# Introduction

During RAN1#100bis-e meeting, the following agreements have been made.

* For inter-band UL CA, if UE reports via capability signaling to support uplink Tx switching, UE further reports via capability signaling which option (between Option 1 and Option 2) is supported.
  + Option 1: If uplink Tx switching is configured, UE is not expected to be scheduled or configured with UL transmission on carrier 2 for case 1.

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| --- | --- | --- |
|  | Number of **Tx chains** in WID (carrier 1 + carrier 2) | Number of **antenna ports** for UL transmission (carrier 1 + carrier 2) |
| Case 1 | 1T+1T | 1P+0P |
| Case 2 | 0T+2T | 0P+2P, 0P+1P |

* + Option 2: If uplink Tx switching is configured, UE can be scheduled or configured with UL transmission on both carrier 1 and carrier 2 for case 1.
    - UE can be scheduled or configured with UL transmission on either carrier 1 or carrier 2.
    - UE can be scheduled or configured with UL transmission on both carrier 1 and carrier 2 simultaneously.

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| --- | --- | --- |
|  | Number of **Tx chains** in WID (carrier 1 + carrier 2) | Number of **antenna ports** for UL transmission (carrier 1 + carrier 2) |
| Case 1 | 1T+1T | 1P+0P, 1P+1P, 0P+1P |
| Case 2 | 0T+2T | 0P+2P, 0P+1P |

**Confirm the working assumption:**

**Working Assumption:**

* For inter-band UL CA, if option 2 is supported, the following ~~sub-option 2-3~~ option 2 is defined.
  + Minimize RAN1 impact
  + No new RAN4 impact
  + No new TDM pattern

~~Option 2-3~~ Option 2

|  |  |  |
| --- | --- | --- |
|  | Number of **Tx chains** in WID (carrier 1 + carrier 2) | Number of **antenna ports** for UL transmission (carrier 1 + carrier 2) |
| Case 1 | 1T+1T | 1P+0P, 1P+1P, 0P+1P |
| Case 2 | 0T+2T | 0P+2P, 0P+1P |

**Confirm the working assumption:**

* **Working Assumption:** For inter-band UL CA, if uplink Tx switching is configured, the state of Tx chains of last UL transmission is assumed in case of no UL transmission.

# TP

Based on the agreements, the following TP is proposed.

***TP1****: {TS38.214 Section: 6.1.0.2 Uplink switching for Carrier Aggregation}*

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| 6.1.0.2 Uplink switching for Carrier Aggregation  For a UE indicating a capability for uplink switching with [*uplinkTxSwitchRequested-r16*] for a band combination, and if it is for that band combination configured with uplink carrier aggregation:  The UE is configured with Carrier1 and Carrier2 for uplink switching, where Carrier1 is a 1-port uplink carrier in which the UE is capable of only 1-port uplink transmission and Carrier2 is a 2-port uplink carrier in which UE is capable of both 1-port and 2-port uplink transmission.  Two modes are defined to represent two different uplink switching modes.  Mode 1: the UE can be configured or scheduled to transmit 1-port transmission on Carrier1,   * and/or the UE can be configured or scheduled to transmit 1-port transmission on Carrier2 for the UE configured with [TxSwitchingOption2]; * and the UE is not expected to have any uplink transmission on Carrier2 for the UE configured with [TxSwitchingOption1].   Mode 2: the UE can be configured to transmit 1-port or 2-port transmission on Carrier2 and the UE is not expected to have any uplink transmission on Carrier1.  The uplink switching mode of last UL transmission is assumed for next UL transmission except in the following cases where the switching period is applicable immediately before next uplink transmission:   * If the UE is under Mode 1, and the UE is configured or scheduled to transmit a 2-port transmission on carrier 2 in next UL transmission or the UE is configured or scheduled to transmit a 1-port transmission on Carrier2 in next UL transmission for the UE configured with [TxSwitchingOption1]. * If the UE is under Mode 2, and the UE is configured or scheduled to transmit a 1-port transmission on Carrier1 in next UL transmission.   During the switching period, the UE is not expected to [be scheduled or configured to] transmit on any of the two carriers for the duration of .  - The UE is not expected to be scheduled or configured to transmit simultaneously on two antenna ports on the first uplink carrier, and any transmission on the second uplink carrier.  - In all other cases the UE is expected to transmit normally all uplink transmissions without interruptions. |