**3GPP TSG RAN WG1 #108-e** **R1-22xxxxx**

**e-Meeting, February 21st – March 3rd, 2022**

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| *CR-Form-v12.0* |
| **DRAFT CHANGE REQUEST** |
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|  | **38.213** | **CR** |  | **rev** |  | **Current version:** | **17.0.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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|  |
| ***Title:***  | Corrections on sidelink enhancements in NR |
|  |  |
| ***Source to WG:*** | Samsung |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | NR\_SL\_enh-Core |  | ***Date:*** | 2022-03-07 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)Rel-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | Corrections on sidelink enhancement in NR. |
|  |  |
| ***Summary of change:*** | 1. Capture conflict information and how a UE performs TX/RX or TX/TX prioritization between E-UTRA and NR including PSFCH with conflict information in clause 16.2.4.1.
2. Capture conflict information and how a UE performs PSFCH TX/RX or TX/TX prioritization between SL HARQ-ACK and resource conflict information in clause 16.2.4.2.
3. Capture conflict information and how a UE performs TX/RX or TX/TX prioritization between PSFCH with conflict information and LTE SL TX/RX in clause 16.2.4.3.1.
4. Update how a UE determines another UE providing conflict information, capture time gap for PSFCH and SCI formats scheduling conflicting TBs, and capture the mapping of conflict information bit values to a cyclic shift of a sequence for a PSFCH in clause 16.3.0.
5. Capture resource conflict reports in clause 16.3.1 depending on whether or not *slotLevelResourceExclusionScheme2* is enabled.
6. Capture power control for SCI format 2-C in clause 16.2.1.
7. Capture that for prioritization between HARQ-ACK and conflict information, PSFCH Tx/Rx for HARQ-ACK is prioritized over PSFCH Tx/Rx for conflict information in clause 16.2.3.
8. Other miscellaneous corrections/alignments
 |
|  |  |
| ***Consequences if not approved:*** | Incomplete support for sidelink enhancements in NR. |
|  |  |
| ***Clauses affected:*** | 16, 16.2.1, 16.2.3, 16.2.4.1, 16.2.4.2, 16.2.4.3.1, 16.3.0, 16.3.1 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 38.211, TS 38.212, TS 38.214 |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

\*\*\* Unchanged text is omitted \*\*\*

# 16 UE procedures for sidelink

A UE is provided by *SL-BWP-Config* a BWP for SL transmissions (SL BWP) with numerology and resource grid determined as described in [4, TS 38.211]. For a resource pool within the SL BWP, the UE is provided by *sl-NumSubchannel* a number of sub-channels where each sub-channel includes a number of contiguous RBs provided by *sl-SubchannelSize*. The first RB of the first sub-channel in the SL BWP is indicated by *sl-StartRB-Subchannel*. Available slots for a resource pool are provided by *sl-TimeResource* and occur with a periodicity of 10240 ms. For an available slot without S-SS/PSBCH blocks, SL transmissions can start from a first symbol indicated by *sl-StartSymbol* and be within a number of consecutive symbols indicated by *sl-LengthSymbols*. For an available slot with S-SS/PSBCH blocks, the first symbol and the number of consecutive symbols is predetermined.

The UE expects to use a same numerology in the SL BWP and in an active UL BWP in a same carrier of a same cell. If the active UL BWP numerology is different than the SL BWP numerology, the SL BWP is deactivated.

A priority of a PSSCH according to NR radio access or according to E-UTRA radio access is indicated by a priority field in a respective scheduling SCI format. A priority of a PSSS/SSSS/PSBCH according to E-UTRA radio access is provided by *sl-SSB-PriorityEUTRA* [13, TS 36.213]. A priority of an S-SS/PSBCH block is provided by *sl-SSB-PriorityNR*. A priority of a PSFCH is same as the priority of a corresponding PSSCH and is determined as described in clause 16.2.4.2.

A UE does not expect to be provided search space sets associated with CORESETs on more than one cell to monitor PDCCH for detection of DCI format 3\_0 or DCI format 3\_1.

\*\*\* Unchanged text is omitted \*\*\*

### 16.2.1 PSSCH

A UE determines a power for a PSSCH transmission on a resource pool in symbols where a corresponding PSCCH is not transmitted in PSCCH-PSSCH transmission occasion on active SL BWP of carrier as:

 [dBm]

where

- is defined in [8-1, TS 38.101-1]

- is determined by a value of *sl-MaxTxPower* based on a priority level of the PSSCH transmission and a CBR range that includes a CBR measured in slot [6, TS 38.214]; if *sl-MaxTxPower* is not provided, then ;

- if *dl-P0-PSSCH-PSCCH* is provided

- [dBm]

- else

- [dBm]

where

- is a value of *dl-P0-PSSCH-PSCCH* if provided

- is a value of *dl-Alpha-PSSCH-PSCCH*, if provided; else,

- when the active SL BWP is on a serving cell , as described in clause 7.1.1 except that

- the RS resource is the one the UE uses for determining a power of a PUSCH transmission scheduled by a DCI format 0\_0 in serving cell when the UE is configured to monitor PDCCH for detection of DCI format 0\_0 in serving cell

- the RS resource is the one corresponding to the SS/PBCH block the UE uses to obtain MIB when the UE is not configured to monitor PDCCH for detection of DCI format 0\_0 in serving cell

- is a number of resource blocks for the PSSCH transmission occasion and is a SCS configuration

- if *sl-P0-PSSCH-PSCCH* is provided and if a SCI format scheduling the PSSCH transmission includes a cast type indicator field indicating unicast or is SCI format 2-C

- [dBm]

- else

- [dBm]

\*\*\* Unchanged text is omitted \*\*\*

### 16.2.3 PSFCH

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 a resource pool in PSFCH transmission occasion on active SL BWP of carrier as

- if *dl-P0-PSFCH* is provided,

 [dBm]

where

- is a value of *dl-P0-PSFCH*

- is a value of *dl-Alpha-PSFCH*, if provided; else,

- when the active SL BWP is on a serving cell , as described in clause 7.1.1 except that

- the RS resource is the one the UE uses for determining a power of a PUSCH transmission scheduled by a DCI format 0\_0 in serving cell when the UE is configured to monitor PDCCH for detection of DCI format 0\_0 in serving cell

- the RS resource is the one corresponding to the SS/PBCH block the UE uses to obtain MIB when the UE is not configured to monitor PDCCH for detection of DCI format 0\_0 in serving cell

- if

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

- and [dBm]

- else

- UE autonomously determines PSFCH transmissions first with ascending order of corresponding priority field values as described in clause 16.2.4.2 over the PSFCH transmissions with HARQ-ACK information, if any, and then with ascending order of priority value over the PSFCH transmissions with conflict information, if any, such that where  is a number of PSFCHs with priority value for PSFCH with HARQ-ACK information and is a number of PSFCHs with priority value for PSFCH with conflict information and is defined as

- the largest value satisfying where is determined according to [8-1, TS 38.101-1] for transmission of all PSFCHs in , if any

- zero, otherwise

and

 [dBm]

where is defined in [8-1, TS 38.101-1] and is determined for the PSFCH transmissions

- else

- the UE autonomously selects PSFCH transmissions with ascending order of corresponding priority field values as described in clause 16.2.4.2

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

- and [dBm]

- else

- the UE autonomously selects PSFCH transmissions in ascending order of corresponding priority field values as described in clause 16.2.4.2 over the PSFCH transmissions with HARQ-ACK information, if any, and then with ascending order of priority value over the PSFCH transmissions with conflict information, if any, such that where is a number of PSFCHs with priority value for PSFCH with HARQ-ACK information and is a number of PSFCHs with priority value for PSFCH with conflict information and is defined as

- the largest value satisfying where is determined according to [8-1, TS 38.101-1] for transmission of all PSFCHs in , if any

- zero, otherwise

 and

 [dBm]

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

- else

 [dBm]

 where the UE autonomously determines PSFCH transmissions with ascending order of corresponding priority field values as described in clause 16.2.4.2 such that and where is determined for the PSFCH transmissions according to [8-1, TS 38.101-1].

\*\*\* Unchanged text is omitted \*\*\*

#### 16.2.4.1 Simultaneous NR and E-UTRA transmission/reception

If a UE

- would transmit a first channel/signal using E-UTRA radio access and second channels/signals using NR radio access, and

- a transmission of the first channel/signal would overlap in time with a transmission of the second channels/signals, and

- the priorities of the channels/signals are known to both E-UTRA radio access and NR radio access at the UE msec prior to the start of the earliest of the two transmissions, where and is based on UE implementation,

the UE transmits only the channels/signals of the radio access technology with the highest priority, where the highest priority

- as determined by the SCI formats scheduling the transmissions, or

- as indicated by higher layers in case of a S-SS/PSBCH block or a sidelink synchronization signal using E-UTRA radio access, or

- as determined in clause 16.2.4.2 in case of PSFCH transmissions

If a UE

- would respectively transmit or receive a first channel/signal using E-UTRA radio access and receive a second channel/signal or transmit second channels/signals using NR radio access, and

- a transmission or reception of the first channel/signal would respectively overlap in time with a reception of the second channel/signal or transmission of the second channels/signals, and

- the priorities of the channels/signals are known to both E-UTRA radio access and NR radio access at the UE msec prior to the start of the earliest transmission or reception, where and is based on UE implementation,

the UE transmits or receives the channels/signals of the radio access technology with the highest priority, where the highest priority

- as determined by the SCI formats scheduling the transmissions, or

- as indicated by higher layers in case of a S-SS/PSBCH block or a sidelink synchronization signal using E-UTRA radio access, or

- as determined in clause 16.2.4.2 among PSFCH transmissions/receptions

#### 16.2.4.2 Simultaneous PSFCH transmission/reception

For a PSFCH transmission or reception with HARQ-ACK information, a priority value for the PSFCH is equal to the priority value indicated by an SCI format 1-A associated with the PSFCH.

For PSFCH transmission with conflict information, a priority value for the PSFCH is equal to the smallest priority value determined by the corresponding SCI formats 1-A for the conflicting resources.

For PSFCH reception with conflict information, a priority value for the PSFCH is equal to the priority value determined by the corresponding SCI format 1-A for the conflicting resource.

If a UE

- would transmit PSFCHs and receive PSFCHs, and

- transmissions of the PSFCHs would overlap in time with receptions of the PSFCHs

the UE transmits or receives only a set of PSFCHs corresponding to the smallest priority field value, as determined by a first set of SCI format 1-A and/or a second set of SCI format 1-A [5, TS 38.212] that are respectively associated with PSFCHs with HARQ-ACK information from the PSFCHs and PSFCHs with HARQ-ACK information from the PSFCHs when one or more of the PSFCHs provide HARQ-ACK information. If none of the PSFCHs and none of the PSFCHs provide HARQ-ACK information, the UE transmits or receives only a set of PSFCHs corresponding to the smallest priority value of the first set of PSFCHs and the second set of PSFCHs that are respectively associated with the PSFCHs and the PSFCHs when the PSFCHs provide conflict information.

If a UE would transmit PSFCHs in a PSFCH transmission occasion, the UE first transmits PSFCHs with HARQ-ACK information from PSFCHs corresponding to the smallest priority field values from the priority field values. Subsequently, the UE transmits remaining PSFCHs with conflict information corresponding to the smallest remaining priority field values from the priority field values, if any.

If a UE would receive PSFCHs in a PSFCH reception occasion, the UE receives PSFCHs with HARQ-ACK information, if any, and PSFCHs with conflict information, if any.

#### 16.2.4.3 Simultaneous SL and UL transmissions/receptions

If a UE

- would simultaneously transmit on the UL and on the SL in a carrier or in two respective carriers, and

- the UE is not capable of simultaneous transmissions on the UL and on the SL in the carrier or in the two respective carriers

the UE transmits only on the link, UL or SL, with the higher priority.

If a UE

- would simultaneously transmit on the UL and receive on the SL in a carrier, or

- would simultaneously transmit on the UL and receive on the SL in two respective carriers and the UE is not capable of simultaneous transmission on the UL and reception on the SL in the two respective carriers

the UE transmits on UL or receives on SL, with the higher priority.

If a UE

- is capable of simultaneous transmissions on the UL and on the SL in two respective carriers,

- would transmit on the UL and on the SL in the two respective carriers,

- the transmission on the UL would overlap with the transmission on the SL over a time period, and

- the total UE transmission power over the time period would exceed

the UE

- reduces the power for the UL transmission prior to the start of the UL transmission, if the SL transmission has higher priority than the UL transmission as determined in clause 16.2.4.3.1, so that the total UE transmission power would not exceed

- reduces the power for the SL transmission prior to the start of the SL transmission, if the UL transmission has higher priority than the SL transmission as determined in clause 16.2.4.3.1, so that the total UE transmission power would not exceed

##### 16.2.4.3.1 Prioritizations for sidelink and uplink transmissions/receptions

A UE performs prioritization between SL transmissions/receptions and UL transmissions after performing the procedures described in clause 9, clause 9.2.5, and clause 9.2.6, and in clause 6.1 of [6, TS 38.214].

PSFCH transmissions in a slot, as determined in clause 16.2.4.2, have a same priority value as the smallest priority value among PSSCH receptions with corresponding HARQ-ACK information provided by the PSFCH transmissions in the slot, if any, and among PSFCH transmissions with conflict information in the slot, if any, where each priority value is equal to the smallest priority value determined by corresponding SCI formats 1-A as described in clause 16.3.

PSFCH receptions in a slot, as determined in clause 16.2.4.2, have a same priority value as the smallest priority value among PSSCH transmissions with corresponding HARQ-ACK information provided by the PSFCH receptions in the slot, if any, and among PSFCH receptions with conflict information in the slot, if any, where each priority value is equal to the priority value determined by corresponding SCI format 1-A as described in clause 16.3.

A priority of S-SS/PSBCH block transmission or reception is provided by *sl-SSB-PriorityNR.*

For prioritization between SL transmission or PSFCH/S-SS/PSBCH block reception and UL transmission other than a PRACH, or a PUSCH scheduled by an UL grant in a RAR and its retransmission, or a PUSCH corresponding to Type-2 random access procedure and its retransmission, or a PUCCH with sidelink HARQ-ACK information report

- if the UL transmission is for a PUSCH or for a PUCCH with priority index 1,

- if *sl-PriorityThreshold-UL-URLLC* is provided

- the SL transmission or reception has higher priority than the UL transmission if the priority value of the SL transmission or reception is smaller than *sl-PriorityThreshold-UL-URLLC*;otherwise, the UL transmission has higher priority than the SL transmission or reception

- else

- the UL transmission has higher priority than the SL transmission or reception

- else

- the SL transmission or reception has higher priority than the UL transmission if the priority value of the SL transmission(s) or reception is smaller than *sl-PriorityThreshold*;otherwise, the UL transmission has higher priority than the SL transmission or reception

A PRACH transmission, or a PUSCH scheduled by an UL grant in a RAR and its retransmission, or a PUSCH for Type-2 random access procedure and its retransmission, or a PUCCH with HARQ-ACK information in response to successRAR, or a PUCCH indicated by a DCI format 1\_0 with CRC scrambled by a corresponding TC-RNTI has higher priority than a SL transmission or reception.

A PUCCH transmission with a sidelink HARQ-ACK information report has higher priority than a SL transmission if a priority value of the PUCCH is smaller than a priority value of the SL transmission. The priority value of the PUCCH transmission is as described in clause 16.5. If the priority value of the PUCCH transmission is larger than the priority value of the SL transmission, the SL transmission has higher priority.

A PUCCH transmission with a sidelink HARQ-ACK information report has higher priority than a PSFCH/S-SS/PSBCH block reception if a priority value of the PUCCH is smaller than a priority value of the SL reception. If the priority value of the PUCCH transmission is larger than the priority value of the PSFCH/S-SS/PSBCH block reception, the SL reception has higher priority.

When one or more SL transmissions from a UE overlap in time with multiple non-overlapping UL transmissions from the UE, the UE performs the SL transmissions if at least one SL transmission is prioritized over all UL transmissions subject to the UE processing timeline with respect to the first SL transmission and the first UL transmission.

When one or more UL transmissions from a UE overlap in time with multiple non-overlapping SL transmissions, the UE performs the UL transmissions if at least one UL transmission is prioritized over all SL transmissions subject to the UE processing timeline with respect to the first SL transmission and the first UL transmission.

When one SL transmission overlaps in time with one or more overlapping UL transmissions, the UE performs the SL transmission if the SL transmission is prioritized over all UL transmissions subject to both the UE multiplexing and processing timelines with respect to the first SL transmission and the first UL transmission, where the UE processing timeline with respect to the first SL transmission and the first UL transmission is same as when one or more SL transmissions overlap in time with multiple non-overlapping UL transmissions.

When one SL transmission overlaps in time with one or more overlapping UL transmissions, the UE performs the UL transmission if at least one UL transmission is prioritized over the SL transmission subject to both the UE multiplexing and processing timelines with respect to the first SL transmission and the first UL transmission, where the UE processing timeline with respect to the first SL transmission and the first UL transmission is same as when one or more SL transmissions overlap in time with multiple non-overlapping UL transmissions.

## 16.3 UE procedure for reporting and obtaining control information in PSFCH

Control information provided by a PSFCH transmission includes HARQ-ACK information or conflict information.

### 16.3.0 UE procedure for transmitting PSFCH with control information

A UE can be indicated by an SCI format scheduling a PSSCH reception to transmit a PSFCH with HARQ-ACK information in response to the PSSCH reception. The UE provides HARQ-ACK information that includes ACK or NACK, or only NACK.

A UE can be provided, by *sl-PSFCH-Period*, a number of slots in a resource pool for a period of PSFCH transmission occasion resources. If the number is zero, PSFCH transmissions from the UE in the resource pool are disabled.

A UE can be enabled, by *inter-UECoordinationScheme2*, to transmit a PSFCH with conflict information in a resource pool. The UE can determine, based on an indication by a SCI format 1-A, a set of resources that includes one or more slots and resource blocks that are reserved for PSSCH transmission. If the UE determines a conflict for a reserved resource for PSSCH transmission, the UE provides conflict information in a PSFCH.

A UE expects that a slot ) has a PSFCH transmission occasion resource if , where is defined in [6, TS 38.214], and is a number of slots that belong to the resource pool within 10240 msec according to [6, TS 38.214], and is provided by *sl-PSFCH-Period*.

A UE may be indicated by higher layers to not transmit a PSFCH that includes HARQ-ACK information in response to a PSSCH reception [11, TS 38.321].

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. 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.

A UE is provided by *sl-PSFCH-RB-Set* a set of PRBs in a resource pool for PSFCH transmission with HARQ-ACK information in a PRB of the resource pool. A UE can be provided by *sl-PSFCH-Conflict-RB-Set* a set of PRBs in a resource pool for PSFCH transmission with conflict information in a PRB of the resource pool. A UE expects that different PRBs are (pre)configured for conflict information and HARQ-ACK information. For a number of sub-channels for the resource pool, provided by *sl-NumSubchannel*, and a number of PSSCH slots associated with a PSFCH slot that is less than or equal to , the UE allocates the PRBs from the PRBs to slot among the PSSCH slots associated with the PSFCH slot and sub-channel , where , , , and the allocation starts in an ascending order of and continues in an ascending order of . The UE expects that isa multiple of *.*

The second OFDM symbol of PSFCH transmission in a slot is defined as .

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 configured as *startSubCH*, and the PRBs are associated with the starting sub-channel of the corresponding PSSCH

- if *sl-PSFCH-CandidateResourceType* is configured as *allocSubCH*, and the PRBs are associated with the sub-channels of the corresponding PSSCH

- for conflict information, the corresponding PSSCH is determined based on *PSFCHOccasionScheme2*

The PSFCH resources are first indexed according to an ascending order of the PRB index, from the PRBs, and then according to an ascending order of the cyclic shift pair index from the cyclic shift pairs.

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 a PSFCH transmission with HARQ-ACK information or conflict information, a UE determines a value, for computing a value of cyclic shift [4, TS 38.211], from a cyclic shift pair index corresponding to a PSFCH resource index and from using Table 16.3-1.

Table 16.3-1: Set of cyclic shift pairs

|  |  |
| --- | --- |
|  |  |
| **Cyclic Shift Pair Index 0** | **Cyclic Shift Pair Index 1** | **Cyclic Shift Pair Index 2** | **Cyclic Shift Pair Index 3** | **Cyclic Shift Pair Index 4** | **Cyclic Shift Pair Index 5** |
| 1 | 0 | - | - | - | - | - |
| 2 | 0 | 3 | - | - | - | - |
| 3 | 0 | 2 | 4 | - | - | - |
| 6 | 0 | 1 | 2 | 3 | 4 | 5 |

For a PSFCH transmission with HARQ-ACK information, a UE determines a value, for computing a value of cyclic shift [4, TS 38.211], as in Table 16.3-2 if the UE detects a SCI format 2-A with Cast type indicator field value of "01" or "10" or a SCI format 2-C, or as in Table 16.3-3 if the UE detects a SCI format 2-B or a SCI format 2-A with Cast type indicator field value of "11". For a PSFCH transmission with conflict information, a UE determines a value for computing a value of cyclic shift [4, TS 38.211] as in Table 16.3-4. The UE applies one cyclic shift from a cyclic shift pair to a sequence used for the PSFCH transmission [4, TS 38.211].

Table 16.3-2: Mapping of HARQ-ACK information bit values to a cyclic shift, from a cyclic shift pair, of a sequence for a PSFCH transmission when HARQ-ACK information includes ACK or NACK

|  |  |  |
| --- | --- | --- |
| HARQ-ACK Value | 0 (NACK) | 1 (ACK) |
| **Sequence cyclic shift** | 0 | 6 |

Table 16.3-3: Mapping of HARQ-ACK information bit values to a cyclic shift, from a cyclic shift pair, of a sequence for a PSFCH transmission when HARQ-ACK information includes only NACK

|  |  |  |
| --- | --- | --- |
| HARQ-ACK Value | 0 (NACK) | 1 (ACK) |
| **Sequence cyclic shift** | 0 | N/A |

Table 16.3-4: Mapping of conflict information bit values to a cyclic shift, from a cyclic shift pair, of a sequence for a PSFCH transmission

|  |  |
| --- | --- |
| Conflict information | Conflict information for a next in time reserved resource indicated in SCI |
| **Sequence cyclic shift** | 0 |

A first UE determines a second UE for providing the conflict information to in a PSFCH as follows

- if the first UE is an intended receiver of the second UE for a reserved resource of a PSSCH transmission in a slot,

- does not expect to perform reception on the sidelink due to half-duplex operation in the slot, and

- determines to transmit to the second UE the PSFCH with the conflict information.

A first UE determines a UE for providing the conflict information to in a PSFCH as follows

- if, for a resource pool, *typeAUEScheme2* is disabled, the first UE has been indicated a first reserved resource and a second reserved resource as resources for PSSCH reception or, if for a resource pool *typeAUEScheme2* is enabled, has been indicated at least the first reserved resource or the second reserved resource for PSSCH reception,

- detects a first SCI format 1-A that includes a first priority value, , and the first reserved resource for PSSCH transmission from a second UE,

- detects a second SCI format 1-A that includes a second priority value, , and the second reserved resource for PSSCH transmission from a third UE, and

- determines that the first and second resources overlap in time and frequency

- the PSFCH occasions for resource conflict information of the second UE and the third UE are valid

- the indicationUEB flag in SCI Format 1-A from the second UE and the third UE is set to 1, if *indicationUEBScheme2* = ‘enabled’

- determines the first SCI format 1-A and the second SCI format 1-A are not received later than *sl-MinTimeGapPSFCH* before the PSFCH occasion for conflict information

- determines to transmit to the second UE the PSFCH with the conflict information

- determines to transmit to either the second UE or the third UE the PSFCH with the conflict information, if

The first UE can be provided conditions by *optionForCondition2A1Scheme2* to determine conflict of reserved resources in a resource pool

- if *optionForCondition2A1Scheme2* = 'RSRP-ThresPerPriorities', the first UE can be provided by, *ThresPSSCH-RSRP-List* , a list of RSRP thresholds for each priority combination [6, TS 38.214]

- if the first UE is an intended receiver for PSSCH in a reserved resource of the second UE, the first UE determines a resource conflict if the RSRP [6, TS 38.214] of the third UE is above a threshold

- if the first UE is an intended receiver for PSSCH in a reserved resource of the third UE, the first UE determines a resource conflict if the RSRP of the second UE is above a threshold

- if *optionForCondition2A1Scheme2* = 'RSRP-ThresWithRsrpMeasurement', the first UE can be provided a value by *deltaRSRPThresh*

- if the first UE is an intended receiver for PSSCH in a reserved resource of the second UE, the first UE determines a resource conflict if , where and are the RSRP measurements from the first UE for the second UE and the third UE, respectively

- if the first UE is an intended receiver for PSSCH in a reserved resource of the third UE, the first UE determines a resource conflict if

If a UE transmits a PSFCH with conflict information corresponding to a reserved resource indicated in an SCI format 1-A, the UE transmits the PSFCH in the resource pool in a slot determined based on *PSFCHOccasionScheme2*

- If *PSFCHOccasionScheme2* = 'followSCI', 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 slot of a PSCCH reception that provides the SCI format 1-A. The PSFCH resource is in a slot that is at least slots [6, TS 38.214] before the resource associated with the conflict information; otherwise, the UE does not transmit the PSFCH with conflict information

- If *PSFCHOccasionScheme2* = 'followReservedResource', the UE transmits the PSFCH in a latest slot that includes PSFCH resources and is at least slots before a slot of the resource associated with conflict information. The PSFCH resource is in a slot that is at least *sl-MinTimeGapPSFCH* slots after a slot of a PSCCH reception that provides the SCI format 1-A; otherwise, the UE does not transmit the PSFCH with conflict information

### 16.3.1 UE procedure for receiving PSFCH with control information

A UE that transmitted a PSSCH scheduled by a SCI format 2-A/2-B/2-C that indicates HARQ feedback enabled, attempts to receive associated PSFCHs with HARQ-ACK information according to PSFCH resources determined as described in clause 16.3.0. The UE determines an ACK or a NACK value for HARQ-ACK information provided in each PSFCH resource as described in [8-4, TS 38.101-4]. The UE does not determine both an ACK value and a NACK value at a same time for a PSFCH resource.

For each PSFCH reception occasion, from a number of PSFCH reception occasions, the UE generates HARQ-ACK information to report to higher layers. For generating the HARQ-ACK information, the UE can be indicated by a SCI format to perform one of the following

- if the UE receives a PSFCH associated with a SCI format 2-A with Cast type indicator field value of "10" or a SCI format 2-C

- report to higher layers HARQ-ACK information with same value as a value of HARQ-ACK information that the UE determines from the PSFCH reception

- if the UE receives a PSFCH associated with a SCI format 2-A with Cast type indicator field value of "01"

- report an ACK value to higher layers if the UE determines an ACK value from at least one PSFCH reception occasion from the number of PSFCH reception occasions in PSFCH resources corresponding to every identity of UEs that the UE expects to receive corresponding PSSCHs as described in clause 16.3; otherwise, report a NACK value to higher layers

- if the UE receives a PSFCH associated with a SCI format 2-B or a SCI format 2-A with Cast type indicator field value of "11"

- report to higher layers an ACK value if the UE determines absence of PSFCH reception for the PSFCH reception occasion; otherwise, report a NACK value to higher layers

A UE that transmitted SCI format 1-A, indicating one or more reserved resources in a resource pool enabled by *inter-UECoordinationScheme2*, attempts to receive associated PSFCH with conflict information in a resource pool with PSFCH resources that the UE determines as described in clause 16.3.0. If the UE determines presence of a resource conflict based on conflict information in a PSFCH reception, the UE reports the resource conflict to higher layers

- if *slotLevelResourceExclusionScheme2* is not provided, the UE reports resources overlapping with a next in time reserved resource indicated by the SCI format 1-A

- if *slotLevelResourceExclusionScheme2* is provided, the UE reports resources in a slot of a next in time reserved resource indicated by the SCI format 1-A

If a UE receives a PSFCH with conflict information corresponding to a reserved resource indicated in an SCI format 1-A, the UE receives the PSFCH in the resource pool in a slot determined based on *PSFCHOccasionScheme2*

- If *PSFCHOccasionScheme2* = 'followSCI', the UE receives 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 slot of a PSCCH transmission that provides the SCI format 1-A. The PSFCH resource is in a slot that is at least slots [6, TS 38.214] before the resource associated with the conflict information; otherwise, the UE does not receive the PSFCH with conflict information

- If *PSFCHOccasionScheme2* = 'followReservedResource', the UE receives the PSFCH in a latest slot that includes PSFCH resources and is at least slots before a slot of the resource associated with conflict information. The PSFCH resource is in a slot that is at least *sl-MinTimeGapPSFCH* slots after a slot of a PSCCH transmission that provides the SCI format 1-A; otherwise, the UE does not receive the PSFCH with conflict information