**3GPP TSG-RAN WG4 Meeting #97-e R4-2017540**

**Electronic Meeting, 2nd - 13th Nov, 2020**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.101-4** | **CR** | **0097** | **rev** | **1** | **Current version:** | **16.2.0** |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | CR on HST DPS requirements | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | RAN4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_HST-Perf | | | | |  | ***Date:*** | | | 2020-10-23 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *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 can be 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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Introduce HST DPS requirements as per RAN4 agreements | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | For abbreviations of DPS, update section 3.3.  For DPS requirements, add section 5.2.2.1.10, 5.2.2.2.10, 5.2.3.1.10, 5.2.3.2.10. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | There will be inconsistence between the specification 38.101-4 and RAN 4 agreements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.3, 5.2.2.1.10, 5.2.2.2.10, 5.2.3.1.10, 5.2.3.2.10 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **x** |  | Test specifications | | | | TS 38.521-4 | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | R4-2015603 | | | | | | | | |

<Start of the change 1>

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

CA Carrier Aggregation

CC Component Carrier

CCE Control Channel Element

CORESET Control Resource Set

CP Cyclic Prefix

CSI Channel-State Information

CSI-IM CSI Interference Measurement

CSI-RS CSI Reference Signal

CW Codeword

CQI Channel Quality Indicator

CRC Cyclic Redundancy Check

CRI CSI-RS Resource Indicator

DC Dual Connectivity

DCI Downlink Control Information

DL Downlink

DMRS Demodulation Reference Signal

DPS Dynamic Point Selection

EPRE Energy Per Resource Element

EN-DC E-UTRA-NR Dual Connectivity

FR Frequency Range

FRC Fixed Reference Channel

HARQ Hybrid Automatic Repeat Request

LI Layer Indicator

MAC Medium Access Control

MCS Modulation and Coding Scheme

MIB Master Information Block

NR New Radio

NSA Non-Standalone Operation Mode

OCNG OFDMA Channel Noise Generator

OFDM Orthogonal Frequency Division Multiplexing

OFDMA Orthogonal Frequency Division Multiple Access

PBCH Physical Broadcast Channel

Pcell Primary Cell

PDCCH Physical Downlink Control Channel

PDSCH Physical Downlink Shared Channel

PMI Precoding Matrix Indicator

PRB Physical Resource Block

PRG Physical resource block group

PSS Primary Synchronization Signal

PTRS Phase Tracking Reference Signal

PUCCH Physical Uplink Control Channel

PUSCH Physical Uplink Shared Channel

QCL Quasi Co-location

RB Resource Block

RBG Resource Block Group

RE Resource Element

REG Resource Element Group

RI Rank Indicator

RRC Radio Resource Control

SA Standalone operation mode

SCS Subcarrier Spacing

SINR Signal-to-Interference-and-Noise Ratio

SNR Signal-to-Noise Ratio

SS Synchronization Signal

SSB Synchronization Signal Block

SSS Secondary Synchronization Signal

TCI Transmission Configuration Indicator

TDM Time division multiplexing

TTI Transmission Time Interval

UL Uplink

VRB Virtual Resource Block

<End of the change 1>

<Start of the change 2>

##### 5.2.2.1.10 Minimum requirements for HST DPS

The performance requirements are specified in Table 5.2.2.1.10-3, with the addition of test parameters in Table 5.2.2.1.10-2 and the downlink physical channel setup according to Annex C.3.1.

The test purposes are specified in Table 5.2.2.1.10-1.

Table 5.2.2.1.10-1: Tests purpose

|  |  |
| --- | --- |
| **Purpose** | **Test index** |
| Verify UE performance in the HST-DPS scenario defined in B.3.3 | 1-1, 1-2 |

Table 5.2.2.1.10-2: Test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
| Duplex mode | | |  | FDD |
| Active DL BWP index | | |  | 1 |
| PDCCH configuration | TCI state | |  | Note 1 |
| PDSCH configuration | Mapping type | |  | Type A |
| k0 | |  | 0 |
| Starting symbol (S) | |  | 2 |
| Length (L) | |  | 12 |
| PDSCH aggregation factor | |  | 1 |
| PRB bundling type | |  | Static |
| PRB bundling size | |  | 2 |
| Resource allocation type | |  | Type 0 |
| RBG size | |  | Config2 |
| VRB-to-PRB mapping type | |  | Non-interleaved |
| VRB-to-PRB mapping interleaver bundle size | |  | N/A |
| PDSCH DMRS configuration | DMRS Type | |  | Type 1 |
| Number of additional DMRS | |  | 2 |
| Maximum number of OFDM symbols for DL front loaded DMRS | |  | 1 |
| CSI-RS for tracking | Resource set #1 | First OFDM symbol in the PRB used for CSI-RS |  | l0 = 5 for CSI-RS resource 1 and 3  l0 = 9 for CSI-RS resource 2 and 4 |
| CSI-RS periodicity | Slots | 10 for CSI-RS resource 1,2,3,4. |
| CSI-RS offset | Slots | 1 for CSI-RS resource 1 and 2 2 for CSI-RS resource 3 and 4 |
| QCL info |  | TCI state #2 |
| Resource set #2 | First OFDM symbol in the PRB used for CSI-RS |  | l0 = 6 for CSI-RS resource 5 and 6  l0 = 10 for CSI-RS resource 7 and 8 |
| CSI-RS periodicity | Slots | 10 for CSI-RS resource 5,6,7,8. |
| CSI-RS offset | Slots | 1 for CSI-RS resource 5 and 6 2 for CSI-RS resource 7 and 8 |
| QCL info |  | TCI state #2 |
| NZP CSI-RS for CSI acquisition | Resource set #3 | First OFDM symbol in the PRB used for CSI-RS |  | l0 = 12 |
| CSI-RS periodicity | Slots | 20 |
| CSI-RS offset | Slots | 0 |
| QCL info |  | TCI state #0 |
| Resource set #4 | First OFDM symbol in the PRB used for CSI-RS |  | l0 = 13 |
| CSI-RS periodicity | Slots | 20 |
| CSI-RS offset | Slots | 0 |
| QCL info |  | TCI state #1 |
| TCI state #0 | Type 1 QCL information | CSI-RS resource |  | CSI-RS resource 1 from 'CSI-RS for tracking Resource set #1' configuration |
| QCL Type |  | Type A |
| Type 2 QCL information | CSI-RS resource |  | N/A |
| QCL Type |  | N/A |
| TCI state #1 | Type 1 QCL information | CSI-RS resource |  | CSI-RS resource 5 from 'CSI-RS for tracking Resource set #2' configuration |
| QCL Type |  | Type A |
| Type 2 QCL information | CSI-RS resource |  | N/A |
| QCL Type |  | N/A |
| TCI state #2 | Type 1 QCL information | SSB index |  | SSB #0 |
| QCL Type |  | Type C |
| Type 2 QCL information | SSB index |  | N/A |
| QCL Type |  | N/A |
| Number of HARQ Processes | | |  | 4 |
| The number of slots between PDSCH and corresponding HARQ-ACK information | | |  | 2 |
| Note 1: For Test 1-1, TCI state switching command is transmitted in slot #i that satisfy and PDCCH associated with TCI # (k mod 2) is transmitted by kth RRH from slot#  to slot#  For Test 1-2, TCI state switching command is transmitted in slot #i that satisfy and PDCCH associated with TCI # (k mod 2) is transmitted by kth RRH from slot#  to slot#  Where k=0, 1, 2… is the RRH number, n = 2520 is half of the number of slots between two RRH, = 2 is the number of slots between PDSCH and corresponding HARQ-ACK information, = 3 is the number of slots for MAC CE processing, = 6 is the number of slots to first TRS transmission occasion after MAC CE command is decoded by the UE, = 2 is the number of slots for TRS processing. | | | | |

Table 5.2.2.1.10-3: Minimum performance for HST DPS

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test num.** | **Reference channel** | **Bandwidth (MHz) / Subcarrier spacing (kHz)** | **Modulation format and code rate** | **Propagation condition** | **Number of active PDSCH TCI states** | **Correlation matrix and antenna configuration** | **Reference value** | |
| **Fraction of maximum throughput (%)** | **SNR (dB)** |
| 1-1 | R.PDSCH.1-8.4 FDD | 10 / 15 | 64QAM, 0.43 | HST-DPS | 1 | 2x2 | 70 | [13.4] |
| 1-2 | R.PDSCH.1-8.4 FDD | 10 / 15 | 64QAM, 0.43 | HST-DPS | 2 | 2x2 | 70 | [13.4] |

<End of the change 2>

<Start of the change 3>

##### 5.2.2.2.10 Minimum requirements for HST DPS

The performance requirements are specified in Table 5.2.2.2.10-3, with the addition of test parameters in Table 5.2.2.2.10-2 and the downlink physical channel setup according to Annex C.3.1.

The test purposes are specified in Table 5.2.2.2.10-1.

Table 5.2.2.2.10-1: Tests purpose

|  |  |
| --- | --- |
| **Purpose** | **Test index** |
| Verify UE performance in the HST-DPS scenario defined in B.3.3 | 1-1, 1-2 |

Table 5.2.3.2.10-2: Test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
| Duplex mode | | |  | TDD |
| Active DL BWP index | | |  | 1 |
| PDCCH configuration | TCI state | |  | Note 1 |
| PDSCH configuration | Mapping type | |  | Type A |
| k0 | |  | 0 |
| Starting symbol (S) | |  | 2 |
| Length (L) | |  | Specific to each Reference channel |
| PDSCH aggregation factor | |  | 1 |
| PRB bundling type | |  | Static |
| PRB bundling size | |  | 2 |
| Resource allocation type | |  | Type 0 |
| RBG size | |  | Config2 |
| VRB-to-PRB mapping type | |  | Non-interleaved |
| VRB-to-PRB mapping interleaver bundle size | |  | N/A |
| PDSCH DMRS configuration | DMRS Type | |  | Type 1 |
| Number of additional DMRS | |  | 2 |
| Maximum number of OFDM symbols for DL front loaded DMRS | |  | 1 |
| CSI-RS for tracking | Resource set #1 | First OFDM symbol in the PRB used for CSI-RS |  | l0 = 5 for CSI-RS resource 1 and 3 |
| l0 = 9 for CSI-RS resource 2 and 4 |
| CSI-RS periodicity | Slots | 20 for CSI-RS resource 1,2,3,4 |
| CSI-RS offset | Slots | 1 for CSI-RS resource 1 and 2 |
| 2 for CSI-RS resource 3 and 4 |
| QCL info |  | TCI state #2 |
| Frequency Occupation |  | Start PRB 0 |
| Number of PRB = 52 |
| Resource set #2 | First OFDM symbol in the PRB used for CSI-RS |  | l0 = 6 for CSI-RS resource 5 and 6 |
| l0 = 10 for CSI-RS resource 7 and 8 |
| CSI-RS periodicity | Slots | 20 for CSI-RS resource 5,6,7,8. |
| CSI-RS offset | Slots | 1 for CSI-RS resource 5 and 6 |
| 2 for CSI-RS resource 7 and 8 |
| QCL info |  | TCI state #2 |
| Frequency Occupation |  | Start PRB 0 |
| Number of PRB = 52 |
| NZP CSI-RS for CSI acquisition | Resource set #3 | First OFDM symbol in the PRB used for CSI-RS |  | l0 = 12 |
| CSI-RS periodicity | Slots | 40 |
| CSI-RS offset | Slots | 0 |
| QCL info |  | TCI state #0 |
| Resource set #4 | First OFDM symbol in the PRB used for CSI-RS |  | l0 = 13 |
| CSI-RS periodicity | Slots | 40 |
| CSI-RS offset | Slots | 0 |
| QCL info |  | TCI state #1 |
| TCI state #0 | Type 1 QCL information | CSI-RS resource |  | CSI-RS resource 1 from 'CSI-RS for tracking Resource set #1' configuration |
| QCL Type |  | Type A |
| Type 2 QCL information | CSI-RS resource |  | N/A |
| QCL Type |  | N/A |
| TCI state #1 | Type 1 QCL information | CSI-RS resource |  | CSI-RS resource 5 from 'CSI-RS for tracking Resource set #2' configuration |
| QCL Type |  | Type A |
| Type 2 QCL information | CSI-RS resource |  | N/A |
| QCL Type |  | N/A |
| TCI state #2 | Type 1 QCL information | SSB index |  | SSB #0 |
| QCL Type |  | Type C |
| Type 2 QCL information | SSB index |  | N/A |
| QCL Type |  | N/A |
| Number of HARQ Processes | | |  | 8 |
| The number of slots between PDSCH and corresponding HARQ-ACK information | | |  | Specific to each TDD UL-DL pattern and as defined in Annex A.1.2 |
| Note 1: For Test 1-1, TCI state switching command is transmitted in slot #i that satisfy and PDCCH associated with TCI # (k mod 2) is transmitted by kth RRH from slot#  to slot#  For Test 1-2, TCI state switching command is transmitted in slot #i that satisfy and PDCCH associated with TCI # (k mod 2) is transmitted by kth RRH from slot#  to slot#  Where k=0, 1, 2… is the RRH number, n = 5040 is half of the number of slots between two RRH, = 8 is the number of slots between PDSCH and corresponding HARQ-ACK information, = 6 is the number of slots for MAC CE processing, = 7 is the number of slots to first TRS transmission occasion after MAC CE command is decoded by the UE, = 4 is the number of slots for TRS processing. | | | | |

Table 5.2.2.2.10-3: Minimum performance for HST DPS

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test num.** | **Reference channel** | **Bandwidth (MHz) / Subcarrier spacing (kHz)** | **Modulation format and code rate** | **Propagation condition** | **Number of active PDSCH TCI states** | **Correlation matrix and antenna configuration** | **Reference value** | |
| **Fraction of maximum throughput (%)** | **SNR (dB)** |
| 1-1 | R.PDSCH.2-10.5 TDD | 40 / 30 | 64QAM, 0.43 | HST-DPS | 1 | 2x2 | 70 | [13.0] |
| 1-2 | R.PDSCH.2-10.5 TDD | 40 / 30 | 64QAM, 0.43 | HST-DPS | 2 | 2x2 | 70 | [13.0] |

<End of the change 3>

<Start of the change 4>

##### 5.2.3.1.10 Minimum requirements for HST DPS

The performance requirements are specified in Table 5.2.3.1.10-3, with the addition of test parameters in Table 5.2.3.1.10-2 and the downlink physical channel setup according to Annex C.3.1.

The test purposes are specified in Table 5.2.3.1.10-1.

Table 5.2.3.1.10-1: Tests purpose

|  |  |
| --- | --- |
| **Purpose** | **Test index** |
| Verify UE performance in the HST-DPS scenario defined in B.3.3 | 1-1, 1-2 |

Table 5.2.3.1.10-2: Test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
| Duplex mode | | |  | FDD |
| Active DL BWP index | | |  | 1 |
| PDCCH configuration | TCI state | |  | Note 1 |
| PDSCH configuration | Mapping type | |  | Type A |
| k0 | |  | 0 |
| Starting symbol (S) | |  | 2 |
| Length (L) | |  | 12 |
| PDSCH aggregation factor | |  | 1 |
| PRB bundling type | |  | Static |
| PRB bundling size | |  | 2 |
| Resource allocation type | |  | Type 0 |
| RBG size | |  | Config2 |
| VRB-to-PRB mapping type | |  | Non-interleaved |
| VRB-to-PRB mapping interleaver bundle size | |  | N/A |
| PDSCH DMRS configuration | DMRS Type | |  | Type 1 |
| Number of additional DMRS | |  | 2 |
| Maximum number of OFDM symbols for DL front loaded DMRS | |  | 1 |
| CSI-RS for tracking | Resource set #1 | First OFDM symbol in the PRB used for CSI-RS |  | l0 = 5 for CSI-RS resource 1 and 3  l0 = 9 for CSI-RS resource 2 and 4 |
| CSI-RS periodicity | Slots | 10 for CSI-RS resource 1,2,3,4. |
| CSI-RS offset | Slots | 1 for CSI-RS resource 1 and 2 2 for CSI-RS resource 3 and 4 |
| QCL info |  | TCI state #2 |
| Resource set #2 | First OFDM symbol in the PRB used for CSI-RS |  | l0 = 6 for CSI-RS resource 5 and 6  l0 = 10 for CSI-RS resource 7 and 8 |
| CSI-RS periodicity | Slots | 10 for CSI-RS resource 5,6,7,8. |
| CSI-RS offset | Slots | 1 for CSI-RS resource 5 and 6 2 for CSI-RS resource 7 and 8 |
| QCL info |  | TCI state #2 |
| NZP CSI-RS for CSI acquisition | Resource set #3 | First OFDM symbol in the PRB used for CSI-RS |  | l0 = 12 |
| CSI-RS periodicity | Slots | 20 |
| CSI-RS offset | Slots | 0 |
| QCL info |  | TCI state #0 |
| Resource set #4 | First OFDM symbol in the PRB used for CSI-RS |  | l0 = 13 |
| CSI-RS periodicity | Slots | 20 |
| CSI-RS offset | Slots | 0 |
| QCL info |  | TCI state #1 |
| TCI state #0 | Type 1 QCL information | CSI-RS resource |  | CSI-RS resource 1 from 'CSI-RS for tracking Resource set #1' configuration |
| QCL Type |  | Type A |
| Type 2 QCL information | CSI-RS resource |  | N/A |
| QCL Type |  | N/A |
| TCI state #1 | Type 1 QCL information | CSI-RS resource |  | CSI-RS resource 5 from 'CSI-RS for tracking Resource set #2' configuration |
| QCL Type |  | Type A |
| Type 2 QCL information | CSI-RS resource |  | N/A |
| QCL Type |  | N/A |
| TCI state #2 | Type 1 QCL information | SSB index |  | SSB #0 |
| QCL Type |  | Type C |
| Type 2 QCL information | SSB index |  | N/A |
| QCL Type |  | N/A |
| Number of HARQ Processes | | |  | 4 |
| The number of slots between PDSCH and corresponding HARQ-ACK information | | |  | 2 |
| Note 1: For Test 1-1, TCI state switching command is transmitted in slot #i that satisfy and PDCCH associated with TCI # (k mod 2) is transmitted by kth RRH from slot#  to slot#  For Test 1-2, TCI state switching command is transmitted in slot #i that satisfy and PDCCH associated with TCI # (k mod 2) is transmitted by kth RRH from slot#  to slot#  Where k=0, 1, 2… is the RRH number, n = 2520 is half of the number of slots between two RRH, = 2 is the number of slots between PDSCH and corresponding HARQ-ACK information, = 3 is the number of slots for MAC CE processing, = 6 is the number of slots to first TRS transmission occasion after MAC CE command is decoded by the UE, = 2 is the number of slots for TRS processing. | | | | |

Table 5.2.3.1.10-3: Minimum performance for HST DPS

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test num.** | **Reference channel** | **Bandwidth (MHz) / Subcarrier spacing (kHz)** | **Modulation format and code rate** | **Propagation condition** | **Number of active PDSCH TCI states** | **Correlation matrix and antenna configuration** | **Reference value** | |
| **Fraction of maximum throughput (%)** | **SNR (dB)** |
| 1-1 | R.PDSCH.1-8.4 FDD | 10 / 15 | 64QAM, 0.43 | HST-DPS | 1 | 2x4 | 70 | [10.6] |
| 1-2 | R.PDSCH.1-8.4 FDD | 10 / 15 | 64QAM, 0.43 | HST-DPS | 2 | 2x4 | 70 | [10.6] |

<End of the change 4>

<Start of the change 5>

##### 5.2.3.2.10 Minimum requirements for HST DPS

The performance requirements are specified in Table 5.2.3.2.10-3, with the addition of test parameters in Table 5.2.3.2.10-2 and the downlink physical channel setup according to Annex C.3.1.

The test purposes are specified in Table 5.2.3.2.10-1.

Table 5.2.3.2.10-1: Tests purpose

|  |  |
| --- | --- |
| **Purpose** | **Test index** |
| Verify UE performance in the HST-DPS scenario defined in B.3.3 | 1-1, 1-2 |

Table 5.2.3.2.10-2: Test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
| Duplex mode | | |  | TDD |
| Active DL BWP index | | |  | 1 |
| PDCCH configuration | TCI state | |  | Note 1 |
| PDSCH configuration | Mapping type | |  | Type A |
| k0 | |  | 0 |
| Starting symbol (S) | |  | 2 |
| Length (L) | |  | Specific to each Reference channel |
| PDSCH aggregation factor | |  | 1 |
| PRB bundling type | |  | Static |
| PRB bundling size | |  | 2 |
| Resource allocation type | |  | Type 0 |
| RBG size | |  | Config2 |
| VRB-to-PRB mapping type | |  | Non-interleaved |
| VRB-to-PRB mapping interleaver bundle size | |  | N/A |
| PDSCH DMRS configuration | DMRS Type | |  | Type 1 |
| Number of additional DMRS | |  | 2 |
| Maximum number of OFDM symbols for DL front loaded DMRS | |  | 1 |
| CSI-RS for tracking | Resource set #1 | First OFDM symbol in the PRB used for CSI-RS |  | l0 = 5 for CSI-RS resource 1 and 3 |
| l0 = 9 for CSI-RS resource 2 and 4 |
| CSI-RS periodicity | Slots | 20 for CSI-RS resource 1,2,3,4 |
| CSI-RS offset | Slots | 1 for CSI-RS resource 1 and 2 |
| 2 for CSI-RS resource 3 and 4 |
| QCL info |  | TCI state #2 |
| Frequency Occupation |  | Start PRB 0 |
| Number of PRB = 52 |
| Resource set #2 | First OFDM symbol in the PRB used for CSI-RS |  | l0 = 6 for CSI-RS resource 5 and 6 |
| l0 = 10 for CSI-RS resource 7 and 8 |
| CSI-RS periodicity | Slots | 20 for CSI-RS resource 5,6,7,8. |
| CSI-RS offset | Slots | 1 for CSI-RS resource 5 and 6 |
| 2 for CSI-RS resource 7 and 8 |
| QCL info |  | TCI state #2 |
| Frequency Occupation |  | Start PRB 0 |
| Number of PRB = 52 |
| NZP CSI-RS for CSI acquisition | Resource set #3 | First OFDM symbol in the PRB used for CSI-RS |  | l0 = 12 |
| CSI-RS periodicity | Slots | 40 |
| CSI-RS offset | Slots | 0 |
| QCL info |  | TCI state #0 |
| Resource set #4 | First OFDM symbol in the PRB used for CSI-RS |  | l0 = 13 |
| CSI-RS periodicity | Slots | 40 |
| CSI-RS offset | Slots | 0 |
| QCL info |  | TCI state #1 |
| TCI state #0 | Type 1 QCL information | CSI-RS resource |  | CSI-RS resource 1 from 'CSI-RS for tracking Resource set #1' configuration |
| QCL Type |  | Type A |
| Type 2 QCL information | CSI-RS resource |  | N/A |
| QCL Type |  | N/A |
| TCI state #1 | Type 1 QCL information | CSI-RS resource |  | CSI-RS resource 5 from 'CSI-RS for tracking Resource set #2' configuration |
| QCL Type |  | Type A |
| Type 2 QCL information | CSI-RS resource |  | N/A |
| QCL Type |  | N/A |
| TCI state #2 | Type 1 QCL information | SSB index |  | SSB #0 |
| QCL Type |  | Type C |
| Type 2 QCL information | SSB index |  | N/A |
| QCL Type |  | N/A |
| Number of HARQ Processes | | |  | 8 |
| The number of slots between PDSCH and corresponding HARQ-ACK information | | |  | Specific to each TDD UL-DL pattern and as defined in Annex A.1.2 |
| Note 1: For Test 1-1, TCI state switching command is transmitted in slot #i that satisfy and PDCCH associated with TCI # (k mod 2) is transmitted by kth RRH from slot#  to slot#  For Test 1-2, TCI state switching command is transmitted in slot #i that satisfy and PDCCH associated with TCI # (k mod 2) is transmitted by kth RRH from slot#  to slot#  Where k=0, 1, 2… is the RRH number, n = 5040 is half of the number of slots between two RRH, = 8 is the number of slots between PDSCH and corresponding HARQ-ACK information, = 6 is the number of slots for MAC CE processing, = 7 is the number of slots to first TRS transmission occasion after MAC CE command is decoded by the UE, = 4 is the number of slots for TRS processing. | | | | |

Table 5.2.3.2.10-3: Minimum performance for HST DPS

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test num.** | **Reference channel** | **Bandwidth (MHz) / Subcarrier spacing (kHz)** | **Modulation format and code rate** | **Propagation condition** | **Number of active PDSCH TCI states** | **Correlation matrix and antenna configuration** | **Reference value** | |
| **Fraction of maximum throughput (%)** | **SNR (dB)** |
| 1-1 | R.PDSCH.2-10.5 TDD | 40 / 30 | 64QAM, 0.43 | HST-DPS | 1 | 2x4 | 70 | [10.2] |
| 1-2 | R.PDSCH.2-10.5 TDD | 40 / 30 | 64QAM, 0.43 | HST-DPS | 2 | 2x4 | 70 | [10.2] |

<End of the change 5>