**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, 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. [Aris]: That should be visible in TS 38.101-1. It is captured in new Clause 16.2.5 for SL CA that the is for all S-SSB transmissions. 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 scheduled PSFCH transmissions for HARQ-ACK information and conflict information, and capable of transmitting a maximum of PSFCHs, determines a number of simultaneous PSFCH transmissions and a power for a PSFCH transmission , , on all the resource pools in PSFCH transmission occasion on all the active SL BWP of all the carrier 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.[Aris]: Similar to the previous comment, in new Clause 16.2.5 for SL CA, it is captured that the procedures in Clause 16.2.3 are performed across all carriers. That is sufficient and cleaner than editing each affected clause separately.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 .A PRB in the first interlace is excluded from the resources for a PSFCH transmission, if for or for for any PRB in the PRB subset, and for or for , where PRB and PRB are the largest and smallest PRB indexes, respectively, in the resources for the PSFCH transmission assuming PRB is excluded. [Aris]: Other than the typo (will be corrected), the suggestion is unclear. How does the description result to incorrect operation now and moving it where will fix that? 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

[Aris]: OK – although the “index” should be understood as that is legacy text. |
| 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.

[Aris] The agreement above is that “Each R16/R17 NR SL S-SSB slot has K corresponding additional candidate S-SSB occasion(s) in different time slot(s)”. The text is basically the agreement. * **Comments 2 (Clause 16.2.5)**

Some typos should be corrected, where “S-SS/PBCH” should be changed to “S-SS/PSBCH”.[Aris]: Yes, thank you.* **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. |

[Aris]: For the PSFCH, the procedures from 16.2.3 and 16.2.4.2 apply (across all carriers instead of one carrier). The rest is legacy operation. * **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.

[Aris]: It is stated that the procedure is applied across all carriers. The number is therefore the one for the transmission carriers, instead of per carrier, and the same applies for the maximum transmission power (can be clarified in 16.2.5 for the PSFCH similar to S-SSBs). * **Comments 5 (Clause 16.3.0)**

IUC mechanism is not discussed in Rel-18 SL-U, so the associated parts should be removed.[Aris] OK – it was not clear. Will remove. * **Comment 6 (Clause 16.3.0)**

The following yellow highlight part should be removed, because 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*, and where the sum is over all RB-sets including resources for the corresponding PSSCH, and the interlaces per RB-set or PRB subsets are associated with the sub-channels of the corresponding PSSCH[Aris] There can be two candidates corresponding to a same interlace and in different RB-sets – that is why “per RB-set” is used. Will modify to “combinations of interlaces and RB-sets” to possibly avoid the confusion.  |
| 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*. [Aris]: Will modify as follows (and for S-SSB) – also, “before” is enough. The UE applies CP extension to the first symbol of a PSFCH and within the first one or two symbols before the first symbol of the 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
	+ - Alt 1: P is equal to the (pre-)configured PSFCH periodicity, i.e., P is provided by *sl-PSFCH-Period*
* 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
	+ FFS: whether to use 1 or N bitmaps to indicate resource for N candidate PSFCH occasion(s), respectively

[Aris]: The text uses ‘n’ to represent the n-th occasion for the PRBs - it should be clear that the PRB subset is for transmission occasion ‘n’. 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 , 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 , 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 , the UE does not transmit the PSCCH /PSSCH, respectively. |

[Aris]: The text was based on an understanding that a power for a PSCCH can be different than a power for a PSSCH and, as a result, a power limitation of PSCCH is not always linked to a power limitation for a PSSCH and the two are treated separately. If there is a common understanding that both PSCCH and PSSCH are dropped if one is dropped (i.e. the PSCCH is dropped if the PSSCH is to be dropped – which may make sense), I will revise accordingly. 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. |

[Aris]: This is captured by the highlighted part above. |
| 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 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 , if any, for transmission of each S-SS/PBCH block in used non-anchor RB-sets labled as , and final power of each SSB is min(,) -*otherwise* the UE equally allocates power remaining from , if any, for transmission of each S-SS/PBCH block in used non-anchor RB-sets . [Aris] The current formulation in the draft CR follows the agreement. It is understood that “notes” are not captured in specifications. 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.~~[Aris]: OK.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.[Aris] Yes, the interlace is for “Type 1” (dedicated interlace), so “common interlace” is not applicable in that sentence. The understanding is correct but the text is clear on it.1. We didn’t notice any description on contiguous RB mapping, is it correct understanding editor intends to capture it in later phase?

[Aris] Could you please be more specific? What channel are you referring to? 1. 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 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.”[Aris] There is no need to add “up to UE implementation”. That applies for all statements in the specifications defining UE behavior. It is up to the UE implementation to satisfy it. 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 , 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 , 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 , the UE does not transmit the PSCCH-PSSCH transmission, and repeats this procedure over the non-dropped carriers.”[Aris]: Please see response to Comment#3 from Xiaomi. If it is a common understanding that PSCCH is dropped if PSSCH needs to be dropped, I can revise based on the suggestion. |
| 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 ”: “*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 “…~~+~~ ” and “… is a frequency location of a ~~lowest~~ S-SS/PSBCH block in RB-set ,where is provided by”: there is no agreement to support “lowest”, suggest to remove it for now and change “+” to “”. We can wait for more RAN1 agreement in maintenance phase.
* Regarding “… is a slot gap between a S-SS/PSBCH block with index 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 ,…”: 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 , 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 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 , 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 ~~+~~ , where- is a frequency location of a ~~lowest~~ S-SS/PSBCH block in RB-set ,where 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;~~- is an index of an S-SS/PSBCH block from repeated S-SS/PSBCH blocks in the frequency domain and within the RB-set , where , and is provided by a value in *sl-NumberRepeatedSSB* corresponding to RB-set ;- is a number of resource blocks, provided by *sl-GapRepeatedSSB*, for a gap between repeated S-SS/PSBCH blocks;- is a number of resource blocks for a S-SS/PSBCH block transmission with SCS configuration .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 of additional candidate S-SS/PBCH block transmission occasions. When , for S-SS/PSBCH block with index , the UE determines indexes of slots that include the additional candidate S-SS/PBCH block transmission occasions as + +, where - is a slot gap between a S-SS/PSBCH block with index 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 , provided by *sl-TimeGapAdditionalOccasion*, for determining the additional candidate S-SS/PBCH block transmission occasions, and- is an index of the additional candidate S-SS/PBCH block transmission occasions, with [Aris]: (a) OK. (b) The suggested text is basically a duplication of the current one defining the anchor RB-set “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 is the anchor RB-set”. There is also additional text to that effect. However, I will add “… that is the RB set that includes the S-SS/PSBCH block”. (c) For non-anchor RB-set, a note exists that the text is subject to RAN1 decisions. That should have been enough but will remove since it is apparently too controversial.(d) Using “±” will not work. Will add a note that the ‘+’ and the ‘lowest’ are up to RAN1 confirmation/revision.(e) The meaning of is clear from the equation – math is clearer than any words.(f) The “a UE attempts to transmit at least S-SS/PSBCH blocks in the anchor RB set” is directly from the RAN1 agreement. 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 ” 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 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
	+ - Alt 1: P is equal to the (pre-)configured PSFCH periodicity, i.e., P is provided by *sl-PSFCH-Period*
* 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
	+ FFS: whether to use 1 or N bitmaps to indicate resource for N candidate PSFCH occasion(s), respectively

[Aris]: The text uses similar wording as RAN1 agreements - “attempt to transmit” means that the UE intends to transmit but may not transmit due to channel access failure. “The nth PSFCH occasion is in slot ” is captured in “a number of first slots”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 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 , 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 , 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 -th candidate PSFCH transmission occasion, , the UE determines a number 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 are available for PSFCH transmission~~*~~.~~* For a number of sub-channels in RB-set and a number of PSSCH slots that is not larger than and is associated with a slot for PSFCH transmission, the UE allocates the interlaces from the interlaces to slot and sub-channel , where , , . The allocation starts in an ascending order of and continues in an ascending order of . The UE expects that isa multiple of *.*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
	+ - Alt 1: P is equal to the (pre-)configured PSFCH periodicity, i.e., P is provided by *sl-PSFCH-Period*
* 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
	+ FFS: whether to use 1 or N bitmaps to indicate resource for N candidate PSFCH occasion(s), respectively

[Aris]: (a) Agree. (b) Based on the equation, it is clear that the PRB subsets are not overlapping. (c) That sentence is to reflect the “UE expects all the PRBs of one interlace within 1 RB set are available for PSFCH transmission” from the agreement – no reason to remove. Comment 4:Suggest following red changes, details are:* Corrected the meaning of , i.e., add “where is the number of PRBs for PSFCH transmission in interlace within RB-set k based on *sl-PSFCH-RB-Set* or *sl-RB-SetPSFCH* and the UE expects that is a multiple of .”
* Swap the mapping order as below to align with agreement:
	+ “The UE determines the 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 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 , a UE determines a subset of PRBs in a first interlace and, based on *sl-PSFCH-RB-Set*, a subset of PRBs in a second interlace for one PSFCH transmission with HARQ-ACK information in a resource pool. Within RB-set , the UE determines a subset of PRBs in a first interlace and, based on *sl-RB-SetPSFCH*, a subset of 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 PRBs in the second interlace are provided by *sl-PSFCH-Type2-DedicatedPRB* where, for the -th candidate PSFCH transmission occasion, , ~~and for each interlace~~ , the UE determines PRB subsets based on *sl-PSFCH-RB-Set* or *sl-RB-SetPSFCH*. ~~The UE expects that is a multiple of .~~ For interlace , the UE determines a PRB subset with index to include PRBs , ~~.~~, where is the number of PRBs for PSFCH transmission in interlace within RB-set k based on *sl-PSFCH-RB-Set* or *sl-RB-SetPSFCH* and the UE expects that is a multiple of . The UE determines the 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 sub-channels in RB-set and a number of slots for PSSCH transmissions that is not larger than and is associated with a slot for PSFCH transmission, the UE allocates the PRB subsets from the PRB subsets to slot among the slots for PSSCH transmissions that are associated with the slot and sub-channel for PSFCH transmissions, where and , . The allocation starts in an ascending order of and continues in an ascending order of . The UE expects that isa multiple of *.* A PRB in the first interlace is excluded from the resources for a PSFCH transmission, if for or for for any PRB in the PRB subset when this PRB subset is finally selected for PSFCH transmission, and for or for , where PRB and PRB are the largest and smallest PRB indexes, respectively, in the resources for the PSFCH transmission assuming PRB is excluded. [Aris]: (a) No need for the first change as the meaning of is clear from the context. (b) Agree with the second change. (c) Agree with the third change on the PRB subset. (d) The typo for will be corrected – however, it is not correct to change 88 to 89 and 44 to 45. The OCB requirement is defined based on the frequency span of the transmission, which is (s\_high-s\_low+1) RBs, and (s\_high-s\_low+1) ≥ 89 is same as (s\_high-s\_low) ≥ 88. 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 -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 where 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*, , , and the 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*, and where the sum is over all RB-sets including resources for the corresponding PSSCH, and the interlaces per RB-set or PRB subsets are associated with the 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 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*. [Aris]: OK. 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.[Aris]: This is a conflicting suggestion to the one made in Comment#5.**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 {, , , , , , }
	+ For 30kHz SCS, the set of values for CPE window of one-symbol length is {, , }
	+ For 30kHz SCS, the set of values for CPE window of two-symbol length is {, , , , , , }
	+ For 60kHz SCS, the set of values for CPE window of one-symbol length is {, }
	+ For 60kHz SCS, the set of values for CPE window of two-symbol length is {, , }
	+ is the starting position of the next AGC symbol
		- Note: when the CPE starting position is , it means that the CPE length is 0
	+ is the starting position of the first symbol just before the next AGC symbol
	+ 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 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*.  |

[Aris]: Please see response to Comment #1 from Xiaomi.  |
| Qualcomm | For sidelink carrier aggregation:1. For SL synchronization with CA, the agreement in RAN 1 was to re-use the LTE SL mechanism. From TS 36.213 Sec. 14.4, the SL synchronization signals are transmitted as per the procedure detailed in TS 36.331, where the parameters *syncFreqList, slss-TxMultiFreq,* and *slss-TxDisabled*. Like TS 36.213, a reference to TS 38.331 should be added at the end of the sentence.
	1. If a UE is configured for sidelink operation on multiple carriers, the UE applies the synchronization procedures in Clause 16.1 on each of the multiple carriers as per TS 38.331.

[Aris]: OK. Will add a reference to [12, TS 38.331].1. For the change of power of the PSSCH/PSCCH transmission, the RAN 1 agreement was to re-use LTE CA power control in Sec. 14 of TS 36.213. The current text should explicitly capture the dropping of the PSSCH/PSCCH with highest priority when P\_CMAX is not met and then applying the same procedure (iteratively) on the remaining transmissions. We propose the following modification to the editor’s text:
* 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 or PSSCHs that would overlap in time on respective carriers and a total power for the transmission of the PSCCHs or PSSCHs would exceed , the UE reduces a power for a transmission of a PSCCH or 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 or the PSSCH with the largest priority value, a total power does not exceed , the UE transmits the PSCCHs or the PSSCHs, respectively. If, after the reduction of the power of the PSCCH or the PSSCH with the largest priority value, a total power exceeds , the UE ~~does not transmit~~  drops the transmission of PSCCH or the PSSCH with the largest priority value, respectively and repeats this procedure over the non-dropped carriers .

[Aris]: I think the text is OK as is. The fact that the procedure will be repeated goes back to the very beginning of the paragraph once the “does not transmit/drop” at the end happens – the UE will have the same situation again (unless all but one are dropped) – i.e. the “repeat” is redundant. The “with the largest priority value” is OK although repetitive and there is no chance for confusion. Using “does not transmit” instead of “drops” is a matter of taste although I can see a possible comment of “what happens after the “does not transmit” - “drop is clearer”). Anyway, as a similar request was also made by ZTE on the clarification for the “repeat”, I will clarify as suggested. For sidelink unlicensed,1. For PSFCH Alt 1-1b, regarding how we index the PRB subsets across interlaces, we think it should be within the interlace first and then across the interlace based on the RAN1#114 agreement.

AgreementIn “*Alt 1-1b: each PSFCH transmission occupies 1 common interlace and K3 dedicated PRB(s)*”, regarding mapping between PSSCH and K3 dedicated PRB(s):Alt 1: Map to a dedicated PRB subset* + - Step 2: Index dedicated PRBs in set#n, based on PRB index in an interlace first and interlace index second rule
		- Step 3: After indexing in Step 2, every K3 dedicated PRBs forms a dedicated PRB subset

 Hence, we propose the following modification to the editor’s text:* “The UE determines the 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”
* “The PSFCH resources are first indexed according to an ascending order of the RB-set indexthe ~~interlace or PRB subset index~~, second according to an ascending order of interlace or PRB subset index ~~the RB-set index~~, and then according to an ascending order of the cyclic shift pair index from the cyclic shift pairs.”
1. For the common interlace RB dropping if there is A/N carrying RB within 1MHz, the original intention of the agreement is not to allow any of common interlace RBs to be within the K3 A/N carrying RB, so that the K3 A/N carrying RBs do not need to share Tx power under PSD limit. The separation of two RBs needs to > 6 RBs for u=1 and >3 RBs for u=2. Moreover, to fulfill the 80% OCB requirement in 20MHz channel (one RB-set), the transmitted signal needs to occupy >=16MHz. Two edge RBs of PSFCH transmission needs to be at least 89/45 RBs apart for u=1/2

So, we propose the following modification to the editor’s text:* A PRB in the first interlace is excluded from the resources for a PSFCH transmission, if 7 for or 4 for for any PRB in the PRB subset, and for or for , where PRB and PRB are the largest and smallest PRB indexes, respectively, in the resources for the PSFCH transmission assuming PRB is excluded.

[Aris]: OK for the first comment – see also response to comment 4/part (c) from Huawei. For the second comment, the change is not needed - please see response to comment 4/part (d) from Huawei. For PSD, a note can be included since it is not clear how RAN1 defines “a PRB of common interlace and a dedicated PRB locate within the same 1 MHz bandwidth”.  |
| Sharp | * **Comment #1, on 16.1:**

The description of “a gap between repeated S-SS/PSBCH blocks" seems a bit unclear. We suggest describing that gap is between two adjacent repeated S-SS/PSBCH blocks.

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| - is a number of resource blocks, provided by *sl-GapRepeatedSSB*, for a gap between two adjacent repeated S-SS/PSBCH blocks; |

[Aris]: OK.* **Comment #2, on 16.1:**

Anchor RB set is the RB set where the S-SSB provided by *sl-AbsoluteFrequencySSB* is located. This should be clearly defined in 213. But the current draft CR seems to assume that anchor RB set is defined elsewhere, and *sl-AbsoluteFrequencySSB* is just yet another configuration parameter of the anchor RB set.[Aris]: It is rather clear but OK – please see response to element (b) in Comment 1 by Huawei.* **Comment #3, on 16.1:**

Agree with Huawei that there is no agreement to support “*sl-AbsoluteFrequencySSB-r18*” and related spec text. All such text should be replaced by TBD in the draft CR.[Aris]: OK – given that it is apparently controversial, it will be removed. Please see response to Comment 1 by Huawei. * **Comment #4, on 16.3.0:**

The description of “The interlaces are ordered based on respective interlace indexes.” below seems not clear on how to order the interlaces, i.e., in an ascending order of interlace index or in a descending order of interlace index. Similar to description of “The UE determines the PRB subsets by ordering the PRB subsets first in an ascending order of interlace index and second in ascending order of PRB subset index within an interlace.” for *sl-PSFCH-Type = ‘type2’* where ascending order of interlace index is used, we suggest to add ascending order of interlace index to remove the ambiguity.

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| For operation with shared spectrum channel access, when *sl-PSFCH-Type = ‘type1’* and within RB-set , a UE determines, based on *sl-PSFCH-RB-Set*, all PRBs of an interlace for PSFCH transmission with HARQ-ACK information in the resource pool. Within the RB-set , the UE determines all PRBs in an interlace for 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 -th candidate PSFCH transmission occasion, , the UE determines a number 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 are available for PSFCH transmission*.* For a number of sub-channels in RB-set and a number of PSSCH slots that is not larger than and is associated with a slot for PSFCH transmission, the UE allocates the interlaces from the interlaces to slot and sub-channel , where , , . The allocation starts in an ascending order of and continues in an ascending order of . The UE expects that isa multiple of *.* |

[Aris]: OK.* **Comment #5, on 16.3.0:**

We assume that is intended to calculate all PRB subsets corresponding to all allocated sub-channels of the corresponding PSSCH, which should be denoted by but not . Propose to change “” to “” and also remove “per RB-set”.

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| - if *sl-PSFCH-CandidateResourceType* is indicated as *allocSubCH*, and where the sum is over all RB-sets including resources for the corresponding PSSCH, and the interlaces ~~per RB-set~~ or PRB subsets are associated with the sub-channels of the corresponding PSSCH |

[Aris]: My understanding is that is not intended as “all PRB subsets corresponding to all allocated sub-channels of the corresponding PSSCH”, but “” is. Based on a previous comment by CATT, since “per RB-set” is confusing, I will update to “combinations of interlaces and RB-sets”. |
| vivo | **Comment1.**

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| 16.2.0 S-SS/PSBCH blocksA UE determines a power for an S-SS/PSBCH block transmission occasion in slot , in the anchor RB-set if applicable, on active SL BWP of carrier as [dBm]where- is defined in [8-1, TS 38.101-1]  |

AgreementRegarding “*UE may transmit S-SSB repetition in more than one RB set*”:* For above Alts, is determined according to TS 38.101-1 for transmission of all S-SSB repetitions on all used RB sets

**Reason for change:** According to the agreement, is for transmission of all S-SSB repetitions on all used RB sets, but the current wording can be interpreted as that is a total budget only for the anchor RB set. Thus, we suggest to refine the wording as below:\*\*\*\*\*\*change1 starts\*\*\*\*\*\*- is defined in [8-1, TS 38.101-1], and is determined for transmission of all S-SS/PBCH blocks on all RB sets used for S-SSB transmissions if applicable.\*\*\*\*\*\*change1 ends\*\*\*\*\*\*[Aris]: The text in new clause 16.2.5 already says that the S-SSB transmissions are the ones on multiple carriers and a reference to 38.101-1 is added for . There is no issue. **Comment2.**

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| 16.2.5 SL Carrier AggregationIf a UE would transmit S-SS/PBCH blocks on multiple carriers, the UE determines a power for each S-SS/PBCH block transmission as described in Clause 16.2.0. If the UE would transmit S-SS/PBCH blocks that would overlap in time on respective carriers and a total power for the transmissions of the S-SS/PBCH blocks would exceed , the UE autonomously reduces a power for one or more of the S-SS/PBCH blocks transmissions so that a resulting total power would not exceed .  |

**Reason for change:** According to agreement, it is up to UE implementation how to adjust the transmit power of each S-SSB transmission. If the power of a selected S-SSB is reduced to zero but the total power still exceeds the power budget, the UE must even terminate the S-SSB transmission and further reduce the power of the remaining the S-SSBs. Therefore, we recommend the following refinement:\*\*\*\*\*\*change2 starts\*\*\*\*\*\*If a UE would transmit S-SS/PBCH blocks on multiple carriers, the UE determines a power for each S-SS/PBCH block transmission as described in Clause 16.2.0. If the UE would transmit S-SS/PBCH blocks that would overlap in time on respective carriers and a total power for the transmissions of the S-SS/PBCH blocks would exceed , the UE autonomously reduces a power for one or more of the S-SS/PBCH blocks transmissions so that a resulting total power would not exceed . If, after the reduction of the power of the S-SS/PBCH blocks transmissions, a total power exceeds , the UE does not transmit at least some of S-SS/PBCH blocks.\*\*\*\*\*\*change2 ends\*\*\*\*\*\*[Aris]: I don’t think the suggestion is supported by an agreement. Also, reducing the power includes reduction to 0 (no transmission) – that also applies in legacy descriptions for power reductions. It is a UE implementation aspect.**Comment3**

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| 16.2.5 SL Carrier AggregationIf 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 or PSSCHs that would overlap in time on respective carriers and a total power for the transmission of the PSCCHs or PSSCHs would exceed , the UE reduces a power for a transmission of a PSCCH or 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 or the PSSCH with the largest priority value, a total power does not exceed , the UE transmits the PSCCHs or the PSSCHs, respectively. If, after the reduction of the power of the PSCCH or the PSSCH with the largest priority value, a total power exceeds , the UE does not transmit the PSCCH or the PSSCH, respectively. |

The LTE spec is as below:*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.***Reason for change:** After dropping one PSSCH with the largest “Priority” field, if the total power still exceeds the power budget, the UE should repeat the power reduction procedure for the remaining non-dropped carriers.:\*\*\*\*\*\*change3 starts\*\*\*\*\*\*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 or PSSCHs that would overlap in time on respective carriers and a total power for the transmission of the PSCCHs or PSSCHs would exceed , the UE reduces a power for a transmission of a PSCCH or 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 or the PSSCH with the largest priority value, a total power does not exceed , the UE transmits the PSCCHs or the PSSCHs, respectively. If, after the reduction of the power of the PSCCH or the PSSCH with the largest priority value, a total power exceeds , the UE does not transmit the PSCCH or the PSSCH, respectively. If, after the dropping of the PSCCH or the PSSCH with the largest priority value, a total power exceeds , UE repeats this power reduction or dropping procedure of PSCCH or PSSCH over non-dropped carriers.\*\*\*\*\*\*change3 ends\*\*\*\*\*\*[Aris]: Although I don’t think it is needed, a “repeats” statement will be captured – please see response to a same comment by Qualcomm. **Comment4**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.**Reason for change:** PSFCH TX/TX prioritization rule in the agreement refer to the PSFCH TX/TX prioritization rule in Clause 16.2.3 for PSFCH power control, the agreement means that for CA case the power control for PSFCH including PSFCH TX/TX de-prioritization should be per CA applied ,but the current PSFCH PC procedure is per carrier applied. changes to Clause 16.2.3 is needed\*\*\*\*\*\*change4 starts\*\*\*\*\*\*16.2.3 PSFCHA UE with scheduled PSFCH transmissions for HARQ-ACK information and conflict information, and capable of transmitting a maximum of PSFCHs, determines a number of simultaneous PSFCH transmissions and a power for a PSFCH transmission , , on all the resource pools in PSFCH transmission occasion on active SL BWP of carrier when UE is not provided with multiple carriers, or all the resource pools in PSFCH transmission occasion on active SL BWPs of multiple carriers if a UE would transmit PSFCH on multiple carriersas - if *dl-P0-PSFCH* is provided, [dBm]Where\*\*\*\*\*\*change4 ends\*\*\*\*\*\*[Aris]: The statement in the last paragraph of new clause 16.2.5 captures the procedures for multiple carriers. It should be clear that the procedures in 16.2.3 are for single carrier but will clarify in 16.2.5.**Comment4**For type-2 PSFCH transmission in shared band, according to the below agreement, firstly, the PRB is indexed first within an interlace and second in interlace index, which seems to be contrary to the below red text in the draft CR; secondly, the interlace for PSFCH is defined for 15kHz and 30kHz SCS (i.e., and ), while the current draft CR is for and as highlighted in yellow.Step 2: Index dedicated PRBs in set#n, based on PRB index in an interlace first and interlace index second ruleDraft CR:For operation with shared spectrum channel access, when *sl-PSFCH-Type = ‘type2’* and within RB-set , a UE determines a subset of PRBs in a first interlace and, based on *sl-PSFCH-RB-Set*, a subset of PRBs in a second interlace for PSFCH transmission with HARQ-ACK information in a resource pool. Within RB-set , the UE determines a subset of PRBs in a first interlace and, based on *sl-RB-SetPSFCH*, a subset of PRBs in a second interlace for 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 PRBs in the second interlace are provided by *sl-PSFCH-Type2-DedicatedPRB* where, for the -th candidate PSFCH transmission occasion, , and for each interlace , the UE determines PRB subsets based on *sl-PSFCH-RB-Set* or *sl-RB-SetPSFCH*. The UE expects that is a multiple of . For interlace , the UE determines a PRB subset with index to include PRBs , . The UE determines the PRB subsets by ordering the PRB subsets first in an ascending order of interlace index and second in ascending order of PRB subset index within an interlace. For a number of sub-channels in RB-set and a number of slots for PSSCH transmissions that is not larger than and is associated with a slot for PSFCH transmission, the UE allocates the PRB subsets from the PRB subsets to slot among the slots for PSSCH transmissions that are associated with the slot and sub-channel for PSFCH transmissions, where and , . The allocation starts in an ascending order of and continues in an ascending order of . The UE expects that isa multiple of *.* A PRB in the first interlace is excluded from the resources for a PSFCH transmission, if for or for for any PRB in the PRB subset, and for or for , where PRB and PRB are the largest and smallest PRB indexes, respectively, in the resources for the PSFCH transmission assuming PRB is excluded. [Aris]: OK – please see response to previous comments on the same issue. |
| OPPO | For SL carrier aggregation (16.2.5)1. For the following description, it is better to use “PSCCH/PSSCH transmissions” instead of “PSCCHs or PSSCHs” due to PSCCH and PSSCH are transmitted in TDM + FDM manner.

“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 or PSSCHs~~ PSCCH/PSSCH transmissions that would overlap in time on respective carriers and a total power for the transmission of the PSCCHs or PSSCHs would exceed ,”[Aris]: Please see response to same issue for comment#3 from Xiaomi and comment#5 by ZTE.1. The following sentence should be removed, whether to transmit PSCCH/PSSCH still needs to consider other rules (e.g., UL/SL prioritization). In LTE SL CA, we only specified whether to drop the SL transmission but didn’t specify whether to transmit the SL transmission in the section of power control.

“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 or the PSSCH with the largest priority value, a total power does not exceed , the UE transmits the PSCCHs or the PSSCHs, respectively.~~ If, after the reduction of the power of the PSCCH or the PSSCH with the largest priority value, a total power exceeds , the UE does not transmit the PSCCH or the PSSCH, respectively.”For PSSCH-PSFCH resource mapping1. For UE behaviour to perform PSFCH transmission using N PSFCH transmission occasions, we have the following agreements:

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| 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
	+ - Alt 1: P is equal to the (pre-)configured PSFCH periodicity, i.e., P is provided by *sl-PSFCH-Period*
* 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
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Based on that, we suggest the modification to the following part“For operation with shared spectrum channel access, the UE can attempt to transmit the PSFCH over a number of ~~first~~ slots, provided by *sl-candidatePSFCH-Occasions*~~,~~. The first PSFCH slot is a first slot 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 nth PSFCH slot among the number of slots is , where k is the slot of the first PSFCH slot, and is provided by *sl-PSFCH-Period* , . The UE attempts to transmit in a slot only when the UE fails to transmit in all previous slots within the number of slots.”[Aris]: The proposed change is equivalent to “first slots that include PSFCH resources and satisfy the minimum time gap requirement”, since the interval for PSFCH resource is 1. For PSFCH type 1 (interlace only), there are following two comments
2. Within interlace subset associate to PSFCH transmission occasion n, the interlaces are re-indexed with ascending order of interlace.
3. The following description is not correct “All PRBs in the interlaces within RB-set are available for PSFCH transmission”, it seems that all interlaces within RB set k are available for PSFCH transmission.

Based on above analysis, we suggest the following modification:“For operation with shared spectrum channel access, when *sl-PSFCH-Type = ‘type1’* and within RB-set , a UE determines, based on *sl-PSFCH-RB-Set*, all PRBs of an interlace for PSFCH transmission with HARQ-ACK information in the resource pool. Within the RB-set , the UE determines all PRBs in an interlace for 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 -th candidate PSFCH transmission occasion, , the UE determines an interlace set which includes a number of interlaces based on *sl-PSFCH-RB-Set* or *sl-RB-SetPSFCH*. The set of interlaces are indexed according to ascending order of ~~ordered based on respective~~ interlace index~~es~~. For each interlace within the interlace set, ~~A~~all PRBs in the interlace~~s within RB-set~~  are available for PSFCH transmission*.* For a number of sub-channels in RB-set and a number of PSSCH slots that is not larger than and is associated with a slot for PSFCH transmission, the UE allocates the interlaces from the interlaces to slot and sub-channel , where , , . The allocation starts in an ascending order of and continues in an ascending order of . The UE expects that isa multiple of *.”*[Aris]: Will update based on the suggestions.1. For PSFCH type 2 (common interlace + dedicated PRB subset), there are following comments
2. During the procedure “For operation with shared spectrum channel access, when *sl-PSFCH-Type = ‘type2’* and within RB-set …”, we think it is to determine PSSCH-PSFCH resource set mapping based on one sub-channel and one slot of PSSCH resource within one RB set. Whether a PRB in common interlace needs to be dropped can only be determined after a specific PSFCH resource for a PSFCH transmission is determined (based on P\_ID and M\_ID). In that case, the following part (“A PRB in the first interlace is excluded from the resources for a PSFCH transmission, if for or for for any PRB in the PRB subset, and for or for , where PRB and PRB are the largest and smallest PRB indexes, respectively, in the resources for the PSFCH transmission assuming PRB is excluded. ”)should be removed to later part when PSFCH resource is determined
3. Based on the agreement for PSSCH-PSFCH mapping, we suggest the following modification:

“For operation with shared spectrum channel access, when *sl-PSFCH-Type = ‘type2’* and within RB-set , a UE determines ~~a subset of PRBs in~~ a first interlace and, based on *sl-PSFCH-RB-Set*, a subset of PRBs ~~in a second interlace~~ for PSFCH transmission with HARQ-ACK information in a resource pool. Within RB-set , the UE determines ~~a subset of PRBs in~~ a first interlace and, based on *sl-RB-SetPSFCH*, a subset of PRBs ~~in a second interlace~~ for 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 PRBs in the second interlace are provided by~~ *~~sl-PSFCH-Type2-DedicatedPRB~~* ~~where, f~~For the -th candidate PSFCH transmission occasion, , ~~and for each interlace ,~~ the UE determines a subset which includes a number of PRBs within the subsets of PRBs ~~based on~~ *~~sl-PSFCH-RB-Set~~* ~~or~~ *~~sl-RB-SetPSFCH~~*. For each interlace *l*, ~~T~~the UE expects that is a multiple of ~~,~~ where is the number of PRBs of interlace *l* in RB-set *k* available for PSFCH transmission occasion *n*, and is number of PRBs of one interlace used for one PSFCH transmission. The UE expects that is a multiple of . ~~For interlace , the UE determines a PRB subset with index to include PRBs , .~~ The ~~UE determines the~~ subset of PRB is indexed ~~subsets by ordering the PRB subsets~~ firstly in an ascending order of PRB index within an interlace ~~interlace index~~ and secondly in ascending order of interlace index ~~PRB subset index within an interlace~~. Within the subset of PRBs, every PRBs forms a PRB subset. For a number of sub-channels in RB-set and a number of slots for PSSCH transmissions that is not larger than and is associated with a slot for PSFCH transmission, the UE allocates the PRB subsets from the PRB subsets to slot among the slots for PSSCH transmissions that are associated with the slot and sub-channel for PSFCH transmissions, where , and , . The allocation starts in an ascending order of and continues in an ascending order of . The UE expects that isa multiple of *.* ~~A PRB in the first interlace is excluded from the resources for a PSFCH transmission, if for or for for any PRB in the PRB subset, and for or for , where PRB and PRB are the largest and smallest PRB indexes, respectively, in the resources for the PSFCH transmission assuming PRB is excluded.~~ ”“A UE determines an index of a PSFCH resource for a PSFCH transmission with HARQ-ACK information in response to a PSSCH reception or with conflict information corresponding to a reserved resource as where is a physical layer source ID provided by SCI format 2-A/2-B/2-C [5, TS 38.212] scheduling the PSSCH reception, or by SCI format 2-A/2-B/2-C with corresponding SCI format 1-A reserving the resource from another UE to be provided with the conflict information. For HARQ-ACK information, is the identity of the UE receiving the PSSCH as indicated by higher layers if the UE detects a SCI format 2-A with Cast type indicator field value of "01"; otherwise, is zero. For conflict information, is zero.For operation with shared spectrum channel access, when *sl-PSFCH-Type = ‘type2’, a* PRB in the first interlace is excluded from the resources for a PSFCH transmission, if for or for for any PRB in the PRB subset associated to the determined PSFCH resource, and for or for , where PRB and PRB are the largest and smallest PRB indexes, respectively, in the resources for the PSFCH transmission assuming PRB is excluded.”[Aris]: OK to move the OCB/PSD part to the end. The changes in the first part are equivalent to the current text.For PSFCH monitoring and reporting:1. The following agreement were achieved in RAN1#114, which can be captured into 16.3.1

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| AgreementIn “*one PSCCH/PSSCH transmission has N associated candidate PSFCH occasion(s)*”, regarding Rx UE behaviour on receiving PSFCH for a PSCCH/PSSCH transmission, support:* For unicast:
	+ FFS: Monitor:
		- Rx UE attempts to monitor candidate PSFCH occasion(s) until one PSFCH is detected or all candidate PSFCH occasion(s) are monitored.
		- If one PSFCH is detected, Rx UE can omit monitoring following candidate PSFCH occasion(s).
	+ Report:
		- If Rx UE receives PSFCH, Rx UE reports same value as a value of HARQ-ACK information that the UE determines from the PSFCH reception to higher layers, otherwise re-ports NACK to higher layer.
* FFS: For groupcast option 1 (NACK only):
	+ FFS: Monitor:
		- Rx UE attempts to monitor all candidate PSFCH occasions.
		- If NACK is detected, Rx UE can omit monitoring following candidate PSFCH occasion(s).
	+ Report:
		- If Rx UE does not detect any PSFCH in all candidate PSFCH occasions, Rx UE reports ACK to higher layers; otherwise, reports NACK to higher layers.
* For groupcast option 2 (ACK/NACK):
	+ FFS: Monitor:
		- Rx UE attempts to monitor PSFCH transmission occasions until PSFCH from all transmitters have been detected or all candidate PSFCH occasions are monitored.
		- If Rx UE detects PSFCH from one PSFCH transmitter, it can omit PSFCH detection for following PSFCH transmission occasions for this PSFCH transmitter.
	+ Report:
		- If ACK has been detected from at least one PSFCH occasion of each of all expected PSSCH receivers, Rx UE reports ACK to higher layers; otherwise, reports NACK to higher layers.

AgreementIn “*one PSCCH/PSSCH transmission has N associated candidate PSFCH occasion(s)*”, regarding Rx UE behaviour on receiving PSFCH for a PSCCH/PSSCH transmission, support:* For unicast:
	+ Monitor:
		- Alt 1: Rx UE attempts to monitor all candidate PSFCH occasion(s)
			* If one PSFCH is detected, Rx UE can omit monitoring following candidate PSFCH occasion(s), if any.
		- PSFCH prioritization rule is used
* For groupcast option 2 (ACK/NACK):
	+ Monitor:
		- Alt 1: Rx UE attempts to monitor all PSFCH transmission occasions.
			* If Rx UE detects PSFCH from a PSFCH transmitter, it can omit PSFCH detection for following PSFCH transmission occasions for this PSFCH transmitter, if any.
		- PSFCH prioritization rule is used
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For Synchronization procedures / S-SSB (16.1)1. The definition of anchor RB set can be supplemented based on the note in the agreements “Note: anchor RB set refers to the RB set where S-SSB indicated by *sl-AbsoluteFrequencySSB-r16* locates”

[Aris]: Please see previous comments/responses to Huawei and Sharp.1. RAN1 does not have a clear agreement about how to map S-SSB repetitions on non-anchor RB set. Furthermore, RAN1 has the agreement on how to determine anchor RB set, and the current agreements implies that the rest RB sets are non-anchor after the determination of anchor RB set. Therefore, by now, it is suggested that “*sl-AbsoluteFrequencySSB-r18*, when RB-set *j* is a non-anchor RB-set” and “*sl-AbsoluteFrequencySSB-r18* when RB-set *j* is a non-anchor RB-set;” can be updated.

[Aris]: Please see previous comments – that statement was under a note for RAN1 confirmation/revision but it seems controversial and is now removed.1. In frequency domain, the gap between repeated S-SS/PSBCH should be described in details based the agreements that “The gap is between the lowest subcarrier of the upper PSBCH and the highest subcarrier of the lower PSBCH”.

[Aris]: That should be captured in 38.211 or in 38.331. =====Start of Draft TP=====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 for RB-set , 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 is the anchor RB-set which refers to the RB set where S-SSB indicated by *sl-AbsoluteFrequencySSB* locates.- *~~sl-AbsoluteFrequencySSB-r18~~*~~, w~~When RB-set *j* is a ~~non-~~anchor RB-set, an RB set other than 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 , 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 +, where- is a frequency location of a lowest S-SS/PSBCH block in RB-set , where is provided by - *sl-AbsoluteFrequencySSB* when RB-set *j* is the anchor RB-set, - *~~sl-AbsoluteFrequencySSB-r18~~*~~, w~~When RB-set *j* is a ~~non-~~anchor RB-set, an RB set other than RB set *j* is a non-anchor RB set.- is an index of an S-SS/PSBCH block from repeated S-SS/PSBCH blocks in the frequency domain and within the RB-set , where , and is provided by a value in *sl-NumberRepeatedSSB* corresponding to RB-set ;- is a number of resource blocks, provided by *sl-GapRepeatedSSB*, for a gap between the lowest subcarrier of the upper PSBCH and the highest subcarrier of the lower PSBCH ~~repeated S-SS/PSBCH blocks~~;- is a number of resource blocks for a S-SS/PSBCH block transmission with SCS configuration .=====End of Draft TP===== |
| DCM | * N PSFCH occasions

As commented by several companies, usage of N PSFCH occasions should be captured in 38.213.* Inter-UE coordination-related texts

In our view, although the feature has not been discussed clearly, ‘PSFCH’ includes PSFCH for HARQ-ACK and PSFCH for IUC scheme 2. This means that agreements so far include the feature and thus removing inter-UE coordination-related texts for SL-U should not be applied. The current editor’s text should be kept.[Aris]: Specifics on one or multiple bitmaps for the N occasions are not agreed yet in RAN1 – will of course update after RAN1 resolves the FFS. For inter-UE coordination, there were several comments to delete the relevant text despite the note. No much value in further discussing this – RAN1 discussion is anyway needed and it is not critical for completeness of specifications - will delete it for now and RAN1 can clarify next time whether or not it is supported. |
| Huawei, HiSilicon\_3 | **Comments for SL CA****Reason for change*** **Change #1:** Following the LTE SL CA procedure, the power adjustment should be applied to both drop and non-dropped carriers, however, current wording does not reflect it clearly. So, we suggest use LTE SL CA like wording.

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| “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.” |

[Aris]: Please see previous comments on the same aspect.* **Change #2:** following the WID, intra-band CA is clarified.

**Suggested changes**

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| 16.2.5 SL Carrier Aggregation…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 or PSSCHs that would overlap in time on respective carriers and a total power for the transmission of the PSCCHs or PSSCHs would exceed , the UE reduces a power for a transmission of a PSCCH or 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 adjusting the power of the PSCCH or the PSSCH with the largest priority value, a total power exceeds P\_CMAX, the UE drop the transmission of the PSCCH or the PSSCH, respectively. And the UE repeat this procedure over 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. ~~If, after the reduction of the power for the transmission of the PSCCH or the PSSCH with the largest priority value, a total power does not exceed , the UE transmits the PSCCHs or the PSSCHs, respectively. If, after the reduction of the power of the PSCCH or the PSSCH with the largest priority value, a total power exceeds , the UE does not transmit the PSCCH or the PSSCH, respectively.~~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 intra-band multiple carriers.  |

[Aris]: The current text is fine - the “repeat” part will be included in the next update. Yes, the carriers are intra-band ones (otherwise several things wouldn’t be possible) but that is expected to be captured in other TS (in 38.213, unless absolutely necessary (it was on very few occasions), there is no reference to bands). |
| OPPO2 | The following agreement is missing in the draft CR.

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| 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
 |

[Aris]: This is for sequence generation - it is captured in 38.211. |
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# Second Round Discussion

Please provide your comments on the draft CR for TS 38.213 at [draftCR\_38213 SL\_v1](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_v1.docx).

The second checkpoint is on September 6, UTC 15:00.

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| Company | Comments |
| Qualcomm | **For sidelink unlicensed,** Comment #1We think the following agreements regarding the PSCCH frequency resources may need to be captured in Sec 16.4 . Mainly, the PSCCH does not use the PRB in the RB-set intra-cell guard bands. Working assumption (RAN1#114)For interlace RB-based PSCCH/PSSCH transmission in SL-U:* The PSCCH modulation symbols are mapped sequentially over the PRBs of a sub-channel, regardless the number of interlace within one sub-channel
* The PSSCH modulation symbols are mapped sequentially over the PRBs among all the allocated PRBs for PSSCH transmission, regardless the number of interlace within one sub-channel and number of allocated sub-channels

Note: this working assumption will be automatically confirmed if no concern is raised before the end of RAN1#114.**Agreement** (RAN1#113)For contiguous RB-based PSCCH/PSSCH transmission in SL-U, regarding sub-channel(s) which include intra-cell guardband PRBs, down-select one or more of the followings in RAN1#113:* Option 2: Such sub-channel(s) can be used for PSCCH/PSSCH transmission
	+ Note: PRBs within intra-cell guard band are not used for PSCCH transmission as per previous agreement
* Option 3: Such sub-channel(s) cannot be used for PSCCH transmission, and can be used for PSSCH transmission
* FFS details, e.g., conditions to apply the above Option(s)
* FFS impacts on definition of candidate resource, and resource selection

**Agreement** (RAN1#114)For contiguous RB-based PSCCH/PSSCH transmission in SL-U, regarding sub-channel(s) which include intra-cell guardband PRBs, support only option 3.* FFS other details, e.g., impacts on resource selection, PSCCH mapping, etc.
* Note:
	+ Option 2: Such sub-channel(s) can be used for PSCCH/PSSCH transmission
		- Note: PRBs within intra-cell guard band are not used for PSCCH transmission as per previous agreement
	+ Option 3: Such sub-channel(s) cannot be used for PSCCH transmission, and can be used for PSSCH transmission
	+ : the number of remaining PRBs of a sub-channel belonging to a RB set after excluding the PRBs belonging to intra-cell guardband
	+ : the number of PRBs for PSCCH transmission

**Agreement**(RAN1#110-bis)Regarding usage of PRBs within intra-cell guard band of two adjacent RB sets:* Such PRBs can be used for PSSCH transmission if and only if a UE can transmit on the respective LBT channels after performing channel access procedure in multi-channel case and the UE uses both of these two RB sets for PSSCH transmission
	+ FFS details, e.g., handling of potential unequal sub-channel size, for interlaced RB based transmission, whether the PRB(s) in the intra-cell guard band have the same interlace index(s) as the PRBs for PSSCH transmission in these two RB sets
* Such PRBs are not used for PSCCH transmission
	+ FFS: whether or not such PRBs are used for PSFCH/S-SSB transmission

**For Sidelink Carrier Aggregation:**We thank the editor for incorporating our comments from the last round of discussions. We have the following comments on the current text.Comment #2:For the power reduction associated with the PSSCH/PSCCH transmissions, the text should capture the fact that, like in LTE SL CA, the exact power reduction algorithm is up to UE implementation. We propose the following edits (in line with the LTE SL specification):* If the UE would transmit PSCCHs or PSSCHs that would overlap in time on respective carriers and a total power for the transmission of the PSCCHs or PSSCHs would exceed , the UE reduces a power for a transmission of a PSCCH or PSSCH that has the largest priority value as determined by SCI formats provided by the PSCCHs scheduling the respective PSSCHs. In this case, calculation of the adjustment to the sidelink transmission power is not specified. If more than one PSCCH/PSSCH transmissions …

AgreementTo reuse LTE SL CA PSCCH/PSSCH power control for NR SL CA PSCCH/PSSCH power control across all the aggregated SL carriers, * The existing PSCCH/PSSCH power control in Rel-16/17 is used for PSCCH/PSSCH power control for each SL carrier.

Comment #3:For the paragraph on PSFCH, the following change should be incorporated for clarity (i.e., clarify that the UE either transmits or receives PSFCH, not perform PSFCH Tx and Rx simultaneously).* 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 either the PSFCHs to transmit or the PSFCHs to receive.
 |
| Apple | **Comment 1**: In Section 16.2.0, RAN1 #114 has the following agreement: *Agreement**Regarding “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*

Based on the highlighted part, we think the S-SSB transmissions on non-anchor RB set should also not exceed the power limitation from DL pathloss, since otherwise causing large interference to gNB. Hence, we suggest the following modifications:“For operation with shared spectrum channel access, after allocating power for transmission of each S-SS/PSBCH block in the anchor RB-set, the UE equally allocates power remaining from , if any, for transmission of each S-SS/PSBCH block in non-anchor RB-sets, which is upper bounded by .”**Comment 2:** For the case ofAlt 1-1b, UE determines PRBs from sl-PSFCH-RB-set or sl-RB-setPSFCH, rather than PRB subsets. Overall, has to be multiple of and it is the number of PRBs in interlace as dedicated PRBs. Hence, we have the following modifications: “For operation with shared spectrum channel access, when *sl-PSFCH-Type = ‘type2’* and within RB-set , a UE determines a subset of PRBs in a first interlace and, based on *sl-PSFCH-RB-Set*, a subset of PRBs in a second interlace for PSFCH transmission with HARQ-ACK information in a resource pool. An index of the first interlace is provided by *sl-PSFCH-Type2-CommonInterlace*. The PRBs in the second interlace are provided by *sl-PSFCH-Type2-DedicatedPRB* where, for the -th candidate PSFCH transmission occasion, , and for each interlace , the UE determines PRBs ~~subsets~~ based on *sl-PSFCH-RB-Set* or *sl-RB-SetPSFCH*. The UE expects that is a multiple of . For interlace , the UE determines a PRB subset with index to include PRBs , . The UE determines the PRB subsets by ordering the PRB subsets first in an ascending order of PRB subset index within an interlace and second in ascending order of interlace index. For a number of sub-channels in RB-set and a number of slots for PSSCH transmissions that is not larger than and is associated with a slot for PSFCH transmission, the UE allocates the PRB subsets from the PRB subsets to slot among the slots for PSSCH transmissions that are associated with the slot and sub-channel for PSFCH transmissions, where and , . The allocation starts in an ascending order of and continues in an ascending order of . The UE expects that isa multiple of *.”***Comment 3:** We have the following RAN1 #114 agreements:AgreementIn “*one PSCCH/PSSCH transmission has N associated candidate PSFCH occasion(s)*”, regarding Rx UE behaviour on receiving PSFCH for a PSCCH/PSSCH transmission, support:* For unicast:
	+ FFS: Monitor:
		- Rx UE attempts to monitor candidate PSFCH occasion(s) until one PSFCH is detected or all candidate PSFCH occasion(s) are monitored.
		- If one PSFCH is detected, Rx UE can omit monitoring following candidate PSFCH occasion(s).
	+ Report:
		- If Rx UE receives PSFCH, Rx UE reports same value as a value of HARQ-ACK information that the UE determines from the PSFCH reception to higher layers, otherwise re-ports NACK to higher layer.
* FFS: For groupcast option 1 (NACK only):
	+ FFS: Monitor:
		- Rx UE attempts to monitor all candidate PSFCH occasions.
		- If NACK is detected, Rx UE can omit monitoring following candidate PSFCH occasion(s).
	+ Report:
		- If Rx UE does not detect any PSFCH in all candidate PSFCH occasions, Rx UE reports ACK to higher layers; otherwise, reports NACK to higher layers.
* For groupcast option 2 (ACK/NACK):
	+ FFS: Monitor:
		- Rx UE attempts to monitor PSFCH transmission occasions until PSFCH from all transmitters have been detected or all candidate PSFCH occasions are monitored.
		- If Rx UE detects PSFCH from one PSFCH transmitter, it can omit PSFCH detection for following PSFCH transmission occasions for this PSFCH transmitter.
	+ Report:
		- If ACK has been detected from at least one PSFCH occasion of each of all expected PSSCH receivers, Rx UE reports ACK to higher layers; otherwise, reports NACK to higher layers.

AgreementIn “*one PSCCH/PSSCH transmission has N associated candidate PSFCH occasion(s)*”, regarding Rx UE behaviour on receiving PSFCH for a PSCCH/PSSCH transmission, support:* For unicast:
	+ Monitor:
		- Alt 1: Rx UE attempts to monitor all candidate PSFCH occasion(s)
			* If one PSFCH is detected, Rx UE can omit monitoring following candidate PSFCH occasion(s), if any.
		- PSFCH prioritization rule is used
* For groupcast option 2 (ACK/NACK):
	+ Monitor:
		- Alt 1: Rx UE attempts to monitor all PSFCH transmission occasions.
			* If Rx UE detects PSFCH from a PSFCH transmitter, it can omit PSFCH detection for following PSFCH transmission occasions for this PSFCH transmitter, if any.
		- PSFCH prioritization rule is used

It seems these agreements are not reflected yet. Hence, we propose the following modifications in Section 16.5:“……For operation with shared spectrum channel access, from a number of candidate PSFCH reception occasions, the UE generates HARQ-ACK information to report in a PUCCH or PUSCH transmission. The UE can be indicated by a SCI format to perform one of the following and the UE constructs a HARQ-ACK codeword with HARQ-ACK information, when applicable- for one or more PSFCH reception occasions associated with SCI format 2-A with Cast type indicator field value of "10"- UE attempts to monitor all candidate PSFCH occasion(s). If one PSFCH is detected, UE can omit monitoring following candidate PSFCH occasion(s), if any.- generate HARQ-ACK information with same value as a value of HARQ-ACK information the UE determines from the PSFCH reception to higher layers, otherwise, generate NACK to higher layer. - for one or more PSFCH reception occasions associated with SCI format 2-A with Cast type indicator field value of "01" - UE attempts to monitor all candidate PSFCH transmission occasions. If the UE detects PSFCH from a PSFCH transmitter, it can omit PSFCH detection for following candidate PSFCH transmission occasions for this PSFCH transmitter, if any. - generate ACK if the UE determines ACK from at least one candidate PSFCH reception occasion from the number of candidate PSFCH reception occasions corresponding to PSSCH transmissions, in PSFCH resources corresponding to every identity of the UEs that the UE expects to receive the PSSCH, as described in clause 16.3; otherwise, generate NACK…….” |
| LGE | Thanks for updating the CR. We have further comments. Regarding the P\_CMAX for S-SSB as mentioned by us and vivo, that does not a SL CA issue, but it is the agreement from SL-U which focus on a single SL carrier. So, the descriptions in 16.2.5 does not handle our worry.

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| 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, 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. [Aris]: That should be visible in TS 38.101-1. It is captured in new Clause 16.2.5 for SL CA that the is for all S-SSB transmissions.  |

In our understanding, even in the existing spec, such kind of description can be found in PSFCH power control even though it also refer the TS38.101 spec as follows:

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| if , where is determined for PSFCH transmissions according to [8-1, TS 38.101-1] |

In our understanding, even though TS38.101 specify how to calculate P\_CMAX, the assumption on the transmission structure is specified in RAN1 spec. If we do not have such description for S-SSB repetition in SL-U, we are worried about the case when the P\_CMAX is determined based on as single S-SSB, so smaller MPR value is used compared to the multiple S-SSB repetition. In this case, even though we have some mechanism on how to allocate S-SSB power on the non-anchor RB sets, the total power based on P\_CMAX determined based on a single S-SSB could exceed P\_CMAX determined based on the actual S-SSB repetitions over multiple RB sets since MPR value for the P\_CMAX determined based on the actual S-SSB repetitions is further increased. Next, on section 16.3.0, as per agreement, “lowest sub-channel” needs to be replaced with “lowest sub-channel index” again to avoid misunderstanding.

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| * + - * + and the dedicated PRB subset(s) are associated with the lowest sub-channel index of lowest RB set of the corresponding PSSCH

…* + - * + and the dedicated ~~PRB subset~~ interlace(s) are associated with the lowest sub-channel index of lowest RB set of the corresponding PSSCH
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Next, on Section 16.3.0, regarding the OCB/PSD handling part for common interlace, following part needs to be removed since it is not a part of agreement. For operation with shared spectrum channel access, when *sl-PSFCH-Type = ‘type2’*, a PRB in the first interlace is excluded from the resources for a PSFCH transmission, if for or for for any PRB in the PRB subset when the PRB subset is selected for PSFCH transmission~~, and for or for , where PRB and PRB are the largest and smallest PRB indexes, respectively, in the resources for the PSFCH transmission assuming PRB is excluded~~. **Agreement**Regarding PSFCH transmission with 15 kHz and 30 kHz SCS:* One of the following alternatives is (pre-)configured:
	+ Alt 1-1b: each PSFCH transmission occupies 1 common interlace and K3 dedicated PRB(s)
		- K3 is (pre-)configured
			* Value range for K3 at least includes {1, 2, 5}
		- K3 dedicated PRB(s) are on the same interlace
		- There can be some guardband PRB(s) between common PRB and dedicated PRB
			* FFS details, e.g., whether/how to derive the number of guardband PRB(s), whether to additionally introduce a (pre-)configured gap (including 0), or whether this can be satisfied by (pre-)configuration and there is no additional specification impact (e.g., setting proper bit values in bitmap for PSFCH PRB allocation), etc.
			* FFS whether to additionally introduce guardband RE between common PRB and dedicated PRB
		- On the K3 dedicated PRB(s), multiple CS pairs can be used as in legacy NR SL PSFCH transmission
		- When a PRB of common interlace and a dedicated PRB locate within the same 1 MHz bandwidth, UE only transmits on the dedicated PRB subject to meeting OCB requirements
		- FFS: whether to reduce power on common PRBs
	+ Alt 2-3a: each PSFCH transmission occupies 1 dedicated interlace
* PSSCH transmissions on non-overlapped resources are mapped to orthogonal dedicated PRBs for PSFCH transmission
* FFS: whether or not to support PRB-level cyclic shift hopping as in NR-U to reduce PAPR
* FFS: whether to drop common PRBs if the dedicated PRBs can already satisfy OCB requirement
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| CATT/GOHIGH | Thanks for your great efforts updating the CR. We have two further comments.* **Comment 1 (Clause 16.2.5)**

It just states that “The UE expects to determine a same time resource…”, but how to achieve such expectation is still unclear. The highlight part in the following agreement can be added as an example.AgreementFrom a UE perspective, the time resources for PSFCH are aligned across SL aggregated carriers (e.g., by (pre)configuring that the period of PSFCH resources and the time resource of resource pool with PSFCH resources are the same across the SL aggregated carriers).* **Comment 2 (Clause 16.3.0)**

Regarding the following part, from our understanding, one combination of interlace and RB set means one interlace within one RB set. If that is the case, we are ok for it. - if *sl-PSFCH-CandidateResourceType* is indicated as *allocSubCH*, and where the sum is over all RB-sets including resources for the corresponding PSSCH, and the combinations of interlaces and RB-sets or PRB subsets are associated with the sub-channels of the corresponding PSSCH |
| Vivo2 | Thank you for updating the CR**Comment1 S-SSB on multiple RB set*** For above Alts, is determined according to TS 38.101-1 for transmission of all S-SSB repetitions on all used RB sets

We share a similar view as LGE, the below bullet is for SL U with a single carrier consisting of multiple RB sets. Without the clarification on , when UE accessed to multiple RB sets successfully but chooses to transmit S-SSB only on one of them, it would be unclear whether UE should apply the power limit for single RB set or the power limit for multiple RB sets. We still prefer to add the following change.\*\*\*\*\*\*change starts\*\*\*\*\*\*- is defined in [8-1, TS 38.101-1], and is determined for transmission of all S-SS/PBCH blocks on all RB sets used for S-SSB transmissions if applicable.\*\*\*\*\*\*change ends\*\*\*\*\*\***Comment2 filling CPE for S-SSB/PSFCH in a burst**the following agreement is for CPE filling for SL burst transmission, which should be applied to PSFCH and SSB, if SSB and PSFCH belongs to the SL burst113 AgreementSpecification supports that CPE can be transmitted between any two consecutive SL transmissions by the same UE to reduce the gap between the two transmissions so that it does not exceed 16µs.Thus, we suggest the following change.\*\*\*\*\*\*change starts\*\*\*\*\*\*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 and within the first one or two symbols before the first symbol of the S-SS/PSBCH block according to an index [4, TS 38.211] provided by *sl-CP-Extension-SSB*. If S-SS/PSBCH is transmitted after another SL transmission in a SL transmission burst, the UE can apply CP extension to reduce the gap between the two transmissions so that it does not exceed 16µs.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 cyclic shift pairs. The UE applies CP extension to the first symbol of a PSFCH and within the first one or two symbols before the first symbol of the PSFCH according to an index [4, TS 38.211] provided by *sl-CP-Extension-PSFCH*. If PSFCH is transmitted after another SL transmission in a SL transmission burst, the UE can apply CP extension to reduce the gap between the two transmissions so that it does not exceed 16µs.\*\*\*\*\*\*change ends\*\*\*\*\*\***Comment3 PSFCH power control in SL CA**

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| [Aris]: The statement in the last paragraph of new clause 16.2.5 captures the procedures for multiple carriers. It should be clear that the procedures in 16.2.3 are for single carrier but will clarify in 16.2.5. |

However, the below statement from 16.2.5 can be misleading as it can be interpreted as that the procedure in 16.2.3 is still applied per carrier, with the UE performing the procedure for each aggregated carrier separately. But according to the agreement, the granularity of performing procedure should be per CA. *“If a UE would simultaneously transmit PSFCHs on multiple carriers, the UE performs the procedures for single carrier in Clause 16.2.3 across all the PSFCHs for transmission using a corresponding in order to determine PSFCHs to transmit and a corresponding power per PSFCH transmission.”*To improve clarity, we suggest either modifying 16.2.3 as change4 proposed in round1 to capture the case of multiple CCs, or further refining the language in 16.2.5 as below. Additionally, we propose using the term "scheduled PSFCH transmission" which has been used in 16.2.3 since R16.\*\*\*\*\*\*change starts\*\*\*\*\*\*If a UE would simultaneously transmit PSFCHs on multiple carriers, the UE performs the procedures for single carrier in Clause 16.2.3 ~~across~~by considering all the scheduled PSFCHs ~~for~~ transmission across the multiple carriers together using a corresponding in order to determine PSFCHs to transmit and a corresponding power per PSFCH transmission. \*\*\*\*\*\*change ends\*\*\*\*\*\* |
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