}$, on all the resource pools in PSFCH transmission occasion $i$ on all the active SL BWP $b$ of all the carrier $f$as…For resource pools configured with PSFCH resources overlapping in time for all the carriers, the UE either expects not to be provided with *dl-P0-PSFCH* or *dl-Alpha-PSFCH* in any of the resource pools, or expects to be provided with the same values of *dl-P0-PSFCH* and the same values of *dl-Alpha-PSFCH* for all the resource pools.On 16.3.0, following part need to be moved after the final PSFCH resource determination with some typo correction. In our understanding, dropping PRB belonging to common interlace will be performed after the UE decides the PRBs for actual PSFCH transmission. Moreover, the final determination on PRBs for the actual PFSCH transmission would be selected among PSFCH resources across multiple PRB sets when $N\_{type }^{PSFCH}=N\_{subch }^{PSSCH}$.A PRB $s\_{1}$ in the first interlace is excluded from the resources for a PSFCH transmission, if $|s\_{1}-s\_{2}|\leq 5$ for $μ=10$ or $|s\_{1}-s\_{2}|\leq 2$ for $μ=21$ for any PRB $s\_{2}$ in the PRB subset, and $\left(s\_{high}-s\_{low}\right)\geq 88$ for $μ=10$ or $\left(s\_{high}-s\_{low}\right)\geq 44$ for $μ=21$, where PRB $s\_{high}$ and PRB $s\_{low}$ are the largest and smallest PRB indexes, respectively, in the resources for the PSFCH transmission assuming PRB $s\_{1}$ is excluded. On 16.4, according to the agreement, it would be necessary to clarify the meaning of the lowest subchannel. We can add “index” after “the lowest sub-channel”. **Agreement**For interlace RB-based PSCCH/PSSCH transmission in SL-U, support the following:* Option 1: lowest sub-channel is the sub-channel with smallest sub-channel index
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| CATT/GOHIGH | * **Comments 1 (Clause 16.1)**

Regarding the configuration of additional candidate S-SSB occasions, it should be accurately captured, as the following agreement, that each legacy Rel-16/17 S-SSB occasion is supported to configure additional S-SSB occasion(s), not “each slot that includes S-SS/PSBCH”.**Agreement**Regarding the number and location(s) of additional candidate S-SSB occasions, support:* Option 2 (12): Each R16/R17 NR SL S-SSB slot has K corresponding additional candidate S-SSB occasion(s) in different time slot(s), and the gap between them is (pre-)configured
	+ FFS details, e.g., value of K, details on gap length (including possibility of being 0), etc.
* **Comments 2 (Clause 16.2.5)**

Some typos should be corrected, where “S-SS/PBCH” should be changed to “S-SS/PSBCH”.* **Comment 3 (Clause 16.2.5)**

Regarding the details of PSFCH power control, the following two highlight parts from TS 36.213 are missed or incorrectly captured.

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| In sidelink transmission mode 3 or 4, if a UE's sidelink transmission on a carrier overlaps in time with sidelink transmission on other carrier(s) and its total transmission power exceeds defined in [6], the UE shall adjust the transmission power of the sidelink transmission which has SCI whose "Priority" field is set to the largest value among all the "Priority" values of the overlapped sidelink transmissions such that its total transmission power does not exceed defined in [6]. In this case, calculation of the adjustment to the sidelink transmission power is not specified. If the transmission power still exceeds  defined in [6] after this power adjustment, the UE shall drop the sidelink transmission with the largest "Priority" field in its SCI and repeat this procedure over the non-dropped carriers. It is not specified which sidelink transmission the UE adjusts when sidelink transmissions overlapping in time on two or more carriers have the same value for the "Priority" field. |

* **Comments 4 (Clause 16.2.5)**

Regarding simultaneously transmissions over multiple carriers, the procedure of Clause 16.2.3 cannot be directly reused, such as the maximum transmission power and the maximum transmission number should be re-defined over all the multiple carriers.Agreement:Rel-16/17 PSFCH power control and PSFCH TX/TX prioritization rule are performed across carriers for all PSFCH transmissions over all the aggregated SL carriers at the same time.* The UE does not expect to be provided with a (pre)configuration that would result in different transmit power per PSFCH on different carriers.
* **Comments 5 (Clause 16.3.0)**

IUC mechanism is not discussed in Rel-18 SL-U, so the associated parts should be removed.* **Comment 6 (Clause 16.3.0)**

The following yellow highlight part should be removed, because $N\_{type }^{PSFCH}⋅M$ indicates all the candidate PSFCH frequency resources within all the used RB sets associated with PSSCH transmission.if *sl-PSFCH-CandidateResourceType* is indicated as *allocSubCH*, $N\_{type }^{PSFCH}=N\_{subch }^{PSSCH}$ and $M=\sum\_{k}^{}M\_{subch, slot,k}^{PSFCH,n}$ where the sum is over all RB-sets including resources for the corresponding PSSCH, and the $N\_{type }^{PSFCH}⋅M$ interlaces per RB-set or PRB subsets are associated with the $N\_{subch }^{PSSCH}$ sub-channels of the corresponding PSSCH |
| Xiaomi | Comment#1On section 16.1 and 16.3.0, to make specification correct, we make the following revision for CPE.For operation with shared spectrum channel access, a UE attempts to transmit at least S-SS/PSBCH blocks in the anchor RB set. The UE applies CP extension within the symbol just before ~~to~~ the first symbol of an S-SS/PSBCH block according to an index [4, TS 38.211] provided by *sl-CP-Extension-SSB*. The UE applies CP extension within the symbol just before ~~to~~ the first symbol of a PSFCH according to an index [4, TS 38.211] provided by *sl-CP-Extension-PSFCH*. Comment #2On section16.3.0, we think following agreements in blue part also need to be captured, which intend to determine the PRB set for each PSFCH occasion.**Agreement**Regarding “*one PSCCH/PSSCH transmission has N associated candidate PSFCH occasion(s)*” and “*For one PSCCH/PSSCH transmission, at least support that its associated candidate PSFCH occasion(s) are in different slots of the same RB set(s)*”, support:* Slot index of 1st PSFCH occasion (denoted as slot k) of a PSCCH/PSSCH transmission is determined in the same way as legacy NR SL
* The nth PSFCH occasion is in slot $k+\left(n-1\right)\*P$
	+ - Alt 1: P is equal to the (pre-)configured PSFCH periodicity, i.e., P is provided by *sl-PSFCH-Period*
	+ $1\leq n\leq N$
* Within a slot including PSFCH, for each RB set, the (pre-)configured PRBs for PSFCH transmission on this RB set are divided into N different PRB sets (denoted as set#1, set#2, …, set#N), which are associated with N candidate PSFCH occasion(s)
	+ Within this RB set, for one sub-channel on one slot of PSCCH/PSSCH transmission, its nth PSFCH occasion includes PRBs belonging to above set#n in slot $k+\left(n-1\right)\*P$
	+ FFS: whether to use 1 or N bitmaps to indicate resource for N candidate PSFCH occasion(s), respectively

Comment #3On section16.2.5, since there is no separate power control procedure for PSCCH, we propose to change the “or” to “/” in the whole paragraph below:

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| If a UE would transmit PSSCHs and PSCCHs on multiple carriers, the UE determines a power for each PSSCH and PSCCH transmission as described in Clauses 16.2.1 and 16.2.2, respectively. If the UE would transmit PSCCHs /PSSCHs that would overlap in time on respective carriers and a total power for the transmission of the PSCCHs /PSSCHs would exceed $P\_{CMAX}$, the UE reduces a power for a transmission of a PSCCH /PSSCH that has the largest priority value as determined by SCI formats provided by the PSCCHs scheduling the respective PSSCHs. If more than one PSCCH/PSSCH transmissions have the largest priority value, the UE autonomously selects one of the more than one PSCCH/PSSCH transmissions to reduce a respective power. If, after the reduction of the power for the transmission of the PSCCH/ PSSCH with the largest priority value, a total power does not exceed $P\_{CMAX}$, the UE transmits the PSCCHs/PSSCHs, respectively. If, after the reduction of the power of the PSCCH /PSSCH with the largest priority value, a total power exceeds $P\_{CMAX}$, the UE does not transmit the PSCCH /PSSCH, respectively. |

Comment #4According to the following agreements in RAN1#114, the following agreement has addressed that the PSFCH transmission power across different carriers shall be same:

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| AgreementRel-16/17 PSFCH power control and PSFCH TX/TX prioritization rule are performed across carriers for all PSFCH transmissions over all the aggregated SL carriers at the same time.* The UE does not expect to be provided with a (pre)configuration that would result in different transmit power per PSFCH on different carriers.
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Therefore, the following sentence should be added to reflect this based on the description in 16.2.3:

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| If a UE would simultaneously transmit PSFCHs and receive PSFCHs on multiple carriers, the UE performs the procedures in Clause 16.2.4.2 across all the PSFCHs for transmission and PSFCHs for reception in order to determine PSFCHs to transmit or PSFCHs to receive. If a UE would simultaneously transmit PSFCHs on multiple carriers, the UE performs the procedures in Clause 16.2.3 across all the PSFCHs for transmission in order to determine PSFCHs to transmit and a corresponding power per PSFCH transmission. The UE expects to determine a same time resource and a same power for each of the PSFCH transmissions on multiple carriers. For all the resource pools on the multiple carriers, the UE either expects not to be provided with dl-P0-PSFCH or dl-Alpha-PSFCH in any of the resource pools on the corresponding multiple carriers, or expects to be provided with the same values of dl-P0-PSFCH and the same values of dl-Alpha-PSFCH for all the resource pools on the corresponding multiple carriers. |

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| ZTE,Sanechips | 1)AgreementRegarding “*UE may transmit S-SSB repetition in more than one RB set*”:* At least the power for S-SSB transmission on anchor RB set does not change due to the number of used RB sets
	+ On anchor RB set, there is a (pre-)configured offset to limit the maximum power as below (changes to legacy NR SL is marked in red)

* + - [dBm], where i is slot index as in legacy

* + - value range of is: {10lg(N), [10lg(N)+2, 10lg(N)+4, …],}

* + On non-anchor RB set
		- UE first allocates power to S-SSB repetitions on anchor RB set, assume the power of each S-SSB repetition is

* + - Then, UE allocates remaining power equally to other S-SSB repetitions on all other used RB sets, where , where and are converted to linear unit (i.e, Watt) in this formula

* + - Note: for both anchor RB set and non-anchor RB set transmission, the same DL pathloss is taken into account
* M is the total number of RB sets within this SL-BWP, N is the number of S-SSB repetitions within the anchor RB set, W is the maximum total number of S-SSB repetitions on RB sets within the SL-BWP
* Note: the above power for S-SSB transmission refers to power of one S-SSB repetition
* UE at least attempts to transmit on anchor RB set
	+ Note: anchor RB set refers to the RB set where S-SSB indicated by *sl-AbsoluteFrequencySSB-r16* locates
* For above Alts, is determined according to TS 38.101-1 for transmission of all S-SSB repetitions on all used RB sets

In 16.2.0, as SSBs in non-anchor RB set also need to take into account the downlink path loss similarSSBs in anchor RB set, so the PC for SSB may need some modification as shown:For operation with shared spectrum channel access, after allocating power $P\_{S-SSB}(i)$ for transmission of each S-SS/PBCH block in the anchor RB-set, -for case *dl-P0-PSBCH-r16 or dl-P0-PSBCH-r17* is provided*,* the UE equally allocates power remaining from $P\_{CMAX}$, if any, for transmission of each S-SS/PBCH block in used non-anchor RB-sets labled as $P'\_{S-SSB}(i)$, and final power of each SSB is min($P'\_{S-SSB}(i)$,$P\_{O,S-SSB}+10log\_{10}\left(2^{μ}∙M\_{RB}^{S-SSB}\right)+α\_{S-SSB}⋅PL$) -*otherwise* the UE equally allocates power remaining from $P\_{CMAX}$, if any, for transmission of each S-SS/PBCH block in used non-anchor RB-sets . 2-1) In S16.3.0, in the following paragraph it seems IUC is also supported for paragraph with the sentence on conflict information, but we don’t think this is covered by previous agreement. We suggest removing that. this does not concur with previous agreement. For operation with shared spectrum channel access, when sl-PSFCH-Type = ‘type1.....~~The UE expects that PSFCH transmissions with conflict information use different interlaces than PSFCH transmissions with HARQ-ACK information.~~2-2 ) In S 16.3.0, in the same paragraph, is it correct understanding that the interlaces herein only consider the interlaces consisting of dedicated RBs, i.e. common interlace is excluded. If so, we suggest clarifying that point in the sentence. The interlaces (except common interlaces) are ordered based on respective interlace indexes.1. We didn’t notice any description on contiguous RB mapping, is it correct understanding editor intends to capture it in later phase?
2. Regarding power part for co-channel coexistence, the agreement in RAN1 #112b-e also specified how to ensure the power level condition is up to UE implementation. Therefore, this should be reflected in 38.213. The modification suggestions are as follows in blue font.

“For sidelink co-channel coexistence between E-UTRA and NR, and for NR PSCCH/PSSCH transmissions with SCS configuration $μ=1$ in slots that overlap with an E-UTRA subframe on the sidelink, the UE transmits NR PSCCH/PSSCH in the earlier overlapping slot with a power that is larger than or equal to the power in the later overlapping slot.It is up to UE implementation how to ensure the above power condition.”1. Regarding power part for PSCCH/PSSCH on multiple carriers, the description “PSCCHs or PSSCHs” is ambiguous, one may infer that PSCCH can be transmitted alone. Aligning other description in 38.213, “PSCCHs or PSSCHs” can be replaced by “PSCCH-PSSCH transmission” including PSCCH not transmitted in PSCCH-PSSCH transmission and PSCCH transmitted in PSCCH-PSSCH transmission. In addition, the power adjustment procedure needs to be repeated in order not to exceed Pcmax as E-UTRA SL CA specified in 36.213. The modification suggestions are as follows in blue font.

“If a UE would transmit PSCCH-PSSCH transmissions on multiple carriers, the UE determines a power for each PSCCH-PSSCH transmission as described in Clauses 16.2.1 and 16.2.2, respectively. If the UE would transmit PSCCH-PSSCH transmissions that would overlap in time on respective carriers and a total power for the transmission of the PSCCH-PSSCH transmissions would exceed $P\_{CMAX}$, the UE reduces a power for a transmission of a PSCCH-PSSCH transmission that has the largest priority value as determined by SCI formats provided by the PSCCHs scheduling the respective PSSCHs. If more than one PSCCH-PSSCH transmissions have the largest priority value, the UE autonomously selects one of the more than one PSCCH-PSSCH transmissions to reduce a respective power. If, after the reduction of the power for the PSCCH-PSSCH transmission with the largest priority value, a total power does not exceed $P\_{CMAX}$, the UE transmits the PSCCH-PSSCH transmissions, respectively. If, after the reduction of the power of the PSCCH-PSSCH transmission with the largest priority value, a total power exceeds $P\_{CMAX}$, the UE does not transmit the PSCCH-PSSCH transmission, and repeats this procedure over the non-dropped carriers.” |
| Huawei, HiSilicon | **Comments for SL-U PHY channel design**Comment 1:Suggest following red changes, details are:* Regarding “…when *sl-NumberRepeatedSSB* is not provided and for RB-set $j$”: “*sl-NumberRepeatedSSB*” is per SL-BWP, not per RB set, add “and” to avoid confusion.
* Regarding “…, where anchor RB-set refers to the RB set where S-SSB indicated by *sl-AbsoluteFrequencySSB* locates”: anchor RB-set is not defined so far. This red addition is copied from agreement.
* Regarding “*~~sl-AbsoluteFrequencySSB-r18~~*~~, when RB-set~~ *~~j~~* ~~is a non-anchor RB-set~~”: there is no agreement to support this. Suggest to remove this part and wait for more RAN1 agreement in maintenance phase.
* Regarding “…$f\_{start,j}^{S-SSB}$~~+~~ $\pm $ $ k\_{S-SSB,j}⋅\left(N\_{gap,j}^{S-SSB}+M\_{RB}^{S-SSB}\right)⋅12⋅2^{μ}∙15 kHz…$” and “…$f\_{start, j}^{S-SSB}$ is a frequency location of a ~~lowest~~ S-SS/PSBCH block in RB-set $j$,where $f\_{start, j}^{S-SSB}$ is provided by”: there is no agreement to support “lowest”, suggest to remove it for now and change “+” to “$\pm $”. We can wait for more RAN1 agreement in maintenance phase.
* Regarding “…$N\_{gap}^{S-SSB}$ is a slot gap between a S-SS/PSBCH block with index $i\_{S-SSB}$ and its first corresponding additional S-SS/PSBCH block, and between any two adjacent additional S-SS/PSBCH blocks corresponding to one S-SS/PSBCH block with index $i\_{S-SSB}$,…”: add red parts to clarify the physical meaning of this gap.
* “For operation with shared spectrum channel access, a UE attempts to transmit at least S-SS/PSBCH blocks in the anchor RB set.”: this sentence is not very accurate. On additional S-SSB occasion, it’s still up to UE implementation to transit on anchor RB set.

==For reception of a S-SS/PSBCH block - for operation without shared spectrum channel access, or for operation with shared spectrum channel access and when *sl-NumberRepeatedSSB* is not provided and for RB-set $j$, a UE assumes a frequency location corresponding to the subcarrier with index 66 in the S-SS/PSBCH block [4, TS 38.211] is provided by- *sl-AbsoluteFrequencySSB*, for operation without shared spectrum channel access or when RB-set $j$ is the anchor RB-set, where anchor RB-set refers to the RB set where S-SSB indicated by *sl-AbsoluteFrequencySSB* locates~~-~~ *~~sl-AbsoluteFrequencySSB-r18~~*~~, when RB-set~~ *~~j~~* ~~is a non-anchor RB-set~~- for operation with shared spectrum channel access when *sl-NumberRepeatedSSB* is provided and in RB-set $j$, a UE assumes a frequency location corresponding to the subcarrier with index 66 in the S-SS/PSBCH block [4, TS 38.211] is provided by $f\_{start,j}^{S-SSB}$~~+~~ $\pm $ $ k\_{S-SSB,j}⋅\left(N\_{gap,j}^{S-SSB}+M\_{RB}^{S-SSB}\right)⋅12⋅2^{μ}∙15 kHz$, where- $f\_{start, j}^{S-SSB}$ is a frequency location of a ~~lowest~~ S-SS/PSBCH block in RB-set $j$,where $f\_{start, j}^{S-SSB}$ is provided by- *sl-AbsoluteFrequencySSB* when RB-set *j* is the anchor RB-set,~~-~~ *~~sl-AbsoluteFrequencySSB-r18~~* ~~when RB-set~~ *~~j~~* ~~is a non-anchor RB-set;~~- $k\_{S-SSB,j}$ is an index of an S-SS/PSBCH block from repeated S-SS/PSBCH blocks in the frequency domain and within the RB-set $j$, where $0\leq k\_{S-SSB,j}\leq N\_{repetition,j}^{S-SSB}-1$, and $N\_{repetition,j}^{S-SSB}$ is provided by a value in *sl-NumberRepeatedSSB* corresponding to RB-set $j$;- $N\_{gap,j}^{S-SSB}$ is a number of resource blocks, provided by *sl-GapRepeatedSSB*, for a gap between repeated S-SS/PSBCH blocks;- $M\_{RB}^{S-SSB}=11$ is a number of resource blocks for a S-SS/PSBCH block transmission with SCS configuration $μ$.For operation with shared spectrum channel access, a UE attempts to transmit at least S-SS/PSBCH blocks in the anchor RB set. The UE applies CP extension to the first symbol of an S-SS/PSBCH block according to an index [4, TS 38.211] provided by *sl-CP-Extension-SSB*. …For operation with shared spectrum channel access and for each slot that includes S-SS/PSBCH blocks, a UE is provided, by *sl-NumAdditionalOccasionPerSSB*, a number $N\_{additional}^{S-SSB}$ of additional candidate S-SS/PBCH block transmission occasions. When $N\_{additional}^{S-SSB}>0$, for S-SS/PSBCH block with index $i\_{S-SSB}$, the UE determines indexes of slots that include the additional candidate S-SS/PBCH block transmission occasions as $N\_{offset}^{S-SSB}$+$\left(N\_{interval}^{S-SSB}+1\right)⋅i\_{S-SSB}$ +$ N\_{gap}^{S-SSB}⋅(\overbar{i}\_{S-SSB}+1)$, where - $N\_{gap}^{S-SSB}$ is a slot gap between a S-SS/PSBCH block with index $i\_{S-SSB}$ and its first corresponding additional S-SS/PSBCH block, and between any two adjacent additional S-SS/PSBCH blocks corresponding to one S-SS/PSBCH block with index $i\_{S-SSB}$, provided by *sl-TimeGapAdditionalOccasion*, for determining the additional candidate S-SS/PBCH block transmission occasions, and- $\overbar{i}\_{S-SSB}$ is an index of the additional candidate S-SS/PBCH block transmission occasions, with $0\leq \overbar{i}\_{S-SSB}\leq N\_{additional}^{S-SSB}-1$Comment 2:* Based on the following part, especially blue part “the UE can attempt to …”, it seems UE can choose not to attempt to transmit on the 1st PSFCH occasion. The last sentence “*The UE attempts to transmit in a slot only when the UE fails to transmit in all previous slots.*” also allows this since there is no previous slots for the 1st PSFCH occasion. Some improvements are needed.
* It seems “The nth PSFCH occasion is in slot $k+\left(n-1\right)\*P$” in agreement is not captured yet. Please could Editor clarify?

==If a UE receives a PSSCH in a resource pool and the HARQ feedback enabled/disabled indicator field in an associated SCI format 2-A/2-B/2-C has value 1 [5, TS 38.212], the UE provides the HARQ-ACK information in a PSFCH transmission in the resource pool. For operation without shared spectrum channel access, the UE transmits the PSFCH in a first slot that includes PSFCH resources and is at least a number of slots, provided by *sl-MinTimeGapPSFCH*, of the resource pool after a last slot of the PSSCH reception. For operation with shared spectrum channel access, the UE can attempt to transmit the PSFCH over a number of first $N\_{occasion}^{PSFCH}$ slots, provided by *sl-candidatePSFCH-Occasions*, that include PSFCH resources and are at least a number of slots, provided by *sl-MinTimeGapPSFCH*, of the resource pool after a last slot of the PSSCH reception. The UE attempts to transmit in a slot only when the UE fails to transmit in all previous slots.AgreementRegarding “*one PSCCH/PSSCH transmission has N associated candidate PSFCH occasion(s)*” and “*For one PSCCH/PSSCH transmission, at least support that its associated candidate PSFCH occasion(s) are in different slots of the same RB set(s)*”, support:* Slot index of 1st PSFCH occasion (denoted as slot k) of a PSCCH/PSSCH transmission is determined in the same way as legacy NR SL
* The nth PSFCH occasion is in slot $k+\left(n-1\right)\*P$
	+ - Alt 1: P is equal to the (pre-)configured PSFCH periodicity, i.e., P is provided by *sl-PSFCH-Period*
	+ $1\leq n\leq N$
* Within a slot including PSFCH, for each RB set, the (pre-)configured PRBs for PSFCH transmission on this RB set are divided into N different PRB sets (denoted as set#1, set#2, …, set#N), which are associated with N candidate PSFCH occasion(s)
	+ Within this RB set, for one sub-channel on one slot of PSCCH/PSSCH transmission, its nth PSFCH occasion includes PRBs belonging to above set#n in slot $k+\left(n-1\right)\*P$
	+ FFS: whether to use 1 or N bitmaps to indicate resource for N candidate PSFCH occasion(s), respectively

Comment 3:Suggest following red changes, details are:* Suggest to add “…for one PSFCH transmission…” to be more accurate, since it uses “…all PRBs of **an** interlace…”.
* It seems the following sentence in agreement is not captured yet, especially “…N different PRB sets …”.
	+ *“…the (pre-)configured PRBs for PSFCH transmission on this RB set are divided into N different PRB sets (denoted as set#1, set#2, …, set#N), which are associated with N candidate PSFCH occasion(s)…”*
* Suggest to remove “~~All PRBs in the interlaces within RB-set~~ $k$ ~~are available for PSFCH transmission~~*~~.~~*”
	+ The first blue sentence already captures this point.
	+ The red sentence implies there is no relationship with *sl-PSFCH-RB-Set*, and thus inaccurate.

==For operation with shared spectrum channel access, when *sl-PSFCH-Type = ‘type1’* and within RB-set $k$, a UE determines, based on *sl-PSFCH-RB-Set*, all PRBs of an interlace for one PSFCH transmission with HARQ-ACK information in the resource pool. Within the RB-set $k$, the UE determines all PRBs in an interlace for one PSFCH transmission with conflict information in the resource pool based on *sl-RB-SetPSFCH.*  The UE expects that PSFCH transmissions with conflict information use different interlaces than PSFCH transmissions with HARQ-ACK information. For the $n$-th candidate PSFCH transmission occasion, $1\leq n\leq N\_{occasion}^{PSFCH}$, the UE determines a number $M\_{interlace,k}^{PSFCH,n}$ of interlaces based on *sl-PSFCH-RB-Set* or *sl-RB-SetPSFCH*. The interlaces are ordered based on respective interlace indexes. ~~All PRBs in the interlaces within RB-set~~ $k$ ~~are available for PSFCH transmission~~*~~.~~* For a number of $N\_{subch}^{k}$ sub-channels in RB-set $k$ and a number of PSSCH slots that is not larger than $N\_{PSSCH}^{PSFCH}$ and is associated with a slot for PSFCH transmission, the UE allocates the $\left[\left(i+j⋅N\_{PSSCH}^{PSFCH}\right)⋅M\_{subch, slot,k}^{PSFCH,n}, \left(i+1+j⋅N\_{PSSCH}^{PSFCH}\right)⋅M\_{subch, slot,k}^{PSFCH,n}-1\right]$ interlaces from the $M\_{interlace,k}^{PSFCH,n}$ interlaces to slot $i$ and sub-channel $j$, where $M\_{subch, slot,k}^{PSFCH,n}={M\_{interlace,k}^{PSFCH,n}}/{\left(N\_{subch}^{k}⋅N\_{PSSCH}^{PSFCH}\right)}$, $0\leq i<N\_{PSSCH}^{PSFCH}$, $0\leq j<N\_{subch}^{k}$. The allocation starts in an ascending order of $i$ and continues in an ascending order of $j$. The UE expects that $M\_{interlace,k}^{PSFCH,n}$ isa multiple of$N\_{subch}^{k}∙N\_{PSSCH}^{PSFCH}$*.*AgreementRegarding “*one PSCCH/PSSCH transmission has N associated candidate PSFCH occasion(s)*” and “*For one PSCCH/PSSCH transmission, at least support that its associated candidate PSFCH occasion(s) are in different slots of the same RB set(s)*”, support:* Slot index of 1st PSFCH occasion (denoted as slot k) of a PSCCH/PSSCH transmission is determined in the same way as legacy NR SL
* The nth PSFCH occasion is in slot $k+\left(n-1\right)\*P$
	+ - Alt 1: P is equal to the (pre-)configured PSFCH periodicity, i.e., P is provided by *sl-PSFCH-Period*
	+ $1\leq n\leq N$
* Within a slot including PSFCH, for each RB set, the (pre-)configured PRBs for PSFCH transmission on this RB set are divided into N different PRB sets (denoted as set#1, set#2, …, set#N), which are associated with N candidate PSFCH occasion(s)
	+ Within this RB set, for one sub-channel on one slot of PSCCH/PSSCH transmission, its nth PSFCH occasion includes PRBs belonging to above set#n in slot $k+\left(n-1\right)\*P$
	+ FFS: whether to use 1 or N bitmaps to indicate resource for N candidate PSFCH occasion(s), respectively

Comment 4:Suggest following red changes, details are:* Corrected the meaning of $M\_{PRB,k,l}^{PSFCH,n}$, i.e., add “where $M\_{PRB,k,l}^{PSFCH,n}$ is the number of PRBs for PSFCH transmission in interlace $l$ within RB-set k based on *sl-PSFCH-RB-Set* or *sl-RB-SetPSFCH* and the UE expects that $M\_{PRB,k,l}^{PSFCH,n}$ is a multiple of $N\_{PRB}^{PSFCH}$.”
* Swap the mapping order as below to align with agreement:
	+ “The UE determines the $M\_{subset,k}^{PSFCH,n}$ PRB subsets by ordering the PRB subsets first in an ascending order of ~~interlace index~~ PRB subset index within an interlace and second in ascending order of ~~PRB subset index within an interlace~~ interlace index.”
* Suggest to add “…for any PRB $s\_{2}$ in the PRB subset when this PRB subset is finally selected for PSFCH transmission”
	+ What matters is the finally selected PRB subset.
	+ E.g., if UE finally selects PRB subset 1 for transmitting PSFCH, then only common PRBs with 1MHz of PRB subset 1 need to be dropped. Common PRBs with 1MHz of PRB subset 2/3/4 shall not be dropped, otherwise OCB cannot be satisfied.
* Corrected some numbers.

==For operation with shared spectrum channel access, when *sl-PSFCH-Type = ‘type2’* and within RB-set $k$, a UE determines a subset of PRBs in a first interlace and, based on *sl-PSFCH-RB-Set*, a subset of $N\_{PRB}^{PSFCH}$ PRBs in a second interlace for one PSFCH transmission with HARQ-ACK information in a resource pool. Within RB-set $k$, the UE determines a subset of PRBs in a first interlace and, based on *sl-RB-SetPSFCH*, a subset of $N\_{PRB}^{PSFCH}$ PRBs in a second interlace for one PSFCH transmission with conflict information in a resource pool*.* The UE expects that PSFCH transmissions with conflict information use different PRB subsets than PSFCH transmissions with HARQ-ACK information. An index of the first interlace is provided by *sl-PSFCH-Type2-CommonInterlace*. The $N\_{PRB}^{PSFCH}$ PRBs in the second interlace are provided by *sl-PSFCH-Type2-DedicatedPRB* where, for the $n$-th candidate PSFCH transmission occasion, $1\leq n\leq N\_{occasion}^{PSFCH}$, ~~and for each interlace~~ $l$, the UE determines $M\_{PRB,k, l}^{PSFCH,n}$ $M\_{subset,k}^{PSFCH,n}$ PRB subsets based on *sl-PSFCH-RB-Set* or *sl-RB-SetPSFCH*. ~~The UE expects that~~ $M\_{PRB,k,l}^{PSFCH,n}$ ~~is a multiple of~~ $N\_{PRB}^{PSFCH}$~~.~~ For interlace $l$, the UE determines a PRB subset with index $s$ to include PRBs $\left\{N\_{PRB}^{PSFCH}⋅s, N\_{PRB}^{PSFCH}⋅s+1, …, N\_{PRB}^{PSFCH}⋅\left(s+1\right)-1\right\}$, $0\leq s\leq M\_{PRB,k,l}^{PSFCH,n}/N\_{PRB}^{PSFCH}-1$~~.~~, where $M\_{PRB,k,l}^{PSFCH,n}$ is the number of PRBs for PSFCH transmission in interlace $l$ within RB-set k based on *sl-PSFCH-RB-Set* or *sl-RB-SetPSFCH* and the UE expects that $M\_{PRB,k,l}^{PSFCH,n}$ is a multiple of $N\_{PRB}^{PSFCH}$. The UE determines the $M\_{subset,k}^{PSFCH,n}$ PRB subsets by ordering the PRB subsets first in an ascending order of ~~interlace index~~ PRB subset index within an interlace and second in ascending order of ~~PRB subset index within an interlace~~ interlace index. For a number of $N\_{subch}^{k}$ sub-channels in RB-set $k$ and a number of slots for PSSCH transmissions that is not larger than $N\_{PSSCH}^{PSFCH}$ and is associated with a slot for PSFCH transmission, the UE allocates the $\left\{\left(i+j⋅N\_{PSSCH}^{PSFCH}\right)⋅M\_{subch, slot,k}^{PSFCH,n}, \left(i+j⋅N\_{PSSCH}^{PSFCH}\right)⋅M\_{subch, slot,k}^{PSFCH,n}+1, …, \left(i+1+j⋅N\_{PSSCH}^{PSFCH}\right)⋅M\_{subch, slot,k}^{PSFCH,n}-1\right\}$ PRB subsets from the $M\_{subset,k}^{PSFCH,n}$ PRB subsets to slot $i$ among the slots for PSSCH transmissions that are associated with the slot and sub-channel $j$ for PSFCH transmissions, where $M\_{subch, slot,k}^{PSFCH,n}={M\_{subset,k}^{PSFCH,n}}/{\left(N\_{subch}^{k}⋅N\_{PSSCH}^{PSFCH}\right)}$ and $0\leq i<N\_{PSSCH}^{PSFCH}$, $0\leq j<N\_{subch}^{k}$. The allocation starts in an ascending order of $i$ and continues in an ascending order of $j$. The UE expects that $M\_{subset,k}^{PSFCH,n}$ isa multiple of$N\_{subch}^{k}∙N\_{PSSCH}^{PSFCH}$*.* A PRB $s\_{1}$ in the first interlace is excluded from the resources for a PSFCH transmission, if $|s\_{1}-s\_{2}|\leq 5$ for $μ=10$ or $|s\_{1}-s\_{2}|\leq 2$ for $μ=21$ for any PRB $s\_{2}$ in the PRB subset when this PRB subset is finally selected for PSFCH transmission, and $\left(s\_{high}-s\_{low}\right)\geq 889$ for $μ=10$ or $\left(s\_{high}-s\_{low}\right)\geq 445$ for $μ=21$, where PRB $s\_{high}$ and PRB $s\_{low}$ are the largest and smallest PRB indexes, respectively, in the resources for the PSFCH transmission assuming PRB $s\_{1}$ is excluded. Comment 5:Suggest following red changes, details are:* “…associated with the ~~first~~ lowest sub-channel within the RB-set with smallest index of the corresponding PSSCH”: to align with agreement and avoid confusion.
* It seems the following agreement on cyclic shift is not captured yet.

==For operation with shared spectrum channel access and for the $n$-th candidate PSFCH transmission occasion, a UE determines a number of PSFCH resources available for multiplexing HARQ-ACK or conflict information in a PSFCH transmission as $R\_{PRB, CS}^{PSFCH}=N\_{type }^{PSFCH}⋅M⋅N\_{CS}^{PSFCH}$ where $N\_{CS}^{PSFCH}$ is a number of cyclic shift pairs for the resource pool provided by *sl-NumMuxCS-Pair* and, based on an indication by *sl-PSFCH-CandidateResourceType*- if *sl-PSFCH-CandidateResourceType* is indicated as *startSubCH*, $N\_{type }^{PSFCH}=1$, $M=M\_{subch, slot,k}^{PSFCH,n}$, and the $N\_{type }^{PSFCH}⋅M$ interlaces or PRB subsets are associated with the ~~first~~ lowest sub-channel within the RB-set with smallest index of the corresponding PSSCH - if *sl-PSFCH-CandidateResourceType* is indicated as *allocSubCH*, $N\_{type }^{PSFCH}=N\_{subch }^{PSSCH}$ and $M=\sum\_{k}^{}M\_{subch, slot,k}^{PSFCH,n}$ where the sum is over all RB-sets including resources for the corresponding PSSCH, and the $N\_{type }^{PSFCH}⋅M$ interlaces per RB-set or PRB subsets are associated with the $N\_{subch }^{PSSCH}$ sub-channels of the corresponding PSSCH- for conflict information, the corresponding PSSCH is determined based on *sl-PSFCH-Occasion*The PSFCH resources are first indexed according to an ascending order of the interlace or PRB subset index, second according to an ascending order of the RB-set index, and then according to an ascending order of the cyclic shift pair index from the $N\_{CS}^{PSFCH}$ cyclic shift pairs. The UE applies CP extension to the first symbol of a PSFCH according to an index [4, TS 38.211] provided by *sl-CP-Extension-PSFCH*. AgreementRegarding PSFCH transmission, * For “*Alt 1-1b: each PSFCH transmission occupies 1 common interlace and K3 dedicated PRB(s)*”
	+ Cyclic shift on each of K3 dedicated PRB(s) is the same
	+ Cyclic shift on each PRB of common interlace is up to UE implementation
* For “*Alt 2-3a: each PSFCH transmission occupies 1 dedicated interlace*”
	+ Support PRB-level cyclic shift hopping as in NR-U to reduce PAPR

Comment 6:Suggest following red changes to align with agreement. RAN1 discussed this issue and finally made agreement to avoid confusion.==A UE can be provided a number of symbols in a resource pool, by *sl-TimeResourcePSCCH*, starting from a second symbol that is available for SL transmissions in a slot, and a number of PRBs in the resource pool, by *sl-FreqResourcePSCCH*, starting from the lowest PRB of the ~~lowest~~ sub-channel with a lowest index, in an RB-set with a lowest index if applicable, of the associated PSSCH for a PSCCH transmission with a SCI format 1-A.**Agreement**For interlace RB-based PSCCH/PSSCH transmission in SL-U, support the following:Option 1: lowest sub-channel is the sub-channel with smallest sub-channel index |
| **Huawei, HiSilicon2** | **Comments for SL-U Channel Access****Comment #1: CPE for PSFCH****Reason for changes**:Based on the agreement below, the CPE is used within the first or second symbol before the next AGC symbol, however, current description, i.e. first symbol of PSFCH, is ambiguous. It is not clear the first symbol is AGC symbol or actual PSFCH transmission symbol. Thus, we have following suggestion.

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| **Agreement** * A set of all candidate CPE starting positions for SL transmission in FR1 unlicensed spectrum is pre-defined in TS38.211 as followed.
	+ For 15kHz SCS, the set contains values {$T\_{sym\\_1}+16μs$, $ T\_{sym\\_1}+25μs$, $T\_{sym\\_1}+34μs$, $T\_{sym\\_1}+43μs$, $T\_{sym\\_1}+52μs$, $T\_{sym\\_1}+61μs$, $T\_{sym\\_0}$}
	+ For 30kHz SCS, the set of values for CPE window of one-symbol length is {$T\_{sym\\_1}+16μs$, $ T\_{sym\\_1}+25μs$, $T\_{sym\\_0}$}
	+ For 30kHz SCS, the set of values for CPE window of two-symbol length is {$T\_{sym\\_2}+16μs$, $ T\_{sym\\_2}+25μs$, $T\_{sym\\_2}+34μs$, $T\_{sym\\_2}+43μs$, $T\_{sym\\_2}+52μs$, $T\_{sym\\_2}+61μs$, $T\_{sym\\_0}$}
	+ For 60kHz SCS, the set of values for CPE window of one-symbol length is {$T\_{sym\\_1}+16μs$, $T\_{sym\\_0}$}
	+ For 60kHz SCS, the set of values for CPE window of two-symbol length is {$T\_{sym\\_2}+16μs$, $ T\_{sym\\_2}+25μs$, $T\_{sym\\_0}$}
	+ $T\_{sym\\_0}$ is the starting position of the next AGC symbol
		- Note: when the CPE starting position is $T\_{sym\\_0}$, it means that the CPE length is 0
	+ $T\_{sym\\_1}$ is the starting position of the first symbol just before the next AGC symbol
	+ $T\_{sym\\_2}$ is the starting position of the second symbol just before the next AGC symbol

**Agreement**A single CPE starting position for PSFCH transmission is (pre-)configured per resource pool and the value is from the set of all candidate CPE starting position defined in TS38.211. |

**Suggested Changes**

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| The PSFCH resources are first indexed according to an ascending order of the interlace or PRB subset index, second according to an ascending order of the RB-set index, and then according to an ascending order of the cyclic shift pair index from the $N\_{CS}^{PSFCH}$ cyclic shift pairs. The UE applies CP extension ~~to~~ within the 1 or 2 symbols before the ~~first~~ AGC symbol of a PSFCH according to an index [4, TS 38.211] provided by *sl-CP-Extension-PSFCH*.  |

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