**3GPP TSG-RAN WG4 Meeting #108-bis R4-2317308**

Xiamen, China, October 09 - 13, 2023

**Agenda item:** 5.23.5

**Source:** Huawei, HiSilicon

**Title:** WF on RRM performance requirements for MC enhancements

**Document for:** Approval

# Notes:

In this document,

* < **Agreement** > represents the decisions made by in this meeting
* < **Wayforward** > represents the next step in later meetings

# Topic #1: Test list and test principle

< **Agreement** >**Issue 1-1: Test case list for UL Tx switching across 3/4 bands**

**Online session (Tuesday October 10, 2023)**

Further discuss option 1 and 2:

* + Option 1:

For single TAG

* DL interruptions at Tx switching across three uplink bands in TDD-TDD CA with different UL/DL pattern in SA
* DL interruptions at Tx switching across three uplink bands in FDD-TDD CA in SA
* DL interruptions at Tx switching across four uplink bands in TDD-TDD CA with different UL/DL pattern in SA
* DL interruptions at Tx switching across four uplink bands in FDD-TDD CA in SA

For Two TAG

* DL interruptions at Tx switching across three uplink bands in TDD-TDD CA with different UL/DL pattern in SA
* DL interruptions at Tx switching across three uplink bands in FDD-TDD CA in SA
* DL interruptions at Tx switching across four uplink bands in TDD-TDD CA with different UL/DL pattern in SA
* DL interruptions at Tx switching across four uplink bands in FDD-TDD CA in SA
  + Option 2:

two test cases for single TAG

* One test case for three uplink bands
* One test case for four uplink bands

two test cases for 2 TAGs

* One test case for three uplink bands
* One test case for four uplink bands

Further discuss: if UE supports four uplink bands, will be UE conduct the test cases for both three and four bands.

< **Wayforward** > **Issue 1-2: Principle of verifying symbol level DL interruption for TX switching across 3 or 4 bands**

* Proposals
  + Option 1: The legacy RRM tests for Tx switching on one or two UL bands can be considered as a starting point, that is,

Triggering an aperiodic CSI-RS L1-RSRP reporting with CSI-RS resources on the OFDM symbol right before the interruption and check UE’s aperiodic L1-RSRP report with corresponding measurement accuracy.

* + Other options are not precluded

< **Wayforward** > **Issue 1-3: Whether to verify the DL interruption when optional capability *[uplinkTxSwitchingPeriod1T1Tto2T]* is reported**

* + Option 1: yes
  + Option 2: no

### Sub-topic 2: Tx switching Scenarios

< **Wayforward** > **Issue 2-1: Tx switching scenario for FDD-TDD uplink CA cases for TX switching across 3 bands**

* + Option 1:
* FR1 FDD PCell (Cell 1), FR1 FDD SCell (Cell 2) and FR1 TDD SCell (Cell 3) where cell 1 with 1TX is on band A, cell 2 with 1TX is on band B, and cell 3 with 2TX is on band C.
* TX switching is from band A to band C, and from band B to band C. Dynamic Tx switches between case1 and case 2.

|  |  |
| --- | --- |
| Case 1 | 1 Tx on FDD band A and 1 Tx on FDD band B |
| Case 2 | 2 Tx on TDD band C |

* + Other options are not precluded

< **Wayforward** > **Issue 2-2: Tx switching scenario for TDD-TDD uplink CA cases for TX switching across 3 bands**

* + Option 1:
* FR1 TDD PCell (Cell 1), FR1 TDD SCell (Cell 2) and FR1 TDD SCell (Cell 3) where cell 1 with 1TX is on band A, cell 2 with 1TX is on band B, and cell 3 with 2TX is on band C.
* TX switching is from band A to band C, and from band B to band C. Dynamic Tx switches between case1 and case 2.

|  |  |
| --- | --- |
| Case 1 | 1 Tx on TDD band A and 1 Tx on TDD band B |
| Case 2 | 2 Tx on TDD band C |

* + Other options are not precluded

< **Wayforward** > **Issue 2-3: Tx switching scenario for FDD-TDD uplink CA cases for TX switching across 4 bands**

* + Option 1:
* TX switching scenario for TX switching across 4 bands can be similar as 3 bands, where Dynamic Tx switches are switched between case 1 and case 2
* For FDD+TDD CA

|  |  |
| --- | --- |
| Case 1 | 1 Tx on FDD band A and 1 Tx on FDD band B |
| Case 2 | 1 Tx on TDD band C and 1 Tx on TDD band D |

* For TDD+TDD CA

|  |  |
| --- | --- |
| Case 1 | 1 Tx on TDD band A and 1 Tx on TDD band B |
| Case 2 | 1 Tx on TDD band C and 1 Tx on TDD band D |

* + Other options are not precluded

### Sub-topic 3: Test configurations

< **Wayforward** > **Issue 3-1: TDD UL/DL pattern for FDD-TDD uplink CA cases for TX switching across 3 or 4 bands**

* + Option 1: The legacy RRM tests for Tx switching on one or two UL bands can be considered as a starting point, that is
* TDD UL/DL pattern is 3D1S4U, S = 10DL: 2GP: 2UL
  + Other options are not precluded

< **Wayforward** > **Issue 3-2: Different TDD UL/DL patterns for TDD-TDD uplink CA cases for TX switching across 3 or 4 bands**

* + Option 1: The legacy RRM tests for Tx switching on one or two UL bands can be considered as a starting point, that is
* TDD UL/DL pattern is 3D1S4U, S = 10DL: 2GP: 2UL;
* TDD UL/DL pattern is 1D1S2U, S = 10DL: 2GP: 2UL
  + Other options are not precluded

< **Wayforward** > **Issue 3-3: MRTD setup for single TAG and dual TAG**

* + Option 1:
* For 1-TAG, time offset is set as 0us;
* For 2-TAG, time offset is set as 9us.
  + Other options are not precluded

< **Wayforward** > **Issue 3-4: Which symbol to be verified for FDD-TDD uplink CA cases for TX switching across 3 or 4 bands for single TAG**

* + Option 1:
* Symbol #8 or symbol #9 or symbol #10 in the slot overlapping with the special slot of the NR TDD carrier depending on UE capability *uplinkTxSwitchingPeriod* on NR FDD carrier
* Symbol #4 or symbol #5 or symbol #8 on the special slot depending on UE capability *uplinkTxSwitchingPeriod* on NR TDD carrier
  + Other options are not precluded

< **Wayforward** > **Issue 3-5: Which symbol to be verified for TDD-TDD uplink CA cases for TX switching across 3 or 4 bands for single TAG**

* + Option 1:
* symbol #4 or symbol #5 or symbol #8 on the special slot depending on UE capability *uplinkTxSwitchingPeriod* on NR TDD PCell
* symbol #4 or symbol #5 or symbol #8 on the 2nd special slot of every 8 slots depending on UE capability *uplinkTxSwitchingPeriod* NR TDD SCell
  + Other options are not precluded

< **Wayforward** > **Issue 3-6: Which symbol to be verified for FDD-TDD uplink CA cases for TX switching across 3 or 4 bands for Dual TAG**

* + Option 1:

Symbol #8 or symbol #9 or symbol #10 in the slot overlapping with the special slot of the NR TDD carrier depending on UE capability *uplinkTxSwitchingPeriod* on NR FDD carrier

Symbol #3 or symbol #5 or symbol #8 on the special slot depending on UE capability *uplinkTxSwitchingPeriod* on NR TDD carrier

* + Other options are not precluded

< **Wayforward** > **Issue 3-7: Which symbol to be verified for TDD-TDD uplink CA cases for TX switching across 3 or 4 bands for Dual TAG**

* + Option 1:

Symbol #3 or symbol #5 or symbol #8 in the slot overlapping with the special slot of the NR TDD carrier depending on UE capability *uplinkTxSwitchingPeriod* on NR TDD carrier

Symbol #3 or symbol #5 or symbol #8 on the special slot depending on UE capability *uplinkTxSwitchingPeriod* on NR TDD carrier

* + Other options are not precluded