**3GPP TSG RAN WG1 Meeting #102-e                     R1-200xxxx**

**e-Meeting, 17 – 28 August, 2020**

**Agenda Item: 7.2.2.2.2**

**Source: Charter Communications**

**Title: Draft [102-e-NR-unlic-NRU-InitAccessProc-01]**

**Document for: Discussion and Decision**

# Introduction

One email discussion has been sanctioned in RAN1#102-e on initial access procedures for Rel-16 NR-U based on contributions submitted to this meeting **Error! Reference source not found.**-[9]. This first discussion that aims to converge by 8/20 has the following scope:

[102-e-NR-unlic-NRU-InitAccessProc-01] Email discussion/approval on the following from R1-2006648 by 8/20; if necessary, endorse associated TPs by 8/26 – Amitav (Charter)

* (#2.5) Timing reference cell update to 38.213.
* (#3.1, #3.3) DCI Format 1\_0 bit-length alignment. Reflect LSB of SFN is not always in the DCI 1\_0 when RAR/msgB window is smaller than 10ms.
* (#4.1) Further clarifications on CSI-RS measurement averaging.
* Proposed conclusions (no spec impact):
	+ For FBE mode, idle UE may transmit PRACH only within FFPs for which SSB, SIBs or paging are detected.
	+ There is no requirement on the difference between the first and last candidate SS/PBCH block index of the SS/PBCH block burst within a discovery burst transmission window.
		- Note: This implies gNB can transmit multiple bursts of SS/PBCH blocks within a discovery burst transmission window.
* If necessary, reply LS from RAN1 to RAN4 is necessary based on R1-2003271 and R1-2005213

These issues have been selected based on the preparatory discussion summarized in [10].

# Company views

## (#2.1) Timing reference cell update to 38.213

Issue: in RAN4 LS (R1-2003272/R4-2005373) to RAN1, RAN4 provided the following information:

According to the UE transmit timing requirements (section 7.1, TS 38.133) in endorsed CR (R4-2005374), for the UE operating in scenario B or in scenario C, if a reference cell in a cell group (CG) is unavailable at the UE for more than 160 ms then the UE [can or shall] use any of the activated SCell(s) as its reference cell for deriving its transmit timing.

However, in current RAN1 specification, Clause 4.1 in TS 38.213 in particular, it says:

“For a serving cell without transmission of SS/PBCH blocks, a UE acquires time and frequency synchronization with the serving cell based on receptions of SS/PBCH blocks on the PCell, or on the PSCell, of the cell group for the serving cell.”

------------------------------------- < Start of TP#1 for Clause 4.1 of 38.213 > -------------------------------------

Synchronization procedures

4.1 Cell search

< Unchanged parts are omitted >

For operation without shared spectrum channel access, ~~F~~for a serving cell without transmission of SS/PBCH blocks, a UE acquires time and frequency synchronization with the serving cell based on receptions of SS/PBCH blocks on the PCell, or on the PSCell, of the cell group for the serving cell.

For operation with shared spectrum channel access, for a serving cell without transmission of SS/PBCH blocks, a UE acquires time and frequency synchronization with the serving cell based on receptions of SS/PBCH blocks on the PCell, or on the PSCell, or on any activated SCell if SS/PBCH blocks on the PCell or on the PSCell are unavailable as described in [10, TS 38.133], of the cell group for the serving cell.

-------------------------------------------------- < End of TP#1> -------------------------------------------------------

|  |  |
| --- | --- |
| **Company** | **Views** |
| Samsung | The impact to 38.213 can be simplified. Since 38.133 already specifies the condition to utilize a SCell for timing, 38.213 can simply refer to 38.133 to avoid any inconsistence between specs in the future. Here is an example we are thinking: For a serving cell without transmission of SS/PBCH blocks, a UE acquires time and frequency synchronization with the serving cell based on receptions of SS/PBCH blocks on the PCell, or on the PSCell, or on a SCell if applicable as described in [10, TS 38.133], of the cell group for the serving cell. |
| Nokia/NSB | We support the simplified text proposed by Samsung, as it prevents from having in the future inconsistencies between 38.213 and 38.133 specifications, and we would propose the following update:For a serving cell without transmission of SS/PBCH blocks, a UE acquires time and frequency synchronization with the serving cell based on receptions of SS/PBCH blocks on the PCell, or on the PSCell, or for operation with shared spectrum access on a SCell if applicable as described in [10, TS 38.133], of the cell group for the serving cell. |
| Qualcomm | Nokia’s proposed change is good for us |
| ZTE, Sanechips | We agree with Nokia’s updated TP. |
| Huawei, HiSilicon | Support Nokia’s change |
| Ericsson | Okay in Nokia's updated TP |
|  |  |

Moderator update:

Proposal 1: Propose to adopt the simplified suggestion from Nokia:

------------------------------------- < Start of TP#1a for Clause 4.1 of 38.213 > ------------------------------------

Synchronization procedures

4.1 Cell search

< Unchanged parts are omitted >

For a serving cell without transmission of SS/PBCH blocks, a UE acquires time and frequency synchronization with the serving cell based on receptions of SS/PBCH blocks on the PCell, or on the PSCell, or for operation with shared spectrum access on a SCell if applicable as described in [10, TS 38.133], of the cell group for the serving cell.

-------------------------------------------------- < End of TP#1a> ------------------------------------------------------

## (#3.1, #3.3) DCI Format 1\_0 bit-length alignment. Reflect LSB of SFN is not always in the DCI 1\_0 when RAR/msgB window is smaller than 10ms.

Issue: In current TS 38.212-g20, the number of DCI format 1\_0 bits except for “Frequency domain resource assignment” field is

- For operation in a cell with shared spectrum channel access

o 28 bits scrambled by RA-RNTI or MsgB-RNTI.

 Note: 4 + 1 + 5 + 2 + 2 + 14.

o 30 bits scrambled by other RNTI (C-RNTI, SI-RNTI, P-RNTI, TC-RNTI).

- For operation in a cell without shared spectrum channel access

o 28 bits scrambled by all RNTI.

The bits length for DCI format 1-0 by different RNTI should be the same. So the reserved bits for the DCI format 1\_0 with CRC scrambled by RA-RNTI for operation in a cell with shared spectrum channel access should be 16 and the reserved bits for the DCI format 1\_0 with CRC scrambled by MsgB-RNTI for operation in a cell with shared spectrum channel access should also be 16 [2].

------------------------------------- < Start of TP#2 for Clause 7.3.1.2.1 of 38.212 > -------------------------------

< Unchanged parts are omitted >

- Reserved bits – 14 bits for the DCI format 1\_0 with CRC scrambled by MsgB-RNTI for operation in a cell without shared spectrum channel access; otherwise 16 bits

< Unchanged parts are omitted >

-------------------------------------------------- < End of TP#2> --------------------------------------------------------

|  |  |
| --- | --- |
| **Company** | **Views** |
| Samsung | Do we still need the TP if TP#3 is adopted?  |
| Nokia/NSB | Agreed with Samsung: if TP#3 is adopted TP#2 is not needed. |
| Qualcomm | Agree with Samsung |
| LG | RAN2 agreement indicates that 2 bits for SFN in DCI format 1\_0 exists conditionally when the response window size is larger than 10ms. Following that agreement, reserved bits should be 14 bits when the response window size is larger than 10ms and 16 bits otherwise, regardless of RA-RNTI or MsgB-RNTI. The proposed text in TP#2 doesn’t seem to reflect this situation and should not be adopted. |
| ZTE, Sanechips | From our understanding, #3.1 and #3.3 are different issues. TP#3 can not resolve Issue #3.1 proposed by NEC. With TP#3, bit number of DCI format 1\_0 with CRC scrambled by RA-RNTI or MsgB-RNTI except for “Frequency domain resource assignment” field is also 28 bits for NR-U, different from other RNTI 30 bits for NR-U(due to the 2 bits ChannelAccess-CPext). TP#2 and TP#3 could be merged as:Reserved bits – 14 bits for the DCI format 1\_0 with CRC scrambled by MsgB-RNTI for operation in a cell without shared spectrum channel access if *msgB-responseWindow-r16* is configured to be larger than 10 ms; or ~~14~~ 18 bits for the DCI format 1\_0 with CRC scrambled by RA-RNTI or MsgB-RNTI for operation in a cell with shared spectrum channel access if *ra-ResponseWindow or ra-ResponseWindow-v1610 or msgB-responseWindow-r16* is configured to be not larger than 10 ms; otherwise 16 bits |
| Huawei, HiSilicon | Issue #3.1 is different from #3.2. It is trying to align the bit for DCI 1\_0 for unlicensed band for all RNTI. Considering 2 additional bits for channel access type are introduced for DCI 1\_0 for other RNTI, the reserved bits for DCI 1\_0 for RA-RNTI and MsgB-RNTI should be increased by 2 if LSB of SFN is not included. |
| Ericsson | We disagree with TP#2. It does not seem correct.However, we do agree that the number of reserved bits need to be increased in some cases to make sure that DCI 1\_0 is 30 bits for operation with shared spectrum channel access (excluding frequency domain resource assignment field). This ensures that DCI 1\_0 is the same length for all RNTIs when shared spectrum channel access is used. Currently (without any changes, these are the lengths):

|  |  |  |
| --- | --- | --- |
| RNTI | Licensed | Shared Spectrum Channel Access |
| P-RNTI | 28 | 30 |
| SI-RNTI | 28 | 30 |
| RA-RNTI | 28 | 28 |
| MsgB-RNTI | 28 | 28 |
| TC-RNTI | 28 | 30 |

So, we need to ensure that for both RA-RNTI and MsgB-RNTI in shared spectrum, the number of reserved bits is increased by 2.I suggest the following way forward:* Abandon TP#2
* Address 30 bit issue in the context of TP#3
 |
| CATT | We have similar view with LGE and TP#2 can’t follow RAN#2 agreement. So TP#2 shouldn’t be accepted. |
| NEC | Agree with ZTE’s comments since the motivation is to align bit length. Actually, our proposed TP#2 didn’t consider the RAN2 LS. On the other hand, RAN2 LS doesn’t resolve the issue in TP#2. We should consider TP#2 and TP#3 together. I think ZTE’s proposal is a good baseline. One comment on ZTE’s proposal is that due to the ‘or’, the condition “if *ra-ResponseWindow* or *ra-ResponseWindow-v1610* or *msgB-responseWindow-r16* is configured to be not larger than 10 ms” is true when (ra-ResponseWindow-v1610 <= 10ms) and (msgB-responseWindow-r16 > 10ms), thus 18 bits are reserved. However, it should be 16 bits for DCI scrambled by MsgB-RNTI. So we should at least separate these two cases and our proposal is that,Alt 1:Reserved bits – 14 bits for the DCI format 1\_0 with CRC scrambled by MsgB-RNTI for operation in a cell without shared spectrum channel access if *msgB-responseWindow-r16* is configured to be larger than 10 ms; or 18 bits for the DCI format 1\_0 with CRC scrambled by RA-RNTI for operation in a cell with shared spectrum channel access if *ra-ResponseWindow or ra-ResponseWindow-v1610* is configured to be not larger than 10 ms; or 18 bits for the DCI format 1\_0 with CRC scrambled by MsgB-RNTI for operation in a cell with shared spectrum channel access if *msgB-responseWindow-r16* is configured to be not larger than 10 ms; otherwise 16 bitsAlt 2:Reserved bits – (18 - A) bits for operation in a cell with shared spectrum channel access; otherwise (16 - A) bits; where A is the bit length of LSBs of SFN field. |
|  |  |
|  |  |

Moderator update:

We see #3.1 and #3.3 as separate issues. In current 38.212, the DCI Format 1\_0 bit-length is not the same across all RNTIs in shared spectrum access; for RA-RNTI and msgB-RNTI scrambling, the bit-length is 28 bits regardless of whether 2 SFN LSB bits are included, and the bit-length is 30 bits for other RNTIs (excluding FDRA). Thus, 18 reserved bits are needed when 2 SFN LSBs are absent, and 16 reserved bits are needed when 2 SFN LSBs are present.

On the other hand, #3.3 originally sought to clarify the conditions under which 2 SFN LSBs are included in Format 1\_0. However, due to overlap, it is more efficient to treat them together in a single TP(s).

Proposed conclusion:

Consolidate DCI Format 1\_0 bit-length alignment and SFN LSB clarification under #3.3 TP discussion.

Issue: RAN2 has made a new agreement regarding the inclusion of the SFN LSB bits in DCI and has sent a new LS to RAN1. The LS states the following:

RAN2 agreed that the gNB signals the SFN bits to the UE only if there is a risk of ambiguity, i.e. if the random access response window or the MSGB response window is larger than 10 ms. The RAR window is configured by *ra-ResponseWindow* or *ra-ResponseWindow-r16* and the MSGB response window is configured by *msgB-ResponseWindow-r16*.

Proposals [5]:

* 38.212 should state that the 2 SFN LSB bits are only included in DCI 1\_0 if either the RAR window or MsgB response window is configured to be larger than 10 ms
* Remove the text "if applicable" in 38.213, since it is now clear when the SFN LSB bits are included in DCI and that the UE must read them when they are included

--------------------------------- < Start of TP#3 for Clause 7.3.1.2.1 of 38.212 > -----------------------------------

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

The following information is transmitted by means of the DCI format 1\_0 with CRC scrambled by RA-RNTI or MsgB-RNTI:

- Frequency domain resource assignment – bits

-  is the size of CORESET 0 if CORESET 0 is configured for the cell and  is the size of initial DL bandwidth part if CORESET 0 is not configured for the cell

- Time domain resource assignment – 4 bits as defined in Clause 5.1.2.1 of [6, TS38.214]

- VRB-to-PRB mapping – 1 bit according to Table 7.3.1.2.2-5

- Modulation and coding scheme – 5 bits as defined in Clause 5.1.3 of [6, TS38.214], using Table 5.1.3.1-1

- TB scaling – 2 bits as defined in Clause 5.1.3.2 of [6, TS38.214]

- LSBs of SFN – 2 bits for the DCI format 1\_0 with CRC scrambled by MsgB-RNTI as defined in Clause 8.2A of [5, TS 38.213] if *msgB-responseWindow-r16* is configured to be larger than 10 ms; or 2 bits for the DCI format 1\_0 with CRC scrambled by RA-RNTI as defined in Clause 8.2 of [5, TS 38.213] for operation in a cell with shared spectrum channel access if *ra-ResponseWindow or ra-ResponseWindow-v1610* is configured to be larger than 10 ms; 0 bit otherwise

- Reserved bits – 14 bits for the DCI format 1\_0 with CRC scrambled by MsgB-RNTI if *msgB-responseWindow-r16* is configured to be larger than 10 ms; or 14 bits for the DCI format 1\_0 with CRC scrambled by RA-RNTI for operation in a cell with shared spectrum channel access if *ra-ResponseWindow or ra-ResponseWindow-v1610* is configured to be larger than 10 ms; otherwise 16 bits

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

-------------------------------------------------- < End of TP#3> --------------------------------------------------------

--------------------------------- < Start of TP#4 for Clause 8 of 38.213 > -----------------------------------

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

8.2 Random access response - Type-1 random access procedure

In response to a PRACH transmission, a UE attempts to detect a DCI format 1\_0 with CRC scrambled by a corresponding RA-RNTI during a window controlled by higher layers [11, TS 38.321]. The window starts at the first symbol of the earliest CORESET the UE is configured to receive PDCCH for Type1-PDCCH CSS set, as defined in Clause 10.1, that is at least one symbol, after the last symbol of the PRACH occasion corresponding to the PRACH transmission, where the symbol duration corresponds to the SCS for Type1-PDCCH CSS set as defined in Clause 10.1. The length of the window in number of slots, based on the SCS for Type1-PDCCH CSS set, is provided by *ra-ResponseWindow*.

If the UE detects the DCI format 1\_0 with CRC scrambled by the corresponding RA-RNTI and LSBs of a SFN field in the DCI format 1\_0, if included ~~and applicable~~, are same as corresponding LSBs of the SFN where the UE transmitted PRACH, and the UE receives a transport block in a corresponding PDSCH within the window, the UE passes the transport block to higher layers. The higher layers parse the transport block for a random access preamble identity (RAPID) associated with the PRACH transmission. If the higher layers identify the RAPID in RAR message(s) of the transport block, the higher layers indicate an uplink grant to the physical layer. This is referred to as random access response (RAR) UL grant in the physical layer.

If the UE does not detect the DCI format 1\_0 with CRC scrambled by the corresponding RA-RNTI within the window, or if the UE detects the DCI format 1\_0 with CRC scrambled by the corresponding RA-RNTI within the window and LSBs of a SFN field in the DCI format 1\_0, if included ~~and applicable~~, are not same as corresponding LSBs of the SFN where the UE transmitted PRACH, or if the UE does not correctly receive the transport block in the corresponding PDSCH within the window, or if the higher layers do not identify the RAPID associated with the PRACH transmission from the UE, the higher layers can indicate to the physical layer to transmit a PRACH. If requested by higher layers, the UE is expected to transmit a PRACH no later than  msec after the last symbol of the window, or the last symbol of the PDSCH reception, where  is a time duration of  symbols corresponding to a PDSCH processing time for UE processing capability 1 assuming  corresponds to the smallest SCS configuration among the SCS configurations for the PDCCH carrying the DCI format 1\_0, the corresponding PDSCH when additional PDSCH DM-RS is configured, and the corresponding PRACH. For , the UE assumes  [6, TS 38.214]. For a PRACH transmission using 1.25 kHz or 5 kHz SCS, the UE determines  assuming SCS configuration .

If the UE detects a DCI format 1\_0 with CRC scrambled by the corresponding RA-RNTI and LSBs of a SFN field in the DCI format 1\_0, if included ~~and applicable~~, are same as corresponding LSBs of the SFN where the UE transmitted the PRACH, and the UE receives a transport block in a corresponding PDSCH, the UE may assume same DM-RS antenna port quasi co-location properties, as described in [6, TS 38.214], as for a SS/PBCH block or a CSI-RS resource the UE used for PRACH association, as described in Clause 8.1, regardless of whether or not the UE is provided *TCI-State* for the CORESET where the UE receives the PDCCH with the DCI format 1\_0.

If the UE attempts to detect the DCI format 1\_0 with CRC scrambled by the corresponding RA-RNTI in response to a PRACH transmission initiated by a PDCCH order that triggers a contention-free random access procedure for the SpCell [11, TS 38.321], the UE may assume that the PDCCH that includes the DCI format 1\_0 and the PDCCH order have same DM-RS antenna port quasi co-location properties. If the UE attempts to detect the DCI format 1\_0 with CRC scrambled by the corresponding RA-RNTI in response to a PRACH transmission initiated by a PDCCH order that triggers a contention-free random access procedure for a secondary cell, the UE may assume the DM-RS antenna port quasi co-location properties of the CORESET associated with the Type1-PDCCH CSS set for receiving the PDCCH that includes the DCI format 1\_0.

A RAR UL grant schedules a PUSCH transmission from the UE. The contents of the RAR UL grant, starting with the MSB and ending with the LSB, are given in Table 8.2-1.

If the value of the frequency hopping flag is 0, the UE transmits the PUSCH without frequency hopping; otherwise, the UE transmits the PUSCH with frequency hopping.

The UE determines the MCS of the PUSCH transmission from the first sixteen indexes of the applicable MCS index table for PUSCH as described in [6, TS 38.214].

The TPC command value  is used for setting the power of the PUSCH transmission, as described in Clause 7.1.1, and is interpreted according to Table 8.2-2.

The CSI request field is reserved.

The ChannelAccess-CPext field indicates a channel access type and CP extension for operation with shared spectrum channel access [15, TS 37.213].

**Table 8.2-1: Random Access Response Grant Content field size**

|  |  |
| --- | --- |
| **RAR grant field** | **Number of bits** |
| Frequency hopping flag | 1 |
| PUSCH frequency resource allocation | 14, for operation without shared spectrum channel access 12, for operation with shared spectrum channel access |
| PUSCH time resource allocation | 4 |
| MCS | 4 |
| TPC command for PUSCH | 3 |
| CSI request | 1 |
| ChannelAccess-CPext | 0, for operation without shared spectrum channel access2, for operation with shared spectrum channel access |

**Table 8.2-2: TPC Command  for PUSCH**

|  |  |
| --- | --- |
| **TPC Command** | **Value (in dB)** |
| 0 | -6 |
| 1 | -4 |
| 2 | -2 |
| 3 | 0 |
| 4 | 2 |
| 5 | 4 |
| 6 | 6 |
| 7 | 8 |

Unless the UE is configured a SCS, the UE receives subsequent PDSCH using same SCS as for the PDSCH reception providing the RAR message.

If the UE does not detect the DCI format 1\_0 with CRC scrambled by the corresponding RA-RNTI within the window, or if the UE detects the DCI format 1\_0 with CRC scrambled by the corresponding RA-RNTI within the window and the LSBs of a SFN field in the DCI format 1\_0, if included ~~and applicable~~, are not same as corresponding LSBs of the SFN where the UE transmitted the PRACH, or the UE does not correctly receive a corresponding transport block within the window, the UE procedure is as described in [11, TS 38.321].

8.2A Random access response - Type-2 random access procedure

In response to a transmission of a PRACH and a PUSCH, or to a transmission of only a PRACH if the PRACH preamble is mapped to a valid PUSCH occasion, a UE attempts to detect a DCI format 1\_0 with CRC scrambled by a corresponding MsgB-RNTI during a window controlled by higher layers [11, TS 38.321]. The window starts at the first symbol of the earliest CORESET the UE is configured to receive PDCCH for Type1-PDCCH CSS set, as defined in Clause 10.1, that is at least one symbol, after the last symbol of the PUSCH occasion corresponding to the PRACH transmission, where the symbol duration corresponds to the SCS for Type1-PDCCH CSS set. The length of the window in number of slots, based on the SCS for Type1-PDCCH CSS set, is provided by *msgB-ResponseWindow*.

In response to a transmission of a PRACH, if the PRACH preamble is not mapped to a valid PUSCH occasion, a UE attempts to detect a DCI format 1\_0 with CRC scrambled by a corresponding MsgB-RNTI during a window controlled by higher layers [11, TS 38.321]. The window starts at the first symbol of the earliest CORESET the UE is configured to receive PDCCH for Type1-PDCCH CSS set, as defined in Clause 10.1, that is at least one symbol, after the last symbol of the PRACH occasion corresponding to the PRACH transmission, where the symbol duration corresponds to the SCS for Type1-PDCCH CSS set. The length of the window in number of slots, based on the SCS for Type1-PDCCH CSS set, is provided by *msgB-ResponseWindow*.

If the UE detects the DCI format 1\_0, with CRC scrambled by the corresponding MsgB-RNTI and LSBs of a SFN field in the DCI format 1\_0, if included ~~applicable~~, are same as corresponding LSBs of the SFN where the UE transmitted PRACH, and the UE receives a transport block in a corresponding PDSCH within the window, the UE passes the transport block to higher layers. The higher layers indicate to the physical layer

- an uplink grant if the RAR message(s) is for fallbackRAR and a random access preamble identity (RAPID) associated with the PRACH transmission is identified, and the UE procedure continues as described in Clauses 8.2, 8.3, and 8.4 when the UE detects a RAR UL grant, or

- transmission of a PUCCH with HARQ-ACK information having ACK value if the RAR message(s) is for successRAR, where

- a PUCCH resource for the transmission of the PUCCH is indicated by PUCCH resource indicator field of 4 bits in the successRAR from a PUCCH resource set that is provided by *pucch-ResourceCommon*

- a slot for the PUCCH transmission is indicated by a PDSCH-to-HARQ\_feedback timing indicator field of 3 bits in the successRAR having a value $k$ from {1, 2, 3, 4, 5, 6, 7, 8} and, with reference to slots for PUCCH transmission having duration $T\_{slot}$, the slot is determined as $n+k+∆$, where $n$ is a slot of the PDSCH reception and $∆$ is as defined for PUSCH transmission in Table 6.1.2.1.1-5 of [6, TS 38.214]

- the UE does not expect the first symbol of the PUCCH transmission to be after the last symbol of the PDSCH reception by a time smaller than $N\_{T,1}+0.5$ msec where $N\_{T,1}$ is the PDSCH processing time for UE processing capability 1 [6, TS 38.214]

- for operation with shared spectrum channel access, a channel access type and CP extension [15, TS 37.213] for a PUCCH transmission is indicated by a ChannelAccess-CPext field in the successRAR

- the PUCCH transmission is with a same spatial domain transmission filter and in a same active UL BWP as a last PUSCH transmission

If the UE detects the DCI format 1\_0 with CRC scrambled by a C-RNTI and a transport block in a corresponding PDSCH within the window, the UE transmits a PUCCH with HARQ-ACK information having ACK value if the UE correctly detects the transport block or NACK value if the UE incorrectly detects the transport block and the time alignment timer is running [11, TS 38.321].

If the UE detects a DCI format 1\_0 with CRC scrambled by the corresponding MsgB-RNTI and receives a transport block within the window in a corresponding PDSCH, the UE may assume same DM-RS antenna port quasi co-location properties, as described in [6, TS 38.214], as for a SS/PBCH block the UE used for PRACH association, as described in Clause 8.1, regardless of whether or not the UE is provided *TCI-State* for the CORESET where the UE receives the PDCCH with the DCI format 1\_0.

The UE does not expect to be indicated to transmit the PUCCH with the HARQ-ACK information at a time that is prior to a time when the UE applies a TA command that is provided by the transport block. If the UE does not detect the DCI format 1\_0 with CRC scrambled by the corresponding MsgB-RNTI within the window, or if the UE detects the DCI format 1\_0 with CRC scrambled by the corresponding MsgB-RNTI within the window and LSBs of a SFN field in the DCI format 1\_0, if included ~~applicable~~, are not same as corresponding LSBs of the SFN where the UE transmitted the PRACH, or if the UE does not correctly receive the transport block in the corresponding PDSCH within the window, or if the higher layers do not identify the RAPID associated with the PRACH transmission from the UE, the higher layers can indicate to the physical layer to transmit only PRACH according to Type-1 random access procedure or to transmit both PRACH and PUSCH according to Type-2 random access procedure [11, TS 38.321]. If requested by higher layers, the UE is expected to transmit a PRACH no later than $N\_{T,1}+0.75$ msec after the last symbol of the window, or the last symbol of the PDSCH reception, where $N\_{T,1}$ is a time duration of $N\_{1}$ symbols corresponding to a PDSCH processing time for UE processing capability 1 when additional PDSCH DM-RS is configured. For $μ=0$, the UE assumes $N\_{1,0}=14$ [6, TS 38.214].

Unless the UE is configured a SCS, the UE receives subsequent PDSCH using same SCS as for the PDSCH reception providing the RAR message.

If the UE does not detect the DCI format 1\_0 with CRC scrambled by the corresponding MsgB-RNTI within the window, or if the UE detects the 1\_0 with CRC scrambled by the corresponding MsgB-RNTI within the window and LSBs of a SFN field in the DCI format 1\_0, if included ~~applicable~~, are not same as corresponding LSBs of the SFN where the UE transmitted the PRACH, or the UE does not correctly receive a corresponding transport block within the window, the UE procedure is as described in [11, TS 38.321].

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

-------------------------------------------------- < End of TP#4> --------------------------------------------------------

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| --- | --- |
| **Company** | **Views** |
| Samsung | We are OK with TP for 38.212. The TP for 38.213 is not quite essential, if the TP for 38.212 is adopted.  |
| Nokia/NSB | Related to the “If [included and] applicable” issue our proposal within R1-2006449 was simpler than TP#3/TP#4 (only 38.123 is impacted), but we see the proposal provided by the FL as equivalent, we therefore have no objection to adopt both TP#3 and TP#4, and we believe TP#4 should be definitely adopted, since it gets rid of the ambiguous “if applicable” wording.Related to the “DCI 1\_0 reserved bits” issue we are fine with TP#3. |
| Qualcomm | Support the TPs |
| LG | TP#3 in this summary reflects RAN2 agreement correctly and we are supportive to TP#3.Regarding TP#4, in last meeting, RAN1 agreed with introducing the text “if included and applicable” not only considering response window size, but also considering other situations where UE doesn’t need to decode 2 bits SFN. For example, in case of CFRA, UE doesn’t need to decode 2 bits SFN for contention resolution while in some cases such as handover in asynchronous network it is a high burden at UE side to read neighbor cell PBCH to exploit SFN. “if applicable” allows UE to avoid such an unnecessary burden while “if included” clarifies the case where 2 bits SFN is not included in DCI format 1\_0. Therefore, we don’t see a reason to remove “if applicable” in the existing text for either type 1 procedure or type 2 procedure. Instead, if RAN1 agrees to reflect the conditional inclusion of SFN bits in 38.213, we propose to change “if applicable” to “if included and applicable” for type 2 random access procedure in 8.2A as we suggested in the TP of Annex B in R1-2006647. |
| ZTE, Sanechips | From our understanding, #3.1 and #3.3 are different issues. TP#3 can not resolve Issue #3.1 proposed by NEC. With TP#3, bit number of DCI format 1\_0 with CRC scrambled by RA-RNTI or MsgB-RNTI except for “Frequency domain resource assignment” field is also 28 bits for NR-U, different from other RNTI 30 bits for NR-U(due to the 2 bits ChannelAccess-CPext). TP#2 and TP#3 could be merged as:Reserved bits – 14 bits for the DCI format 1\_0 with CRC scrambled by MsgB-RNTI for operation in a cell without shared spectrum channel access if *msgB-responseWindow-r16* is configured to be larger than 10 ms; or ~~14~~ 18 bits for the DCI format 1\_0 with CRC scrambled by RA-RNTI or MsgB-RNTI for operation in a cell with shared spectrum channel access if *ra-ResponseWindow or ra-ResponseWindow-v1610 or msgB-responseWindow-r16* is configured to be not larger than 10 ms; otherwise 16 bitsWe are fine with TP#4. |
| Huawei, HiSilicon | Support TP#3 and TP#4. |
| Ericsson | We support TP#4. "If applicable" is vague, and worse, undefined.Support TP#3a below (modification of TP#3 to ensure that the number of bits, excluding FDRA field, is 30 for operation with shared spectrum channel access – please see our comments on Issue #3.1 above. ZTE's proposal above attempts a similar thing, but I think the bit accounting is not quite right – why 18 reserved bits? Also, it is preferable to avoid the wording "operation *without* shared spectrum channel access," since this is the "normal" case.I realize that TP#3a could be more compact, since a lot of cases result in 16 reserved bits, but I believe it is preferable to list all of the cases explicitly for clarity. |
| CATT | For TP#3, in general we are fine with intention of TP#3. But unit of these 3RRC parameters on msgB-responseWindow-r16, ra-ResponseWindow and ra-ResponseWindow-v1610 is ” Slot”, not time unit(such as millisecond, second) and slot duration is related to SCS numerology. These parameters can’t directly be used to compare with threshold 10ms. So we suggest modifying TP#3 as follows:- LSBs of SFN – If the random access response window provided by msgB-ResponseWindow >10ms, 2 bits for the DCI format 1\_0 with CRC scrambled by MsgB-RNTI as defined in Clause 8.2A of [5, TS 38.213]; or if the random access response window provided by ra-ResponseWindow or ra-ResponseWindow-r16 >10 ms, 2 bits for the DCI format 1\_0 with CRC scrambled by RA-RNTI as defined in Clause 8.2 of [5, TS 38.213] for operation in a cell with shared spectrum channel access; 0 bit otherwise- Reserved bits – If the random access response window provided by msgB-ResponseWindow >10ms, 14 bits for the DCI format 1\_0 with CRC scrambled by MsgB-RNTI; or if the random access response window provided by ra-ResponseWindow or ra-ResponseWindow-r16 > 10 ms, 14 bits for the DCI format 1\_0 with CRC scrambled by RA-RNTI for operation in a cell with shared spectrum channel access; otherwise 16 bits.For TP#4, we have same view with Samsung. If the TP for 38.212 is adopted, The TP for 38.213 is unnecessary. |
| NEC | For TP#3, agree the LSB of SFN part. For reserved bits part, we have out comments above on issue #3.1. |
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------------------------------- < Start of TP#3a for Clause 7.3.1.2.1 of 38.212 > -----------------------------------

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

The following information is transmitted by means of the DCI format 1\_0 with CRC scrambled by RA-RNTI or MsgB-RNTI:

- Frequency domain resource assignment – bits

-  is the size of CORESET 0 if CORESET 0 is configured for the cell and  is the size of initial DL bandwidth part if CORESET 0 is not configured for the cell

- Time domain resource assignment – 4 bits as defined in Clause 5.1.2.1 of [6, TS38.214]

- VRB-to-PRB mapping – 1 bit according to Table 7.3.1.2.2-5

- Modulation and coding scheme – 5 bits as defined in Clause 5.1.3 of [6, TS38.214], using Table 5.1.3.1-1

- TB scaling – 2 bits as defined in Clause 5.1.3.2 of [6, TS38.214]

- LSBs of SFN – 2 bits for the DCI format 1\_0 with CRC scrambled by MsgB-RNTI as defined in Clause 8.2A of [5, TS 38.213] if *msgB-responseWindow-r16* is configured to be larger than 10 ms; or 2 bits for the DCI format 1\_0 with CRC scrambled by RA-RNTI as defined in Clause 8.2 of [5, TS 38.213] for operation in a cell with shared spectrum channel access if *ra-ResponseWindow or ra-ResponseWindow-v1610* is configured to be larger than 10 ms; 0 bit otherwise

- Reserved bits – 14 bits for the DCI format 1\_0 with CRC scrambled by MsgB-RNTI; or 14 bits for the DCI format 1\_0 with CRC scrambled by RA-RNTI for operation in a cell with shared spectrum channel access; otherwise 16 bits

- Reserved bits – 16 bits for operation in shared spectrum channel access ; 14 bits otherwise

- Reserved bits – 14 bits for the DCI format 1\_0 with CRC scrambled by MsgB-RNTI and *msgB-responseWindow-r16* is configured to be larger than 10 ms; or 16 bits for the DCI format 1\_0 with CRC scrambled by MsgB-RNTI for operation in a cell with shared spectrum channel access and *msgB-responseWindow-r16* is configured to be larger than 10 ms; or ~~14~~ 16 bits for the DCI format 1\_0 with CRC scrambled by RA-RNTI for operation in a cell with shared spectrum channel access if *ra-ResponseWindow or ra-ResponseWindow-v1610* is configured to be larger than 10 ms; otherwise 16 bits

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

------------------------------------------------- < End of TP#3a> --------------------------------------------------------

16 bits if shared spectrum channel access AND ((MsgB-RNTI and >10 ms) OR (RA-RANTI AND > 10 ms))

14 bits otherwise

Moderator update:

For 38.212: proposed TP#3a above has multiple reserved bit fields (typo?). Also, we don’t seem to obtain 30 bits bit-length in all cases.

Proposal 2:

------------------------------- < Start of TP#3b for Clause 7.3.1.2.1 of 38.212 > -----------------------------------

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

The following information is transmitted by means of the DCI format 1\_0 with CRC scrambled by RA-RNTI or MsgB-RNTI:

- Frequency domain resource assignment – bits

-  is the size of CORESET 0 if CORESET 0 is configured for the cell and  is the size of initial DL bandwidth part if CORESET 0 is not configured for the cell

- Time domain resource assignment – 4 bits as defined in Clause 5.1.2.1 of [6, TS38.214]

- VRB-to-PRB mapping – 1 bit according to Table 7.3.1.2.2-5

- Modulation and coding scheme – 5 bits as defined in Clause 5.1.3 of [6, TS38.214], using Table 5.1.3.1-1

- TB scaling – 2 bits as defined in Clause 5.1.3.2 of [6, TS38.214]

- LSBs of SFN – 2 bits for the DCI format 1\_0 with CRC scrambled by MsgB-RNTI as defined in Clause 8.2A of [5, TS 38.213] if *msgB-responseWindow-r16* is configured to be larger than 10 ms; or 2 bits for the DCI format 1\_0 with CRC scrambled by RA-RNTI as defined in Clause 8.2 of [5, TS 38.213] for operation in a cell with shared spectrum channel access if *ra-ResponseWindow or ra-ResponseWindow-v1610* is configured to be larger than 10 ms; 0 bit otherwise

- Reserved bits – 14 bits for the DCI format 1\_0 with CRC scrambled by MsgB-RNTI and *msgB-responseWindow-r16* is configured to be larger than 10 ms; or 16 bits for the DCI format 1\_0 with CRC scrambled by MsgB-RNTI for operation in a cell with shared spectrum channel access and *msgB-responseWindow-r16* is configured to be larger than 10 ms; or ~~14~~ 16 bits for the DCI format 1\_0 with CRC scrambled by RA-RNTI for operation in a cell with shared spectrum channel access if *ra-ResponseWindow or ra-ResponseWindow-v1610* is configured to be larger than 10 ms; otherwise 18bits

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

------------------------------------------------- < End of TP#3b> --------------------------------------------------------

For 38.213 TP#4: 7 companies support the TP, 2 companies think it is not essential, and 1 company sees additional uses of ‘if applicable’ beyond scope of RAN2 LS.

Proposal 3: Continue email discussion on TP#4 until 8/26.

## (#4.1) Further clarifications on CSI-RS measurement averaging

Issue: there were discussions (not concluded) during the last RAN1 #101-e meeting about the following paragraph within TS 38.214, subclause 5.2.1.1:

For operation with shared spectrum channel access, the UE should not average CSI-RS measurements for channel estimation from occasions of an NZP CSI-RS (defined in [4, TS 38.211]) located in different DL transmissions burst (defined in [16, TS 37.213]).

There were two concerns raised with this paragraph:

- The “located in different DL transmission bursts” wording is written from the gNB perspective, but it was unclear for some how the UE can discriminate between “different DL transmission bursts”.

- The “not average CSI-RS” statement is not applicable to NZP CSI-RS for L1-RSRP, RLM, BFD, CBD and RRM, but only to RI-PMI-CQI, RI-il, RI-il-CQI, RI-CQI or RI-LI-PMI-CQI measurements.

------------------------------------- < Start of TP#5 for Clause 5.2.1.1 of 38.214 > ---------------------------------

5.2.1.1 Reporting settings

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

For operation with shared spectrum channel access and if the higher layer parameter *reportQuantity* is set to 'cri-RI-PMI-CQI', 'cri-RI-LI-PMI-CQI', 'cri-RI-i1', 'cri-RI-CQI' or 'cri-RI-i1-CQI', the UE should not average CSI-RS measurements for channel estimation from occasions of an NZP CSI-RS (defined in [4, TS 38.211]) located in different DL transmissions which satisfies any of the following conditions:

* gap among the different DL transmissions is greater than $16us$ if the UE does not detect a DCI format 2\_0 that indicates a channel occupancy duration which overlaps the occasions of the NZP CSI-RS

the DL transmissions are in different detected channel occupancy durations

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

-------------------------------------------------- < End of TP#5> --------------------------------------------------------

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| **Company** | **Views** |
| Samsung | We are OK with the TP. One minor editorial change on the indent format: For operation with shared spectrum channel access and if the higher layer parameter *reportQuantity* is set to 'cri-RI-PMI-CQI', 'cri-RI-LI-PMI-CQI', 'cri-RI-i1', 'cri-RI-CQI' or 'cri-RI-i1-CQI', the UE should not average CSI-RS measurements for channel estimation from occasions of an NZP CSI-RS (defined in [4, TS 38.211]) located in different DL transmissions which satisfies any of the following conditions:* gap among the different DL transmissions is greater than $16us$ if the UE does not detect a DCI format 2\_0 that indicates a channel occupancy duration which overlaps the occasions of the NZP CSI-RS
* the DL transmissions are in different detected channel occupancy durations
 |
| Nokia/NSB | We are fine with the first updated part of the TP related to *reportQuantity*. Regarding the remaining updates we don’t think they are needed; as indicated in our contribution R1-2006449 how the UE can discriminate “different DL transmission bursts” is already know and defined within NR-U Rel-16 specifications; adding the proposed text may lead in the future to inconsistencies between specs. |
| Qualcomm | We agree that the original language on “should not average … in different DL burst” is hard to enforce as DL burst is defined from gNB perspective. From UE perspective, it is in general hard to make sure the CSI-RS are in one DL burst from different DCI detections. In general, it is very hard (if not impossible) for UE to know two DL transmissions are in one DL burst or two DL bursts.On the other hand, if within on COT, we assume gNB will not change the transmit power of CSI-RS, even if they are in two different DL burst. In that case, we don’t see issue averaging channel estimates even if the CSI-RS are in different DL bursts in the same COT. Therefore, it might be better to use the following TPFor operation with shared spectrum channel access and if the higher layer parameter *reportQuantity* is set to 'cri-RI-PMI-CQI', 'cri-RI-LI-PMI-CQI', 'cri-RI-i1', 'cri-RI-CQI' or 'cri-RI-i1-CQI', the UE should not average CSI-RS measurements for channel estimation from occasions of an NZP CSI-RS (defined in [4, TS 38.211]) located in different detected channel occupancy durations |
| LG | We are OK with the first part clarifying the scope of *reportQuantity* setting. For the second part, as we commented on reflector, it seems better to discuss under DL#02 email thread. |
| ZTE, Sanechips | We agree with the first updated part of the TP related to *reportQuantity.* As for the second part, Qualcomm’s TP looks good to us. |
| Huawei, HiSilicon | Support the TP on *reportQuantity* part. |
| Ericsson | OK with the intent of the *reportQuantity* part of the TP, except Section 5.2.1.1 is not the right place. It should be moved to Section 5.2.1.4.2 where *reportQuantity* is defined.Furthermore, it should be reworded to be consistent with the spec language used in Section 5.2.1.4.2.We propose TP#5a below. |
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------------------------------- < Start of TP#5a for Clause 5.2.1 of 38.214 > -----------------------------------

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

5.2.1.1 Reporting settings

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

~~For operation with shared spectrum channel access, the UE should not average CSI-RS measurements for channel estimation from occasions of an NZP CSI-RS (defined in [4, TS 38.211]) located in different DL transmissions burst (defined in [16, TS 37.213]).~~

5.2.1.4.2 Report Quantity Configurations

A UE may be configured with a *CSI-ReportConfig* with the higher layer parameter *reportQuantity* set to either 'none', 'cri-RI-PMI-CQI ', 'cri-RI-i1', 'cri-RI-i1-CQI', 'cri-RI-CQI', 'cri-RSRP', 'cri-SINR', 'ssb-Index-RSRP', 'ssb-Index-SINR' or 'cri-RI-LI-PMI-CQI'.

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

If the UE is configured with a *CSI-ReportConfig* with higher layer parameter *reportQuantity* set to 'cri-RSRP', 'cri-SINR' or 'none' and the *CSI-ReportConfig* is linked to a resource setting configured with the higher layer parameter *resourceType* set to 'aperiodic', then the UE is not expected to be configured with more than 16 CSI-RS resources in a CSI-RS resource set contained within the resource setting.

For operation with shared spectrum channel access, if the higher layer parameter *reportQuantity* set to 'cri-RI-PMI-CQI ', 'cri-RI-i1', 'cri-RI-i1-CQI', 'cri-RI-CQI' or 'cri-RI-LI-PMI-CQI' the UE shall derive the CSI parameters without averaging instances of any *nzp-CSI-RSResource* in the corresponding *nzp-CSI-RS-ResourceSet* for channel measurement located in different DL transmission bursts (defined in [X, TS 37.213]).

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

-------------------------------------------------- < End of TP#5a> -------------------------------------------------------

Moderator update:

Proposal 4: Adopt TP#5a

## Proposed conclusions (no spec impact)

### FBE RO

* For FBE mode, idle UE may transmit PRACH only within FFPs for which SSB, SIBs or paging are detected.

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| --- | --- |
| **Company** | **Views** |
| Samsung | We are supportive of the proposed conclusion.  |
| Nokia/NSB | We also support the proposed conclusion. 😊 |
| Qualcomm | Support |
| LG | Support |
| ZTE, Sanechips | Support |
| Huawei, HiSilicon | Support  |
| Ericsson | We still believe that this conclusion is not needed; it can be inferred from a reading of Section 4.3 of 37.213, specifically this part:A UE may transmit UL transmission burst(s) after detection of a DL transmission burst(s) within the channel occupancy time as follows:-     If the gap between the UL and DL transmission bursts is at most ,  the UE may transmit UL transmission burst(s) after a DL transmission burst(s) within the channel occupancy time without sensing the channel.-     If the gap between the UL and DL transmission bursts is more than ,  the UE may transmit UL transmission burst(s) after a DL transmission burst(s) within the channel occupancy time after sensing the channel to be idle for at least a sensing slot duration  within a  interval ending immediately before transmission. |

Moderator update:

Proposal 5:

Conclusion:

* For semi-static channel access, an idle UE may transmit PRACH only within FFPs for which SSB, SIBs or paging transmissions are detected.

### SS/PBCH block burst within a discovery burst transmission window

* There is no requirement on the difference between the first and last candidate SS/PBCH block index of the SS/PBCH block burst within a discovery burst transmission window.
	+ Note: This implies gNB can transmit multiple bursts of SS/PBCH blocks within a discovery burst transmission window.

|  |  |
| --- | --- |
| **Company** | **Views** |
| Samsung | We are supportive of the proposed conclusion.  |
| Nokia/NSB | We also support the proposed conclusion. |
| Qualcomm | Support |
| LG | Support |
| ZTE, Sanechips | Support |
| Huawei, HiSilicon | Support |
| Ericsson | Support |
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Moderator update:

Proposal 6:

Conclusion:

* There is no requirement on the difference between the first and last candidate SS/PBCH block index of the SS/PBCH block burst within a discovery burst transmission window.
	+ - Note: This implies gNB can transmit multiple bursts of SS/PBCH blocks within a discovery burst transmission window.

## Necessity of LS reply to RAN4 based on R1-2003271 and R1-2005213

Issue: is a separate reply LS from RAN1 to RAN4 needed, given RAN2’s feedback in R1-2005213 regarding UE declaring beam failure due to LBT failures during active TCI switching?

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| **Company** | **Views** |
| Samsung | Procedure wise a response LS seems necessary since there is an action point from the original RAN4 LS. RAN1 can send a simple one to confirm RAN2’s feedback.  |
| Nokia/NSB | As indicated within our contribution R1-2006449 we are fine with both ways (Reply LS sent or not sent).Note: In the case we agree to send a Reply LS to RAN4 Nokia volunteers to draft the Reply LS. Otherwise we would suggest to capture a conclusion stating that a Reply LS to RAN4 will not be sent because our (RAN1) statement is the same as RAN2 R1-2005213 LS. |
| ZTE, Sanechips | We share similar view with Samsung, RAN1 can send a Reply LS to confirm RAN2’s feedback. |
| Huawei, HiSilicon | We do not think it is necessary to send LS if RAN1 share similar view as RAN2.  |
| Ericsson | Either way is fine |
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Moderator update:

Proposal 7: Draft LS reply to RAN4 to confirm RAN2’s feedback without additional technical discussion in RAN1. Draft LS to be prepared by Nokia/NSB.

# References

1. R1-2005334 Remaining issues on initial access procedure for NR-U vivo
2. R1-2005601 Remaining issues on the initial access procedure for NR-U ZTE, Sanechips
3. R1-2005756 TPs on DCI reserved bits length in NR-U NEC
4. R1-2005810 Maintenance on initial access procedures Huawei, HiSilicon
5. R1-2005915 Enhancements to initial access procedures Ericsson
6. R1-2006021 Discussion on the remaining issues of enhancements to initial access procedure OPPO
7. R1-2006096 Initial access procedures for NR-U Samsung
8. R1-2006449 On Enhancements to Initial Access Procedures for NR-U Nokia, Nokia Shanghai Bell
9. R1-2006764 TP for Initial access and mobility procedures for NR-U Qualcomm Incorporated
10. R1-2006648 Feature lead summary on for initial access procedures enhancements Charter Communications