

<b>Title:</b>	Discussion for test configuration table format of RX for 4DL with UL CA
<b>Source:</b>	SGS Wireless
<b>Agenda Item:</b>	5.3.10.2
<b>Document for:</b>	Discussion and endorsement

## 1 Introduction

At RAN#70, Rel-13 CA WI was approved by [1] and test configuration table format for 4DL with UL CA needs to be discussed as did in 3DL/1UL case.

## 2 Discussion

According to the discussion paper by [2] in RAN5#70 meeting, the following 8 types of 4DL/1UL CA shown in Table 2-1 can be put in together.

**Table 2-1: CA types list for 4DL/1UL CA in TS 36.101 v13.2.0**

CA types	Classes
All intra C	CA_XE
inter + intra C(3CCs)	CA_XA-YD/CA_XD-YA
inter + intra C(2CCs)	CA_XA-YA-ZC/CA_XA-YC-ZA/CA_XC-YA-ZA CA_XA-YA-ZB
All inter	CA_WA-XA-YA-ZA
intra C(2CCs) + intra C(2CCs)	CA_XC-YC
intra NC + intra NC	CA_XA-XA-YA-YA
intra NC + Intra C(2CCs)	CA_XA-XA-YB
intra NC+inter	CA_XA-XA-YA-ZA/CA_XA-YA-YA-ZA

### 1. Putting all the CA types in together/in the same table format:

In discussion paper [2], all intra-band contiguous (highlighted by orange in Table 2-1) needs to consider defined and make in a specified Table as Table 2-2, the types of inter-band relative and intra-band contiguous + intra-band contiguous (highlighted by green & aquamarine in Table 2-1) can be put in the same table format like Table 2-3.

### 2. Considering a new table format for 3DL/4DL/5DL CA with/without UL CA

In last RAN5 #71 meeting the TC title for “4DL CA with UL CA” and “4DL CA without UL CA” is defined as “xxx for 4DL CA” which is meant both should consider in together, in view of this, the TC title for “3DL CA with UL CA” and “3DL CA without UL CA” is also changed to “xxx for 3DL CA”.

In this meeting, we are going to introduce a new configuration table format considering different CA types with single UL PCC allocation and UL CA.

### 3. Older Table Format VS. New Table Format

The Table 2-2 & Table 2-4 is older format with suggestion from discussion paper [2].

In this table format the “UL Allocation” is located in the rightmost of table; the configuration table will become wider if considering with UL CA.

The Table 2-3 & Table 2-5 is a new format which is made by comment [3].

In this table all of older title/ID/Parameters are continuous to use and the difference is adding new column under each cc for UL allocation.

#### 4. Separating into two groups (Intra-band contiguous relative & Intra-band non-contiguous relative)

Finally, all intra-band contiguous & inter-band can be put in together, and intra-band non-contiguous & Inter-band can be put in together as shown in Table 2-6.

NOTE: Test points in these tables below are just example and we are not proposing default test points for each CA type.

**Table 2-2: Test Configuration Table (Intra-band contiguous) (Older format)**

**Table 2-3: Test Configuration Table (Intra-band contiguous) (New format)**

Initial Conditions																				
Test Environment as specified in TS 36.508[7] subclause 4.1												NC, TL/VL, TL/VH, TH/VL, TH/VH								
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.												For test frequencies refer to "Range" columns. For mapping within Band refer to "CC" columns								
Test CC Combination setting ( $N_{RB\_agg}$ ) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.												Refer to "PCC $N_{RB}$ " and "SCCs $N_{RB}$ " columns								
Network signalling value												NS_01 by default, exceptions listed in Table 7.3.3-3, dependent on PCC Band								
Test Parameters for CA Configurations																				
ID	PCC				SCC1				SCC2				SCC3				SCC4			
	Band	Range	$N_{RB}$	MOD	Band	Range	$N_{RB}$	MOD	Band	Range	$N_{RB}$	MOD	Band	Range	$N_{RB}$	MOD	Band	Range	$N_{RB}$	MOD
	UL_alloc	DL_alloc	UL_alloc	DL_alloc	UL_alloc	DL_alloc	UL_alloc	DL_alloc	UL_alloc	DL_alloc	UL_alloc	DL_alloc	UL_alloc	DL_alloc	UL_alloc	DL_alloc	UL_alloc	DL_alloc		
Default Test Settings for a CA_XE Configuration																				
1	X	Low/CC1	Highest NRB_agg	QPSK	X	Low/CC2	Highest NRB_agg	QPSK	X	Low/CC3	Highest NRB_agg	QPSK	X	Low/CC4	Highest NRB_agg	QPSK				
	REFSENS	ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs						
2	X	Low/CC1	Lowest NRB_agg	QPSK	X	Low/CC2	Lowest NRB_agg	QPSK	X	Low/CC3	Lowest NRB_agg	QPSK	X	Low/CC4	Lowest NRB_agg	QPSK				
	REFSENS	ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs						
3	X	High/CC1	Highest NRB_agg	QPSK	X	High/CC2	Highest NRB_agg	QPSK	X	High/CC3	Highest NRB_agg	QPSK	X	High/CC4	Highest NRB_agg	QPSK				
	REFSENS	ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs						
4	X	High/CC1	Lowest NRB_agg	QPSK	X	High/CC2	Lowest NRB_agg	QPSK	X	High/CC3	Lowest NRB_agg	QPSK	X	High/CC4	Lowest NRB_agg	QPSK				
	REFSENS	ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs						

**Table 2-3: Test Configuration Table (Inter-band) (Older format)**

Initial Conditions																
Test Environment as specified in TS 36.508[7] subclause 4.1									NC, TL/VL, TL/VH, TH/VL, TH/VH							
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.									For test frequencies refer to "Range" columns. For mapping within Band refer to "CC" columns							
Test CC Combination setting ( $N_{RB\_agg}$ ) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.									Refer to "PCC $N_{RB}$ " and "SCCs $N_{RB}$ " columns							
Network signalling value									NS_01 by default, exceptions listed in Table 7.3.3-3, dependent on PCC Band							
Test Parameters for CA Configurations																
ID	CA Configuration / $N_{RB\_agg}$									DL Allocation						
	CA Configuration							PCC $N_{RB}$	SCCs $N_{RB}$			CC MOD				
	PCC		SCC1		SCC2		SCC3		SCC1	SCC2	SCC3					
	Band	Range	Band	Range	Band	Range	Band	Range	PCC	SCC1	SCC2	SCC3				
Default Test Settings for a CA_WA-XA-YA-ZA Configuration																
1	W	Mid	X	Mid	Y	Mid	Z	Mid	Highest $N_{RB}$ for all CCs		QPSK	All RBs	QPSK	REFSENS		
2	X	Mid	W	Mid	Y	Mid	Z	Mid	Highest $N_{RB}$ for all CCs		QPSK	All RBs	QPSK	REFSENS		
3	Y	Mid	W	Mid	X	Mid	Z	Mid	Highest $N_{RB}$ for all CCs		QPSK	All RBs	QPSK	REFSENS		
4	Z	Mid	W	Mid	X	Mid	Y	Mid	Highest $N_{RB}$ for all CCs		QPSK	All RBs	QPSK	REFSENS		
Default Test Settings for a CA_XA-YD Configuration																
1	X	Mid	Y	Mid /CC1	Y	Mid /CC2	Y	Mid /CC3	Highest $N_{RB}$	Highest $N_{RB\_agg}$		QPSK	All RBs	QPSK	REFSENS	
2	Y	Low /CC1	Y	Low /CC2	Y	Low /CC3	X	Mid	Highest $N_{RB\_agg}$		Highest $N_{RB}$	QPSK	All RBs	QPSK	REFSENS	
3	Y	High /CC1	Y	High /CC2	Y	High /CC3	X	Mid	Lowest $N_{RB\_agg}$		Highest $N_{RB}$	QPSK	All RBs	QPSK	REFSENS	
4	Y	Low /CC1	Y	Low /CC2	Y	Low /CC3	X	Mid	Highest $N_{RB\_agg}$		Highest $N_{RB}$	QPSK	All RBs	QPSK	REFSENS	
5	Y	High /CC1	Y	High /CC2	Y	High /CC3	X	Mid	Lowest $N_{RB\_agg}$		Highest $N_{RB}$	QPSK	All RBs	QPSK	REFSENS	
Default Test Settings for a CA_XA-YA-ZC and CA_XA-YA-ZB Configuration																
1	X	Mid	Y	Mid	Z	Mid /CC1	Z	Mid /CC2	Highest $N_{RB}$	Highest $N_{RB}$	Highest $N_{RB\_agg}$	QPSK	All RBs	QPSK	REFSENS	
2	Y	Mid	X	Mid	Z	Mid /CC1	Z	Mid /CC2	Highest $N_{RB}$	Highest $N_{RB}$	Highest $N_{RB\_agg}$	QPSK	All RBs	QPSK	REFSENS	
3	Z	Low /CC1	Z	Low /CC2	X	Mid	Y	Mid	Highest $N_{RB\_agg}$		Highest $N_{RB}$	Highest $N_{RB}$	QPSK	All RBs	QPSK	REFSENS

<b>4</b>	Z	Low /CC1	Z	Low /CC2	Y	Mid	X	Mid	Lowest N <sub>RB_agg</sub>	Highest N <sub>RB</sub>	Highest N <sub>RB</sub>	QPSK	All RBs	QPSK	REFSENS
<b>5</b>	Z	High /CC1	Z	High /CC2	X	Mid	Y	Mid	Highest N <sub>RB_agg</sub>	Highest N <sub>RB</sub>	Highest N <sub>RB</sub>	QPSK	All RBs	QPSK	REFSENS
<b>6</b>	Z	High /CC1	Z	High /CC2	Y	Mid	X	Mid	Lowest N <sub>RB_agg</sub>	Highest N <sub>RB</sub>	Highest N <sub>RB</sub>	QPSK	All RBs	QPSK	REFSENS

**Default Test Settings for a CA\_XC-YC Configuration**

<b>1</b>	X	Low /CC1	X	Low /CC2	Y	Low /CC1	Y	Low /CC2	Highest N <sub>RB_agg</sub>	Highest N <sub>RB_agg</sub>	QPSK	All RBs	QPSK	REFSENS
<b>2</b>	X	Low /CC1	X	Low /CC2	Y	Low /CC1	Y	Low /CC2	Lowest N <sub>RB_agg</sub>	Lowest N <sub>RB_agg</sub>	QPSK	All RBs	QPSK	REFSENS
<b>3</b>	Y	High /CC1	Y	High /CC2	X	High /CC1	X	High /CC2	Highest N <sub>RB_agg</sub>	Highest N <sub>RB_agg</sub>	QPSK	All RBs	QPSK	REFSENS
<b>4</b>	Y	High /CC1	Y	High /CC2	X	High /CC1	X	High /CC2	Lowest N <sub>RB_agg</sub>	Lowest N <sub>RB_agg</sub>	QPSK	All RBs	QPSK	REFSENS

Note: TBD

**Table 2-5: Test Configuration Table (Inter-band) (New format)**

Initial Conditions																			
Test Environment as specified in TS 36.508[7] subclause 4.1												NC							
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.												For test frequencies refer to "Range" columns. For mapping within Band refer to "CC" columns							
Test CC Combination setting ( $N_{RB\_agg}$ ) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.												Refer to "PCC $N_{RB}$ " and "SCCs $N_{RB}$ " columns							
Network signalling value												NS_01 by default, exceptions listed in Table 7.3.3-3, dependent on PCC Band							
Test Parameters for CA Configurations																			
ID	PCC				SCC1				SCC2				SCC3				SCC4		
	Band	Range	$N_{RB}$	MOD	Band	Range	$N_{RB}$	MOD	Band	Range	$N_{RB}$	MOD	Band	Range	$N_{RB}$	MOD	Band	Range	$N_{RB}$
	UL_alloc	DL_alloc		UL_alloc	DL_alloc		UL_alloc	DL_alloc		UL_alloc	DL_alloc		UL_alloc	DL_alloc		UL_alloc	DL_alloc		
Default Test Settings for a CA_XA-YA-ZA-RA Configuration																			
1	X	Mid	Highest NRB	QPSK	Y	Mid	Highest NRB	QPSK	Z	Mid	Highest NRB	QPSK	R	Mid	Highest NRB	QPSK			
	REFSENS		ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs				
2	Y	Mid	Highest NRB	QPSK	X	Mid	Highest NRB	QPSK	Z	Mid	Highest NRB	QPSK	R	Mid	Highest NRB	QPSK			
	REFSENS		ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs				
3	Z	Mid	Highest NRB	QPSK	X	Mid	Highest NRB	QPSK	Y	Mid	Highest NRB	QPSK	R	Mid	Highest NRB	QPSK			
	REFSENS		ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs				
4	R	Mid	Highest NRB	QPSK	X	Mid	Highest NRB	QPSK	Y	Mid	Highest NRB	QPSK	Z	Mid	Highest NRB	QPSK			
	REFSENS		ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs				
Default Test Settings for a CA_XA-YD Configuration																			
1	X	Mid	Highest NRB	QPSK	Y	Mid/CC1	Highest NRB_agg	QPSK	Y	Mid/CC2	Highest NRB_agg	QPSK	Y	Mid/CC3	Highest NRB_agg	QPSK			
	REFSENS		ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs				
2	Y	Low/CC1	Highest NRB_agg	QPSK	Y	Low/CC2	Highest NRB_agg	QPSK	Y	Low/CC3	Highest NRB_agg	QPSK	X	Mid	Highest NRB	QPSK			
	REFSENS		ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs				

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For UL alloc

3	Y	High/CC1	Lowest NRB_agg	QPSK	Y	High/CC2	Lowest NRB_agg	QPSK	Y	High/CC3	Lowest NRB_agg	QPSK	X	Mid	Highest NRB	QPSK		
	REFSENS	ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs				
4	Y	Low/CC1	Highest NRB_agg	QPSK	Y	Low/CC2	Highest NRB_agg	QPSK	Y	Low/CC3	Highest NRB_agg	QPSK	X	Mid	Highest NRB	QPSK		
	REFSENS	ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs				
5	Y	High/CC1	Lowest NRB_agg	QPSK	Y	High/CC2	Lowest NRB_agg	QPSK	Y	High/CC3	Lowest NRB_agg	QPSK	X	Mid	Highest NRB	QPSK		
	REFSENS	ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs				
<b>Default Test Settings for a CA_XB-YA-ZA and CA_XC-YA-ZA Configuration</b>																		
1	X	Low/CC1	Highest NRB_agg	QPSK	X	Low/CC2	Highest NRB_agg	QPSK	Y	Mid	Highest NRB	QPSK	Z	Mid	Highest NRB	QPSK		
	REFSENS	ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs				
2	X	Low/CC1	Lowest NRB_agg	QPSK	X	Low/CC2	Lowest NRB_agg	QPSK	Y	Mid	Highest NRB	QPSK	Z	Mid	Highest NRB	QPSK		
	REFSENS	ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs				
3	X	High/CC1	Highest NRB_agg	QPSK	X	High/CC2	Highest NRB_agg	QPSK	Y	Mid	Highest NRB	QPSK	Z	Mid	Highest NRB	QPSK		
	REFSENS	ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs				
4	X	High/CC1	Lowest NRB_agg	QPSK	X	High/CC2	Lowest NRB_agg	QPSK	Y	Mid	Highest NRB	QPSK	Z	Mid	Highest NRB	QPSK		
	REFSENS	ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs				
5	Y	Mid	Highest NRB	QPSK	X	Mid/CC1	Highest NRB_agg	QPSK	X	Mid/CC2	Highest NRB_agg	QPSK	Z	Mid	Highest NRB	QPSK		
	REFSENS	ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs				
6	Z	Mid	Highest NRB	QPSK	X	Mid/CC1	Highest NRB_agg	QPSK	X	Mid/CC2	Highest NRB_agg	QPSK	Y	Mid	Highest NRB	QPSK		
	REFSENS	ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs				
<b>Default Test Settings for a CA_XC-YC Configuration</b>																		
1	X	Low/CC1	Highest NRB_agg	QPSK	X	Low/CC2	Highest NRB_agg	QPSK	Y	Low/CC1	Highest NRB_agg	QPSK	Y	Low/CC2	Highest NRB_agg	QPSK		
	REFSENS	ALL RBs		N/A		ALL RBs		N/A		ALL RBs		N/A		ALL RBs				

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2	X	Low/CC1	Lowest NRB_agg	QPSK	X	Low/CC2	Lowest NRB_agg	QPSK	Y	Low/CC1	Lowest NRB_agg	QPSK	Y	Low/CC2	Lowest NRB_agg	QPSK		
	REFSENS	ALL RBs			N/A		ALL RBs			N/A		ALL RBs			N/A		ALL RBs	
3	Y	High/CC1	Highest NRB_agg	QPSK	Y	High/CC2	Highest NRB_agg	QPSK	X	High/CC1	Highest NRB_agg	QPSK	X	High/CC2	Highest NRB_agg	QPSK		
	REFSENS	ALL RBs			N/A		ALL RBs			N/A		ALL RBs			N/A		ALL RBs	
4	Y	High/CC1	Lowest NRB_agg	QPSK	Y	High/CC2	Lowest NRB_agg	QPSK	X	High/CC1	Lowest NRB_agg	QPSK	X	High/CC2	Lowest NRB_agg	QPSK		
	REFSENS	ALL RBs			N/A		ALL RBs			N/A		ALL RBs			N/A		ALL RBs	
Note: TBD																		

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Table 2-6: CA types list for 4DL CA

CA types	Classes
All intra C	CA_XE
inter + intra C(3CCs)	CA_XA-YD/CA_XD-YA
inter + intra C(2CCs)	CA_XA-YA-ZC/CA_XA-YC-ZA/CA_XC-YA-ZA CA_XA-YA-ZB
All inter	CA_WA-XA-YA-ZA
intra C(2CCs) + intra C(2CCs)	CA_XC-YC
intra NC + intra NC	CA_XA-XA-YA-YA
intra NC + Intra C(2CCs)	CA_XA-XA-YB
intra NC+inter	CA_XA-XA-YA-ZA/CA_XA-YA-YA-ZA

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## 3 Proposal

In this document it is proposed that for 4DL/1UL CA receiver test cases

**Proposal #1: Table 2-2 & 2-4 is older table format from [2], and these two don't consider UL CA**

**Proposal #2: Table 2-3 & 2-5 is new table format and has considered the UL CA, also we think that inter-band relative & intra-band contiguous CA can be put in together.**

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## 4 References

[1] RP-151764 New Work Item proposal: UE Conformance Test Aspects - Rel-13 LTE CA configurations

[2] R5-160353 Discussion for test configuration table format of receiver test cases for 4DL/1UL CA

[3] Comment to R5-165651 (test conf format for 4DL by SGS Wireless) by the e-mail from Jussi Kuusisto Dish