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Technical Report

3rd Generation Partnership Project;

Technical Specification Group Radio Access Network;

NR inter-band Carrier Aggregation (CA) for

3 Down Link (DL) / 1 Up Link (UL)

(Release 17)

** 

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Contents

Foreword 11

1 Scope 13

2 References 13

3 Definitions, symbols and abbreviations 13

3.1 Definitions 13

3.2 Symbols 14

3.3 Abbreviations 14

4 Background 14

4.1 The present document maintenance 15

5 3 Band Carrier Aggregation with Single UL: General Part 15

6 3 Band Carrier Aggregation with Single UL: Specific Band Combination Part 15

6.1 CA\_n1-n77-n79 15

6.1.1 Operating bands for CA 15

6.1.2 Channel bandwidths per operating band for CA 16

6.1.3 Co-existence studies 17

6.1.4 ∆TIB,c and ∆RIB,c values 17

6.1.5 REFSENS requirements 17

6.2 CA\_n1-n78-n79 17

6.2.1 Operating bands for CA 17

6.2.2 Channel bandwidths per operating band for CA 18

6.2.3 Co-existence studies 19

6.2.4 ∆TIB,c and ∆RIB,c values 19

6.2.5 REFSENS requirements 19

6.3 CA\_n3-n28-n41 19

6.3.1 Operating bands for CA 19

6.3.2 Channel bandwidths per operating band for CA 20

6.3.3 UE co-existence studies 21

6.3.4 ∆TIB and ∆RIB values 21

6.3.5 REFSENS requirements 21

6.4 CA\_n3-n41-n78 21

6.4.1 Operating bands for CA 21

6.4.2 Channel bandwidths per operating band for CA 22

6.4.3 Co-existence studies 22

6.4.4 ∆TIB,c and ∆RIB,c values 22

6.4.5 REFSENS requirements 23

6.5 CA\_n5-n25-n66 23

6.5.1 Operating bands for CA 23

6.5.2 Channel bandwidths per operating band for CA 23

6.5.3 Co-existence studies 24

6.5.4 ∆TIB,c and ∆RIB,c values 24

6.5.5 REFSENS requirements 25

6.6 CA\_n5-n25-n78 25

6.6.1 Operating bands for CA 25

6.6.2 Channel bandwidths per operating band for CA 25

6.6.3 Co-existence studies 26

6.6.4 ∆TIB,c and ∆RIB,c values 26

6.6.5 REFSENS requirements 27

6.7 CA\_n25-n48-n66 27

6.7.1 Operating bands for CA 27

6.7.2 Channel bandwidths per operating band for CA 27

6.7.3 Co-existence studies 28

6.7.4 ∆TIB,c and ∆RIB,c values 28

6.7.5 REFSENS requirements 28

6.8 CA\_n39-n40-n41 29

6.8.1 Operating bands for CA 29

6.8.2 Channel bandwidths per operating band for CA 29

6.8.3 Co-existence studies 29

6.8.4 ∆TIB and ∆RIB values 30

6.8.5 REFSENS requirements 30

6.9 CA\_n39-n40-n79 30

6.9.1 Operating bands for CA 30

6.9.2 Channel bandwidths per operating band for CA 31

6.9.3 Co-existence studies 31

6.9.4 ∆TIB and ∆RIB values 31

6.9.5 REFSENS requirements 32

6.10 CA\_n1-n77-n257 32

6.10.1 Operating bands for CA 32

6.10.2 Channel bandwidths per operating band for CA 33

6.10.3 Co-existence requirements 34

6.10.4 ∆TIB,c and ∆RIB,c values 34

6.10.5 REFSENS requirements 34

6.11 CA\_n1-n78-n257 34

6.11.1 Operating bands for CA 34

6.11.2 Channel bandwidths per operating band for CA 35

6.11.3 Co-existence requirements 38

6.11.4 ∆TIB,c and ∆RIB,c values 38

6.11.5 REFSENS requirements 38

6.12 CA\_n1-n79-n257 38

6.12.1 Operating bands for CA 38

6.12.2 Channel bandwidths per operating band for CA 39

6.12.3 Co-existence requirements 40

6.12.4 ∆TIB,c and ∆RIB,c values 40

6.12.5 REFSENS requirements 40

6.13 CA\_n3-n41-n77 40

6.13.1 Operating bands for CA 40

6.13.2 Channel bandwidths per operating band for CA 41

6.13.3 Co-existence studies 41

6.13.4 ∆TIB,c and ∆RIB,c values 41

6.13.5 REFSENS requirements 42

6.14 CA\_n28-n41-n77 42

6.14.1 Operating bands for CA 42

6.14.2 Channel bandwidths per operating band for CA 42

6.14.3 Co-existence studies 42

6.14.4 ∆TIB,c and ∆RIB,c values 42

6.14.5 REFSENS requirements 43

6.15 CA\_n28-n41-n78 43

6.15.1 Operating bands for CA 43

6.15.2 Channel bandwidths per operating band for CA 43

6.15.3 Co-existence studies 43

6.15.4 ∆TIB,c and ∆RIB,c values 44

6.15.5 REFSENS requirements 44

6.16 CA\_n1-n8-n78 44

6.16.1 Operating bands for CA 44

6.16.2 Channel bandwidths per operating band for CA 44

6.16.3 Co-existence studies 44

6.16.4 ∆TIB,c and ∆RIB,c values 44

6.16.5 REFSENS requirements 45

6.17 CA\_n8-n40-n41 45

6.17.1 Operating bands for CA 45

6.17.2 Channel bandwidths per operating band for CA 45

6.17.3 Co-existence studies 45

6.17.4 ∆TIB and ∆RIB values 46

6.17.5 REFSENS requirements 46

6.18 CA\_n5-n66-n77 46

6.18.1 Operating bands for CA 46

6.18.2 Channel bandwidths per operating band for CA 47

6.18.3 Co-existence studies 47

6.18.4 ∆TIB,c and ∆RIB,c values 47

6.18.5 REFSENS requirements 48

6.19 CA\_n2-n66-n77 48

6.19.1 Operating bands for CA 48

6.19.2 Channel bandwidths per operating band for CA 48

6.19.3 Co-existence studies 48

6.19.4 ∆TIB,c and ∆RIB,c values 49

6.19.5 REFSENS requirements 49

6.20 CA\_n66-n71-n78 49

6.20.1 Operating bands for CA 49

6.20.2 Channel bandwidths per operating band for CA 50

6.20.3 Co-existence studies 50

6.20.4 ∆TIB,c and ∆RIB,c values 50

6.20.5 REFSENS requirements 51

6.21 CA\_n38-n66-n78 51

6.21.1 Operating bands for CA 51

6.21.2 Channel bandwidths per operating band for CA 51

6.21.3 Co-existence studies 52

6.21.4 ∆TIB,c and ∆RIB,c values 52

6.21.5 REFSENS requirements 52

6.22 CA\_n25-n38-n78 52

6.22.1 Operating bands for CA 52

6.22.2 Channel bandwidths per operating band for CA 53

6.22.3 Co-existence studies 53

6.22.4 ∆TIB,c and ∆RIB,c values 53

6.22.5 REFSENS requirements 54

6.23 CA\_n3-n5-n7 54

6.23.1 Operating bands for CA 54

6.23.2 Channel bandwidths per operating band for CA 54

6.23.3 Co-existence studies 54

6.23.4 ∆TIB,c and ∆RIB,c values 55

6.23.5 REFSENS requirements 55

6.24 CA\_n5-n7-n78 55

6.24.1 Operating bands for CA 55

6.24.2 Channel bandwidths per operating band for CA 56

6.24.3 Co-existence studies 56

6.24.4 ∆TIB,c and ∆RIB,c values 57

6.24.5 REFSENS requirements 57

6.25 CA\_n25-n41-n77 57

6.25.1 Operating bands for CA 57

6.25.2 Channel bandwidths per operating band for CA 58

6.25.3 Co-existence studies 58

6.25.4 ∆TIB and ∆RIB values 59

6.25.5 REFSENS requirements 59

6.26 CA\_n25-n66-n77 59

6.26.1 Operating bands for CA 59

6.26.2 Channel bandwidths per operating band for CA 60

6.26.3 Co-existence studies 60

6.26.4 ∆TIB and ∆RIB values 61

6.31 CA\_n5-n25-n77 68

6.31.1 Operating bands for CA 68

6.31.2 Channel bandwidths per operating band for CA 68

6.31.3 Co-existence studies 68

6.31.4 ∆TIB,c and ∆RIB,c values 69

6.31.5 REFSENS requirements 69

6.32 CA\_n3-n18-n41 70

6.32.1 Operating bands for CA 70

6.32.2 Channel bandwidths per operating band for CA 70

6.32.3 UE co-existence studies 71

6.32.4 ∆TIB and ∆RIB values 71

6.32.5 REFSENS requirements 71

6.33 CA\_n3-n28-n77 71

6.33.1 Operating bands for CA 71

6.33.2 Channel bandwidths per operating band for CA 72

6.33.3 Co-existence studies 72

6.33.4 ∆TIB,c and ∆RIB,c values 72

6.33.5 REFSENS requirements 72

6.34 CA\_n3-n28-n78 72

6.34.1 Operating bands for CA 72

6.34.2 Channel bandwidths per operating band for CA 73

6.34.3 Co-existence studies 73

6.34.4 ∆TIB,c and ∆RIB,c values 73

6.34.5 REFSENS requirements 73

6.35 CA\_n28-n41-n78 73

6.35.1 Operating bands for CA 73

6.35.2 Channel bandwidths per operating band for CA 74

6.35.3 Co-existence studies 74

6.35.4 ∆TIB,c and ∆RIB,c values 74

6.35.5 REFSENS requirements 74

6.36 CA\_n13-n25-n66 74

6.36.1 Operating bands for CA 74

6.36.2 Channel bandwidths per operating band for CA 75

6.36.3 Co-existence studies 75

6.36.4 ∆TIB,c and ∆RIB,c values 75

6.36.5 REFSENS requirements 75

6.37 CA\_n25-n29-n66 76

6.37.1 Operating bands for CA 76

6.37.2 Channel bandwidths per operating band for CA 76

6.37.3 UE co-existence studies 77

6.37.4 ∆TIB and ∆RIB values 77

6.37.5 REFSENS requirements 77

6.38 CA\_n28-n77-n79 77

6.38.1 Operating bands for CA 77

6.38.2 Channel bandwidths per operating band for CA 78

6.38.3 Co-existence studies 79

6.38.4 ∆TIB,c and ∆RIB,c values 79

6.38.5 REFSENS requirements 79

6.39 CA\_n28-n78-n79 79

6.39.1 Operating bands for CA 79

6.39.2 Channel bandwidths per operating band for CA 80

6.39.3 Co-existence studies 81

6.39.4 ∆TIB,c and ∆RIB,c values 81

6.39.5 REFSENS requirements 81

6.40 CA\_n1-n8-n79 81

6.40.1 Operating bands for CA 81

6.40.2 Channel bandwidths per operating band for CA 82

6.40.3 Co-existence studies 82

6.40.4 ∆TIB,c and ∆RIB,c values 82

6.40.5 REFSENS requirements 82

6.41 CA\_n8-n78-n79 82

6.41.1 Operating bands for CA 82

6.41.2 Channel bandwidths per operating band for CA 83

6.41.3 Co-existence studies 83

6.41.4 ∆TIB,c and ∆RIB,c values 83

6.41.5 REFSENS requirements 83

6.42 CA\_n1-n3-n20 84

6.42.1 Operating bands for CA 84

6.42.2 Channel bandwidths per operating band for CA 84

6.42.3 UE co-existence studies 84

6.42.4 ∆TIB and ∆RIB values 84

6.42.5 REFSENS requirements 84

6.43 CA\_n1-n20-n78 85

6.43.1 Operating bands for CA 85

6.43.2 Channel bandwidths per operating band for CA 85

6.43.3 UE co-existence studies 85

6.43.4 ∆TIB and ∆RIB values 85

6.43.5 REFSENS requirements 85

6.44 CA\_n3-n20-n78 86

6.44.1 Operating bands for CA 86

6.44.2 Channel bandwidths per operating band for CA 86

6.44.3 UE co-existence studies 86

6.44.4 ∆TIB and ∆RIB values 86

6.44.5 REFSENS requirements 86

6.45 CA\_n8-n28-n78 87

6.45.1 Operating bands for CA 87

6.45.2 Channel bandwidths per operating band for CA 87

6.45.3 UE co-existence studies 87

6.45.4 ∆TIB and ∆RIB values 87

6.45.5 REFSENS requirements 87

6.46 CA\_n3-n28-n79 88

6.46.1 Operating band for CA 88

6.46.2 Channel bandwidths per operating band for CA 88

6.46.3 Co-existence studies 88

6.46.4 ∆TIB and ∆RIB values 88

6.46.5 REFSENS requirements 88

6.47 CA\_n3-n79-n257 89

6.47.1 Operating band for CA 89

6.47.2 Channel bandwidths per operating band for CA 89

6.47.3 Co-existence studies 89

6.47.4 ∆TIB and ∆RIB values 89

6.47.5 REFSENS requirements 90

6.48 CA\_n28-n79-n257 90

6.48.1 Operating band for CA 90

6.48.2 Channel bandwidths per operating band for CA 90

6.48.3 Co-existence studies 90

6.48.4 ∆TIB and ∆RIB values 90

6.48.5 REFSENS requirements 91

6.49 CA\_n7-n25-n77 91

6.49.1 Operating bands for CA 91

6.49.2 Channel bandwidths per operating band for CA 91

6.49.3 Co-existence studies 92

6.49.4 ∆TIB,c and ∆RIB,c values 92

6.49.5 REFSENS requirements 92

6.50 CA\_n7-n66-n77 92

6.50.1 Operating bands for CA 92

6.50.2 Channel bandwidths per operating band for CA 93

6.50.3 Co-existence studies 93

6.50.4 ∆TIB,c and ∆RIB,c values 93

6.50.5 REFSENS requirements 94

6.51 CA\_n1-n3-n7 94

6.51.1 Operating bands for CA 94

6.51.2 Channel bandwidths per operating band for CA 95

6.51.3 Co-existence studies 95

6.51.4 ∆TIB,c and ∆RIB,c values 95

6.51.5 REFSENS requirements 95

6.52 CA\_n2-n5-n66 95

6.52.1 Operating bands for CA 95

6.52.2 Channel bandwidths per operating band for CA 96

6.52.3 Co-existence studies 96

6.52.4 ∆TIB and ∆RIB values 96

6.52.5 MSD 97

6.53 CA\_n2-n5-n30 97

6.53.1 Operating bands for CA 97

6.53.2 Channel bandwidths per operating band for CA 97

6.53.3 Co-existence studies 97

6.53.4 ∆TIB and ∆RIB values 98

6.53.5 MSD 98

6.54 CA\_n13-n25-n77 98

6.54.1 Operating bands for CA 98

6.54.2 Channel bandwidths per operating band for CA 99

6.54.3 Co-existence studies 99

6.54.4 ∆TIB and ∆RIB values 99

6.54.5 MSD 100

6.55 CA\_n13-n66-n77 100

6.55.1 Operating bands for CA 100

6.55.2 Channel bandwidths per operating band for CA 100

6.55.3 Co-existence studies 100

6.55.4 ∆TIB and ∆RIB values 101

6.55.5 MSD 101

6.56 CA\_n2-n30-n66 101

6.56.1 Operating bands for CA 101

6.56.2 Channel bandwidths per operating band for CA 102

6.56.3 Co-existence studies 102

6.56.4 ∆TIB,c and ∆RIB,c values 103

6.56.5 REFSENS requirements 103

6.57 CA\_n5-n30-n66 103

6.57.1 Operating bands for CA 103

6.57.2 Channel bandwidths per operating band for CA 103

6.57.3 Co-existence studies 104

6.57.4 ∆TIB,c and ∆RIB,c values 104

6.57.5 REFSENS requirements 104

6.58 CA\_n5-n30-n66 105

6.58.1 Operating bands for CA 105

6.58.2 Channel bandwidths per operating band for CA 105

6.58.3 Co-existence studies 105

6.58.4 ∆TIB,c and ∆RIB,c values 106

6.58.5 REFSENS requirements 106

6.59 CA\_n2-n77-n260 106

6.59.1 Operating bands for CA 106

6.59.2 Channel bandwidths per operating band for CA 107

6.59.3 Co-existence requirements 108

6.59.4 ∆TIB,c and ∆RIB,c values 108

6.59.5 REFSENS requirements 108

6.60 CA\_n2-n77-n261 108

6.60.1 Operating bands for CA 108

6.60.2 Channel bandwidths per operating band for CA 109

6.60.3 Co-existence requirements 110

6.60.4 ∆TIB,c and ∆RIB,c values 110

6.60.5 REFSENS requirements 110

6.61 CA\_n5-n77-n260 110

6.61.1 Operating bands for CA 110

6.61.2 Channel bandwidths per operating band for CA 111

6.61.3 Co-existence requirements 112

6.61.4 ∆TIB,c and ∆RIB,c values 112

6.61.5 REFSENS requirements 112

6.62 CA\_n5-n77-n261 112

6.62.1 Operating bands for CA 112

6.62.2 Channel bandwidths per operating band for CA 113

6.62.3 Co-existence requirements 114

6.62.4 ∆TIB,c and ∆RIB,c values 114

6.62.5 REFSENS requirements 114

6.63 CA\_n66-n77-n260 114

6.63.1 Operating bands for CA 114

6.63.2 Channel bandwidths per operating band for CA 115

6.63.3 Co-existence requirements 117

6.63.4 ∆TIB,c and ∆RIB,c values 117

6.63.5 REFSENS requirements 117

6.64 CA\_n66-n77-n261 117

6.64.1 Operating bands for CA 117

6.64.2 Channel bandwidths per operating band for CA 118

6.64.3 Co-existence requirements 120

6.64.4 ∆TIB,c and ∆RIB,c values 120

6.64.5 REFSENS requirements 120

6.65 CA\_n24-n41-n48 120

6.66 CA\_n24-n41-n77 120

6.66.1 Operating bands for CA 120

6.66.2 Channel bandwidths per operating band for CA 120

6.66.3 Co-existence studies 121

6.66.4 ∆TIB and ∆RIB values 121

6.66.5 REFSENS requirements 122

6.67 CA\_n3-n77-n79 123

6.67.1 Operating band for CA 123

6.67.2 Channel bandwidths per operating band for CA 123

6.67.3 Co-existence studies 123

6.67.4 ∆TIB and ∆RIB values 123

6.67.5 REFSENS requirements 124

6.68 CA\_n41-n79-n258 124

6.68.1 Operating bands for CA 124

6.68.2 Channel bandwidths per operating band for CA 124

6.68.3 Co-existence studies 124

6.68.5 REFSENS requirements 125

6.69 CA\_n25-n71-n78 125

6.69.1 Operating bands for CA 125

6.69.2 Channel bandwidths per operating band for CA 125

6.69.3 Co-existence studies 125

6.69.4 ∆TIB,c and ∆RIB,c values 125

6.69.5 REFSENS requirements 126

6.70 CA\_n14-n66-n77 126

6.70.1 Operating bands for CA 126

6.70.2 Channel bandwidths per operating band for CA 126

6.70.3 Co-existence studies 126

6.70.4 ∆TIB,c and ∆RIB,c values 127

6.70.5 REFSENS requirements 127

6.71 CA\_n14-n30-n77 127

6.71.1 Operating bands for CA 127

6.71.2 Channel bandwidths per operating band for CA 127

6.71.3 Co-existence studies 127

6.71.4 ∆TIB,c and ∆RIB,c values 128

6.71.5 REFSENS requirements 128

6.72 CA\_n5-n14-n77 128

6.72.1 Operating bands for CA 128

6.72.2 Channel bandwidths per operating band for CA 129

6.72.3 Co-existence studies 129

6.72.4 ∆TIB,c and ∆RIB,c values 129

6.72.5 REFSENS requirements 130

6.73 CA\_n2-n14-n77 130

6.73.1 Operating bands for CA 130

6.73.2 Channel bandwidths per operating band for CA 130

6.73.3 Co-existence studies 130

6.73.4 ∆TIB,c and ∆RIB,c values 131

6.73.5 REFSENS requirements 131

6.74 CA\_n12-n66-n77 131

6.74.1 Operating bands for CA 131

6.74.2 Channel bandwidths per operating band for CA 131

6.74.3 Co-existence studies 132

6.74.4 ∆TIB,c and ∆RIB,c values 132

6.74.5 REFSENS requirements 132

6.75 CA\_n12-n30-n77 133

6.75.1 Operating bands for CA 133

6.75.2 Channel bandwidths per operating band for CA 133

6.75.3 Co-existence studies 133

6.75.4 ∆TIB,c and ∆RIB,c values 134

6.75.5 REFSENS requirements 134

6.76 CA\_n2-n12-n77 134

6.76.1 Operating bands for CA 134

6.76.2 Channel bandwidths per operating band for CA 134

6.76.3 Co-existence studies 134

6.76.4 ∆TIB,c and ∆RIB,c values 135

6.76.5 REFSENS requirements 135

6.77 CA\_n5-n12-n77 135

6.77.1 Operating bands for CA 135

6.77.2 Channel bandwidths per operating band for CA 136

6.77.3 Co-existence studies 136

6.77.4 ∆TIB,c and ∆RIB,c values 136

6.77.5 REFSENS requirements 137

6.78 CA\_n2-n5-n77 137

6.78.1 Operating bands for CA 137

6.78.2 Channel bandwidths per operating band for CA 137

6.78.3 Co-existence studies 137

6.78.4 ∆TIB,c and ∆RIB,c values 138

6.78.5 REFSENS requirements 138

6.79 CA\_n5-n30-n77 138

6.79.1 Operating bands for CA 138

6.79.2 Channel bandwidths per operating band for CA 139

6.79.3 Co-existence studies 139

6.79.4 ∆TIB,c and ∆RIB,c values 139

6.79.5 REFSENS requirements 140

6.80 CA\_n2-n30-n77 140

6.80.1 Operating bands for CA 140

6.80.2 Channel bandwidths per operating band for CA 140

6.80.3 Co-existence studies 140

6.80.4 ∆TIB,c and ∆RIB,c values 141

6.80.5 REFSENS requirements 141

6.81 CA\_n30-n66-n77 141

6.81.1 Operating bands for CA 141

6.81.2 Channel bandwidths per operating band for CA 142

6.81.3 Co-existence studies 142

6.81.4 ∆TIB,c and ∆RIB,c values 142

6.81.5 REFSENS requirements 143

6.82 CA\_n7-n25-n78 143

6.82.1 Operating bands for CA 143

6.82.2 Channel bandwidths per operating band for CA 143

6.82.3 Co-existence studies 143

6.82.4 ∆TIB and ∆RIB values 144

6.82.5 REFSENS requirements 144

6.83 CA\_n7-n78-n258 144

6.83.1 Operating band for CA 144

6.83.2 Channel bandwidths per operating band for CA 144

6.83.4 ∆TIB and ∆RIB values 146

6.83.5 REFSENS requirements 146

Annex A: Change history 147

# Foreword

This Technical Report has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

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2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

**shall** indicates a mandatory requirement to do something

**shall not** indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

**should** indicates a recommendation to do something

**should not** indicates a recommendation not to do something

**may** indicates permission to do something

**need not** indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

**can** indicates that something is possible

**cannot** indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

**will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

**will not** indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

**might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

**might not** indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

**is** (or any other verb in the indicative mood) indicates a statement of fact

**is not** (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

# 1 Scope

The present document is a technical report for Rel-17 NR 3DL/1UL Inter-band Carrier Aggregation. The purpose is to gather the relevant background information and studies in order to address 3DL/1UL Inter-band Carrier Aggregation requirements for the Rel-17 band combinations in Table 1-1. UL carrier is supported in each of the 3 bands being aggregated unless otherwise specified.

Table 1-1: Release 17 3DL/1UL inter-band carrier aggregation combinations

|  |  |  |  |
| --- | --- | --- | --- |
| CA combination | | REL independent from | |
| CA\_x1A-yA-zA | |  | |
|  | |  | |
|  | |  | |
|  | |  | |
|  | |  | |
|  | |  | |
|  | |  | |
|  | |  | |

The present document contains a general part and band specific combination part. The actual requirements are added to the corresponding technical specifications.

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] RP-200922: " New WID: Rel-17 NR inter-band CA for 3 bands DL with 1 band UL ", RAN#88e.

[3] 3GPP TS 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone".

[4] 3GPP TS 38.101-2: "NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone".

[5] 3GPP TS 38.101-3: "NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios".

[6] 3GPP TR 37.865-01-01: " NR Carrier Aggregation for intra-band (m Down Link (DL) / 1 Up Link (UL) bands) and inter-band (n Down Link (DL) / 1 Up Link (UL) bands)".

[7] 3GPP TR 38.716-02-00, “”

# 3 Definitions of terms, symbols and abbreviations

## 3.1 Terms

For the purposes of the present document, the terms given in TR 21.905 [1] and the following apply.   
A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

**Carrier aggregation:** Aggregation of two or more component carriers in order to support wider transmission bandwidths.

**Inter-band carrier aggregation:** Carrier aggregation of component carriers in different operating bands.

NOTE: Carriers aggregated in each band can be contiguous or non-contiguous.

## 3.2 Symbols

For the purposes of the present document, the following symbols apply:

ΔRIB,c Allowed reference sensitivity relaxation due to support for inter-band CA operation, for serving cell *c*.

ΔTIB,c Allowed maximum configured output power relaxation due to support for inter-band CA operation, for serving cell *c*.

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 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 TR 21.905 [1].

BS Base Station

BCS Bandwidth Combination Set

CA Carrier Aggregation

CA\_X Intra-band contiguous CA of component carriers in one sub-block within Band X where X is the applicable NR operating band

CA\_X-X Intra-band non-contiguous CA of component carriers in two sub-blocks within Band X where X is the applicable NR operating band

CA\_X-Y Inter-band CA of component carrier(s) in one sub-block within Band X and component carrier(s) in one sub-block within Band Y where X and Y are the applicable NR operating band

CA\_X-X-Y CA of component carriers in two sub-blocks within Band X and component carrier(s) in one sub-block within Band Y where X and Y are the applicable NR operating bands

CC Component Carriers

DL Downlink

FDD Frequency Division Duplex

IMD Inter-modulation

MSD Maximum Sensitivity Degradation

SCS Subcarrier Spacing

TDD Time Division Duplex

PA Power Amplifier

PCC Primary Component Carrier

REFSENS Reference Sensitivity power level

SCC Secondary Component Carrier

TDD Time Division Duplex

UE User Equipment

UL Uplink

# 4 Background

The present document is a technical report for 3DL/1UL Inter-band Carrier Aggregation under Rel-17 time frame. It covers both the UE and BS side. The present document is divided in two different parts:

- General part: this part covers BS and UE specific which is band combination independent.

- Specific band combination part: this part covers each band combination and its specific issues independently from each other (i.e. one subclause is defined per band combination).

The specific band combination parts are independent and therefore, the working speed also differs.

It should be noted that a single company is responsible for introducing all approved TPs in the present document, i.e. editor of the present document. However, it is the responsibility of the contact person of each band combination to ensure that the TPs related to the band combination have been implemented.

# 5 3 Band Carrier Aggregation with Single UL: General Part

*<Text will be added.>*

# 6 3 Band Carrier Aggregation with Single UL: Specific Band Combination Part

## 6.1 CA\_n1-n77-n79

### 6.1.1 Operating bands for CA

Table 6.1.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n77-n79 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |
| n79 | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |

### 6.1.2 Channel bandwidths per operating band for CA

Table 6.1.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** | **SCS**  **(kHz)** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n1A-n77A-n79A1 | - | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |
| n79 | 15 |  |  |  |  |  |  | Yes | Yes |  |  |  |  |  |
| 30 |  |  |  |  |  |  | Yes | Yes | Yes |  | Yes |  | Yes |
| 60 |  |  |  |  |  |  | Yes | Yes | Yes |  | Yes |  | Yes |
| NOTE: The minimum requirements only apply for non simultaneous Tx/Rx between all carriers for TDD combinations. | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.1.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference from n1 to n77 and n79, and from n77 to n1 and n79, and from n79 to n1 and n77 have been already studied for 3DL/1UL fallback combinations CA n1-n77 and CA\_n1-n79 and n77-n79.

### 6.1.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n1, n77 and n79, the ΔTIB,c and ΔRIB,c values are shown in table 6.1.4-1 and table 6.1.4-2, respectively.

Table 6.1.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n77-n79 | n1 | 0.6 |
| n77 | 0.8 |
| n79 | 0.5 |

Table 6.1.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n77-n79 | n1 | 0.2 |
| n77 | 0.5 |
| n79 | 0 |

### 6.1.5 REFSENS requirements

MSD studies can be omitted because harmonic interference from n1 to n77 and n79, and from n77 to n1 and n79, and from n79 to n1 and n77 have been already studied for 3DL/1UL fallback combinations CA n1-n77 and CA\_n1-n79 and n77-n79.

## 6.2 CA\_n1-n78-n79

### 6.2.1 Operating bands for CA

Table 6.2.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n78-n79 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |
| n79 | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |

### 6.2.2 Channel bandwidths per operating band for CA

Table 6.2.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n1A-n78A-n79A | - | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n78 |  | 10 | 15 | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |
| n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 1 |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 |  | 80 | 90 | 100 |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |
| CA\_n1A-n78(2A)-n79A | - | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n78 | See CA\_n78(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |
| NOTE: Simultaneous Rx/Tx capability for TDD combinations does not apply for UEs supporting band n78 with a n77 implementation. | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.2.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference from n1 to n78 and n79, and from n78 to n1 and n79, and from n79 to n1 and n78 have been already studied for 3DL/1UL fallback combinations CA n1-n78 and CA\_n1-n79 and n78-n79.

### 6.2.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n1, n78 and n79, the ΔTIB,c and ΔRIB,c values are shown in table 6.2.4-1 and table 6.2.4-2, respectively.

Table 6.2.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n78-n79 | n1 | 0.3 |
| n78 | 0.8 |
| 1.58 |
| n79 | 0.5 |
| 1.58 |
| NOTE: The requirements only apply for UE supporting inter-band carrier aggregation with simultaneous Rx/Tx capability, and NR UL carrier frequencies are confined to 3700 MHz-3800 MHz for n78 and 4400 MHz-4500MHz for n79. Simultaneous Rx/Tx capability does not apply for UEs supporting band n78 with a n77 implementation. | | |

Table 6.2.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n78-n79 | n1 | 0 |
| n78 | 0.5 |
| n79 | 0 |

### 6.2.5 REFSENS requirements

MSD studies can be omitted because harmonic interference from n1 to n78 and n79, and from n78 to n1 and n79, and from n79 to n1 and n78 have been already studied for 3DL/1UL fallback combinations CA n1-n78 and CA\_n1-n79 and n78-n79.

## 6.3 CA\_n3-n28-n41

### 6.3.1 Operating bands for CA

Table 6.3.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band | Uplink (UL) band | | | Downlink (DL) band | | | Duplex  mode |
| BS receive / UE transmit | | | BS transmit / UE receive | | |
| FUL\_low – FUL\_high | | | FDL\_low – FDL\_high | | |
| n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880MHz | FDD |
| n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |
| n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |

### 6.3.2 Channel bandwidths per operating band for CA

Table 6.3.2-1: Supported bandwidths per CA band combination of band n3+n28+n41

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **NR Uplink CA configuration** | **NR Band** | **SCS**  **(kHz)** | **5**  **MHz** | **10**  **MHz** | **15**  **MHz** | **20**  **MHz** | **25**  **MHz** | **30**  **MHz** | **40**  **MHz** | **50**  **MHz** | **60**  **MHz** | **70**  **MHz** | **80**  **MHz** | **90**  **MHz** | **100 MHz** | **Bandwidth combination set** |
| CA\_n3A-n28A-n41A | - | n3 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n28 | 15 | Yes | Yes | Yes | Yes |  | Yes |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  | Yes |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n41 | 15 |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |

### 6.3.3 UE co-existence studies

Co-existence studies of CA\_n3-n28-n41 with 1UL have been covered in the constituent fall-back modes.

### 6.3.4 ∆TIB and ∆RIB values

For three DLs of Band n3, n28 and n41, the same ΔTIB,c and ΔRIB,c values specified for LTE CA\_3-28-41 are used as below.

Table 6.3.4-1: ΔTIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n28-n41 | n3 | 0.5 |
| n28 | 0.3 |
| n41 | 0.31/0.82 |
| NOTE 1: Applicable for the frequency range of 2515-2690 MHz.  NOTE 2: Applicable for the frequency range of 2496-2515 MHz. | | |

Table 6.3.4-2: ΔRIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n28-n41 | n3 | 0 |
| n28 | 0 |
| n41 | 01/0.52 |
| NOTE 1: Applicable for the frequency range of 2515-2690 MHz.  NOTE 2: Applicable for the frequency range of 2496-2515 MHz. | | |

### 6.3.5 REFSENS requirements

There are no additional MSD requirements for this band combination

## 6.4 CA\_n3-n41-n78

### 6.4.1 Operating bands for CA

Table 6.4.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n3-n41-n78 | n3 | 1710MHz | – | 1780MHz | 1805MHz | – | 1880MHz | FDD |
| n41 | 2496MHz | – | 2690MHz | 2496MHz | – | 2690MHz | TDD |
| n78 | 3300MHz | – | 3800MHz | 3300MHz | – | 3800MHz | TDD |

### 6.4.2 Channel bandwidths per operating band for CA

Table 6.4.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n3A-n41A-n78A | - | n3 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n41 | 15 |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| n78 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n3A-n41A-n78(2A) | - | n3 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n41 | 15 |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| n78 | See CA\_n78(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 in TS 38.101-1 | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.4.3 Co-existence studies

Co-existence studies of CA\_n3-n41-n78 with 1UL are already covered in the constituent fall-back modes.

### 6.4.4 ∆TIB,c and ∆RIB,c values

For CA\_n3-n41-n78, the ΔTIB,c and ΔRIB,c values can reuse the values for DC\_3-41\_n78 as shown in table 6.4.4-1 and table 6.4.4-2, respectively.

Table 6.4.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n41-n78 | n3 | 0.6 |
| n41 | 0.31/0.82 |
| n78 | 0.8 |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2515-2690 MHz.  NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2515 MHz. | | |

Table 6.4.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n41-n78 | n3 | 0.2 |
| n41 | 01/0.52 |
| n78 | 0.5 |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2515-2690 MHz.  NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2515 MHz. | | |

### 6.4.5 REFSENS requirements

There are no additional MSD requirements for this band combination

## 6.5 CA\_n5-n25-n66

### 6.5.1 Operating bands for CA

Table 6.5.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n5-n25-n66 | n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n25 | 1850 MHz | – | 1915 MHz | 1930 MHz | – | 1995 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | TDD |

### 6.5.2 Channel bandwidths per operating band for CA

Table 6.5.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5**  **MHz** | **10**  **MHz** | **15**  **MHz** | **20**  **MHz** | **25**  **MHz** | **30**  **MHz** | **40**  **MHz** | **50**  **MHz** | **60**  **MHz** | **80**  **MHz** | **90**  **MHz** | **100**  **MHz** | **Bandwidth combination set** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n5A-n25A-n66A | - | n5 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |
| n25 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| n66 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| CA\_n5A-n25(2A)-n66A | - | n5 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |
| n25 | See CA\_n25(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n66 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| CA\_n5A-n25A-n66(2A) | - | n5 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |
| n25 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| CA\_n5A-n25(2A)-n66(2A) | - | n5 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |
| n25 | See CA\_n25(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |

### 6.5.3 Co-existence studies

Table 6.5.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. No harmonic issue is identified for this band combination.

Table 6.5.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge |
| n5 | 824 | 849 | 869 | 894 | 1648 | 1698 | 2472 | 2547 |  |  |
| n25 | 1850 | 1915 | 1930 | 1995 | 3700 | 3830 | 5550 | 5745 |  |  |
| n66 | 1710 | 1780 | 2110 | 2200 | 3420 | 3560 | 5130 | 5340 |  |  |

Table 6.5.3-2 gives harmonic mixing issue for CA with Band n5, n25 and n66. No harmonic mixing issue is identified for this band combination.

Table 6.5.3-2: Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge |
| n5 | 824 | 849 | 869 | 894 | 1738 | 1788 | 2607 | 2682 |  |  |
| n25 | 1850 | 1915 | 1930 | 1995 | 3860 | 3990 | 5790 | 5985 |  |  |
| n66 | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 |  |  |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1 [3].

### 6.5.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n5, n25 and n66, the ΔTIB,c and ΔRIB,c values are shown in table 6.5.4-1 and table 6.5.4-2, respectively. The requirement is reused from the similar combination, CA\_2-5-66.

Table 6.5.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n25-n66 | n5 | 0.3 |
| n25 | 0.5 |
| n66 | 0.5 |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2515-2690 MHz.  NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2515 MHz. | | |

Table 6.5.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n25-n66 | n5 | 0 |
| n25 | 0 |
| n66 | 0 |

### 6.5.5 REFSENS requirements

There is no specific REFSENS requirement for 1 band UL of this combination.

## 6.6 CA\_n5-n25-n78

### 6.6.1 Operating bands for CA

Table 6.6.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n5-n25-n78 | n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n25 | 1850 MHz | – | 1915 MHz | 1930 MHz | – | 1995 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

### 6.6.2 Channel bandwidths per operating band for CA

Table 6.6.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5**  **MHz** | **10**  **MHz** | **15**  **MHz** | **20**  **MHz** | **25**  **MHz** | **30**  **MHz** | **40**  **MHz** | **50**  **MHz** | **60**  **MHz** | **70**  **MHz** | **80**  **MHz** | **90**  **MHz** | **100**  **MHz** | **Bandwidth combination set** |
| CA\_n5A-n25A-n78A | - | n5 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| n25 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n78 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n5A-n25(2A)-n78A | - | n5 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| n25 | See CA\_n25(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | |
| n78 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n5A-n25A-n78(2A) | - | n5 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| n25 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n78 | See CA\_n78(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 | | | | | | | | | | | | | |

### 6.6.3 Co-existence studies

Table 6.6.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. The 4th harmonic of Band n5 may fall into own Rx of Band n78. The 2nd harmonic of Band n25 may fall into own Rx of Band n78.

Table 6.6.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge |
| n5 | 824 | 849 | 869 | 894 | 1648 | 1698 | 2472 | 2547 | 3296 | 3396 |
| n25 | 1850 | 1915 | 1930 | 1995 | 3700 | 3830 | 5550 | 5745 |  |  |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 |  |  |

Table 6.6.3-2 gives harmonic mixing issue for CA with Band n5, n25 and n6. The 4th harmonic mixing of Band n5 may fall into own Rx of Band n78.

Table 6.6.3-2 Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge |
| n5 | 824 | 849 | 869 | 894 | 1738 | 1788 | 2607 | 2682 | 3476 | 3576 |
| n25 | 1850 | 1915 | 1930 | 1995 | 3860 | 3990 | 5790 | 5985 |  |  |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 |  |  |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1 [3].

### 6.6.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n5, n25 and n78, the ΔTIB,c and ΔRIB,c values are shown in table 6.6.4-1 and table 6.6.4-2, respectively. The requirement is derived from the max operation of all fallback CAs.

Table 6.6.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n25-n78 | n5 | 0.6 |
| n25 | 0.6 |
| n78 | 0.8 |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2515-2690 MHz.  NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2515 MHz. | | |

Table 6.6.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n25-n78 | n5 | 0.2 |
| n25 | 0.2 |
| n78 | 0.5 |

### 6.6.5 REFSENS requirements

Band n78 MSD due to Band n5 and Band n25 uplink is already specified in 2DL/1UL WI. No specific analysis for 3DL/1UL is needed.

## 6.7 CA\_n25-n48-n66

### 6.7.1 Operating bands for CA

Table 6.7.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n25A-n48A-n66A | n25 | 1850 MHz | – | 1915 MHz | 1930 MHz | – | 1995 MHz | FDD |
| n48 | 3550 MHz | – | 3700 MHz | 3550 MHz | – | 3700 MHz | TDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |

### 6.7.2 Channel bandwidths per operating band for CA

Table 6.7.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n25A-n48A-n66A | - | n25 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| n48 | 15 | Yes | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |
| n66 | 15 | Yes | Yes | Yes | Yes |  |  | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  | Yes |  |  |  |  |  |  |
| n25 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 1 |
| n48 |  | 5 | 10 | 15 | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 |
| n66 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| CA\_n25A-n48(2A)-n66A | - | n25 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| n48 | See CA\_n48(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | |
| n66 | 15 | Yes | Yes | Yes | Yes |  |  | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  | Yes |  |  |  |  |  |  |
| n25 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 1 |
| n48 |  | See CA\_n48(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n66 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| CA\_n25A-n48C-n66A | - | n25 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| n48 | See CA\_n48C Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | | |
| n66 | 15 | Yes | Yes | Yes | Yes |  |  | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  | Yes |  |  |  |  |  |  |
| n25 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 1 |
| n48 |  | See CA\_n48C Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | |
| n66 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |

### 6.7.3 Co-existence studies

Table 6.7.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. It can be seen that there are 2nd harmonic issues from n25 UL into n48 DL but that is addressed in the lower order combination CA\_n25-48.

Table 6.7.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge |
| n25 | 1850 | 1915 | 1930 | 1995 | 3700 | 3830 | 5550 | 5745 | 7400 | 7660 |
| n48 | 3550 | 3700 | 3550 | 3700 | 7100 | 7400 | 10650 | 11100 | 14200 | 14800 |
| n66 | 1710 | 1780 | 2110 | 2200 | 3420 | 3560 | 5130 | 5340 | 6840 | 7120 |

Table 6.7.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. It can be seen that there are no issues.

Table 6.7.3-2: Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge |
| n25 | 1850 | 1915 | 1930 | 1995 | 3860 | 3990 | 5790 | 5985 | 7720 | 7980 |
| n48 | 3550 | 3700 | 3550 | 3700 | 7400 | 10650 | 11100 | 14200 | 14800 | 7400 |
| n66 | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 | 8440 | 8800 |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1.

### 6.7.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n25, n48 and n66, the ΔTIB,c and ΔRIB,c values are shown in table 6.7.4-1 and table 6.7.4-2, respectively. Values are same as for DC\_2-48\_n66.

Table 6.7.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n25-n48-n66 | n25 | 0.6 |
| n48 | 0.8 |
| n66 | 0.6 |

Table 6.7.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n25-n48-n66 | n25 | 0.3 |
| n48 | 0.5 |
| n66 | 0.3 |

### 6.7.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.8 CA\_n39-n40-n41

### 6.8.1 Operating bands for CA

**Table 6.8.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR Band** | **NR Band** | **Uplink (UL) band** | | | **Downlink (DL) band** | | | **Duplex**  **mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n39A-n40A-n41A | n39 | 1880 MHz | – | 1920 MHz | 1880 MHz | – | 1920 MHz | TDD |
| n40 | 2300 MHz | – | 2400 MHz | 2300 MHz | – | 2400 MHz | TDD |
| n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |

### 6.8.2 Channel bandwidths per operating band for CA

Table 6.8.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA  configuration** | **NR Band** | **SCS (kHz)** | **5  MHz** | **10  MHz** | **15  MHz** | **20  MHz** | **25  MHz** | **30  MHz** | **40 MHz** | **50 MHz** | **60 MHz** | **70 MHz** | **80 MHz** | **90 MHz** | **100 MHz** | **Bandwidth combination set** |
| CA\_n39A-n40A-n41A | - | n39 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n40 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  | Yes |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  | Yes |  |  |
| n41 | 15 |  | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |

### 6.8.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.8.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. It can be seen that no harmonic issue for band combination CA\_n39-n40-n41.

**Table 6.8.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n39 | 1880 | 1920 | 1880 | 1920 | 3760 | 3840 | 5640 | 5760 |  |  |
| n40 | 2300 | 2400 | 2300 | 2400 | 4600 | 4800 | 6900 | 7200 |  |  |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 |  |  |

Table 6.8.3-2 gives harmonic mixing issue for CA with Band n39, n40 and n41. It is seen that no harmonic mixing issue for band combination CA\_n39-n40-n41.

**Table 6.8.3-2: Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n39 | 1880 | 1920 | 1880 | 1920 | 3760 | 3840 | 5640 | 5760 |  |  |
| n40 | 2300 | 2400 | 2300 | 2400 | 4600 | 4800 | 6900 | 7200 |  |  |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 |  |  |

### 6.8.4 ∆TIB and ∆RIB values

For CA\_n39A-n40A-n41A, the ΔTIB,c and ΔRIB values are the same with DC\_39\_n40-n41, which are given in the tables below.

**Table 6.8.4-1: ΔTIB,c**

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n39A-n40A-n41A | n39 | 0.3 |
| n40 | 0.3 |
| n41 | 0.3 |

**Table 6.8.4-2: ΔRIB,c**

| Inter-band CA Configuration | NR Band | ΔRIB [dB] |
| --- | --- | --- |
| CA\_n39A-n40A-n41A | n39 | 0 |
| n40 | 0 |
| n41 | 0 |

### 6.8.5 REFSENS requirements

There are no specific REFSENS requirements for this combination in 3DL/1UL NR CA operation.

## 6.9 CA\_n39-n40-n79

### 6.9.1 Operating bands for CA

**Table 6.9.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR Band** | **NR Band** | **Uplink (UL) band** | | | **Downlink (DL) band** | | | **Duplex**  **mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n39A-n40A-n79A | n39 | 1880 MHz | – | 1920 MHz | 1880 MHz | – | 1920 MHz | TDD |
| n40 | 2300 MHz | – | 2400 MHz | 2300 MHz | – | 2400 MHz | TDD |
| n79 | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |

### 6.9.2 Channel bandwidths per operating band for CA

**Table 6.9.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA  configuration** | **NR Band** | **SCS (kHz)** | **5  MHz** | **10  MHz** | **15  MHz** | **20  MHz** | **25  MHz** | **30  MHz** | **40 MHz** | **50 MHz** | **60 MHz** | **70 MHz** | **80 MHz** | **90 MHz** | **100 MHz** | **Bandwidth combination set** |
| CA\_n39A-n40A-n79A | - | n39 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n40 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  | Yes |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  | Yes |  |  |
| n79 | 15 |  |  |  |  |  |  | Yes | Yes |  |  |  |  |  |
| 30 |  |  |  |  |  |  | Yes | Yes | Yes |  | Yes |  | Yes |
| 60 |  |  |  |  |  |  | Yes | Yes | Yes |  | Yes |  | Yes |

### 6.9.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.9.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. It can be seen that 2nd order harmonic of Band n40 will fall into Band n79.

**Table 6.9.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n39 | 1880 | 1920 | 1880 | 1920 | 3760 | 3840 | 5640 | 5760 |  |  |
| n40 | 2300 | 2400 | 2300 | 2400 | 4600 | 4800 | 6900 | 7200 |  |  |
| n79 | 4400 | 5000 | 4400 | 5000 | 8800 | 10000 | 13200 | 15000 |  |  |

Table 6.9.3-2 gives harmonic mixing issue for CA with Band n39, n40 and n41. It is seen that 2nd harmonic mixing issue for the band combination of n40 and n79.

**Table 6.9.3-2 Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n39 | 1880 | 1920 | 1880 | 1920 | 3760 | 3840 | 5640 | 5760 |  |  |
| n40 | 2300 | 2400 | 2300 | 2400 | 4600 | 4800 | 6900 | 7200 |  |  |
| n79 | 4400 | 5000 | 4400 | 5000 | 8800 | 10000 | 13200 | 15000 |  |  |

### 6.9.4 ∆TIB and ∆RIB values

For CA\_n39A-n40A-n79A, the ΔTIB,c and ΔRIB values are the same with DC\_39\_n40-n79, which are given in the tables below.

1. Table 6.9.4-1: ΔTIB,c

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n39-n40-n79 | n39 | 0.3 |
| n40 | 0 |
| n79 | 0.8 |

**Table 6.9.4-2: ΔRIB,c**

| Inter-band CA Configuration | NR Band | ΔRIB [dB] |
| --- | --- | --- |
| CA\_n39-n40-n79 | n39 | 0.3 |
| n40 | 0.3 |
| n79 | 0.5 |

### 6.9.5 REFSENS requirements

The harmonic and harmonic mixing issue for band n40 and band n79 have been already addressed in [7] TR 38.716-02-00. No need to specify for REFSENS requirements for this combination in 3DL/1UL NR CA operation.

## 6.10 CA\_n1-n77-n257

### 6.10.1 Operating bands for CA

Table 6.10.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n77-n257 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |
| n257 | 26500 MHz | – | 29500 MHz | 26500 MHz | – | 29500 MHz | TDD |

### 6.10.2 Channel bandwidths per operating band for CA

Table 6.10.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** | **SCS**  **(kHz)** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** | **Bandwidth combination set** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n1A-n77A-n257A | - | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |
| n257 | 60 |  |  |  |  |  |  |  | Yes |  |  |  |  | Yes | Yes |  |
| 120 |  |  |  |  |  |  |  | Yes |  |  |  |  | Yes | Yes | Yes |
| CA\_n1A-n77A-n257G | CA\_n257G | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |
| n257 | See CA\_n257G in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n1A-n77A-n257H | CA\_n257G  CA\_n257H | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |
| n257 | See CA\_n257H in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n1A-n77A-n257I | CA\_n257G  CA\_n257H  CA\_n257I | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |
| n257 | See CA\_n257I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.10.3 Co-existence requirements

### 6.10.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n1, n77 and n257, the ΔTIB,c and ΔRIB,c values are shown in table 6.10.4-1 and table 6.10.4-2, respectively.

Table 6.10.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n77-n257 | n1 | 0.6 |
| n77 | 0.8 |
| n257 | 0 |

Table 6.10.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n77-n257 | n1 | 0.2 |
| n77 | 0.5 |
| n257 | 0 |

### 6.10.5 REFSENS requirements

MSD studies can be omitted because harmonic interference between FR1 bands have been already studied for CA\_n1-n77, and harmonic interference between FR1 bands and FR2 band are negligible.

## 6.11 CA\_n1-n78-n257

### 6.11.1 Operating bands for CA

Table 6.11.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n78-n257 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |
| n257 | 26500 MHz | – | 29500 MHz | 26500 MHz | – | 29500 MHz | TDD |

### 6.11.2 Channel bandwidths per operating band for CA

Table 6.11.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** | **SCS**  **(kHz)** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** | | **Bandwidth combination set** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n1A-n78A-n257A | - | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | |
| n78 | 15 |  | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |  |  | |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  | |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  | |
| n257 | 60 |  |  |  |  |  |  |  | Yes |  |  |  |  | Yes | Yes |  | |
| 120 |  |  |  |  |  |  |  | Yes |  |  |  |  | Yes | Yes | Yes | |
| CA\_n1A-n78A-n257D | - | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | |
| n78 | 15 |  | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |  |  | |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  | |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  | |
| n257 | See CA\_n257D in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n78A-n257E | - | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | 0 | |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| n78 | 15 |  | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |
| n257 | See CA\_n257E in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n1A-n78A-n257F | - | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | 0 | |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| n78 | 15 |  | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |
| n257 | See CA\_n257F in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n1A-n78A-n257G | CA\_n257G | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | |
| n78 | 15 |  | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |  |  | |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  | |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  | |
| n257 | See CA\_n257G in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n78A-n257H | CA\_n257G  CA\_n257H | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | |
| n78 | 15 |  | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |  |  | |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  | |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  | |
| n257 | See CA\_n257H in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n78A-n257I | CA\_n257G  CA\_n257H  CA\_n257I | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | |
| n78 | 15 |  | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |  |  | |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  | |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  | |
| n257 | See CA\_n257I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n78A-n257J | - | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | |
| n78 | 15 |  | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |  |  | |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  | |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  | |
| n257 | See CA\_n257J in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n78A-n257K | - | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | |
| n78 | 15 |  | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |  |  | |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  | |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  | |
| n257 | See CA\_n257K in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n78A-n257L | - | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | |
| n78 | 15 |  | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |  |  | |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  | |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  | |
| n257 | See CA\_n257L in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n78A-n257M | - | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | 0 | |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| n78 | 15 |  | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |
| n257 | See CA\_n257M in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.11.3 Co-existence requirements

### 6.11.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n1, n78 and n257, the ΔTIB,c and ΔRIB,c values are shown in table 6.11.4-1 and table 6.11.4-2, respectively.

Table 6.11.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n78-n257 | n1 | 0.3 |
| n78 | 0.8 |
| n257 | 0 |

Table 6.11.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n78-n257 | n1 | 0 |
| n78 | 0.5 |
| n257 | 0 |

### 6.11.5 REFSENS requirements

MSD studies can be omitted because harmonic interference between FR1 bands have been already studied for CA\_n1-n78, and harmonic interference between FR1 bands and FR2 band are negligible.

## 6.12 CA\_n1-n79-n257

### 6.12.1 Operating bands for CA

Table 6.12.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n79-n257 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n79 | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |
| n257 | 26500 MHz | – | 29500 MHz | 26500 MHz | – | 29500 MHz | TDD |

### 6.12.2 Channel bandwidths per operating band for CA

Table 6.12.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** | **SCS**  **(kHz)** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** | **Bandwidth combination set** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n1A-n79A-n257A | - | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| n79 | 15 |  |  |  |  |  |  | Yes | Yes |  |  |  |  |  |  |  |
| 30 |  |  |  |  |  |  | Yes | Yes | Yes |  | Yes |  | Yes |  |  |
| 60 |  |  |  |  |  |  | Yes | Yes | Yes |  | Yes |  | Yes |  |  |
| n257 | 60 |  |  |  |  |  |  |  | Yes |  |  |  |  | Yes | Yes |  |
| 120 |  |  |  |  |  |  |  | Yes |  |  |  |  | Yes | Yes | Yes |
| CA\_n1A-n79A-n257G | CA\_n257G | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| n79 | 15 |  |  |  |  |  |  | Yes | Yes |  |  |  |  |  |  |  |
| 30 |  |  |  |  |  |  | Yes | Yes | Yes |  | Yes |  | Yes |  |  |
| 60 |  |  |  |  |  |  | Yes | Yes | Yes |  | Yes |  | Yes |  |  |
| n257 | See CA\_n257G in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n1A-n79A-n257H | CA\_n257G  CA\_n257H | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| n79 | 15 |  |  |  |  |  |  | Yes | Yes |  |  |  |  |  |  |  |
| 30 |  |  |  |  |  |  | Yes | Yes | Yes |  | Yes |  | Yes |  |  |
| 60 |  |  |  |  |  |  | Yes | Yes | Yes |  | Yes |  | Yes |  |  |
| n257 | See CA\_n257H in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n1A-n79A-n257I | CA\_n257G  CA\_n257H  CA\_n257I | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| n79 | 15 |  |  |  |  |  |  | Yes | Yes |  |  |  |  |  |  |  |
| 30 |  |  |  |  |  |  | Yes | Yes | Yes |  | Yes |  | Yes |  |  |
| 60 |  |  |  |  |  |  | Yes | Yes | Yes |  | Yes |  | Yes |  |  |
| n257 | See CA\_n257I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.12.3 Co-existence requirements

Void.

### 6.12.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n1, n79 and n257, the ΔTIB,c and ΔRIB,c values are shown in table 6.12.4-1 and table 6.12.4-2, respectively.

Table 6.12.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n79-n257 | n1 | 0 |
| n79 | 0 |
| n257 | 0 |

Table 6.12.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n79-n257 | n1 | 0 |
| n79 | 0 |
| n257 | 0 |

### 6.12.5 REFSENS requirements

MSD studies can be omitted because harmonic interference between FR1 bands have been already studied for CA\_n1-n79, and harmonic interference between FR1 bands and FR2 band are negligible.

## 6.13 CA\_n3-n41-n77

### 6.13.1 Operating bands for CA

Table 6.13.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n3-n41-n77 | n3 | 1710MHz | – | 1780MHz | 1805MHz | – | 1880MHz | FDD |
| n41 | 2496MHz | – | 2690MHz | 2496MHz | – | 2690MHz | TDD |
| n77 | 3300MHz | – | 4200MHz | 3300MHz | – | 4200MHz | TDD |

### 6.13.2 Channel bandwidths per operating band for CA

Table 6.13.2-1: Supported channel bandwidths

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n3A-n41A-n77A | - | n3 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n41 | 15 |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n3A-n41A-n77(2A) | - | n3 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n41 | 15 |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 in TS 38.101-1 | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.13.3 Co-existence studies

Co-existence studies of CA\_n3-n41-n77 with 1UL are already covered in the constituent fall-back modes.

### 6.13.4 ∆TIB,c and ∆RIB,c values

For CA\_n3-n41-n77, the ΔTIB,c and ΔRIB,c values can reuse the values for DC\_3-41\_n77 as shown in table 6.13.4-1 and table 6.13.4-2, respectively.

Table 6.13.4-1: ΔTIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n41-n77 | n3 | 0.6 |
| n41 | 0.31/0.82 |
| n77 | 0.8 |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2515-2690 MHz.  NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2515 MHz. | | |

Table 6.13.4-2: ΔRIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n41-n77 | n3 | 0.2 |
| n41 | 01/0.52 |
| n77 | 0.5 |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2515-2690 MHz.  NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2515 MHz. | | |

### 6.13.5 REFSENS requirements

<void>

## 6.14 CA\_n28-n41-n77

### 6.14.1 Operating bands for CA

Table 6.14.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n28-n41-n77 | n28 | 703MHz | – | 748MHz | 758MHz | – | 803MHz | FDD |
| n41 | 2496MHz | – | 2690MHz | 2496MHz | – | 2690MHz | TDD |
| n77 | 3300MHz | – | 4200MHz | 3300MHz | – | 4200MHz | TDD |

### 6.14.2 Channel bandwidths per operating band for CA

Table 6.14.2-1: Supported channel bandwidths

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n28A-n41A-n77A | - | n28 | 15 | Yes | Yes | Yes | Yes |  | Yes |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  | Yes |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n41 | 15 |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n28A-n41A-n77(2A) | - | n28 | 15 | Yes | Yes | Yes | Yes |  | Yes |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  | Yes |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n41 | 15 |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 in TS 38.101-1 | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.14.3 Co-existence studies

Co-existence studies of CA\_n28-n41-n77 with 1UL are already covered in the constituent fall-back modes.

### 6.14.4 ∆TIB,c and ∆RIB,c values

For CA\_n28-n41-n77, the ΔTIB,c and ΔRIB,c values can reuse the values for DC\_28-41\_n77 as shown in table 6.14.4-1 and table 6.14.4-2, respectively.

Table 6.14.4-1: ΔTIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n28-n41-n77 | n28 | 0.5 |
| n41 | 0.3 |
| n77 | 0.8 |

Table 6.14.4-2: ΔRIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n28-n41-n77 | n28 | 0.2 |
| n41 | 0 |
| n77 | 0.5 |

### 6.14.5 REFSENS requirements

There are no additional MSD requirements for this band combination

## 6.15 CA\_n28-n41-n78

### 6.15.1 Operating bands for CA

Table 6.15.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n28-n41-n78 | n28 | 703MHz | – | 748MHz | 758MHz | – | 803MHz | FDD |
| n41 | 2496MHz | – | 2690MHz | 2496MHz | – | 2690MHz | TDD |
| n78 | 3300MHz | – | 4200MHz | 3300MHz | – | 4200MHz | TDD |

### 6.15.2 Channel bandwidths per operating band for CA

Table 6.15.2-1: Supported channel bandwidths

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n28A-n41A-n78(2A) | - | n28 | 15 | Yes | Yes | Yes | Yes |  | Yes |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  | Yes |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n41 | 15 |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| n78 | See CA\_n78(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 in TS 38.101-1 | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.15.3 Co-existence studies

Co-existence studies of CA\_n28-n41-n78 with 1UL are already covered in the constituent fall-back modes.

### 6.15.4 ∆TIB,c and ∆RIB,c values

For CA\_n28-n41-n78, the ΔTIB,c and ΔRIB,c values have been defined in TS 38.101-1.

### 6.15.5 REFSENS requirements

There are no additional MSD requirements for this band combination.

## 6.16 CA\_n1-n8-n78

### 6.16.1 Operating bands for CA

Table 6.16.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n8-n78 | n1 | 1920MHz | – | 1980MHz | 2110MHz | – | 2170MHz | FDD |
| n8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |
| n78 | 3300MHz | – | 3800MHz | 3300MHz | – | 3800MHz | TDD |

### 6.16.2 Channel bandwidths per operating band for CA

Table 6.16.2-1: Supported channel bandwidths

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n1A-n8A-n78(2A) | - | n1 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |
| n8 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |
| n78 | See CA\_n78(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |

### 6.16.3 Co-existence studies

Co-existence analysis is captured into REL16 TR 38.416-03-01 for CA\_n1A-n8A-n78A.

### 6.16.4 ∆TIB,c and ∆RIB,c values

Already in specification.

Table 6.16.4-1: ΔTIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n8-n78 | n1 | 0.3 |
| n8 | 0.6 |
| n78 | 0.8 |

Table 6.16.4-2: ΔRIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n8-n78 | n1 | 0 |
| n8 | 0.2 |
| n78 | 0.5 |

### 6.16.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

## 6.17 CA\_n8-n40-n41

### 6.17.1 Operating bands for CA

**Table 6.17.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR Band** | **NR Band** | **Uplink (UL) band** | | | **Downlink (DL) band** | | | **Duplex**  **mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n8-n40-n41 | n8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |
| n40 | 2300 MHz | – | 2400 MHz | 2300 MHz | – | 2400 MHz | TDD |
| n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |

### 6.17.2 Channel bandwidths per operating band for CA

Table 6.17.2-1: Supported channel bandwidths

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA  configuration** | **NR Band** | **SCS (kHz)** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n8A-n40A-n41A | - | n8 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n40 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  | Yes |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  | Yes |  |  |
| n41 | 15 |  | Yes | Yes | Yes |  |  | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes |  |  | Yes | Yes | Yes |  | Yes | Yes | Yes |

### 6.17.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.17.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. It can be seen that the 3rd order harmonic of Band n8 will fall into Band n41.

**Table 6.17.3-1: Harmonic Interference**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n8 | 880 | 915 | 925 | 960 | 1760 | 1830 | 2640 | 2745 |  |  |
| n40 | 2300 | 2400 | 2300 | 2400 | 4600 | 4800 | 6900 | 7200 |  |  |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 |  |  |

Table 6.17.3-2 gives harmonic mixing issue for CA with Band n8, n40 and n41. It is seen that no harmonic mixing issue for band combination CA\_n8-n40-n41.

**Table 6.17.3-2 Harmonic mixing**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n8 | 880 | 915 | 925 | 960 | 1850 | 1920 | 2775 | 2880 |  |  |
| n40 | 2300 | 2400 | 2300 | 2400 | 4600 | 4800 | 6900 | 7200 |  |  |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 |  |  |

### 6.17.4 ∆TIB and ∆RIB values

For CA\_n8A-n40A-n41A, the ΔTIB,c and ΔRIB values are the same with DC\_8\_n40-n41, which are given in the tables below.

**Table 6.17.4-1: ΔTIB,c**

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n8A-n40A-n41A | n8 | 0.3 |
| n40 | 0.3 |
| n41 | 0.3 |

**Table 6.17.4-2: ΔRIB,c**

| Inter-band CA Configuration | NR Band | ΔRIB [dB] |
| --- | --- | --- |
| CA\_n8A-n40A-n41A | n8 | 0 |
| n40 | 0 |
| n41 | 0 |

### 6.17.5 REFSENS requirements

The MSD caused by 3rd order harmonic of Band n8 will fall into Band n41 have been already captured in the TR38.716-02-00. There are no additional REFSENS requirements for this combination in 3DL/1UL NR CA operation.

## 6.18 CA\_n5-n66-n77

### 6.18.1 Operating bands for CA

Table 6.18.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n5-n66-n77 | n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.18.2 Channel bandwidths per operating band for CA

Table 6.18.2-1: Supported channel bandwidths

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n5A-n66A-n77A | - | n5 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n66 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n5A-n66-n77(2A) | - | n5 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n66 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | | |

### 6.18.3 Co-existence studies

Table 6.18.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. The 4th harmonic of Band n5 may fall into own Rx of Band n77. The 2nd harmonic of Band n66 may fall into own Rx of Band n77.

Table 6.18.3-1: Harmonic Interference

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge |
| n5 | 824 | 849 | 869 | 894 | 1648 | 1698 | 2472 | 2547 | 3296 | 3396 |
| n66 | 1710 | 1780 | 2110 | 2200 | 3420 | 3560 | 5130 | 5340 |  |  |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 |  |  |

Table 6.18.3-2 gives harmonic mixing issue for CA with Band n5, n66 and n77. The 4th harmonic mixing of Band n5 may fall into own Rx of Band n77.

Table 6.18.3-2 Harmonic mixing

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge |
| n5 | 824 | 849 | 869 | 894 | 1738 | 1788 | 2607 | 2682 | 3476 | 3576 |
| n66 | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 |  |  |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 |  |  |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1 [3].

### 6.18.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n5, n66 and n77, the ΔTIB,c and ΔRIB,c values are shown in table 6.18.4-1 and table 6.18.4-2, respectively. The requirement is derived from the max operation of all fallback CAs.

Table 6.18.4-1: ΔTIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n66-n77 | n5 | 0.6 |
| n66 | 0.6 |
| n77 | 0.8 |

Table 6.18.4-2: ΔRIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n66-n77 | n5 | 0.2 |
| n66 | 0.2 |
| n77 | 0.5 |

### 6.18.5 REFSENS requirements

Band n77 MSD due to Band n5 and Band n66 uplink is already specified in 2DL/1UL WI. No specific analysis for 3DL/1UL is needed.

## 6.19 CA\_n2-n66-n77

### 6.19.1 Operating bands for CA

Table 6.19.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2-n66-n77 | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.19.2 Channel bandwidths per operating band for CA

Table 6.19.2-1: Supported channel bandwidths

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | 15 | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n2A-n66A-n77A | - | n2 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| n66 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

### 6.19.3 Co-existence studies

Table 6.19.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. The 2nd harmonic of Band n2 may fall into own Rx of Band n77. The 2nd harmonic of Band n66 may fall into own Rx of Band n77.

Table 6.19.3-1: Harmonic Interference

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge |
| n2 | 1850 | 1910 | 1930 | 1990 | 3700 | 3820 | 5550 | 5730 |  |  |
| n66 | 1710 | 1780 | 2110 | 2200 | 3420 | 3560 | 5130 | 5340 |  |  |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 |  |  |

Table 6.19.3-2 gives harmonic mixing issue for CA with Band n5, n66 and n77. The 2nd harmonic mixing of Band n2 may fall into own Rx of Band n77.

Table 6.19.3-2 Harmonic mixing

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge |
| n2 | 1850 | 1910 | 1930 | 1990 | 3860 | 3980 | 5790 | 5970 |  |  |
| n66 | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 |  |  |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 |  |  |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1 [3].

### 6.19.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n2, n66 and n77, the ΔTIB,c and ΔRIB,c values are shown in table 6.19.4-1 and table 6.19.4-2, respectively. The requirement is derived from the max operation of all fallback CAs.

Table 6.19.4-1: ΔTIB,c for

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n66-n77 | n2 | 0.6 |
| n66 | 0.6 |
| n77 | 0.8 |

Table 6.19.4-2: ΔRIB,c for

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n66-n77 | n2 | 0.2 |
| n66 | 0.2 |
| n77 | 0.5 |

### 6.19.5 REFSENS requirements

Band n77 MSD due to Band n2 and Band n66 uplink is already specified in 2DL/1UL WI. No specific analysis for 3DL/1UL is needed.

## 6.20 CA\_n66-n71-n78

### 6.20.1 Operating bands for CA

**Table 6.20.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n66-n71-n78 | n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n71 | 663 MHz | – | 698 MHz | 617 MHz | – | 652 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

### 6.20.2 Channel bandwidths per operating band for CA

**Table 6.20.2-1: Supported channel bandwidths**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n66A-n71A-n78A | - | n66 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n71 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n78 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n66A-n71A-n78(2A) | - | n66 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n71 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n78 | See CA\_n78(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 | | | | | | | | | | | | | |
| CA\_n66(2A)-n71A-n78A | - | n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | | | 0 |
| n71 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n78 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n66(2A)-n71A-n78(2A) | - | n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | | | 0 |
| n71 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n78 | See CA\_n78(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 | | | | | | | | | | | | | |

### 6.20.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

### 6.20.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n66, n71 and n78, the ΔTIB,c and ΔRIB,c values are shown in table 6.20.4-1 and table 6.20.4-2, respectively.

**Table 6.20.4-1: ΔTIB,c**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n66-n71-n78 | n66 | 0.6 |
| n71 | 0.5 |
| n78 | 0.8 |

**Table 6.20.4-2: ΔRIB,c**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n66-n71-n78 | n66 | 0.2 |
| n71 | 0.2 |
| n78 | 0.5 |

### 6.20.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.21 CA\_n38-n66-n78

### 6.21.1 Operating bands for CA

**Table 6.21.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n38-n66-n78 | n38 | 2570 MHz | – | 2620 MHz | 2570 MHz | – | 2620 MHz | TDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

### 6.21.2 Channel bandwidths per operating band for CA

**Table 6.21.2-1: Supported channel bandwidths**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n38A-n66A-n78A | - | n38 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n66 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n78 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n38A-n66A-n78(2A) | - | n38 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n66 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n78 | See CA\_n78(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 | | | | | | | | | | | | | |
| CA\_n38A-n66(2A)-n78A | - | n38 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | | |
| n78 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n38A-n66(2A)-n78(2A) | - | n38 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | | |
| n78 | See CA\_n78(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 | | | | | | | | | | | | | |

### 6.21.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

### 6.21.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n38, n66 and n78, the ΔTIB,c and ΔRIB,c values are shown in table 6.21.4-1 and table 6.21.4-2, respectively.

**Table 6.21.4-1: ΔTIB,c**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n38-n66-n78 | n38 | 0.5 |
| n66 | 0.5 |
| n78 | 0.8 |

**Table 6.21.4-2: ΔRIB,c**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n38-n66-n78 | n38 | 0.5 |
| n66 | 0.5 |
| n78 | 0.5 |

### 6.21.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.22 CA\_n25-n38-n78

### 6.22.1 Operating bands for CA

**Table 6.22.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n25-n38-n78 | n25 | 1850 MHz | – | 1915 MHz | 1930 MHz | – | 1995 MHz | FDD |
| n38 | 2570 MHz | – | 2620 MHz | 2570 MHz | – | 2620 MHz | TDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

### 6.22.2 Channel bandwidths per operating band for CA

**Table 6.22.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n25A-n38A-n78A | - | n25 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n38 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n78 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n25A-n38A-n78(2A) | - | n25 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n38 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n78 | See CA\_n78(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 | | | | | | | | | | | | | |
| CA\_n25(2A)-n38A-n78A | - | n25 | See CA\_n25(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | | 0 |
| n38 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n78 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n25(2A)-n38A-n78(2A) | - | n25 | See CA\_n25(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | | 0 |
| n38 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n78 | See CA\_n78(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 | | | | | | | | | | | | | |

### 6.22.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

### 6.22.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n25, n38 and n78, the ΔTIB,c and ΔRIB,c values are shown in table 6.22.4-1 and table 6.22.4-2, respectively.

**Table 6.22.4-1: ΔTIB,c**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n25-n38-n78 | n25 | 0.5 |
| n38 | 0.4 |
| n78 | 0.8 |

**Table 6.22.4-2: ΔRIB,c**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n25-n38-n78 | n25 | 0.2 |
| n38 | 0.4 |
| n78 | 0.5 |

### 6.22.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.23 CA\_n3-n5-n7

### 6.23.1 Operating bands for CA

Table 6.23.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n3-n5-n7 | n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n7 | 2500 MHz | – | 2570 MHz | 2620 MHz | – | 2690 MHz | FDD |

### 6.23.2 Channel bandwidths per operating band for CA

Table 6.23.2-1: Supported channel bandwidths

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n3A-n5A-n7A | - | n3 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n5 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n7 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| CA\_n3A-n5A-n7B | - | n3 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n5 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n7 | See CA\_n7B Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | | |

### 6.23.3 Co-existence studies

Table 6.23.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. It can be seen that there are no issues.

Table 6.23.3-1: Harmonic Interference

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge |
| n3 | 1710 | 1785 | 1805 | 1880 | 3420 | 3570 | 5130 | 5355 | 6840 | 7140 |
| n5 | 824 | 849 | 869 | 894 | 1648 | 1698 | 2472 | 2547 | 3296 | 3396 |
| n7 | 2500 | 2570 | 2620 | 2690 | 5000 | 5140 | 7500 | 7710 | 10000 | 10280 |

Table 6.23.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. It can be seen that there are no issues.

Table 6.23.3-2 Harmonic mixing

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge |
| n3 | 1710 | 1785 | 1805 | 1880 | 3610 | 3760 | 5415 | 5640 | 7220 | 7520 |
| n5 | 824 | 849 | 869 | 894 | 1738 | 1788 | 2607 | 2682 | 3476 | 3576 |
| n7 | 2500 | 2570 | 2620 | 2690 | 5240 | 5380 | 7860 | 8070 | 10480 | 10760 |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1.

### 6.23.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n3, n5 and n7, the ΔTIB,c and ΔRIB,c values are shown in table 6.23.4-1 and table 6.23.4-2, respectively. Values are same as for DC\_3-7\_n5.

Table 6.23.4-1: ΔTIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n5-n7 | n3 | 0.5 |
| n5 | 0.3 |
| n7 | 0.5 |

Table 6.23.4-2: ΔRIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n5-n7 | n3 | 0 |
| n5 | 0 |
| n7 | 0 |

### 6.23.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.24 CA\_n5-n7-n78

### 6.24.1 Operating bands for CA

Table 6.24.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n5-n7-n78 | n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n7 | 2500 MHz | – | 2570 MHz | 2620 MHz | – | 2690 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

### 6.24.2 Channel bandwidths per operating band for CA

Table 6.24.2-1: Supported channel bandwidths

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n5A-n7A-n78A | - | n5 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n7 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| n78 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n5A-n7B-n78A | - | n5 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n7 | See CA\_n7B Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | | |
| n78 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes4 | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes4 | Yes | Yes | Yes |

### 6.24.3 Co-existence studies

Table 6.24.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. It can be seen that there are 4th harmonic issues from n5 UL into n78 DL but that is not needed to be addressed at this level.

Table 6.24.3-1: Harmonic Interference

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge |
| n5 | 824 | 849 | 869 | 894 | 1648 | 1698 | 2472 | 2547 | 3296 | 3396 |
| n7 | 2500 | 2570 | 2620 | 2690 | 5000 | 5140 | 7500 | 7710 | 10000 | 10280 |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 | 13200 | 15200 |

Table 6.24.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. It can be seen that there are 4th harmonic mixing issues from n5 UL into n78 DL but that is not needed to be addressed at this level.

Table 6.24.3-2 Harmonic mixing

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge |
| n5 | 824 | 849 | 869 | 894 | 1738 | 1788 | 2607 | 2682 | 3476 | 3576 |
| n7 | 2500 | 2570 | 2620 | 2690 | 5240 | 5380 | 7860 | 8070 | 10480 | 10760 |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 | 13200 | 15200 |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1.

### 6.24.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n3, n5 and n7, the ΔTIB,c and ΔRIB,c values are shown in table 6.24.4-1 and table 6.24.4-2, respectively. Values are same as for DC\_5-7\_n78.

Table 6.24.4-1: ΔTIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n7-n78 | n5 | 0.6 |
| n7 | 0.6 |
| n78 | 0.8 |

Table 6.24.4-2: ΔRIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n7-n78 | n5 | 0.2 |
| n7 | 0.2 |
| n78 | 0.5 |

### 6.24.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.25 CA\_n25-n41-n77

### 6.25.1 Operating bands for CA

**Table 6.25.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n25-n41-n77 | n25 | 1850 MHz | – | 1915 MHz | 1930 MHz | – | 1995 MHz | FDD |
| n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.25.2 Channel bandwidths per operating band for CA

Table 6.25.2-1: Supported channel bandwidths

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n25A-n41A-n77A | - | n25 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n41 | 15 |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n25A-n41(2A)-n77A | - | n25 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n41 | See CA\_n41(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | | |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n25A-n41C-n77A | - | n25 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n41 | See CA\_n41C Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | | |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

### 6.25.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.25.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. It can be seen that there are 2nd harmonic issues from n25 UL into n77 DL which need to be addressed in lower order combination.

**Table 6.25.3-1: Harmonic Interference**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n25 | 1850 | 1915 | 1930 | 1995 | 3700 | 3830 | 5550 | 5745 | 7400 | 7660 |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 | 9984 | 10760 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.25.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. It can be seen that there are 2nd harmonic issues from n25 DL into n77 UL which need to be addressed in lower order combination.

**Table 6.25.3-2 Harmonic mixing**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n25 | 1850 | 1915 | 1930 | 1995 | 3860 | 3990 | 5790 | 5985 | 7720 | 7980 |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 | 9984 | 10760 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

### 6.25.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n25, n41 and n77, the ΔTIB,c and ΔRIB,c values are shown in tables below. Values are derived from DC\_2-7\_n78.

**Table 6.25.4-1: ΔTIB,c**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n25-n41-n77 | n25 | 0.5 |
| n41 | 0.5 |
| n77 | 0.6 |

**Table 6.25.4-2: ΔRIB,c**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n25-n41-n77 | n25 | 0 |
| n41 | 0 |
| n77 | 0 |

### 6.25.5 REFSENS requirements

The 2nd harmonic issues from n25 DL into n77 UL will be addressed in lower order combination.

## 6.26 CA\_n25-n66-n77

### 6.26.1 Operating bands for CA

Table 6.26.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n25-n66-n77 | n25 | 1850 MHz | – | 1915 MHz | 1930 MHz | – | 1995 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.26.2 Channel bandwidths per operating band for CA

Table 6.26.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA config | NR Band | Channel bandwidth(MHz) (NOTE 3) | | | | | | | | | | | | | Bandwidth combination set |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| CA\_n25A-n66A-n77A | - | n25 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n25A-n66(2A)-n77A | - | n25 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 0 |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n25A-n66A-n77(2A) | - | n25 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| CA\_n25A-n66(2A)-n77(2A) | - | n25 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 0 |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| CA\_n25(2A)-n66A-n77A | - | n25 | See CA\_n25(2A) Bandwidth Combination Set 0 in Table 5.5A.2-0 | | | | | | | | | | | | | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n25(2A)-n66(2A)-n77A | - | n25 | See CA\_n25(2A) Bandwidth Combination Set 0 in Table 5.5A.2-0 | | | | | | | | | | | | | 0 |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n25(2A)-n66A-n77(2A) | - | n25 | See CA\_n25(2A) Bandwidth Combination Set 0 in Table 5.5A.2-0 | | | | | | | | | | | | | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| CA\_n25(2A)-n66(2A)-n77(2A) | - | n25 | See CA\_n25(2A) Bandwidth Combination Set 0 in Table 5.5A.2-0 | | | | | | | | | | | | | 0 |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |

### 6.26.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.26.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. It can be seen that there are 2nd harmonic issues from n25 and n66 UL into n77 DL which need to be addressed in lower order combination.

**Table 6.26.3-1: Harmonic Interference**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n25 | 1850 | 1915 | 1930 | 1995 | 3700 | 3830 | 5550 | 5745 | 7400 | 7660 |
| n66 | 1710 | 1780 | 2110 | 2200 | 3420 | 3560 | 5130 | 5340 | 6840 | 7120 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.26.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. It can be seen that there are 2nd harmonic issues from n25 into n77 UL which need to be addressed in lower order combination

**Table 6.26.3-2 Harmonic mixing**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n25 | 1850 | 1915 | 1930 | 1995 | 3860 | 3990 | 5790 | 5985 | 7720 | 7980 |
| n66 | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 | 8440 | 8800 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

### 6.26.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n25, n66 and n77, the ΔTIB,c and ΔRIB,c values are shown in table 6.26.4-1 and table 6.26.4-2, respectively. Values are derived from DC\_2-66\_n78.

**Table 6.26.4-1: ΔTIB,c**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n25-n66-n77 | n25 | 0.6 |
| n66 | 0.6 |
| n77 | 0.8 |

**Table 6.26.4-2: ΔRIB,c**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n25-n66-n77 | n25 | 0.3 |
| n66 | 0.3 |
| n77 | 0.5 |

6.26.5 REFSENS requirements

The 2nd harmonic issues from n25 DL and n66 DL into n77 UL will be addressed in lower order combination.

6.27 CA\_n25-n71-n77

6.27.1 Operating bands for CA

**Table 6.27.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n25-n71-n77 | n25 | 1850 MHz | – | 1915 MHz | 1930 MHz | – | 1995 MHz | FDD |
| n71 | 663 MHz | – | 698 MHz | 617 MHz | – | 652 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

6.27.2 Channel bandwidths per operating band for CA

**Table 6.27.2-1: Supported channel bandwidths**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n25A-n71A-n77A | - | n25 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n71 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

6.27.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.27.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. It can be seen that there are 2nd harmonic issues from n25 UL into n77 DL which need to be addressed in lower order combination.

**Table 6.27.3-1: Harmonic Interference**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n25 | 1850 | 1915 | 1930 | 1995 | 3700 | 3830 | 5550 | 5745 | 7400 | 7660 |
| n71 | 663 | 698 | 617 | 652 | 1326 | 1396 | 1989 | 2094 | 2652 | 2792 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.27.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. It can be seen that there are 2nd harmonic issues from n25 DL into n77 UL which need to be addressed in lower order combination.

**Table 6.27.3-2 Harmonic mixing**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n25 | 1850 | 1915 | 1930 | 1995 | 3860 | 3990 | 5790 | 5985 | 7720 | 7980 |
| n71 | 663 | 698 | 617 | 652 | 1234 | 1304 | 1851 | 1956 | 2468 | 2608 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

6.27.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n25, n71 and n77, the ΔTIB,c and ΔRIB,c values are shown in table 6.27.4-1 and table 6.27.4-2, respectively. Values are derived from DC\_2-71\_n78.

**Table 6.27.4-1: ΔTIB,c**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n25-n71-n77 | n25 | 0.6 |
| n71 | 0.6 |
| n77 | 0.8 |

**Table 6.27.4-2: ΔRIB,c**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n25-n71-n77 | n25 | 0.2 |
| n71 | 0.2 |
| n77 | 0.5 |

6.27.5 REFSENS requirements

The 2nd harmonic issues from n25 DL into n77 UL will be addressed in lower order combination.

6.28 CA\_n41-n66-n77

6.28.1 Operating bands for CA

**Table 6.28.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n41-n66-n77 | n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

6.28.2 Channel bandwidths per operating band for CA

**Table 6.28.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n41A-n66A-n77A | - | n41 | 15 |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| n66 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n41(2A)-n66A-n77A | - | n41 | See CA\_n41(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | | | 0 |
| n66 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n41C-n66A-n77A | - | n41 | See CA\_n41C Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | | | 0 |
| n66 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

6.28.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.28.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. It can be seen that there are 2nd harmonic issues from n66 UL into n77 DL which need to be addressed in lower order combination.

**Table 6.28.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 | 9984 | 10760 |
| n66 | 1710 | 1780 | 2110 | 2200 | 3420 | 3560 | 5130 | 5340 | 6840 | 7120 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.28.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. No issues can be seen.

**Table 6.28.3-2: Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 | 9984 | 10760 |
| n66 | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 | 8440 | 8800 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

6.28.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n41, n66 and n77, the ΔTIB,c and ΔRIB,c values are shown in table 6.28.4-1 and table 6.28.4-2, respectively. Values are derived from DC\_66\_n7-n78.

**Table 6.28.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n41-n66-n77 | n41 | 0.5 |
| n66 | 0.6 |
| n77 | 0.8 |

**Table 6.28.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n41-n66-n77 | n41 | 0.2 |
| n66 | 0.2 |
| n77 | 0.5 |

6.28.5 REFSENS requirements

The 2nd harmonic issues from n66 DL into n77 UL will be addressed in lower order combination.

6.29 CA\_n41-n71-n77

6.29.1 Operating bands for CA

**Table 6.29.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n41-n71-n77 | n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |
| n71 | 663 MHz | – | 698 MHz | 617 MHz | – | 652 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

6.29.2 Channel bandwidths per operating band for CA

**Table 6.29.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n41A-n71A-n77A | - | n41 | 15 |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| n71 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n41(2A)-n71A-n77A | - | n41 | See CA\_n41(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | | | 0 |
| n71 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n41C-n71A-n77A | - | n41 | See CA\_n41C Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | | | 0 |
| n71 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

6.29.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.29.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. No issues can be seen.

**Table 6.29.3-1: Harmonic Interference**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 | 9984 | 10760 |
| n71 | 663 | 698 | 617 | 652 | 1326 | 1396 | 1989 | 2094 | 2652 | 2792 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.29.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. No issues can be seen.

**Table 6.29.3-2: Harmonic mixing**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 | 9984 | 10760 |
| n71 | 663 | 698 | 617 | 652 | 1234 | 1304 | 1851 | 1956 | 2468 | 2608 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

6.29.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n41, n71 and n77, the ΔTIB,c and ΔRIB,c values are shown in table 6.29.4-1 and table 6.29.4-2, respectively. Values are derived from DC\_41\_n28-n77.

**Table 6.29.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n41-n71-n77 | n41 | 0.3 |
| n71 | 0.5 |
| n77 | 0.8 |

**Table 6.29.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n41-n71-n77 | n41 | 0 |
| n71 | 0.2 |
| n77 | 0.5 |

6.29.5 REFSENS requirements

No harmonic issues to be addressed.

6.30 CA\_n66-n71-n77

6.30.1 Operating bands for CA

**Table 6.30.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n66-n71-n77 | n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n71 | 663 MHz | – | 698 MHz | 617 MHz | – | 652 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

6.30.2 Channel bandwidths per operating band for CA

**Table 6.30.2-1: Supported channel bandwidths**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n66A-n71A-n77A | - | n66 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n71 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

6.30.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.30.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. It can be seen that there are 2nd harmonic issues from n66 UL into n77 DL which need to be addressed in lower order combination.

**Table 6.30.3-1: Harmonic Interference**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n66 | 1710 | 1780 | 2110 | 2200 | 3420 | 3560 | 5130 | 5340 | 6840 | 7120 |
| n71 | 663 | 698 | 617 | 652 | 1326 | 1396 | 1989 | 2094 | 2652 | 2792 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.30.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. No issues can be seen.

**Table 6.30.3-2: Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n66 | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 | 8440 | 8800 |
| n71 | 663 | 698 | 617 | 652 | 1234 | 1304 | 1851 | 1956 | 2468 | 2608 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

6.30.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n66, n71 and n77, the ΔTIB,c and ΔRIB,c values are shown in table 6.30.4-1 and table 6.30.4-2, respectively. Values are derived from DC\_66-71\_n78.

**Table 6.30.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n66-n71-n77 | n66 | 0.6 |
| n71 | 0.6 |
| n77 | 0.8 |

**Table 6.30.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n66-n71-n77 | n66 | 0.2 |
| n71 | 0.2 |
| n77 | 0.5 |

6.30.5 REFSENS requirements

The 2nd harmonic issues from n66 DL into n77 UL will be addressed in lower order combination.

## 6.31 CA\_n5-n25-n77

### 6.31.1 Operating bands for CA

Table 6.31.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n5-n25-n77 | n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n25 | 1850 MHz | – | 1915 MHz | 1930 MHz | – | 1995 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.31.2 Channel bandwidths per operating band for CA

Table 6.31.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **Channel bandwidth (MHz)** | | | | | | | | | | | | | **Bandwidth combination set** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| CA\_n5A-n25A-n77A | - | n5 | 5 | 10 | 15 | 10 |  |  |  |  |  |  |  |  |  | 0 |
| n25 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

### 6.31.3 Co-existence studies

Table 6.31.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. The 4th and 5th harmonics of band n5 uplink may fall into band n77 downlink. The 2nd harmonic of band n25 may fall into band n77 downlink.

Table 6.31.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | | **5th Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge |
| n5 | 824 | 849 | 869 | 894 | 1648 | 1698 | 2472 | 2547 | 3296 | 3396 | 4120 | 4245 |
| n25 | 1850 | 1915 | 1930 | 1995 | 3700 | 3830 | 5550 | 5745 | - | - | - | - |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | - | - | - | - |

Table 6.31.3-2 gives harmonic mixing issue for CA with Band n5, n25 and n77. There is a harmonic mixing relation for the 4th harmonic of n5 downlink and n77 downlink. There is a harmonic mixing relation for the 2nd harmonic of n25 downlink and n77 downlink.

Table 6.31.3-2 Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | | **5th Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge |
| n5 | 824 | 849 | 869 | 894 | 1738 | 1788 | 2607 | 2682 | 3476 | 3576 | 4345 | 4470 |
| n25 | 1850 | 1915 | 1930 | 1995 | 3860 | 3990 | 5790 | 5985 | - | - | - | - |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | - | - | - | - |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1 [3].

### 6.31.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n5, n25 and n77, the ΔTIB,c and ΔRIB,c values are shown in table 6.31.4-1 and table 6.31.4-2, respectively. The requirement is reused from the similar combination, DC\_2-5\_n77.

Table 6.31.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n25-n77 | n5 | 0.6 |
| n25 | 0.6 |
| n77 | 0.8 |

Table 6.31.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n25-n77 | n5 | 0.2 |
| n25 | 0.2 |
| n77 | 0.5 |

### 6.31.5 REFSENS requirements

MSD due to the above harmonic issues are specified in 2DL/1UL fallback CAs, CA\_n5-n77 and CA\_n25-n77.

## 6.32 CA\_n3-n18-n41

### 6.32.1 Operating bands for CA

Table 6.32.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band | Uplink (UL) band | | | Downlink (DL) band | | | Duplex  mode |
| BS receive / UE transmit | | | BS transmit / UE receive | | |
| FUL\_low – FUL\_high | | | FDL\_low – FDL\_high | | |
| n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880MHz | FDD |
| n18 | 815 MHz | – | 830 MHz | 860 MHz | – | 875 MHz | FDD |
| n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |

### 6.32.2 Channel bandwidths per operating band for CA

Table 6.32.2-1: Supported bandwidths per CA band combination of band n3+n18+n41

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **NR Uplink CA configuration** | **NR Band** | **SCS**  **(kHz)** | **5**  **MHz** | **10**  **MHz** | **15**  **MHz** | **20**  **MHz** | **25**  **MHz** | **30**  **MHz** | **40**  **MHz** | **50**  **MHz** | **60**  **MHz** | **70**  **MHz** | **80**  **MHz** | **90**  **MHz** | **100 MHz** | **Bandwidth combination set** |
| CA\_n3A-n18A-n41A | - | n3 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
|  | 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n18 | 15 | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n41 | 15 |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
|  | 60 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |  |

### 6.32.3 UE co-existence studies

Co-existence studies of CA\_n3-n18-n41 with 1UL have been covered in the constituent fall-back modes.

### 6.32.4 ∆TIB and ∆RIB values

For three DLs of Band n3, n18 and n41, the ΔTIB,c and ΔRIB,c values specified for LTE CA\_3-5-41 are used as below.

Table 6.32.4-1: ΔTIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n18-n41 | n3 | 0.5 |
| n18 | 0.3 |
| n41 | 0.31/0.82 |
| NOTE 1: Applicable for the frequency range of 2515-2690 MHz.  NOTE 2: Applicable for the frequency range of 2496-2515 MHz. | | |

Table 6.32.4-2: ΔRIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n18-n41 | n3 | 0 |
| n18 | 0 |
| n41 | 01/0.52 |
| NOTE 1: Applicable for the frequency range of 2515-2690 MHz.  NOTE 2: Applicable for the frequency range of 2496-2515 MHz. | | |

### 6.32.5 REFSENS requirements

There are no additional MSD requirements for this band combination

## 6.33 CA\_n3-n28-n77

### 6.33.1 Operating bands for CA

Table 6.33.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n3-n28-n77 | n3 | 1710MHz | – | 1780MHz | 1805MHz | – | 1880MHz | FDD |
| n28 | 703MHz | – | 748MHz | 758MHz | – | 803MHz | FDD |
| n77 | 3300MHz | – | 4200MHz | 3300MHz | – | 4200MHz | TDD |

### 6.33.2 Channel bandwidths per operating band for CA

Table 6.33.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| CA\_n3A-n28A-n77(2A) | CA\_n77(2A) | n3 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 0 |
| n28 | 5 | 10 | 15 | 20 |  | 30 |  |  |  |  |  |  |  |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 in TS 38.101-1 | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.33.3 Co-existence studies

For 3DL/1UL NR CA, only, only harmonic issue and harmonic mixing issue need to be considered. There is no in this band combination MSD issue.

### 6.33.4 ∆TIB,c and ∆RIB,c values

For CA\_n3-n28-n77, the ΔTIB,c and ΔRIB,c values have been defined in TS 38.101-1.

### 6.33.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

## 6.34 CA\_n3-n28-n78

### 6.34.1 Operating bands for CA

Table 6.34.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n3-n28-n78 | n3 | 1710MHz | – | 1780MHz | 1805MHz | – | 1880MHz | FDD |
| n28 | 703MHz | – | 748MHz | 758MHz | – | 803MHz | FDD |
| n78 | 3300MHz | – | 3800MHz | 3300MHz | – | 3800MHz | TDD |

### 6.34.2 Channel bandwidths per operating band for CA

Table 6.34.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n3A-n28A-n78(2A) | CA\_n78(2A) | n3 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
|  | 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
|  | 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n28 | 15 | Yes | Yes | Yes | Yes |  | Yes |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  | Yes |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n78 | See CA\_n78(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 in TS 38.101-1 | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.34.3 Co-existence studies

For 3DL/1UL NR CA, only, only harmonic issue and harmonic mixing issue need to be considered. There is no in this band combination MSD issue.

### 6.34.4 ∆TIB,c and ∆RIB,c values

For CA\_n3-n28-n78, the ΔTIB,c and ΔRIB,c values have been defined in TS 38.101-1.

### 6.34.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

## 6.35 CA\_n28-n41-n78

### 6.35.1 Operating bands for CA

Table 6.35.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n28-n41-n78 | n28 | 703MHz | – | 748MHz | 758MHz | – | 803MHz | FDD |
| n41 | 2496MHz | – | 2690MHz | 2496MHz | – | 2690MHz | TDD |
| n78 | 3300MHz | – | 4200MHz | 3300MHz | – | 4200MHz | TDD |

### 6.35.2 Channel bandwidths per operating band for CA

Table 6.35.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n28A-n41A-n78(2A) | CA\_n78(2A) | n28 | 15 | Yes | Yes | Yes | Yes |  | Yes |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  | Yes |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n41 | 15 |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| n78 | See CA\_n78(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 in TS 38.101-1 | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.35.3 Co-existence studies

Co-existence studies of CA\_n28-n41-n78 with 1UL are already covered in the constituent fall-back modes.

### 6.35.4 ∆TIB,c and ∆RIB,c values

For CA\_n28-n41-n78, the ΔTIB,c and ΔRIB,c values have been defined in TS 38.101-1.

### 6.35.5 REFSENS requirements

There are no additional MSD requirements for this band combination.

## 6.36 CA\_n13-n25-n66

### 6.36.1 Operating bands for CA

Table 6.36.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n13-n25-n66 | n13 | 777 MHz | – | 787 MHz | 746 MHz | – | 756 MHz | FDD |
| n25 | 1850 MHz | – | 1915 MHz | 1930 MHz | – | 1995 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |

### 6.36.2 Channel bandwidths per operating band for CA

Table 6.36.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n13A-n25A-n66A | - | n13 | 15 | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | Yes |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n25 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n66 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.36.3 Co-existence studies

Co-existence studies of CA\_n13-n25-n66 with 2UL are already covered in the constituent fall-back modes.

### 6.36.4 ∆TIB,c and ∆RIB,c values

For CA\_n13-n25-n66, the ΔTIB,c and ΔRIB,c values can reuse DC\_2-13\_n66 defined in TS 38.101-3.

Table 6.36.4-1: ΔTIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n13-n25-n66 | n13 | 0.3 |
| n25 | 0.5 |
| n66 | 0.5 |

Table 6.36.4-2: ΔRIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n13-n25-n66 | n13 | 0 |
| n25 | 0.3 |
| n66 | 0.3 |

### 6.36.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

## 6.37 CA\_n25-n29-n66

### 6.37.1 Operating bands for CA

Table 6.37.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band | Uplink (UL) band | | | Downlink (DL) band | | | Duplex  mode |
| BS receive / UE transmit | | | BS transmit / UE receive | | |
| FUL\_low – FUL\_high | | | FDL\_low – FDL\_high | | |
| n25 | 1850 MHz | – | 1915 MHz | 1930 MHz | – | 1995 MHz | FDD |
| n29 | N/A | | | 717 MHz | – | 728 MHz | SDL |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |

### 6.37.2 Channel bandwidths per operating band for CA

Table 6.37.2-1: Supported bandwidths per CA band combination of band n25+n29+n66

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **NR Uplink CA configuration** | **NR Band** | **SCS**  **(kHz)** | **5**  **MHz** | **10**  **MHz** | **15**  **MHz** | **20**  **MHz** | **25**  **MHz** | **30**  **MHz** | **40**  **MHz** | **50**  **MHz** | **60**  **MHz** | **70**  **MHz** | **80**  **MHz** | **90**  **MHz** | **100 MHz** | **Bandwidth combination set** |
| CA\_n25A-n29A-n66A | - | n25 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n29 | 15 | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | Yes |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n66 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |

### 6.37.3 UE co-existence studies

Co-existence studies of CA\_n25-n29-n66 with 1UL have been covered in the constituent fall-back modes.

### 6.37.4 ∆TIB and ∆RIB values

For three DLs of Band n25, n29 and n66, the ΔTIB,c and ΔRIB,c values specified for DC\_29-66\_n2 are used as below.

Table 6.37.4-1: ΔTIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n25-n29-n66 | n25 | 0.5 |
| n29 | 0 |
| n66 | 0.5 |

Table 6.37.4-2: ΔRIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n25-n29-n66 | n25 | 0.3 |
| n29 | 0 |
| n66 | 0.3 |

### 6.37.5 REFSENS requirements

There are no additional MSD requirements for this band combination

## 6.38 CA\_n28-n77-n79

### 6.38.1 Operating bands for CA

Table 6.38.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n28-n77-n79 | n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |
| n79 | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |

### 6.38.2 Channel bandwidths per operating band for CA

Table 6.38.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA configuration** | **Uplink CA configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE3)** | | | | | | | | | | | | | **Bandwidth combination set** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| CA\_n28A-n77A-n79A4 | - | n28 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | 15 | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |
| CA\_n28A-n77(2A)-n79A4 | - | n28 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1.  NOTE 4: The minimum requirements only apply for non simultaneous Tx/Rx between all carriers for TDD combinations. | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 when operating in single carrier mode.

### 6.38.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference have been already studied for 2DL/1UL fallback combinations such as CA n28-n77, CA\_n28-n79 and n77-n79.

### 6.38.4 ∆TIB,c and ∆RIB,c values

For three DLs and one UL of Band n28, n77 and n79, the ΔTIB,c and ΔRIB,c values are shown in table 6.38.4-1 and table 6.38.4-2, respectively.

Table 6.38.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n28-n77-n79 | n28 | 0.5 |
| n77 | 0.8 |
| n79 | 0.5 |

Table 6.38.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n28-n77-n79 | n28 | 0.2 |
| n77 | 0.5 |
| n79 | 0 |

### 6.38.5 REFSENS requirements

MSD studies can be omitted because harmonic interference have been already studied for 2DL/1UL fallback combinations such as CA n28-n77, CA\_n28-n79 and n77-n79.

## 6.39 CA\_n28-n78-n79

### 6.39.1 Operating bands for CA

Table 6.39.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n28-n78-n79 | n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |
| n79 | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |

### 6.39.2 Channel bandwidths per operating band for CA

Table 6.39.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA configuration** | **Uplink CA configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE3)** | | | | | | | | | | | | | **Bandwidth combination set** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |  |
| CA\_n28A-n78A-n79A5 | - | n28 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n78 |  | 10 | 15 | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1.  NOTE 5: Simultaneous Rx/Tx capability for TDD combinations does not apply for UEs supporting band n78 with a n77 implementation. | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 when operating in single carrier mode.

### 6.39.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference have been already studied for 2DL/1UL fallback combinations such as CA n28-n78, CA\_n28-n79 and n78-n79.

### 6.39.4 ∆TIB,c and ∆RIB,c values

For three DLs and one UL of Band n28, n78 and n79, the ΔTIB,c and ΔRIB,c values are shown in table 6.39.4-1 and table 6.39.4-2, respectively.

Table 6.39.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n28-n78-n79 | n28 | 0.5 |
| n78 | 0.8 |
| 1.58 |
| n79 | 0.5 |
| 1.58 |
| NOTE 8: The requirements only apply for UE supporting inter-band carrier aggregation with simultaneous Rx/Tx capability, and NR UL carrier frequencies are confined to 3700 MHz-3800MHz for n78 and 4400 MHz-4500MHz for n79. Simultaneous Rx/Tx capability does not apply for UEs supporting band n78 with a n77 implementation. | | |

Table 6.39.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n28-n78-n79 | n28 | 0.2 |
| n78 | 0.5 |
| n79 | 0 |

### 6.39.5 REFSENS requirements

MSD studies can be omitted because harmonic interference have been already studied for 2DL/1UL fallback combinations such as CA n28-n78, CA\_n28-n79 and n78-n79.

## 6.40 CA\_n1-n8-n79

### 6.40.1 Operating bands for CA

Table 6.40.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n8-n79 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |
| n79 | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |

### 6.40.2 Channel bandwidths per operating band for CA

Table 6.40.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n1A-n8A-n79A | - | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n8 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |

### 6.40.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis.

### 6.40.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n1, n8 and n79, the ΔTIB,c and ΔRIB,c values are shown in table 6.40.4-1 and table 6.40.4-2, respectively.

Table 6.40.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n8-n79 | n1 | 0.3 |
| n8 | 0.6 |
| n79 | 0.8 |

Table 6.40.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n8-n79 | n1 | 0 |
| n8 | 0.2 |
| n79 | 0.5 |

### 6.40.5 REFSENS requirements

MSD studies can be omitted because the corresponding analysis and requirements are covered by fallback combinations.

## 6.41 CA\_n8-n78-n79

### 6.41.1 Operating bands for CA

Table 6.41.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n8-n78-n79 | n8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |
| n79 | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |

### 6.41.2 Channel bandwidths per operating band for CA

Table 6.41.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n8A-n78A-n79A | - | n8 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 |  | 80 | 90 | 100 |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |
| CA\_n8A-n78(2A)-n79A | - | n8 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n78 | See CA\_n78(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |

### 6.41.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis.

### 6.41.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n1, n8 and n79, the ΔTIB,c and ΔRIB,c values are shown in table 6.41.4-1 and table 6.41.4-2, respectively.

Table 6.41.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n8-n78-n79 | n8 | 0.6 |
| n78 | 0.8 |
| n79 | 0.8 |

Table 6.41.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n8-n78-n79 | n8 | 0.2 |
| n78 | 0.5 |
| n79 | 0.5 |

### 6.41.5 REFSENS requirements

MSD studies can be omitted because the corresponding analysis and requirements are covered by fallback combinations.

## 6.42 CA\_n1-n3-n20

### 6.42.1 Operating bands for CA

Table 6.42.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **NR Band** | **Uplink (UL) band** | | | **Downlink (DL) band** | | | **Duplex**  **mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| n20 | 832 MHz | – | 862 MHz | 791 MHz | – | 821 MHz | FDD |

### 6.42.2 Channel bandwidths per operating band for CA

Table 6.42.2-1: Supported bandwidths per CA band combination of band n1+n3+n20

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| CA\_n1A-n3A-n20A | - | n1 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 0 |
| n3 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n20 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |

### 6.42.3 UE co-existence studies

Co-existence studies of CA\_n1-n3-n20 with 1UL have been covered in the constituent fall-back modes.

### 6.42.4 ∆TIB and ∆RIB values

For three DLs of Band n1, n3 and n20, the ΔTIB,c and ΔRIB,c values specified for LTE CA\_1-3-20 are used as below.

Table 6.42.4-1: ΔTIB,c

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n3-n20 | n1 | 0.3 |
| n3 | 0.3 |
| n20 | 0.3 |

Table 6.42.4-2: ΔRIB,c

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n3-n20 | n1 | 0 |
| n3 | 0 |
| n20 | 0 |

### 6.42.5 REFSENS requirements

From LTE CA\_1A-3A-20A:

## 6.43 CA\_n1-n20-n78

### 6.43.1 Operating bands for CA

Table 6.43.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band | Uplink (UL) band | | | Downlink (DL) band | | | Duplex  mode |
| BS receive / UE transmit | | | BS transmit / UE receive | | |
| FUL\_low – FUL\_high | | | FDL\_low – FDL\_high | | |
| n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n20 | 832 MHz | – | 862 MHz | 791 MHz | – | 821 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

### 6.43.2 Channel bandwidths per operating band for CA

Table 6.43.2-1: Supported bandwidths per CA band combination of band n1+n20+n78

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| CA\_n1A-n20A-n78A | - | n1 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 0 |
| n20 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

### 6.43.3 UE co-existence studies

Co-existence studies of CA\_n1-n20-n78 with 1UL have been covered in the constituent fall-back modes.

### 6.43.4 ∆TIB and ∆RIB values

For three DLs of Band n1, n20 and n78, the ΔTIB,c and ΔRIB,c values specified for the constituent fall-back modes are used below.

Table 6.43.4-1: ΔTIB,c

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n20-n78 | n1 | 0.3 |
| n20 | 0.6 |
| n78 | 0.8 |

Table 6.43.4-2: ΔRIB,c

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n20-n78 | n1 | 0 |
| n20 | 0 |
| n78 | 0.5 |

### 6.43.5 REFSENS requirements

There are no additional MSD requirements for this band combination.

## 6.44 CA\_n3-n20-n78

### 6.44.1 Operating bands for CA

Table 6.45.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band | Uplink (UL) band | | | Downlink (DL) band | | | Duplex  mode |
| BS receive / UE transmit | | | BS transmit / UE receive | | |
| FUL\_low – FUL\_high | | | FDL\_low – FDL\_high | | |
| n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| n20 | 832 MHz | – | 862 MHz | 791 MHz | – | 821 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

### 6.44.2 Channel bandwidths per operating band for CA

Table 6.44.2-1: Supported bandwidths per CA band combination of band n3+n20+n78

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| CA\_n3A-n20A-n78A | - | n3 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 0 |
| n20 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

### 6.44.3 UE co-existence studies

Co-existence studies of CA\_n3-n20-n78 with 1UL have been covered in the constituent fall-back modes.

### 6.44.4 ∆TIB and ∆RIB values

For three DLs of Band n3, n20 and n78, the ΔTIB,c and ΔRIB,c values specified for the constituent fall-back modes are used below.

Table 6.44.4-1: ΔTIB,c

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n3-n20-n78 | n3 | 0.6 |
| n20 | 0.6 |
| n78 | 0.8 |

Table 6.44.4-2: ΔRIB,c

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n3-n20-n78 | n3 | 0.2 |
| n20 | 0 |
| n78 | 0.5 |

### 6.44.5 REFSENS requirements

There are no additional MSD requirements for this band combination.

## 6.45 CA\_n8-n28-n78

### 6.45.1 Operating bands for CA

Table 6.45.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band | Uplink (UL) band | | | Downlink (DL) band | | | Duplex  mode |
| BS receive / UE transmit | | | BS transmit / UE receive | | |
| FUL\_low – FUL\_high | | | FDL\_low – FDL\_high | | |
| n8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |
| n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

### 6.45.2 Channel bandwidths per operating band for CA

Table 6.45.2-1: Supported bandwidths per CA band combination of band n8+n28+n78

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| CA\_n8A-n28A-n78A | - | n8 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n28 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

### 6.45.3 UE co-existence studies

Co-existence studies of CA\_n8-n28-n78 with 1UL have been covered in the constituent fall-back modes.

### 6.45.4 ∆TIB and ∆RIB values

For three DLs of Band n8, n28 and n78, the ΔTIB,c and ΔRIB,c values specified for the constituent fall-back modes are used below.

Table 6.45.4-1: ΔTIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| **CA\_n8-n28-n78** | n8 | 0.6 |
| n28 | 0.5 |
| n78 | 0.8 |

Table 6.45.4-2: ΔRIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| **CA\_n8-n28-n78** | n8 | 0.2 |
| n28 | 0.2 |
| n78 | 0.5 |

### 6.45.5 REFSENS requirements

There are no additional MSD requirements for this band combination.

## 6.46 CA\_n3-n28-n79

### 6.46.1 Operating band for CA

Table 6.46.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA Band | NR Band | Uplink (UL) operating band | | | Downlink (DL) operating band | | | Duplex Mode |
| BS receive / UE transmit | | | BS transmit / UE receive | | |
| FUL\_low – FUL\_high | | | FDL\_low – FDL\_high | | |
| **CA\_n3-n28-n79** | **n3** | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| **n28** | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |
| **n79** | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |

### 6.46.2 Channel bandwidths per operating band for CA

Table 6.46.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **UL Config** | **NR Band** | **Channel bandwidth (MHz)** | | | | | | | | | | | | | **Bandwidth combination set** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| CA\_n3A-n28A-n79A | - | n3 | 5 | 10 | 15 | 20 | 25 | 30 |  |  |  |  |  |  |  | 0 |
| n28 | 10 | 15 | 20 | 5 |  |  |  |  |  |  |  |  |  |  |
| n79 |  |  |  |  |  |  | 40 | 50 |  |  | 80 |  | 100 |  |

### 6.46.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference have been already studied for 2DL/1UL fallback combinations such as CA n3-n28, CA\_n3-n79 and n28-n79.

### 6.46.4 ∆TIB and ∆RIB values

For CA\_n3-n28-n79, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 6.46.4-1: ΔTIB,c

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n3-n28-n79 | n3 | 0.3 |
| n28 | 0.5 |
| n79 | 0.8 |

Table 6.46.4-2: ΔRIB

| Inter-band CA Configuration | NR Band | ΔRIB [dB] |
| --- | --- | --- |
| CA\_n3-n28-n79 | n3 | 0 |
| n28 | 0.2 |
| n79 | 0.5 |

### 6.46.5 REFSENS requirements

Based on 6.46.3, there are no additional MSD requirements for this band combination.

## 6.47 CA\_n3-n79-n257

### 6.47.1 Operating band for CA

Table 6.47.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA Band | NR Band | Uplink (UL) operating band | | | Downlink (DL) operating band | | | Duplex Mode |
| BS receive / UE transmit | | | BS transmit / UE receive | | |
| FUL\_low – FUL\_high | | | FDL\_low – FDL\_high | | |
| CA\_n3-n79-n257 | n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| n79 | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |
| n257 | 26500 MHz | – | 29500 MHz | 26500 MHz | – | 29500 MHz | TDD |

### 6.47.2 Channel bandwidths per operating band for CA

Table 6.47.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **UL Config** | **NR Band** | **Channel bandwidth (MHz)** | | | | | | | | | | | | | | | **Bandwidth combination set** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** |
| CA\_n3A-n79A-n257A | - | n3 | 5 | 10 | 15 | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  | 0 |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |  |  |
| n257 |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| CA\_n3A-n79A-n257G | - | n3 | 5 | 10 | 15 | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  | 0 |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |  |  |
| n257 | CA\_n257G | | | | | | | | | | | | | | |
| CA\_n3A-n79A-n257H | - | n3 | 5 | 10 | 15 | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  | 0 |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |  |  |
| n257 | CA\_n257H | | | | | | | | | | | | | | |
| CA\_n3A-n79A-n257I | - | n3 | 5 | 10 | 15 | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  | 0 |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |  |  |
| n257 | CA\_n257I | | | | | | | | | | | | | | |

### 6.47.3 Co-existence studies

### 6.47.4 ∆TIB and ∆RIB values

For CA\_n3-n79-n257, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 6.47.4-1: ΔTIB,c

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n3-n79-n257 | n3 | 0.3 |
| n79 | 0.8 |
| n257 | 0 |

Table 6.47.4-2: ΔRIB

| Inter-band CA Configuration | NR Band | ΔRIB [dB] |
| --- | --- | --- |
| CA\_n3-n79-n257 | n3 | 0 |
| n79 | 0.5 |
| n257 | 0 |

### 6.47.5 REFSENS requirements

MSD studies can be omitted because harmonic interference between FR1 bands have been already studied in the fallback band combination and harmonic interference between FR1 bands and FR2 band are negligible.

## 6.48 CA\_n28-n79-n257

### 6.48.1 Operating band for CA

Table 6.48.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA Band | NR Band | Uplink (UL) operating band | | | Downlink (DL) operating band | | | Duplex Mode |
| BS receive / UE transmit | | | BS transmit / UE receive | | |
| FUL\_low – FUL\_high | | | FDL\_low – FDL\_high | | |
| CA\_n28-n79-n257 | n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |
| n79 | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |
| n257 | 27500 MHz | – | 29500 MHz | 27500 MHz | – | 29500 MHz | TDD |

### 6.48.2 Channel bandwidths per operating band for CA

Table 6.48.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **UL Config** | **NR Band** | **Channel bandwidth (MHz)** | | | | | | | | | | | | | | | **Bandwidth combination set** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** |
| CA\_n28A-n79A-n257A | - | n28 | 5 | 10 | 15 | 20 |  | 30 |  |  |  |  |  |  |  |  |  | 0 |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |  |  |
| n257 |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| CA\_n28A-n79A-n257G | - | n28 | 5 | 10 | 15 | 20 |  | 30 |  |  |  |  |  |  |  |  |  | 0 |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |  |  |
| n257 | CA\_n257G | | | | | | | | | | | | | | |
| CA\_n28A-n79A-n257H | - | n28 | 5 | 10 | 15 | 20 |  | 30 |  |  |  |  |  |  |  |  |  | 0 |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |  |  |
| n257 | CA\_n257H | | | | | | | | | | | | | | |
| CA\_n28A-n79A-n257I | - | n28 | 5 | 10 | 15 | 20 |  | 30 |  |  |  |  |  |  |  |  |  | 0 |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |  |  |
| n257 | CA\_n257I | | | | | | | | | | | | | | |

### 6.48.3 Co-existence studies

### 6.48.4 ∆TIB and ∆RIB values

For CA\_n28-n79-n257, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 6.48.4-1: ΔTIB,c

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n28-n79-n257 | n28 | 0.5 |
| n79 | 0.8 |
| n257 | 0 |

Table 6.48.4-2: ΔRIB

| Inter-band CA Configuration | NR Band | ΔRIB [dB] |
| --- | --- | --- |
| CA\_n28-n79-n257 | n28 | 0.2 |
| n79 | 0.5 |
| n257 | 0 |

### 6.48.5 REFSENS requirements

MSD studies can be omitted because harmonic interference between FR1 bands have been already studied in the fallback band combination and harmonic interference between FR1 bands and FR2 band are negligible.

## 6.49 CA\_n7-n25-n77

### 6.49.1 Operating bands for CA

Table 6.49.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n7-n25-n77 | n7, n25, n77 |

### 6.49.2 Channel bandwidths per operating band for CA

Table 6.49.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA config** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| CA\_n7A-n25A-n77A | - | n7 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 0 |
| n25 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n7A-n25(2A)-n77A | - | n7 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 0 |
| n25 | See CA\_n25(2A) Bandwidth Combination Set 0 in Table 5.5A.2-0 | | | | | | | | | | | | |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n7A-n25A-n77(2A) | - | n7 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 0 |
| n25 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| CA\_n7A-n25(2A)-n77(2A) | - | n7 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 0 |
| n25 | See CA\_n25(2A) Bandwidth Combination Set 0 in Table 5.5A.2-0 | | | | | | | | | | | | |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| CA\_n7(2A)-n25A-n77A | - | n7 | See CA\_n7(2A) Bandwidth Combination Set 0 in Table 5.5A.2-0 | | | | | | | | | | | | | 0 |
| n25 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n7(2A)-n25(2A)-n77A | - | n7 | See CA\_n7(2A) Bandwidth Combination Set 0 in Table 5.5A.2-0 | | | | | | | | | | | | | 0 |
| n25 | See CA\_n25(2A) Bandwidth Combination Set 0 in Table 5.5A.2-0 | | | | | | | | | | | | |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n7(2A)-n25A-n77(2A) | - | n7 | See CA\_n7(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | 0 |
| n25 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| CA\_n7(2A)-n25(2A)-n77(2A) | - | n7 | See CA\_n7(2A) Bandwidth Combination Set 0 in Table 5.5A.2-0 | | | | | | | | | | | | | 0 |
| n25 | See CA\_n25(2A) Bandwidth Combination Set 0 in Table 5.5A.2-0 | | | | | | | | | | | | |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.49.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis

### 6.49.4 ∆TIB,c and ∆RIB,c values

For CA\_n7-n25-n77, the ΔTIB,c and ΔRIB,c values can reuse DC\_2-7\_n77 defined in TS 38.101-3.

Table 6.49.4-1: ΔTIB,c due to NR CA (three bands)

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n7-n25-n77 | n7 | 0.5 |
| n25 | 0.6 |
| n77 | 0.8 |

Table 6.49.4-2: ΔRIB,c due to NR CA (three bands)

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n7-n25-n77 | n7 | 0.5 |
| n25 | 0.2 |
| n77 | 0.5 |

### 6.49.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

## 6.50 CA\_n7-n66-n77

### 6.50.1 Operating bands for CA

Table 6.50.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n7-n66-n77 | n7, n66, n77 |

### 6.50.2 Channel bandwidths per operating band for CA

Table 6.50.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA config | NR Band | Channel bandwidth (MHz) (NOTE 3) | | | | | | | | | | | | | Bandwidth combination set |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| CA\_n7A-n66A-n77A | - | n7 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n7A-n66(2A)-n77A | - | n7 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 0 |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-0 | | | | | | | | | | | | |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n7A-n66A-n77(2A) | - | n7 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| CA\_n7A-n66(2A)-n77(2A) | - | n7 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 0 |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-0 | | | | | | | | | | | | |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| CA\_n7(2A)-n66A-n77A | - | n7 | See CA\_n7(2A) Bandwidth Combination Set 0 in Table 5.5A.2-0 | | | | | | | | | | | | | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n7(2A)-n66(2A)-n77A | - | n7 | See CA\_n7(2A) Bandwidth Combination Set 0 in Table 5.5A.2-0 | | | | | | | | | | | | | 0 |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-0 | | | | | | | | | | | | |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n7(2A)-n66A-n77(2A) | - | n7 | See CA\_n7(2A) Bandwidth Combination Set 0 in Table Table 5.5A.2-1 | | | | | | | | | | | | | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| CA\_n7(2A)-n66(2A)-n77(2A) | - | n7 | See CA\_n7(2A) Bandwidth Combination Set 0 in Table 5.5A.2-0 | | | | | | | | | | | | | 0 |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-0 | | | | | | | | | | | | |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.50.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis

### 6.50.4 ∆TIB,c and ∆RIB,c values

For CA\_n7-n66-n77, the ΔTIB,c and ΔRIB,c values can reuse DC\_7-66\_n77 defined in TS 38.101-3.

Table 6.50.4-1: ΔTIB,c due to NR CA (three bands)

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n7-n66-n77 | n7 | 0.5 |
| n66 | 0.6 |
| n77 | 0.8 |

Table 6.50.4-2: ΔRIB,c due to NR CA (three bands)

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n7-n66-n77 | n7 | 0.5 |
| n66 | 0.5 |
| n77 | 0.5 |

### 6.50.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

## 6.51 CA\_n1-n3-n7

### 6.51.1 Operating bands for CA

Table 6.51.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n3-n7 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| n7 | 2500 MHz | – | 2570 MHz | 2620 MHz | – | 2690 MHz | FDD |

### 6.51.2 Channel bandwidths per operating band for CA

Table 6.51.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n1A-n3A-n7A | - | n1 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 1 |
| n3 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n7 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |

### 6.51.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis.

### 6.51.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n1, n3 and n7, the ΔTIB,c and ΔRIB,c values are shown in table 6.51.4-1 and table 6.51.4-2, respectively.

Table 6.51.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n3-n7 | n1 | 0.6 |
| n3 | 0.6 |
| n7 | 0.6 |

Table 6.51.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n3-n7 | n1 | 0 |
| n3 | 0 |
| n7 | 0 |

### 6.51.5 REFSENS requirements

MSD studies can be omitted because the corresponding analysis and requirements are covered by fallback combinations.

## 6.52 CA\_n2-n5-n66

### 6.52.1 Operating bands for CA

**Table 6.52.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2-n5-n66 | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |

### 6.52.2 Channel bandwidths per operating band for CA

**Table 6.52.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n2A-n5A-n66A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| CA\_n2(2A)-n5A-n66A | - | n2 | CA\_n2(2A) | | | | | | | | | | | | | 0 |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| CA\_n2A-n5A-n66(2A) | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n66 | CA\_n66(2A) | | | | | | | | | | | | |

### 6.52.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.52.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. No issues can be seen.

**Table 6.52.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n2 | 1850 | 1910 | 1930 | 1990 | 3700 | 3820 | 5550 | 5730 | 7400 | 7640 |
| n5 | 824 | 849 | 869 | 894 | 1648 | 1698 | 2472 | 2547 | 3296 | 3396 |
| n66 | 1710 | 1780 | 2110 | 2200 | 3420 | 3560 | 5130 | 5340 | 6840 | 7120 |

Table 6.52.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. It can be seen that there are 2nd harmonic mixing issues from n5 DL may fall into n66 UL which need to be addressed in lower order combination.

**Table 6.52.3-2 Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n2 | 1850 | 1910 | 1930 | 1990 | 3860 | 3980 | 5790 | 5970 | 7720 | 7960 |
| n5 | 824 | 849 | 869 | 894 | 1738 | 1788 | 2607 | 2682 | 3476 | 3576 |
| n66 | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 | 8440 | 8800 |

### 6.52.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n2, n5 and n66, the ΔTIB,c and ΔRIB,c values are shown in table 6.52.4-1 and table 6.52.4-2, respectively. Values are derived from DC\_2-5\_n66.

**Table 6.52.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n5-n66 | n2 | 0.5 |
| n5 | 0.3 |
| n66 | 0.5 |

**Table 6.52.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n5-n66 | n2 | 0.3 |
| n5 | 0 |
| n66 | 0.3 |

### 6.52.5 MSD

The 2nd harmonic mixing issues from n5 UL into n66 DL will be addressed in lower order combination.

## 6.53 CA\_n2-n5-n30

### 6.53.1 Operating bands for CA

**Table 6.53.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2-n5-n30 | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n30 | 2305 MHz | – | 2315 MHz | 2350 MHz | – | 2360 MHz | FDD |

### 6.53.2 Channel bandwidths per operating band for CA

**Table 6.53.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n2A-n5A-n30A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |
| CA\_n2(2A)-n5A-n30A | - | n2 | CA\_n2(2A) | | | | | | | | | | | | | 0 |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |

### 6.53.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.53.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. No issues can be seen.

**Table 6.53.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n2 | 1850 | 1910 | 1930 | 1990 | 3700 | 3820 | 5550 | 5730 | 7400 | 7640 |
| n5 | 824 | 849 | 869 | 894 | 1648 | 1698 | 2472 | 2547 | 3296 | 3396 |
| n30 | 2305 | 2315 | 2350 | 2360 | 4610 | 4630 | 6915 | 6945 | 9220 | 9260 |

Table 6.53.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. No issues can be seen.

**Table 6.53.3-2 Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n2 | 1850 | 1910 | 1930 | 1990 | 3860 | 3980 | 5790 | 5970 | 7720 | 7960 |
| n5 | 824 | 849 | 869 | 894 | 1738 | 1788 | 2607 | 2682 | 3476 | 3576 |
| n30 | 2305 | 2315 | 2350 | 2360 | 4700 | 4720 | 7050 | 7080 | 9400 | 9440 |

### 6.53.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n2, n5 and n30, the ΔTIB,c and ΔRIB,c values are shown in table 6.53.4-1 and table 6.53.4-2, respectively. Values are derived from DC\_2-30\_n5.

**Table 6.53.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n5-n30 | n2 | 0.5 |
| n5 | 0.3 |
| n30 | 0.3 |

**Table 6.53.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n5-n30 | n2 | 0.4 |
| n5 | 0 |
| n30 | 0.5 |

### 6.53.5 MSD

MSD is not needed to be defined.

## 6.54 CA\_n13-n25-n77

### 6.54.1 Operating bands for CA

**Table 6.54.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n13-n25-n77 | n13 | 777 MHz | – | 787 MHz | 746 MHz | – | 756 MHz | FDD |
| n25 | 1850 MHz | – | 1915 MHz | 1930 MHz | – | 1995 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.54.2 Channel bandwidths per operating band for CA

**Table 6.54.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n13A-n25A-n77A | - | n13 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n25 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

### 6.54.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.54.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. 2nd harmonic from n25 UL might fall into n77 DL.

**Table 6.54.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n13 | 777 | 787 | 746 | 756 | 1554 | 1574 | 2331 | 2361 | 3108 | 3148 |
| n25 | 1850 | 1915 | 1930 | 1995 | 3700 | 3830 | 5550 | 5745 | 7400 | 7660 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.54.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. 2nd harmonic mixing from n25 DL might fall into n77 UL.

**Table 6.54.3-2 Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n13 | 777 | 787 | 746 | 756 | 1492 | 1512 | 2238 | 2268 | 2984 | 3024 |
| n25 | 1850 | 1915 | 1930 | 1995 | 3860 | 3990 | 5790 | 5985 | 7720 | 7980 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

### 6.54.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n13, n25 and n77, the ΔTIB,c and ΔRIB,c values are shown in table 6.54.4-1 and table 6.54.4-2, respectively. Values are derived from DC\_13\_n2-n77.

**Table 6.54.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n13-n25-n77 | n13 | 0.3 |
| n25 | 0.6 |
| n77 | 0.8 |

**Table 6.54.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n13-n25-n77 | n13 | 0 |
| n25 | 0.2 |
| n77 | 0.5 |

### 6.54.5 MSD

The 2nd harmonic and 2nd harmonic mixing issues between n25 and n77 will be addressed in lower order combinations.

## 6.55 CA\_n13-n66-n77

### 6.55.1 Operating bands for CA

**Table 6.55.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n13-n66-n77 | n13 | 777 MHz | – | 787 MHz | 746 MHz | – | 756 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.55.2 Channel bandwidths per operating band for CA

**Table 6.55.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n13A-n66A-n77A | - | n13 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

### 6.55.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.55.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. 2nd harmonic from n66 UL might fall into n77 DL.

**Table 6.55.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n13 | 777 | 787 | 746 | 756 | 1554 | 1574 | 2331 | 2361 | 3108 | 3148 |
| n66 | 1710 | 1780 | 2110 | 2200 | 3420 | 3560 | 5130 | 5340 | 6840 | 7120 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.55.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. 2nd harmonic mixing from n66 DL might fall into n77 UL.

**Table 6.55.3-2 Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n13 | 777 | 787 | 746 | 756 | 1492 | 1512 | 2238 | 2268 | 2984 | 3024 |
| n66 | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 | 8440 | 8800 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

### 6.55.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n13, n66 and n77, the ΔTIB,c and ΔRIB,c values are shown in table 6.55.4-1 and table 6.55.4-2, respectively. Values are derived from DC\_13-66\_n77.

**Table 6.55.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n13-n66-n77 | n13 | 0.5 |
| n66 | 0.6 |
| n77 | 0.8 |

**Table 6.55.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n13-n66-n77 | n13 | 0.3 |
| n66 | 0.3 |
| n77 | 0.5 |

### 6.55.5 MSD

The 2nd harmonic and 2nd harmonic mixing issues between n66 and n77 will be addressed in lower order combinations.

## 6.56 CA\_n2-n30-n66

### 6.56.1 Operating bands for CA

Table 6.56.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2-n30-n66 | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n30 | 2305 MHz | – | 2315 MHz | 2350 MHz | – | 2360 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |

### 6.56.2 Channel bandwidths per operating band for CA

Table 6.56.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n2A-n30A-n66A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |
| n66 | 5 | 10 | 15 | 20 |  |  | 40 |  |  |  |  |  |  |
| CA\_n2(2A)-n30A-n66A | - | n2 | See CA\_n2(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 in TS 38.101-1 | | | | | | | | | | | | | 0 |
| n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |
| n66 | 5 | 10 | 15 | 20 |  |  | 40 |  |  |  |  |  |  |
| CA\_n2A-n30A-n66(2A) | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 in TS 38.101-1 | | | | | | | | | | | | |

### 6.56.3 Co-existence studies

Table 6.56.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. There are no harmonic interference.

Table 6.56.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| **2** | 1850 | 1910 | 1930 | 1990 | 3700 | 3820 | 5550 | 5730 | 7400 | 7640 |
| **30** | 2305 | 2315 | 2350 | 2360 | 4610 | 4630 | 6915 | 6945 | 9220 | 9260 |
| **66** | 1710 | 1780 | 2110 | 2200 | 3420 | 3560 | 5130 | 5340 | 6840 | 7120 |

Table 6.56.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. There are no harmonic mixing interference.

Table 6.56.3-2 Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| **2** | 1850 | 1910 | 1930 | 1990 | 3860 | 3980 | 5790 | 5970 | 7720 | 7960 |
| **30** | 2305 | 2315 | 2350 | 2360 | 4700 | 4720 | 7050 | 7080 | 9400 | 9440 |
| **66** | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 | 8440 | 8800 |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1.

### 6.56.4 ∆TIB,c and ∆RIB,c values

It is proposed to re-use ΔTIB,c and ΔRIB,c values from DC\_2-30\_n66.

Table 6.56.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n30-n66 | n2 | 0.5 |
| n30 | 0.3 |
| n66 | 0.5 |

Table 6.56.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n30-n66 | n2 | 0.4 |
| n30 | 0.5 |
| n66 | 0.4 |

### 6.56.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.57 CA\_n5-n30-n66

### 6.57.1 Operating bands for CA

Table 6.57.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n5-n30-n66 | n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n30 | 2305 MHz | – | 2315 MHz | 2350 MHz | – | 2360 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |

### 6.57.2 Channel bandwidths per operating band for CA

Table 6.57.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n5A-n30A-n66A | - | n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |
| n66 | 5 | 10 | 15 | 20 |  |  | 40 |  |  |  |  |  |  |
| CA\_n5A-n30A-n66(2A) | - | n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 in TS 38.101-1 | | | | | | | | | | | | |

### 6.57.3 Co-existence studies

Table 6.57.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. There is no harmonic interference.

Table 6.57.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| **5** | 824 | 849 | 869 | 894 | 1648 | 1698 | 2472 | 2547 | 3296 | 3396 |
| **30** | 2305 | 2315 | 2350 | 2360 | 4610 | 4630 | 6915 | 6945 | 9220 | 9260 |
| **66** | 1710 | 1780 | 2110 | 2200 | 3420 | 3560 | 5130 | 5340 | 6840 | 7120 |

Table 6.57.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. There are no harmonic mixing interference.

Table 6.57.3-2 Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| **5** | 824 | 849 | 869 | 894 | 1738 | 1788 | 2607 | 2682 | 3476 | 3576 |
| **30** | 2305 | 2315 | 2350 | 2360 | 4700 | 4720 | 7050 | 7080 | 9400 | 9440 |
| **66** | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 | 8440 | 8800 |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1.

### 6.57.4 ∆TIB,c and ∆RIB,c values

It is proposed to re-use ΔTIB,c and ΔRIB,c values from DC\_5-30\_n66.

Table 6.57.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n30-n66 | n2 | 0.3 |
| n30 | 0.3 |
| n66 | 0.5 |

Table 6.57.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n30-n66 | n2 | 0 |
| n30 | 0.5 |
| n66 | 0.4 |

### 6.57.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.58 CA\_n5-n30-n66

### 6.58.1 Operating bands for CA

Table 6.58.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n5-n30-n66 | n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n30 | 2305 MHz | – | 2315 MHz | 2350 MHz | – | 2360 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |

### 6.58.2 Channel bandwidths per operating band for CA

Table 6.58.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n5A-n30A-n66A | - | n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |
| n66 | 5 | 10 | 15 | 20 |  |  | 40 |  |  |  |  |  |  |
| CA\_n5A-n30A-n66(2A) | - | n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 in TS 38.101-1 | | | | | | | | | | | | |

### 6.58.3 Co-existence studies

Table 6.58.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. There is no harmonic interference.

Table 6.58.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| **5** | 824 | 849 | 869 | 894 | 1648 | 1698 | 2472 | 2547 | 3296 | 3396 |
| **30** | 2305 | 2315 | 2350 | 2360 | 4610 | 4630 | 6915 | 6945 | 9220 | 9260 |
| **66** | 1710 | 1780 | 2110 | 2200 | 3420 | 3560 | 5130 | 5340 | 6840 | 7120 |

Table 6.58.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. There are no harmonic mixing interference.

Table 6.58.3-2 Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| **5** | 824 | 849 | 869 | 894 | 1738 | 1788 | 2607 | 2682 | 3476 | 3576 |
| **30** | 2305 | 2315 | 2350 | 2360 | 4700 | 4720 | 7050 | 7080 | 9400 | 9440 |
| **66** | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 | 8440 | 8800 |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1.

### 6.58.4 ∆TIB,c and ∆RIB,c values

It is proposed to re-use ΔTIB,c and ΔRIB,c values from DC\_5-30\_n66.

Table 6.58.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n30-n66 | n2 | 0.3 |
| n30 | 0.3 |
| n66 | 0.5 |

Table 6.58.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n30-n66 | n2 | 0 |
| n30 | 0.5 |
| n66 | 0.4 |

### 6.58.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.59 CA\_n2-n77-n260

### 6.59.1 Operating bands for CA

Table 6.59.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2-n77-n260 | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |
| n260 | 37000 MHz | – | 40000 MHz | 37000 MHz | – | 40000 MHz | TDD |

### 6.59.2 Channel bandwidths per operating band for CA

Table 6.59.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** |  | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** | **BCS** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n2A-n77A-n260A | - | n2 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 |  |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| CA\_n2A-n77A-n260I | - | n2 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n2A-n77A-n260J | - | n2 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260J in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n2A-n77A-n260K | - | n2 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260K in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n2A-n77A-n260L | - | n2 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260L in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n2A-n77A-n260M | - | n2 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260M in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.59.3 Co-existence requirements

### 6.59.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n2, n77 and n260, the ΔTIB,c and ΔRIB,c values are shown in table 6.59.4-1 and table 6.59.4-2, respectively.

Table 6.59.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n2-n77-n260 | n2 | 0.6 |
| n77 | 0.8 |
| n260 | 0 |

Table 6.59.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n2-n77-n260 | n2 | 0.2 |
| n77 | 0.5 |
| n260 | 0 |

### 6.59.5 REFSENS requirements

No harmonics issue is found up to 5th order products from the FR1 and FR2 bands. The MSD between FR1 bands has been studied in CA\_n2-n77 combination.

## 6.60 CA\_n2-n77-n261

### 6.60.1 Operating bands for CA

Table 6.60.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2-n77-n261 | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |
| n261 | 27500 MHz | – | 28350 MHz | 27500 MHz | – | 28350 MHz | TDD |

### 6.60.2 Channel bandwidths per operating band for CA

Table 6.60.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** |  | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** | **BCS** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n2A-n77A-n261A | - | n2 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 |  |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| CA\_n2A-n77A-n261I | - | n2 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n2A-n77A-n261J | - | n2 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261J in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n2A-n77A-n261K | - | n2 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261K in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n2A-n77A-n261L | - | n2 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261L in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n2A-n77A-n261J | - | n2 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261M in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.60.3 Co-existence requirements

### 6.60.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n2, n77 and n261, the ΔTIB,c and ΔRIB,c values are shown in table 6.60.4-1 and table 6.60.4-2, respectively.

Table 6.60.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n2-n77-n261 | n2 | 0.6 |
| n77 | 0.8 |
| n261 | 0 |

Table 6.60.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n2-n77-n261 | n2 | 0.2 |
| n77 | 0.5 |
| n261 | 0 |

### 6.60.5 REFSENS requirements

No harmonics issue is found up to 5th order products from the FR1 and FR2 bands. The MSD between FR1 bands has been studied in CA\_n2-n77 combination.

## 6.61 CA\_n5-n77-n260

### 6.61.1 Operating bands for CA

Table 6.61.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n5-n77-n260 | n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |
| n260 | 37000 MHz | – | 40000 MHz | 37000 MHz | – | 40000 MHz | TDD |

### 6.61.2 Channel bandwidths per operating band for CA

Table 6.61.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** |  | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** | **BCS** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n5A-n77A-n260A | - | n5 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 |  |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| CA\_n5A-n77A-n260I | - | n5 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n5A-n77A-n260J | - | n5 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260J in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n5A-n77A-n260K | - | n5 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260K in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n5A-n77A-n260L | - | n5 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260L in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n5A-n77A-n260M | - | n5 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260M in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.61.3 Co-existence requirements

### 6.61.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n5, n77 and n260, the ΔTIB,c and ΔRIB,c values are shown in table 6.61.4-1 and table 6.61.4-2, respectively.

Table 6.61.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n5-n77-n260 | n5 | 0.6 |
| n77 | 0.8 |
| n260 | 0 |

Table 6.61.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n5-n77-n260 | n5 | 0.2 |
| n77 | 0.5 |
| n260 | 0 |

### 6.61.5 REFSENS requirements

No harmonics issue is found up to 5th order products from the FR1 and FR2 bands. The MSD between FR1 bands has been studied in CA\_n5-n77 combination.

## 6.62 CA\_n5-n77-n261

### 6.62.1 Operating bands for CA

Table 6.62.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n5-n77-n261 | n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |
| n261 | 27500 MHz | – | 28350 MHz | 27500 MHz | – | 28350 MHz | TDD |

### 6.62.2 Channel bandwidths per operating band for CA

Table 6.62.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** |  | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** | **BCS** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n5A-n77A-n261A | - | n5 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 |  |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| CA\_n5A-n77A-n261I | - | n5 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n5A-n77A-n261J | - | n5 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261J in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n5A-n77A-n261K | - | n5 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261K in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n5A-n77A-n261L | - | n5 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261L in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n5A-n77A-n261J | - | n5 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261M in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are defined as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.62.3 Co-existence requirements

### 6.62.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n5, n77 and n261, the ΔTIB,c and ΔRIB,c values are shown in table 6.62.4-1 and table 6.62.4-2, respectively.

Table 6.62.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n5-n77-n261 | n5 | 0.6 |
| n77 | 0.8 |
| n261 | 0 |

Table 6.62.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n5-n77-n261 | n5 | 0.2 |
| n77 | 0.5 |
| n261 | 0 |

### 6.62.5 REFSENS requirements

No harmonics issue is found up to 5th order products from the FR1 and FR2 bands. The MSD between FR1 bands has been studied in CA\_n5-n77 combination.

## 6.63 CA\_n66-n77-n260

### 6.63.1 Operating bands for CA

Table 6.63.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n66-n77-n260 | n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |
| n260 | 37000 MHz | – | 40000 MHz | 37000 MHz | – | 40000 MHz | TDD |

### 6.63.2 Channel bandwidths per operating band for CA

Table 6.63.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** |  | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** | **BCS** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n66A-n77A-n260A | - | n66 |  | 5 | 10 | 15 | 20 |  |  | 40 |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 |  |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| - | n66 |  | 5 | 10 | 15 | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  | 1 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 |  |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| CA\_n66A-n77A-n260I | - | n66 |  | 5 | 10 | 15 | 20 |  |  | 40 |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| - | n66 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | 1 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n66A-n77A-n260J | - | n66 |  | 5 | 10 | 15 | 20 |  |  | 40 |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260J in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| - | n66 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | 1 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260J in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n66A-n77A-n260K | - | n66 |  | 5 | 10 | 15 | 20 |  |  | 40 |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260K in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| - | n66 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | 1 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260K in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n66A-n77A-n260L | - | n66 |  | 5 | 10 | 15 | 20 |  |  | 40 |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260L in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| - | n66 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | 1 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260L in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n66A-n77A-n260M | - | n66 |  | 5 | 10 | 15 | 20 |  |  | 40 |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260M in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| - | n66 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | 1 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n260M in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.63.3 Co-existence requirements

### 6.63.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n66, n77 and n260, the ΔTIB,c and ΔRIB,c values are shown in table 6.63.4-1 and table 6.63.4-2, respectively.

Table 6.63.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n66-n77-n260 | n66 | 0.6 |
| n77 | 0.8 |
| n260 | 0 |

Table 6.63.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n66-n77-n260 | n66 | 0.2 |
| n77 | 0.5 |
| n260 | 0 |

### 6.63.5 REFSENS requirements

No harmonics issue is found up to 5th order products from the FR1 and FR2 bands. The MSD between FR1 bands has been studied in CA\_n66-n77 combination.

## 6.64 CA\_n66-n77-n261

### 6.64.1 Operating bands for CA

Table 6.64.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n66-n77-n261 | n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |
| n261 | 27500 MHz | – | 28350 MHz | 27500 MHz | – | 28350 MHz | TDD |

### 6.64.2 Channel bandwidths per operating band for CA

Table 6.64.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** |  | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** | **BCS** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n66A-n77A-n261A | - | n66 |  | 5 | 10 | 15 | 20 |  |  | 40 |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 |  |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| - | n66 |  | 5 | 10 | 15 | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  | 1 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 |  |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| CA\_n66A-n77A-n261I | - | n66 |  | 5 | 10 | 15 | 20 |  |  | 40 |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| - | n66 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | 1 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n66A-n77A-n261J | - | n66 |  | 5 | 10 | 15 | 20 |  |  | 40 |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261J in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| - | n66 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | 1 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261J in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n66A-n77A-n261K | - | n66 |  | 5 | 10 | 15 | 20 |  |  | 40 |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261K in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| - | n66 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | 1 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261K in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n66A-n77A-n261L | - | n66 |  | 5 | 10 | 15 | 20 |  |  | 40 |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261L in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| - | n66 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | 1 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n260 | See CA\_n261L in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n66A-n77A-n261M | - | n66 |  | 5 | 10 | 15 | 20 |  |  | 40 |  |  |  |  |  |  |  |  | 0 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261M in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| - | n66 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | 1 |
| n77 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n261 | See CA\_n261M in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.64.3 Co-existence requirements

### 6.64.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n66, n77 and n261, the ΔTIB,c and ΔRIB,c values are shown in table 6.64.4-1 and table 6.64.4-2, respectively.

Table 6.64.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n66-n77-n261 | n66 | 0.6 |
| n77 | 0.8 |
| n261 | 0 |

Table 6.64.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n66-n77-n261 | n66 | 0.2 |
| n77 | 0.5 |
| n261 | 0 |

### 6.64.5 REFSENS requirements

No harmonics issue is found up to 5th order products from the FR1 and FR2 bands. The MSD between FR1 bands has been studied in CA\_n66-n77 combination.

## 6.65 CA\_n24-n41-n48

[To be added later once the TP is approved.]

## 6.66 CA\_n24-n41-n77

### 6.66.1 Operating bands for CA

**Table 6.66.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **NR Band** | **Uplink (UL) band** | | | **Downlink (DL) band** | | | **Duplex**  **mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| n24 | 1626.5 MHz | – | 1660.5 MHz | 1525 MHz | – | 1559 MHz | FDD |
| n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.66.2 Channel bandwidths per operating band for CA

**Table 6.66.2-1: Supported bandwidths per CA band combination for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Configuration** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n24A-n41A-n77A |  | n24 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 |  | 80 | 90 | 100 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |
| CA\_n24A-n41(2A)-n77A |  | n24 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n41 | See CA\_n41(2A) BCS1 in Table 5.5A.2-1 from 38.101-1 | | | | | | | | | | | | |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |
| CA\_n24A-n41A-n77(2A) |  | n24 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 |  | 80 | 90 | 100 |
| n77 | See CA\_n77(2A) BCS0 in Table 5.5A.2-1 from 38.101-1 | | | | | | | | | | | | |
| CA\_n24A-n41(2A)-n77(2A) |  | n24 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
|  | n41 | See CA\_n41(2A) BCS1 in Table 5.5A.2-1 from 38.101-1 | | | | | | | | | | | | |
|  | n77 | See CA\_n77(2A) BCS0 in Table 5.5A.2-1 from 38.101-1 | | | | | | | | | | | | |

### 6.66.3 Co-existence studies

Table 6.66.3-1 summarizes frequency ranges where harmonics occur for CA\_n24-n41-n77.

**Table 6.66.1.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | | **5th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | |
| n24 | 1626.5 | 1660.5 | 1525 | 1559 | 3253 | 3321 | 4879.5 | 4981.5 | 6506 | 6642 | 8132.5 | 8302.5 | |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 | 9984 | 10760 | 12480 | 13450 | |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 | 16500 | 21000 | |

Based on above table, the 2nd harmonic of n24 UL may fall into the lower DL frequency range of n77 which need to be addressed in lower order combination.

Table 6.66.1.3-2 summarizes frequency ranges where harmonics mixing occur for CA\_n24-n41-n77.

**Table 6.66.1.3-2: Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | | **5th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n24 | 1626.5 | 1660.5 | 1525 | 1559 | 3050 | 3118 | 4575 | 4677 | 6100 | 6236 | 7625 | 7795 |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 | 9984 | 10760 | 12480 | 13450 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 | 16500 | 21000 |

Based on above table, there are no harmonic mixing issues for the CA\_n24-n41-n77 combinations.

### 6.66.4 ∆TIB and ∆RIB values

For CA\_n24-n41-n77, the ∆TIB,c and ∆RIB,c values are given according to CA\_n24-n41, CA\_n24-n77 relaxation values.

**Table 6.66.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n24-n41-n77 | n24 | 0.6 |
| n41 | 0.41 |
| 0.92 |
| n77 | 0.8 |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545-2690MHz.  NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2545MHz. | | |

**Table 6.66.4-2: ΔRIB,c for 3DL aggregation**

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n24-n41-n77 | n24 | 0.2 |
| n41 | 0.0 |
| n77 | 0.5 |

### 6.66.5 REFSENS requirements

The 2nd harmonic issues from n24 UL into n77 DL is addressed in lower order combination.

## 6.67 CA\_n3-n77-n79

### 6.67.1 Operating band for CA

Table 6.67.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n3-n77-n79 | n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |
| n79 | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |

### 6.67.2 Channel bandwidths per operating band for CA

Table 6.67.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **NR Uplink CA configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE3)** | | | | | | | | | | | | | **BCS** |
| 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |
| CA\_n3A-n77A-n79A4 | - | n3 | 5 | 10 | 15 | 20 | 25 | 30 |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | 15 | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |
| CA\_n3A-n77(2A)-n79A4 | - | n3 | 5 | 10 | 15 | 20 | 25 | 30 |  |  |  |  |  |  |  | 0 |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |
| NOTE 1: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1.  NOTE 2: The minimum requirements only apply for non simultaneous Tx/Rx between all carriers for TDD combinations. | | | | | | | | | | | | | | | | |

### 6.67.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference have been already studied for 2DL/1UL fallback combinations such as CA n3-n77, CA\_n3-n79 and n77-n79.

### 6.67.4 ∆TIB and ∆RIB values

For CA\_n3-n77-n79, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 6.67.4-1: ΔTIB,c

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n3-n77-n79 | n3 | 0.6 |
| n77 | 0.8 |
| n79 | 0 |

Table 6.67.4-2: ΔRIB

| Inter-band CA Configuration | NR Band | ΔRIB [dB] |
| --- | --- | --- |
| CA\_n3-n77-n79 | n3 | 0.2 |
| n77 | 0.5 |
| n79 | 0 |

### 6.67.5 REFSENS requirements

Based on 6.67.3, there are no additional MSD requirements for this band combination since harmonic interference from n3 to n77 and n79, and from n77 to n3 and n79, and from n79 to n3 and n77 have been already studied.

## 6.68 CA\_n41-n79-n258

### 6.68.1 Operating bands for CA

**Table 6.68.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR Band** | **NR Band** | **Uplink (UL) band** | | | **Downlink (DL) band** | | | **Duplex**  **mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n41A-n79A-n258A | n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |
| n79 | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |
| n258 | 24250 MHz | – | 27500 MHz | 24250 MHz | – | 27500 MHz | TDD |

### 6.68.2 Channel bandwidths per operating band for CA

Table 6.68.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA config | Uplink CA config | NR Band | Channel bandwidth (MHz) | | | | | | | | | | | | | | | BCS |
| 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 200 | 400 |  |
| CA\_n41A-n79A-n258A | - | n41 |  | 10 | 15 | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 |  |  | 0 |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |  |  |  |
| n258 |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |  |

### 6.68.3 Co-existence studies

The coexistence studies of harmonic interference have been captured in the constituent fallback modes in TR 38.716-02-00.

6.68.4 ∆TIB and ∆RIB values

For CA\_n41A-n79A-n258A, the ΔTIB,c and ΔRIB values are given in the tables below, where same ΔTIB,c and ΔRIB values as CA\_n41A-n79A for band n41 and band n79.

**Table 6.68.4-1: ΔTIB,c**

| **Inter-band CA Combination** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n41-n79-n258 | n41 | 0.3 |
| n79 | 0.8 |
| n258 | 0 |

**Table 6.68.4-2: ΔRIB,c**

| **Inter-band CA Combination** | **NR Band** | **ΔRIB [dB]** |
| --- | --- | --- |
| CA\_n41-n79-n258 | n41 | 0.5 |
| n79 | 0.5 |
| n258 | 0 |

### 6.68.5 REFSENS requirements

MSD studies can be omitted because harmonic interference between FR1 bands have been already studied for CA\_n41-n79, and harmonic interference between FR1 bands and FR2 band are negligible

## 6.69 CA\_n25-n71-n78

### 6.69.1 Operating bands for CA

**Table 6.69.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n25-n71-n78 | n25 | 1850 MHz | – | 1915 MHz | 1930 MHz | – | 1995 MHz | FDD |
| n71 | 663 MHz | – | 698 MHz | 617 MHz | – | 652 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

### 6.69.2 Channel bandwidths per operating band for CA

**Table 6.69.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | | **BCS** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |  | |
| CA\_n25A-n71A-n78A | - | n25 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 0 | |
| n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  | |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  | |
| CA\_n25A-n71A-n78(2A) | - | n25 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 0 | |
| n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  | |
| n78 | See CA\_n78(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 | | | | | | | | | | | | | |  |

### 6.69.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

### 6.69.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n25, n38 and n78, the ΔTIB,c and ΔRIB,c values are shown in table 6.69.4-1 and table 6.69.4-2, respectively.

**Table 6.69.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n25-n71-n78 | n25 | 0.6 |
| n71 | 0.6 |
| n78 | 0.8 |

**Table 6.69.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n25-n71-n78 | n25 | 0.2 |
| n71 | 0.3 |
| n78 | 0.5 |

### 6.69.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

## 6.70 CA\_n14-n66-n77

### 6.70.1 Operating bands for CA

**Table 6.70.1-1: CA band combination of CA\_n14 + n66 + n77**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n14A-n66A-n77A | n14 | 778 MHz | – | 788 MHz | 758 MHz | – | 768 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n77 | 3300MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.70.2 Channel bandwidths per operating band for CA

Table 6.70.2-1: Supported bandwidths per CA band combination of CA\_n14 + n66 + n77

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | UL configuration | NR Band | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | Bandwidth combination set |
| CA\_n14A-n66A-n77A | - | n14 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

### 6.70.3 Co-existence studies

Table 6.70.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL

Table 6.70.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | | **5th Harmonic** | |
|  | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| **n14** | 778 | 788 | 1556 | 1576 | 2334 | 2364 | 3112 | 3152 | 3890 | 3940 |
| **n66** | 1710 | 1780 | 3420 | 3560 | 5130 | 5340 | 6840 | 7120 | 8550 | 8900 |
| **n77** | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 | 16500 | 21000 |

Based on above table the 5th harmonic of band n14 as well as the 2nd harmonic of band n66 falls inside band n77. Both are found in the fall back mode to this combination.

Table 6.70.3-2 gives harmonic mixing issue for CA with Band n14, n66 and n77. No harmonic mixing issue is identified for this band combination.

Table 6.70.3-2 Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| **n14** | 778 | 788 | 758 | 768 | 1516 | 1536 | 2274 | 2304 | 3032 | 3072 |
| **n66** | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 | 8440 | 8800 |
| **n77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

### 6.70.4 ∆TIB,c and ∆RIB,c values

For three DLs of Band n14, n66 and n77, the same ΔTIB,c and ΔRIB,c values specified for CA\_n5-n66-n77 are used as below.

Table 6.70.4-1: ΔTIB,c

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n14-n66-n77 | n14 | 0.6 |
| n66 | 0.6 |
| n77 | 0.8 |

Table 6.70.4-2: ΔRIB

| Inter-band CA Configuration | NR Band | ΔRIB [dB] |
| --- | --- | --- |
| CA\_n14-n66-n77 | n14 | 0.2 |
| n66 | 0.5 |
| n77 | 0.5 |

### 6.70.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.71 CA\_n14-n30-n77

### 6.71.1 Operating bands for CA

Table 6.71.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n14-n30-n77 | n14 | 788 MHz | – | 798 MHz | 758 MHz | – | 769 MHz | FDD |
| n30 | 2305 MHz | – | 2315 MHz | 2350 MHz | – | 2360 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.71.2 Channel bandwidths per operating band for CA

Table 6.71.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n14A-n30A-n77A | - | n14 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
| n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |

### 6.71.3 Co-existence studies

Table 6.71.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. There are no harmonic interference.

Table 6.71.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| **14** | 788 | 798 | 758 | 769 | 1576 | 1596 | 2364 | 2394 | 3152 | 3192 |
| **30** | 2305 | 2315 | 2350 | 2360 | 4610 | 4630 | 6915 | 6945 | 9220 | 9260 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.71.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. There are no harmonic mixing interference.

Table 6.71.3-2 Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| **14** | 788 | 798 | 758 | 769 | 1516 | 1538 | 2274 | 2307 | 3032 | 3076 |
| **30** | 2305 | 2315 | 2350 | 2360 | 4700 | 4720 | 7050 | 7080 | 9400 | 9440 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1.

### 6.71.4 ∆TIB,c and ∆RIB,c values

It is proposed to re-use ΔTIB,c and ΔRIB,c values from CA\_14-30 and DC\_13\_n78.

Table 6.71.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n14-n30-n77 | n14 | 0.5 |
| n30 | 0.3 |
| n77 | 0.8 |

Table 6.71.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n14-n30-n77 | n14 | 0.2 |
| n30 | 0 |
| n77 | 0.5 |

### 6.71.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.72 CA\_n5-n14-n77

### 6.72.1 Operating bands for CA

Table 6.72.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n5-n14-n77 | n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n14 | 788 MHz | – | 798 MHz | 758 MHz | – | 768 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.72.2 Channel bandwidths per operating band for CA

Table 6.72.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n5A-n14A-n77A | - | n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |
| n14 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |

### 6.72.3 Co-existence studies

Table 6.72.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. There is 4th HAM from n5 UL to n77 DL. MSD is already defined for this in 38.101-1

Table 6.72.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| **5** | 824 | 849 | 869 | 894 | 1648 | 1698 | 2472 | 2547 | 3296 | 3396 |
| **14** | 788 | 798 | 758 | 768 | 1576 | 1596 | 2364 | 2394 | 3152 | 3192 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.72.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. There is 4th HAM from n5 UL to n77 DL. MSD is already defined for this in 38.101-1.

Table 6.72.3-2 Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| **5** | 824 | 849 | 869 | 894 | 1738 | 1788 | 2607 | 2682 | 3476 | 3576 |
| **14** | 788 | 798 | 758 | 768 | 1516 | 1536 | 2274 | 2304 | 3032 | 3072 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1.

### 6.72.4 ∆TIB,c and ∆RIB,c values

It is proposed to re-use ΔTIB,c and ΔRIB,c values from DC\_13-n77, DC\_5\_n77 and CA\_5-13.

Table 6.72.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n14-n77 | n5 | 0.5 |
| n14 | 0.3 |
| n77 | 0.8 |

Table 6.72.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n14-n77 | n5 | 0.2 |
| n14 | 0.2 |
| n77 | 0.5 |

### 6.72.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.73 CA\_n2-n14-n77

### 6.73.1 Operating bands for CA

Table 6.73.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2-n14-n77 | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n14 | 788 MHz | – | 798 MHz | 758 MHz | – | 768 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.73.2 Channel bandwidths per operating band for CA

Table 6.73.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n2A-n14A-n77A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |
| n14 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |

### 6.73.3 Co-existence studies

Table 6.73.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. There is 2nd HAM from n2 UL to n77 DL. MSD is already defined for this in 38.101-1.

Table 6.73.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| **2** | 1850 | 1910 | 1930 | 1990 | 3700 | 3820 | 5550 | 5730 | 7400 | 7640 |
| **14** | 788 | 798 | 758 | 768 | 1576 | 1596 | 2364 | 2394 | 3152 | 3192 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.73.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. There is 2nd HAM from n2 UL to n77 DL. MSD is already defined for this in 38.101-1.

Table 6.73.3-2: Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| **2** | 1850 | 1910 | 1930 | 1990 | 3860 | 3980 | 5790 | 5970 | 7720 | 7960 |
| **14** | 788 | 798 | 758 | 768 | 1516 | 1536 | 2274 | 2304 | 3032 | 3072 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1.

### 6.73.4 ∆TIB,c and ∆RIB,c values

It is proposed to re-use ΔTIB,c and ΔRIB,c values from DC\_13-n77 and CA\_n2-n77.

Table 6.73.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n14-n77 | n2 | 0.5 |
| n14 | 0.3 |
| n77 | 0.8 |

Table 6.73.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n14-n77 | n2 | 0.2 |
| n14 | 0.2 |
| n77 | 0.5 |

### 6.73.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.74 CA\_n12-n66-n77

### 6.74.1 Operating bands for CA

**Table 6.74.1-1: CA band combination of CA\_n12 + n66 + n77**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n12A-n66A-n77A | n12 | 699 MHz | – | 716 MHz | 729 MHz | – | 745 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n77 | 3300MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.74.2 Channel bandwidths per operating band for CA

Table 6.74.2-1: Supported bandwidths per CA band combination of CA\_n12 + n66 + n77

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | UL configuration | NR Band | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | Bandwidth combination set |
| CA\_n12A-n66A-n77A | - | n12 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

### 6.74.3 Co-existence studies

Table 6.74.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. 3rd HAM from n66 UL might fall in n77 DL. MSD for this is already captured in 38.101-1.

Table 6.74.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | | **5th Harmonic** | |
|  | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| **12** | 699 | 716 | 729 | 746 | 1398 | 1432 | 2097 | 2148 | 2796 | 2864 |
| **66** | 1710 | 1780 | 3420 | 3560 | 3420 | 3560 | 5130 | 5340 | 6840 | 7120 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.74.3-2 gives harmonic mixing issue for CA with Band n14, n66 and n77. No harmonic mixing issue is identified for this band combination.

Table 6.74.3-2 Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| **12** | 699 | 716 | 729 | 746 | 1458 | 1492 | 2187 | 2238 | 2916 | 2984 |
| **66** | 1710 | 1780 | 3420 | 3560 | 6840 | 7120 | 10260 | 10680 | 13680 | 14240 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

### 6.74.4 ∆TIB,c and ∆RIB,c values

For three DLs of Band n12, n66 and n77, the same ΔTIB,c and ΔRIB,c values specified for DC\_66\_n77 and DC\_12\_n66, are used as below.

Table 6.74.4-1: ΔTIB,c

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n12-n66-n77 | n12 | 0.8 |
| n66 | 0.6 |
| n77 | 0.8 |

Table 6.74.4-2: ΔRIB

| Inter-band CA Configuration | NR Band | ΔRIB [dB] |
| --- | --- | --- |
| CA\_n12-n66-n77 | n12 | 0.5 |
| n66 | 0.5 |
| n77 | 0.5 |

### 6.74.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.75 CA\_n12-n30-n77

### 6.75.1 Operating bands for CA

Table 6.75.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n12-n30-n77 | n12 | 699 MHz | – | 716 MHz | 729 MHz | – | 746 MHz | FDD |
| n30 | 2305 MHz | – | 2315 MHz | 2350 MHz | – | 2360 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.75.2 Channel bandwidths per operating band for CA

Table 6.75.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n12A-n30A-n77A | - | n12 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |
| n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |

### 6.75.3 Co-existence studies

Table 6.75.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. There are no harmonic interference.

Table 6.75.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| **12** | 699 | 716 | 729 | 746 | 1398 | 1432 | 2097 | 2148 | 2796 | 2864 |
| **30** | 2305 | 2315 | 2350 | 2360 | 4610 | 4630 | 6915 | 6945 | 9220 | 9260 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.75.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. There are no harmonic mixing interference.

Table 6.75.3-2: Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| **12** | 699 | 716 | 729 | 746 | 1458 | 1492 | 2187 | 2238 | 2916 | 2984 |
| **30** | 2305 | 2315 | 2350 | 2360 | 4700 | 4720 | 7050 | 7080 | 9400 | 9440 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1.

### 6.75.4 ∆TIB,c and ∆RIB,c values

It is proposed to re-use ΔTIB,c and ΔRIB,c values from CA\_12-30, DC\_12\_n30 and DC\_12\_n78.

Table 6.75.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n12-n30-n77 | n12 | 0.5 |
| n30 | 0.3 |
| n77 | 0.5 |

Table 6.75.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n12-n30-n77 | n12 | 0.2 |
| n30 | 0 |
| n77 | 0.5 |

### 6.75.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.76 CA\_n2-n12-n77

### 6.76.1 Operating bands for CA

Table 6.76.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2-n12-n77 | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n12 | 699 MHz | – | 716 MHz | 729 MHz | – | 746 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.76.2 Channel bandwidths per operating band for CA

Table 6.76.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n2A-n12A-n77A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |
| n12 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |

### 6.76.3 Co-existence studies

Table 6.76.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. There are no harmonic issues.

Table 6.76.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| **2** | 1850 | 1910 | 1930 | 1990 | 3700 | 3820 | 5550 | 5730 | 7400 | 7640 |
| **12** | 699 | 716 | 729 | 746 | 1398 | 1432 | 2097 | 2148 | 2796 | 2864 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.76.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. There are no harmonic issues.

Table 6.76.3-2: Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| **2** | 1850 | 1910 | 1930 | 1990 | 3860 | 3980 | 5790 | 5970 | 7720 | 7960 |
| **12** | 699 | 716 | 729 | 746 | 1458 | 1492 | 2187 | 2238 | 2916 | 2984 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1.

### 6.76.4 ∆TIB,c and ∆RIB,c values

It is proposed to re-use ΔTIB,c and ΔRIB,c values from CA\_n2-n77, DC\_12\_n78 and CA\_2-12.

Table 6.76.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n12-n77 | n2 | 0.6 |
| n12 | 0.3 |
| n77 | 0.8 |

Table 6.76.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n12-n77 | n2 | 0.2 |
| n12 | 0.2 |
| n77 | 0.5 |

### 6.76.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.77 CA\_n5-n12-n77

### 6.77.1 Operating bands for CA

Table 6.77.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n5-n12-n77 | n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n12 | 699 MHz | – | 716 MHz | 729 MHz | – | 746 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.77.2 Channel bandwidths per operating band for CA

Table 6.77.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n5A-n12A-n77A | - | n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |
| n12 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |

### 6.77.3 Co-existence studies

Table 6.77.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. There are 4th HAM from n5 UL to n77 DL. MSD sue to this is already defined in 38.101-1.

Table 6.77.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| **5** | 824 | 849 | 869 | 894 | 1648 | 1698 | 2472 | 2547 | 3296 | 3396 |
| **12** | 699 | 716 | 729 | 746 | 1398 | 1432 | 2097 | 2148 | 2796 | 2864 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.77.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. There are 4th HAM from n5 UL to n77 DL. MSD sue to this is already defined in 38.101-1.

Table 6.77.3-2 Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| **5** | 824 | 849 | 869 | 894 | 1738 | 1788 | 2607 | 2682 | 3476 | 3576 |
| **12** | 699 | 716 | 729 | 746 | 1458 | 1492 | 2187 | 2238 | 2916 | 2984 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1.

### 6.77.4 ∆TIB,c and ∆RIB,c values

It is proposed to re-use ΔTIB,c and ΔRIB,c values from CA\_5-12, DC\_5\_n77, DC\_5\_n12 and DC\_12\_n78.

Table 6.77.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n12-n77 | n5 | 0.8 |
| n12 | 0.4 |
| n77 | 0.5 |

Table 6.77.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n12-n77 | n5 | 0.5 |
| n12 | 0.3 |
| n77 | 0.5 |

### 6.77.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.78 CA\_n2-n5-n77

### 6.78.1 Operating bands for CA

Table 6.78.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2-n5-n77 | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.78.2 Channel bandwidths per operating band for CA

Table 6.78.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n2A-n5A-n77A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |

### 6.78.3 Co-existence studies

Table 6.78.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. There is 2nd HAM from n2 UL to n77 DL and 4th HAM from n5 UL to n77 DL. MSD is already defined for this in 38.101-1

Table 6.78.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| **2** | 1850 | 1910 | 1930 | 1990 | 3700 | 3820 | 5550 | 5730 | 7400 | 7640 |
| **5** | 824 | 849 | 869 | 894 | 1648 | 1698 | 2472 | 2547 | 3296 | 3396 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.78.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. There is 2nd HAM from n2 UL to n77 DL and 4th HAM from n5 UL to n77 DL. MSD is already defined for this in 38.101-1

Table 6.78.3-2: Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| **2** | 1850 | 1910 | 1930 | 1990 | 3860 | 3980 | 5790 | 5970 | 7720 | 7960 |
| **5** | 824 | 849 | 869 | 894 | 1738 | 1788 | 2607 | 2682 | 3476 | 3576 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1.

### 6.78.4 ∆TIB,c and ∆RIB,c values

It is proposed to re-use ΔTIB,c and ΔRIB,c values from CA\_n2-n77, DC\_5\_n77 and CA\_2-5.

Table 6.78.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n5-n77 | n2 | 0.6 |
| n5 | 0.8 |
| n77 | 0.8 |

Table 6.78.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n5-n77 | n2 | 0.2 |
| n5 | 0.5 |
| n77 | 0.5 |

### 6.78.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.79 CA\_n5-n30-n77

### 6.79.1 Operating bands for CA

Table 6.79.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n5-n30-n77 | n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n30 | 2305 MHz | – | 2315 MHz | 2350 MHz | – | 2360 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.79.2 Channel bandwidths per operating band for CA

Table 6.79.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n5A-n30A-n77A | - | n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |
| n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |

### 6.79.3 Co-existence studies

Table 6.79.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. There is 4th HAM from n5 UL to n77 DL. MSD is already defined for this in 38.101-1

Table 6.79.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| **5** | 824 | 849 | 869 | 894 | 1648 | 1698 | 2472 | 2547 | 3296 | 3396 |
| **30** | 2305 | 2315 | 2350 | 2360 | 4610 | 4630 | 6915 | 6945 | 9220 | 9260 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.79.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. There is 4th HAM from n5 UL to n77 DL. MSD is already defined for this in 38.101-1.

Table 6.79.3-2: Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| **5** | 824 | 849 | 869 | 894 | 1738 | 1788 | 2607 | 2682 | 3476 | 3576 |
| **30** | 2305 | 2315 | 2350 | 2360 | 4700 | 4720 | 7050 | 7080 | 9400 | 9440 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1.

### 6.79.4 ∆TIB,c and ∆RIB,c values

It is proposed to re-use ΔTIB,c and ΔRIB,c values from DC\_5\_n77 and CA\_5-30.

Table 6.79.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n30-n77 | n5 | 0.6 |
| n30 | 0.3 |
| n77 | 0.8 |

Table 6.79.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n30-n77 | n5 | 0.2 |
| n30 | 0 |
| n77 | 0.5 |

### 6.79.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.80 CA\_n2-n30-n77

### 6.80.1 Operating bands for CA

Table 6.80.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2-n30-n77 | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n30 | 2305 MHz | – | 2315 MHz | 2350 MHz | – | 2360 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.80.2 Channel bandwidths per operating band for CA

Table 6.80.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n2A-n30A-n77A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |
| n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |

### 6.80.3 Co-existence studies

Table 6.80.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. There is 2nd HAM from n2 UL to n77 DL. MSD is already defined for this in 38.101-1.

Table 6.80.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| **2** | 1850 | 1910 | 1930 | 1990 | 3700 | 3820 | 5550 | 5730 | 7400 | 7640 |
| **30** | 2305 | 2315 | 2350 | 2360 | 4610 | 4630 | 6915 | 6945 | 9220 | 9260 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.80.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. There is 2nd HAM from n2 UL to n77 DL. MSD is already defined for this in 38.101-1.

Table 6.80.3-2 Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| **2** | 1850 | 1910 | 1930 | 1990 | 3860 | 3980 | 5790 | 5970 | 7720 | 7960 |
| **30** | 2305 | 2315 | 2350 | 2360 | 4700 | 4720 | 7050 | 7080 | 9400 | 9440 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1.

### 6.80.4 ∆TIB,c and ∆RIB,c values

It is proposed to re-use ΔTIB,c and ΔRIB,c values from CA\_n2-n77 and CA\_2-30.

Table 6.80.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n30-n77 | n2 | 0.6 |
| n30 | 0.3 |
| n77 | 0.8 |

Table 6.80.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n30-n77 | n2 | 0.2 |
| n30 | 0 |
| n77 | 0.5 |

### 6.80.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.81 CA\_n30-n66-n77

### 6.81.1 Operating bands for CA

Table 6.81.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n30-n66-n77 | n30 | 2305 MHz | – | 2315 MHz | 2350 MHz | – | 2360 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

### 6.81.2 Channel bandwidths per operating band for CA

Table 6.81.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n30A-n66A-n77A | - | n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 0 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |

### 6.81.3 Co-existence studies

Table 6.81.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. There are 2nd HAM from n66 UL to n77 DL. MSD for this is already defined in 38.101-1.

Table 6.81.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| **30** | 2305 | 2315 | 2350 | 2360 | 4610 | 4630 | 6915 | 6945 | 9220 | 9260 |
| **66** | 1710 | 1780 | 2110 | 2200 | 3420 | 3560 | 5130 | 5340 | 6840 | 7120 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.81.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. There are no harmonic issue.

Table 6.81.3-2: Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| **30** | 2305 | 2315 | 2350 | 2360 | 4700 | 4720 | 7050 | 7080 | 9400 | 9440 |
| **66** | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 | 8440 | 8800 |
| **77** | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1.

### 6.81.4 ∆TIB,c and ∆RIB,c values

It is proposed to re-use ΔTIB,c and ΔRIB,c values from CA\_30-66 and DC\_66\_n77.

Table 6.81.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n30-n66-n77 | n30 | 0.3 |
| n66 | 0.6 |
| n77 | 0.8 |

Table 6.81.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n30-n66-n77 | n30 | 0.5 |
| n66 | 0.4 |
| n77 | 0.5 |

### 6.81.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.82 CA\_n7-n25-n78

### 6.82.1 Operating bands for CA

**Table 6.82.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n7-n25-n78 | n7 | 2500 MHz | – | 2570 MHz | 2620 MHz | – | 2690 MHz | FDD |
| n25 | 1850 MHz | – | 1915 MHz | 1930 MHz | – | 1995 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

### 6.82.2 Channel bandwidths per operating band for CA

**Table 6.82.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n7A-n25A-n78A | - | n7 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 0 |
| n25 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 704 | 80 | 904 | 100 |
| CA\_n7A-n25A-n78(2A) | - | n7 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 0 |
| n25 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n78 | See CA\_n78(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| NOTE: This UE channel bandwidth is optional in this release of the specification. | | | | | | | | | | | | | | | | |

### 6.82.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.82.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. As can be seen, 2nd harmonic from n25 UL might affect n78 DL, which are addressed in lower order combinations.

**Table 6.82.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| **n7** | 2500 | 2570 | 2620 | 2690 | 5000 | 5140 | 7500 | 7710 | 10000 | 10280 |
| **n25** | 1850 | 1915 | 1930 | 1995 | 3700 | 3830 | 5550 | 5745 | 7400 | 7660 |
| **n78** | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 | 13200 | 15200 |

Table 6.82.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. No issues can be seen.

**Table 6.82.3-2: Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n7 | 2500 | 2570 | 2620 | 2690 | 5240 | 5380 | 7860 | 8070 | 10480 | 10760 |
| n25 | 1850 | 1915 | 1930 | 1995 | 3860 | 3990 | 5790 | 5985 | 7720 | 7980 |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 | 13200 | 15200 |

### 6.82.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n7, n25 and n78, the ΔTIB,c and ΔRIB,c values are shown in table 6.1.x.4-1 and table 6.1.x.4-2, respectively. Values are derived from DC\_7-25\_n78.

**Table 6.82.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n7-n25-n78 | n7 | 0.5 |
| n25 | 0.6 |
| n78 | 0.8 |

**Table 6.82.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n7-n25-n78 | n7 | 0.5 |
| n25 | 0.2 |
| n78 | 0.5 |

### 6.82.5 REFSENS requirements

The 2nd harmonic mixing issues from n25 UL into n78 DL will be addressed in lower order combination.

## 6.83 CA\_n7-n78-n258

### 6.83.1 Operating band for CA

**Table 6.83.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n7-n78-n258 | n7 | 2500 MHz | – | 2570 MHz | 2620 MHz | – | 2690 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |
| n258 | 24250 MHz | – | 27500 MHz | 24250 MHz | – | 27500 MHz | TDD |

### 6.83.2 Channel bandwidths per operating band for CA

**Table 6.83.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

| **NR CA config** | **UL config** | **NR Band** |  | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** | **Bandwidth combination set** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n7A-n78A-n258A | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 |  |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258B in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| n7 |  |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258C in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258D in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7A-n78A-n258E | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258E in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7A-n78A-n258F | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258F in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7A-n78A-n258G | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258G in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7A-n78A-n258H | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
|  |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258H in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7A-n78A-n258I | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7A-n78A-n258J | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258J in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7A-n78A-n258K | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258K in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7A-n78A-n258L | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258L in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7A-n78A-n258M | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
|  |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258M in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7B-n78A-n258A | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 |  |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| CA\_n7B-n78A-n258B | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258B in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7B-n78A-n258C | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258C in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7B-n78A-n258D | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258D in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7B-n78A-n258E | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
|  |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258E in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7B-n78A-n258F | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258F in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7B-n78A-n258G | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258G in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7B-n78A-n258H | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258H in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7B-n78A-n258I | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7B-n78A-n258J | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258J in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7B-n78A-n258K | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258K in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258L in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n7B-n78A-n258M | - | n7 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |  |  | 0 |
| n78 |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n258 | See CA\_n258M in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |

### 6.83.3 Co-existence studies<void>

### 6.83.4 ∆TIB and ∆RIB values

For CA\_n7-n78-n258, the ΔTIB,c and ΔRIB,c values are given in the tables below.

**Table 6.83.4-1: ΔTIB,c**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n7-n78-n258 | n7 | 0.5 |
| n78 | 0.8 |
| n258 | 0 |

**Table 6.83.4-2: ΔRIB**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB [dB]** |
| --- | --- | --- |
| CA\_n7-n78-n258 | n7 | 0.5 |
| n78 | 0.5 |
| n258 | 0 |

### 6.83.5 REFSENS requirements

MSD studies can be omitted because harmonic interference between FR1 bands have been already studied in the fallback band combination and harmonic interference between FR1 bands and FR2 band are negligible.

## 6.84 CA\_n2-n14-n30

### 6.84.1 Operating bands for CA

Table 6.84.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2-n14-n30 | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n14 | 788 MHz | – | 798 MHz | 758 MHz | – | 768 MHz | FDD |
| n30 | 2305 MHz | – | 2315 MHz | 2350 MHz | – | 2360 MHz | FDD |

### 6.84.2 Channel bandwidths per operating band for CA

Table 6.84.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Config** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n2A-n14A-n30A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n14 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
| n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
| CA\_n2(2A)-n14A-n30A | - | n2 | See CA\_n2(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | 0 |
| n14 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
| n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |

### 6.84.3 Co-existence studies

Table 6.84.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. No harmonic relation is identified.

Table 6.84.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **nth Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge |
| n2 | 1850 | 1910 | 1930 | 1990 | 3700 | 3820 | 5550 | 5730 | - | - |
| n14 | 788 | 798 | 758 | 768 | 1576 | 1596 | 2364 | 2394 | - | - |
| n30 | 2305 | 2315 | 2350 | 2360 | 4610 | 4630 | 6915 | 6945 | - | - |

Table 6.84.3-2 gives harmonic mixing issue for CA with Band n2, n14 and n30. No harmonic mixing relation is identified.

Table 6.84.3-2 Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **mth Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge |
| n2 | 1850 | 1910 | 1930 | 1990 | 3860 | 3980 | 5790 | 5970 | - | - |
| n14 | 788 | 798 | 758 | 768 | 1516 | 1536 | 2274 | 2304 | - | - |
| n30 | 2305 | 2315 | 2350 | 2360 | 4700 | 4720 | 7050 | 7080 | - | - |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1 [3].

### 6.84.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n2, n14 and n30, the ΔTIB,c and ΔRIB,c values are shown in table 6.84.4-1 and table 6.84.4-2, respectively. The requirement is reused from the similar combination, E-UTRA CA\_2-14-30.

Table 6.84.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n14-n30 | n2 | 0.5 |
| n14 | 0.3 |
| n30 | 0.5 |

Table 6.84.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n14-n30 | n2 | 0.3 |
| n14 | 0 |
| n30 | 0.3 |

### 6.84.5 REFSENS requirements

There is no REFSENS exception.

## 6.85 CA\_n2-n14-n66

### 6.85.1 Operating bands for CA

Table 6.85.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2-n14-n66 | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n14 | 788 MHz | – | 798 MHz | 758 MHz | – | 768 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |

### 6.85.2 Channel bandwidths per operating band for CA

Table 6.85.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Config** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n2A-n14A-n66A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n14 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| CA\_n2(2A)-n14A-n66A | - | n2 | See CA\_n2(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | 0 |
| n14 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| CA\_n2A-n14A-n66(2A) | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n14 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |

### 6.85.3 Co-existence studies

Table 6.85.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. No harmonic relation is identified.

Table 6.85.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **nth Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge |
| n2 | 1850 | 1910 | 1930 | 1990 | 3700 | 3820 | 5550 | 5730 | - | - |
| n14 | 788 | 798 | 758 | 768 | 1576 | 1596 | 2364 | 2394 | - | - |
| n66 | 1710 | 1780 | 2110 | 2200 | 3420 | 3560 | 5130 | 5340 | - | - |

Table 6.85.3-2 gives harmonic mixing issue for CA with Band n2, n14 and n66. No harmonic mixing relation is identified.

Table 6.85.3-2 Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **mth Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge |
| n2 | 1850 | 1910 | 1930 | 1990 | 3860 | 3980 | 5790 | 5970 | - | - |
| n14 | 788 | 798 | 758 | 768 | 1516 | 1536 | 2274 | 2304 | - | - |
| n66 | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 | - | - |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1 [3].

### 6.85.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n2, n14 and n66, the ΔTIB,c and ΔRIB,c values are shown in table 6.85.4-1 and table 6.85.4-2, respectively. The requirement is reused from the similar combination, E-UTRA CA\_2-14-66.

Table 6.85.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n14-n66 | n2 | 0.5 |
| n14 | 0.3 |
| n66 | 0.5 |

Table 6.85.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n14-n66 | n2 | 0.3 |
| n14 | 0 |
| n66 | 0.3 |

### 6.85.5 REFSENS requirements

There is no REFSENS exception.

## 6.86 CA\_n14-n30-n66

### 6.86.1 Operating bands for CA

Table 6.86.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n14-n30-n66 | n14 | 788 MHz | – | 798 MHz | 758 MHz | – | 768 MHz | FDD |
| n30 | 2305 MHz | – | 2315 MHz | 2350 MHz | – | 2360 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |

### 6.86.2 Channel bandwidths per operating band for CA

Table 6.85.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Config** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n14A-n30A-n66A | - | n14 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| CA\_n14A-n30A-n66(2A) | - | n14 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |

### 6.86.3 Co-existence studies

Table 6.86.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. No harmonic relation is identified.

Table 6.86.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **nth Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge |
| n14 | 788 | 798 | 758 | 768 | 1576 | 1596 | 2364 | 2394 | - | - |
| n30 | 2305 | 2315 | 2350 | 2360 | 4610 | 4630 | 6915 | 6945 | - | - |
| n66 | 1710 | 1780 | 2110 | 2200 | 3420 | 3560 | 5130 | 5340 | - | - |

Table 6.86.3-1 summarizes frequency ranges where harmonic mixing occur due to 3DL bands CA with 1 UL. No harmonic mixing relation is identified.

Table 6.86.3-2 Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **mth Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge |
| n14 | 788 | 798 | 758 | 768 | 1516 | 1536 | 2274 | 2304 | - | - |
| n30 | 2305 | 2315 | 2350 | 2360 | 4700 | 4720 | 7050 | 7080 | - | - |
| n66 | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 | - | - |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1 [3].

### 6.86.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n14, n30 and n66, the ΔTIB,c and ΔRIB,c values are shown in table 6.86.4-1 and table 6.86.4-2, respectively. The requirement is reused from the similar combination, E-UTRA CA\_14-30-66.

Table 6.86.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n14-n30-n66 | n14 | 0.3 |
| n30 | 0.3 |
| n66 | 0.5 |

Table 6.86.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n14-n30-n66 | n14 | 0 |
| n30 | 0.5 |
| n66 | 0.4 |

### 6.86.5 REFSENS requirements

There is no REFSENS exception.

6.87 CA\_n1-n3-n77

6.87.1 Operating bands for CA

**Table 6.87.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n3-n77 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

6.87.2 Channel bandwidths per operating band for CA

**Table 6.87.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA config** | **Uplink config** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **BCS** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |  |
| CA\_n1A-n3A-n77A | - | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n3 | 5 | 10 | 15 | 20 | 25 | 30 |  |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 |
| CA\_n1A-n3A-n77(2A) | - | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n3 | 5 | 10 | 15 | 20 | 25 | 30 |  |  |  |  |  |  |  |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 | | | | | | | | | | | | |

6.87.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

6.87.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n1, n3 and n77, the ΔTIB,c and ΔRIB,c values are shown in table 6.87.4-1 and table 6.87.4-2 refer to DC\_1-3\_n77 in 38.101-3, respectively.

**Table 6.87.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n3-n77 | n1 | 0.6 |
| n3 | 0.6 |
| n77 | 0.8 |

**Table 6.87.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n3-n77 | n1 | 0.2 |
| n3 | 0.2 |
| n77 | 0.5 |

6.87.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

6.88 CA\_n1-n3-n257

6.88.1 Operating bands for CA

**Table 6.88.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n3-n257 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| n257 | 26500 MHz | – | 29500 MHz | 26500 MHz | – | 29500 MHz | TDD |

6.88.2 Channel bandwidths per operating band for CA

**Table 6.88.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA config** | **Uplink config** | **NR Band** |  | |  | | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **BCS** |
|  |  |  | **5** | **10** | | **15** | | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** |
| CA\_n1A-n3A-n257A | - | n1 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n3 | 5 | 10 | | 15 | | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  |
| n257 |  |  | |  | |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| CA\_n1A-n3A-n257G | - | n1 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n3 | 5 | 10 | | 15 | | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257G in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n3A-n257H | - | n1 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n3 | 5 | 10 | | 15 | | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257H in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n3A-n257I | - | n1 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n3 | 5 | 10 | | 15 | | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n3A-n257J | - | n1 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n3 | 5 | 10 | | 15 | | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257J in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n3A-n257K | - | n1 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n3 | 5 | 10 | | 15 | | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257K in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n3A-n257L | - | n1 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n3 | 5 | 10 | | 15 | | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257L in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n3A-n257M | - | n1 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n3 | 5 | 10 | | 15 | | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257M in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |

6.88.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

6.88.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n1, n3 and n257, the ΔTIB,c and ΔRIB,c values are shown in table 6.88.4-1 and table 6.88.4-2, respectively.

**Table 6.88.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n3-n257 | n1 | 0.6 |
| n3 | 0.6 |
| n257 | 0 |

**Table 6.88.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n3-n257 | n1 | 0.2 |
| n3 | 0.2 |
| n257 | 0 |

6.88.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

6.89 CA\_n3-n8-n77

6.89.1 Operating bands for CA

**Table 6.89.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n3-n8-n77 | n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| n8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

6.89.2 Channel bandwidths per operating band for CA

**Table 6.89.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA config** | **Uplink config** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **BCS** |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| CA\_n3A-n8A-n77A | - | n3 | 5 | 10 | 15 | 20 | 25 | 30 |  |  |  |  |  |  |  | 0 |
| n8 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 |
|  | - | n3 | 5 | 10 | 15 | 20 | 25 | 30 |  |  |  |  |  |  |  | 0 |
| CA\_n3A-n8A-n77(2A) | n8 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 | | | | | | | | | | | | |

6.89.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

6.89.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n3, n8 and n77, the ΔTIB,c and ΔRIB,c values are shown in table 6.89.4-1 and table 6.89.4-2 refer to DC\_3-8\_n77 in 38.101-3, respectively.

**Table 6.89.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n8-n77 | n3 | 0.6 |
| n8 | 0.6 |
| n77 | 0.8 |

**Table 6.89.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n8-n77 | n3 | 0.2 |
| n8 | 0.2 |
| n77 | 0.5 |

6.89.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

6.90 CA\_n3-n8-n257

6.90.1 Operating bands for CA

**Table 6.90.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n3-n8-n257 | n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| n8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |
| n257 | 26500 MHz | – | 29500 MHz | 26500 MHz | – | 29500 MHz | TDD |

6.90.2 Channel bandwidths per operating band for CA

**Table 6.90.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA config** | **Uplink config** | **NR Band** |  | |  | | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **BCS** |
|  |  |  | **5** | **10** | | **15** | | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **100** |
| CA\_n3A-n8A-n257A | - | n3 | 5 | 10 | | 15 | | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  | 0 |
| n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n257 |  |  | |  | |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| CA\_n3A-n8A-n257G | - | n3 | 5 | 10 | | 15 | | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  | 0 |
| n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257G in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n3A-n8A-n257H | - | n3 | 5 | 10 | | 15 | | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  | 0 |
| n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257H in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n3A-n8A-n257I | - | n3 | 5 | 10 | | 15 | | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  | 0 |
| n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n3A-n8A-n257J | - | n3 | 5 | 10 | | 15 | | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  | 0 |
| n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257J in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n3A-n8A-n257K | - | n3 | 5 | 10 | | 15 | | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  | 0 |
| n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257K in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n3A-n8A-n257L | - | n3 | 5 | 10 | | 15 | | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  | 0 |
| n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257L in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n3A-n8A-n257M | - | n3 | 5 | 10 | | 15 | | 20 | 25 | 30 |  |  |  |  |  |  |  |  |  | 0 |
| n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257M in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |

6.90.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

6.90.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n3, n8 and n257, the ΔTIB,c and ΔRIB,c values are shown in table 6.90.4-1 and table 6.90.4-2, respectively.

**Table 6.90.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n8-n257 | n3 | 0.6 |
| n8 | 0.6 |
| n257 | 0 |

**Table 6.90.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n8-n257 | n3 | 0.2 |
| n8 | 0.2 |
| n257 | 0 |

6.90.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

6.91 CA\_n8-n77-n257

6.91.1 Operating bands for CA

**Table 6.91.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n8-n77-n257 | n8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |
| n257 | 26500 MHz | – | 29500 MHz | 26500 MHz | – | 29500 MHz | TDD |

6.91.2 Channel bandwidths per operating band for CA

**Table 6.91.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA config** | **Uplink config** | **NR Band** |  | |  | | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **BCS** |
|  |  |  | **5** | **10** | | **15** | | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **100** |
| CA\_n8A-n77A-n257A | - | n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | | 15 | | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 |  |  |
| n257 |  |  | |  | |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| CA\_n8A-n77A-n257G | - | n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | | 15 | | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 |  |  |
| n257 | See CA\_n257G in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n8A-n77A-n257H | - | n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | | 15 | | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 |  |  |
| n257 | See CA\_n257H in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n8A-n77A-n257I | - | n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | | 15 | | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 |  |  |
| n257 | See CA\_n257I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n8A-n77A-n257J | - | n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | | 15 | | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 |  |  |
| n257 | See CA\_n257J in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n8A-n77A-n257K | - | n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | | 15 | | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 |  |  |
| n257 | See CA\_n257K in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n8A-n77A-n257L | - | n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | | 15 | | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 |  |  |
| n257 | See CA\_n257L in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n8A-n77A-n257M | - | n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | | 15 | | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 |  |  |
| n257 | See CA\_n257M in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n8A-n77(2A)-n257A | - | n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | | | | |
| n257 |  |  | |  | |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| CA\_n8A-n77(2A)-n257G | - | n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | | | | |
| n257 | See CA\_n257G in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n8A-n77(2A)-n257H | - | n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | | | | |
| n257 | See CA\_n257H in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n8A-n77(2A)-n257I | - | n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | | | | |
| n257 | See CA\_n257I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n8A-n77(2A)-n257J | - | n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | | | | |
| n257 | See CA\_n257J in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n8A-n77(2A)-n257K | - | n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | | | | |
| n257 | See CA\_n257K in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n8A-n77(2A)-n257L | - | n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | | | | |
| n257 | See CA\_n257L in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n8A-n77(2A)-n257M | - | n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | | | | |
| n257 | See CA\_n257M in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |

6.91.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

6.91.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n8, n77 and n257, the ΔTIB,c and ΔRIB,c values are shown in table 6.91.4-1 and table 6.91.4-2, respectively.

**Table 6.91.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n8-n77-n257 | n8 | 0.6 |
| n77 | 0.8 |
| n257 | 0 |

**Table 6.91.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n8-n77-n257 | n8 | 0.2 |
| n77 | 0.5 |
| n257 | 0 |

6.91.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

## 6.92 CA\_n48-n66-n77

### 6.92.1 Operating bands for CA

Table 6.92.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n48-n66-n77 | n48, n66, n77 |

### 6.92.2 Channel bandwidths per operating band for CA

Table 6.92.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA config** | **Uplink config** | **NR Band** | **5  MHz** | **10  MHz** | **15  MHz** | **20  MHz** | **25  MHz** | **30  MHz** |  | **40 MHz** | **50 MHz** | **60 MHz** | **70 MHz** | **80 MHz** | **90 MHz** | **100 MHz** | **BCS** |
| CA\_n48A-n66A-n77A | - | n48 | 5 | 10 | 15 | 20 |  | 30 |  | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n48B-n66A-n77A | - | n48 | See CA\_n48B Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | | | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| n48 | See CA\_n48B Bandwidth Combination Set 1 in Table 5.5A.1-1 | | | | | | | | | | | | | | 1 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |
| n48 | See CA\_n48B Bandwidth Combination Set 2 in Table 5.5A.1-1 | | | | | | | | | | | | | | 2 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n48(2A)-n66A-n77A | - | n48 | See CA\_n48(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| n48 | See CA\_n48(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | | | 1 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.92.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference from n48 to n66 and n77, and from n66 to n48 and n77, and from n77 to n48 and n66 have been already studied for 3DL/1UL fallback combinations CA n48-n66 and CA\_n48-n77 and n66-n77.

### 6.92.4 ∆TIB,c and ∆RIB,c values

The ΔTIB,c and ΔRIB,c values are given in tables below.

Table 6.92.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n48-n66-n77 | n48 | 0.8 |
| n66 | 0.6 |
| n77 | 0.8 |

Table 6.92.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n48-n66-n77 | n48 | 0.5 |
| n66 | 0.2 |
| n77 | 0.5 |

### 6.92.5 REFSENS requirements

MSD requirements are captured in lower order combinations and there is no additional requirement for this CA configuration.

## 6.93 CA\_n5-n48-n77

### 6.93.1 Operating bands for CA

Table 6.93.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n5-n48-n77 | n5, n48, n77 |

### 6.93.2 Channel bandwidths per operating band for CA

Table 6.93.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA config** | **Uplink config** | **NR Band** | **5  MHz** | **10  MHz** | **15  MHz** | **20  MHz** | **25  MHz** | **30  MHz** | **40 MHz** | **50 MHz** | **60 MHz** | **70 MHz** | **80 MHz** | **90 MHz** | **100 MHz** | **BCS** |
| CA\_n5A-n48A-n77A | - | n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n48 | 5 | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n5A-n48B-n77A | - | n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n48 | See CA\_n48B Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| n5 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  | 1 |
| n48 | See CA\_n48B Bandwidth Combination Set 1 in Table 5.5A.1-1 | | | | | | | | | | | | |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 2 |
| n48 | See CA\_n48B Bandwidth Combination Set 2 in Table 5.5A.1-1 | | | | | | | | | | | | |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n5A-n48(2A)-n77A | - | n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n48 | See CA\_n48(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 1 |
| n48 | See CA\_n48(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.93.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference from n5 to n48 and n77, and from n48 to n5 and n77, and from n77 to n5 and n48 have been already studied for 3DL/1UL fallback combinations CA n5-n48 and CA\_n5-n77 and n48-n77.

### 6.93.4 ∆TIB,c and ∆RIB,c values

The ΔTIB,c and ΔRIB,c values are given in tables below.

Table 6.93.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n48-n77 | n5 | 0.6 |
| n48 | 0.8 |
| n77 | 0.8 |

Table 6.93.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n48-n77 | n5 | 0.2 |
| n48 | 0.5 |
| n77 | 0.5 |

### 6.93.5 REFSENS requirements

MSD requirements are captured in lower order combinations and there is no additional requirement for this CA configuration.

## 6.94 CA\_n5-n48-n66

### 6.94.1 Operating bands for CA

Table 6.94.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n5-n48-n66 | n5, n48, n66 |

### 6.94.2 Channel bandwidths per operating band for CA

Table 6.94.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA config** | **Uplink config** | **NR Band** | **5  MHz** | **10  MHz** | **15  MHz** | **20  MHz** | **25  MHz** | **30  MHz** | **40 MHz** | **50 MHz** | **60 MHz** | **70 MHz** | **80 MHz** | **90 MHz** | **100 MHz** | **BCS** |
| CA\_n5A-n48A-n66A | - | n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n48 | 5 | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| CA\_n5A-n48B-n66A | - | n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n48 | See CA\_n48B Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 1 |
| n48 | See CA\_n48B Bandwidth Combination Set 1 in Table 5.5A.1-1 | | | | | | | | | | | | |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 2 |
| n48 | See CA\_n48B Bandwidth Combination Set 2 in Table 5.5A.1-1 | | | | | | | | | | | | |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| CA\_n5A-n48(2A)-n66A | - | n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n48 | See CA\_n48(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 1 |
| n48 | See CA\_n48(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.94.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference from n5 to n48 and n66, and from n48 to n5 and n66, and from n66 to n5 and n48 have been already studied for 3DL/1UL fallback combinations CA n5-n48 and CA\_n5-n66 and n48-n66.

### 6.94.4 ∆TIB,c and ∆RIB,c values

The ΔTIB,c and ΔRIB,c values are given in tables below.

Table 6.94.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n48-n66 | n5 | 0.3 |
| n48 | 0.8 |
| n66 | 0.6 |

Table 6.94.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n5-n48-n66 | n5 | 0 |
| n48 | 0.5 |
| n66 | 0.2 |

### 6.94.5 REFSENS requirements

MSD requirements are captured in lower order combinations and there is no additional requirement for this CA configuration.

## 6.95 CA\_n2-n48-n77

### 6.95.1 Operating bands for CA

Table 6.95.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n2-n48-n77 | n2, n48, n77 |

### 6.95.2 Channel bandwidths per operating band for CA

Table 6.95.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA config** | **Uplink config** | **NR Band** | **5  MHz** | **10  MHz** | **15  MHz** | **20  MHz** | **25  MHz** | **30  MHz** | **40 MHz** | **50 MHz** | **60 MHz** | **70 MHz** | **80 MHz** | **90 MHz** | **100 MHz** | **BCS** |
| CA\_n2A-n48A-n77A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n48 | 5 | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n2A-n48B-n77A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n48 | See CA\_n48B Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 1 |
| n48 | See CA\_n48B Bandwidth Combination Set 1 in Table 5.5A.1-1 | | | | | | | | | | | | |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| n2 |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 |
| n48 | See CA\_n48B Bandwidth Combination Set 2 in Table 5.5A.1-1 | | | | | | | | | | | | |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n2A-n48(2A)-n77A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n48 | See CA\_n48(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 1 |
| n48 | See CA\_n48(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.95.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference from n2 to n48 and n77, and from n48 to n2 and n77, and from n77 to n2 and n48 have been already studied for 3DL/1UL fallback combinations CA n2-n48 and CA\_n2-n77 and n48-n77.

### 6.95.4 ∆TIB,c and ∆RIB,c values

The ΔTIB,c and ΔRIB,c values are given in tables below.

Table 6.95.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n48-n77 | n2 | 0.6 |
| n48 | 0.8 |
| n77 | 0.8 |

Table 6.95.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n48-n77 | n2 | 0.2 |
| n48 | 0.5 |
| n77 | 0.5 |

### 6.95.5 REFSENS requirements

MSD requirements are captured in lower order combinations and there is no additional requirement for this CA configuration.

## 6.96 CA\_n2-n48-n66

### 6.96.1 Operating bands for CA

Table 6.96.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n2-n48-n66 | n2, n48, n66 |

### 6.96.2 Channel bandwidths per operating band for CA

Table 6.96.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA config** | **Uplink config** | **NR Band** | **5  MHz** | **10  MHz** | **15  MHz** | **20  MHz** | **25  MHz** | **30  MHz** | **40 MHz** | **50 MHz** | **60 MHz** | **70 MHz** | **80 MHz** | **90 MHz** | **100 MHz** | **Bandwidth combination set** |
| CA\_n2A-n48A-n66A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n48 | 5 | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| CA\_n2A-n48B-n66A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n48 | See CA\_n48B Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 1 |
| n48 | See CA\_n48B Bandwidth Combination Set 1 in Table 5.5A.1-1 | | | | | | | | | | | | |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 2 |
| n48 | See CA\_n48B Bandwidth Combination Set 2 in Table 5.5A.1-1 | | | | | | | | | | | | |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| CA\_n2A-n48(2A)-n66A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n48 | See CA\_n48(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
|  |  | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 1 |
| n48 | See CA\_n48(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.96.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference from n2 to n48 and n66, and from n48 to n2 and n66, and from n66 to n2 and n48 have been already studied as fallback combinations.

### 6.96.4 ∆TIB,c and ∆RIB,c values

The ΔTIB,c and ΔRIB,c values are given in tables below.

Table 6.96.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n48-n66 | n2 | 0.6 |
| n48 | 0.8 |
| n66 | 0.6 |

Table 6.96.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n48-n66 | n2 | 0.3 |
| n48 | 0.5 |
| n66 | 0.3 |

### 6.96.5 REFSENS requirements

MSD requirements are captured in lower order combinations and there is no additional requirement for this CA configuration.

## 6.97 CA\_n2-n5-n48

### 6.97.1 Operating bands for CA

Table 6.97.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n2-n5-n48 | n2, n5, n48 |

### 6.97.2 Channel bandwidths per operating band for CA

Table 6.97.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA config** | **Uplink config** | **NR Band** | **5  MHz** | **10  MHz** | **15  MHz** | **20  MHz** | **25  MHz** | **30  MHz** | **40 MHz** | **50 MHz** | **60 MHz** | **70 MHz** | **80 MHz** | **90 MHz** | **100 MHz** | **BCS** |
| CA\_n2A-n5A-n48A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n48 | 5 | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n2A-n5A-n48B | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n48 | See CA\_n48B Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | |
| n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 1 |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n48 | See CA\_n48B Bandwidth Combination Set 1 in Table 5.5A.1-1 | | | | | | | | | | | | |
| n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 2 |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n48 | See CA\_n48B Bandwidth Combination Set 2 in Table 5.5A.1-1 | | | | | | | | | | | | |
| CA\_n2A-n5A-n48(2A) | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n48 | See CA\_n48(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 1 |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n48 | See CA\_n48(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.97.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference from n2 to n5 and n48, and from n5 to n2 and n48, and from n48 to n2 and n5 have been already studied for 3DL/1UL fallback combinations CA n2-n5, CA\_n2-n48 and n5-n48.

### 6.97.4 ∆TIB,c and ∆RIB,c values

The ΔTIB,c and ΔRIB,c values are given in tables below.

Table 6.97.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n5-n48 | n2 | 0.6 |
| n5 | 0.3 |
| n48 | 0.8 |

Table 6.97.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n5-n48 | n2 | 0.2 |
| n5 | 0..0 |
| n48 | 0.5 |

### 6.97.5 REFSENS requirements

MSD requirements are captured in lower order combinations and there is no additional requirement for this CA configuration.

6.98 CA\_n1-n3-n5

6.98.1 Operating bands for CA

**Table 6.98.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n3-n5 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |

6.98.2 Channel bandwidths per operating band for CA

**Table 6.98.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Config** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n1A-n3A-n5A | - | n1 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 0 |
| n3 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |

6.98.3 Co-existence studies

Table 6.98.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. No issues can be ssen.

**Table 6.98.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n1 | 1920 | 1980 | 2110 | 2170 | 3840 | 3960 | 5760 | 5940 | 7680 | 7920 |
| n3 | 1710 | 1785 | 1805 | 1880 | 3420 | 3570 | 5130 | 5355 | 6840 | 7140 |
| n5 | 824 | 849 | 869 | 894 | 1648 | 1698 | 2472 | 2547 | 3296 | 3396 |

Table 6.98.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. No issues can be seen.

**Table 6.98.3-2 Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n1 | 1920 | 1980 | 2110 | 2170 | 4220 | 4340 | 6330 | 6510 | 8440 | 8680 |
| n3 | 1710 | 1785 | 1805 | 1880 | 3610 | 3760 | 5415 | 5640 | 7220 | 7520 |
| n5 | 824 | 849 | 869 | 894 | 1738 | 1788 | 2607 | 2682 | 3476 | 3576 |

6.98.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n1, n3 and n5, the ΔTIB,c and ΔRIB,c  values are shown in table 6.1.x.4-1 and table 6.1.x.4-2, respectively. Values are derived from CA\_1-3-5.

**Table 6.98.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n3-n5 | n3 | 0.3 |
| n5 | 0.3 |
| n78 | 0.3 |

**Table 6.98.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n3-n5 | n3 | 0 |
| n5 | 0 |
| n78 | 0 |

6.98.5 REFSENS requriements

No harmonic issues to be addressed.

6.99 CA\_n1-n5-n7

6.99.1 Operating bands for CA

**Table 6.99.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n5-n7 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n7 | 2500MHz | – | 2570 MHz | 2620 MHz | – | 2690 MHz | FDD |

6.99.2 Channel bandwidths per operating band for CA

**Table 6.99.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Config** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n1A-n5A-n7A | - | n1 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 0 |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n7 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  |
| CA\_n1A-n5A-n7B | - | n1 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 0 |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n7 | See CA\_n7B Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | |

6.99.3 Co-existence studies

Table 6.99.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. No harmonic mixing issue can be seen.

**Table 6.99.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n1 | 1920 | 1980 | 2110 | 2170 | 3840 | 3960 | 5760 | 5940 | 7680 | 7920 |
| n5 | 824 | 849 | 869 | 894 | 1648 | 1698 | 2472 | 2547 | 3296 | 3396 |
| n7 | 2500 | 2570 | 2620 | 2690 | 5000 | 5140 | 7500 | 7710 | 10000 | 10280 |

Table 6.99.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. No harmonic mixing issue can be seen.

**Table 6.99.3-2 Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n1 | 1920 | 1980 | 2110 | 2170 | 4220 | 4340 | 6330 | 6510 | 8440 | 8680 |
| n5 | 824 | 849 | 869 | 894 | 1738 | 1788 | 2607 | 2682 | 3476 | 3576 |
| n7 | 2500 | 2570 | 2620 | 2690 | 5000 | 5140 | 7500 | 7710 | 10000 | 10280 |

6.99.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n1, n5 and n7, the ΔTIB,c and ΔRIB,c  values are shown in table 6.1.x.4-1 and table 6.1.x.4-2, respectively. Values are derived from DC\_1-5\_n7.

**Table 6.99.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n5-n7 | n1 | 0.5 |
| n5 | 0.3 |
| n7 | 0.6 |

**Table 6.99.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n5-n7 | n1 | 0 |
| n5 | 0 |
| n7 | 0 |

6.99.5 REFSENS requirements

No Harmonic mixing issues need to be addressed.

6.100 CA\_n1-n5-n78

6.100.1 Operating bands for CA

**Table 6.100.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n5-n78 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

6.100.2 Channel bandwidths per operating band for CA

**Table 6.100.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Config** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n1A-n5A-n78A | - | n1 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 0 |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 704 | 80 | 90 | 100 |

6.100.3 Co-existence studies

Table 6.100.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. As can be seen, 4th harmonic/harmonic mixing from n5 might affect n78 DL, which are addressed in lower order combinations.

**Table 6.100.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n1 | 1920 | 1980 | 2110 | 2170 | 3840 | 3960 | 5760 | 5940 | 7680 | 7920 |
| n5 | 824 | 849 | 869 | 894 | 1648 | 1698 | 2472 | 2547 | 3296 | 3396 |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 | 13200 | 15200 |

Table 6.100.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. As can be seen, 4th harmonic/harmonic mixing from n5 might affect n78 DL, which are addressed in lower order combinations.

**Table 6.100.3-2 Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n1 | 1920 | 1980 | 2110 | 2170 | 4220 | 4340 | 6330 | 6510 | 8440 | 8680 |
| n5 | 824 | 849 | 869 | 894 | 1738 | 1788 | 2607 | 2682 | 3476 | 3576 |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 | 13200 | 15200 |

6.100.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n1, n5 and n78, the ΔTIB,c and ΔRIB,c  values are shown in table 6.1.x.4-1 and table 6.1.x.4-2, respectively. Values are derived from DC\_1-5\_n78.

**Table 6.100.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n5-n78 | n1 | 0.6 |
| n5 | 0.6 |
| n78 | 0.8 |

**Table 6.100.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n5-n78 | n1 | 0.2 |
| n5 | 0.2 |
| n78 | 0.5 |

6.100.5 REFSENS requirements

The 4th harmonic/harmonic mixing from n5 into n78 DL and UL will be addressed in lower order combination.

6.101 CA\_n28-n41-n79

6.101.1 Operating bands for CA

**Table 6.101.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR Band** | **NR Band** | **Uplink (UL) band** | | | **Downlink (DL) band** | | | **Duplex**  **mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n28-n41-n793 | n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | TDD |
| n41 | 2496 MHz | – | 2690MHz | 2496 MHz | – | 2690 MHz | TDD |
| n79 | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |
| NOTE 3: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | | | | | | |

6.101.2 Channel bandwidths per operating band for CA

Table 6.101.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA config | Uplink config | NR Band | Channel bandwidth (MHz) | | | | | | | | | | | | | BCS |
| 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n28A-n41A-n79A | - | n28 | 5 | 10 | 15 | 20 |  | 30 |  |  |  |  |  |  |  | 0 |
| n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |

6.101.3 Co-existence studies

The coexistence studies of harmonic interference have been captured in the constituent fallback modes in TR 38.716-02-00, where no harmonic issues for the 1UL/3DL NR CA CA\_n28A-n41A-n79A.

6.101.4 ∆TIB and ∆RIB values

For CA\_n28A-n41A-n79A, ΔTIB,c and ΔRIB,c values are given in table 6.101.4.1 and 6.101.4.2

**6.101.4.1 ΔTIB,c**

|  |  |  |
| --- | --- | --- |
| **Inter-band CA combination** | **NR Band** | **ΔTIB,c (dB)** |
| CA\_n28-n41-n79 | n28 | 0.5 |
| n41 | 0.3 |
| n79 | 0.8 |

**6.101.4.2 ΔRIB,c**

|  |  |  |
| --- | --- | --- |
| **Inter-band CA combination** | **NR Band** | **ΔRIB,c (dB)** |
| CA\_n28-n41-n79 | n28 | 0.2 |
| n41 | 0.5 |
| n79 | 0.5 |

6.101.5 MSD

No additional MSD is needed for 1UL/3DL NR CA CA\_n28A-n41A-n79A since there are no harmonic issues. Also there are no cross band isolation MSD issues.

## 6.102 CA\_n41-n71-n78

### 6.102.1 Operating bands for CA

Table 6.102.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |  |
| --- | --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) | DL interruption allowed  (Note 4) |
| CA\_n41-n71-n78 | n41, n71, n78 |  |

### 6.102.2 Channel bandwidths per operating band for CA

Table 6.102.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA config | Uplink config | NR Band | Channel bandwidth (MHz) (NOTE 3) | | | | | | | | | | | | | BCS |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |  |
| CA\_n41A-n71A-n78A | - | n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 0 |
| n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n41A-n71A-n78(2A) | - | n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 0 |
| n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n78 | See CA\_n78(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.102.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis

### 6.102.4 ∆TIB,c and ∆RIB,c values

For CA\_n41-n71-n78, the ΔTIB,c and ΔRIB,c values can reuse CA\_n41-n71-n77 defined in TS 38.101-1.

Table 6.102.4-1: ΔTIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n41-n71-n78 | n41 | 0.3 |
| n71 | 0.5 |
| n78 | 0.8 |

Table 6.102.4-2: ΔRIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n41-n71-n78 | n41 | 0 |
| n71 | 0.2 |
| n78 | 0.5 |

### 6.102.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

6.103 CA\_n1-n3-n8

6.103.1 Operating bands for CA

**Table 6.103.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n3-n8 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| n8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |

6.103.2 Channel bandwidths per operating band for CA

**Table 6.103.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA config** | **Uplink config** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **BCS** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| CA\_n1A-n3A-n8A | - | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n3 | 5 | 10 | 15 | 20 | 25 | 30 |  |  |  |  |  |  |  |
| n8 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |

6.103.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

6.103.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n1, n3 and n8, the ΔTIB,c and ΔRIB,c values are shown in table 6.103.4-1 and table 6.103.4-2 refer to DC\_1-3\_n8 in 38.101-3, respectively.

**Table 6.103.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n3-n8 | n1 | 0.3 |
| n3 | 0.3 |
| n8 | 0.3 |

**Table 6.103.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n3-n8 | n1 | 0.2 |
| n3 | 0.2 |
| n8 | 0.5 |

6.103.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

6.104 CA\_n1-n8-n77

6.104.1 Operating bands for CA

**Table 6.104.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n8-n77 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

6.104.2 Channel bandwidths per operating band for CA

**Table 6.104.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA config** | **Uplink config** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **BCS** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| CA\_n1A-n8A-n77A | - | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n8 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 |
| CA\_n1A-n8A-n77(2A) | - | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n8 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n77 | See CA\_n77(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 | | | | | | | | | | | | |

6.104.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

6.104.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n1, n8 and n77, the ΔTIB,c and ΔRIB,c values are shown in table 6.104.4-1 and table 6.104.4-2 refer to DC\_1-8\_n77 in 38.101-3, respectively.

**Table 6.104.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n8-n77 | n1 | 0.3 |
| n8 | 0.6 |
| n77 | 0.8 |

**Table 6.104.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n8-n77 | n1 | 0 |
| n8 | 0.2 |
| n77 | 0.5 |

6.104.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

6.105 CA\_n1-n8-n257

6.105.1 Operating bands for CA

**Table 6.105.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n8-n257 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |
| n257 | 26500 MHz | – | 29500 MHz | 26500 MHz | – | 29500 MHz | TDD |

6.105.2 Channel bandwidths per operating band for CA

**Table 6.105.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA config** | **Uplink config** | **NR Band** |  | |  | | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | | **BCS** |
|  |  |  | **5** | **10** | | **15** | | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **100** |  | |
| CA\_n1A-n8A-n257A | - | n1 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 | |
| n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n257 |  |  | |  | |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| CA\_n1A-n8A-n257G | - | n1 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 | |
| n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257G in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n8A-n257H | - | n1 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 | |
| n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257H in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n8A-n257I | - | n1 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 | |
| n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n8A-n257J | - | n1 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 | |
| n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257J in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n8A-n257K | - | n1 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 | |
| n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257K in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n8A-n257L | - | n1 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 | |
| n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257L in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |
| CA\_n1A-n8A-n257M | - | n1 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 | |
| n8 | 5 | 10 | | 15 | | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n257 | See CA\_n257M in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | | |

6.105.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

6.105.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n1, n8 and n257, the ΔTIB,c and ΔRIB,c values are shown in table 6.105.4-1 and table 6.105.4-2, respectively.

**Table 6.105.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n8-n257 | n1 | 0.3 |
| n8 | 0.6 |
| n257 | 0 |

**Table 6.105.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n8-n257 | n1 | 0 |
| n8 | 0.2 |
| n257 | 0 |

6.105.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

6.106 CA\_n40-n41-n258

6.106.1 Operating bands for CA

**Table 6.106.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR Band** | **NR Band** | **Uplink (UL) band** | | | **Downlink (DL) band** | | | **Duplex**  **mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n40-n41-n258 | n40 | 2300 MHz | – | 2400MHz | 2300 MHz | – | 2400 MHz | TDD |
| n41 | 2496 MHz | – | 2690MHz | 2496 MHz | – | 2690 MHz | TDD |
| n258 | 24250 MHz | – | 27500 MHz | 24250 MHz | – | 27500 MHz | TDD |

6.106.2 Channel bandwidths per operating band for CA

Table 6.106.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA config | Uplink config | NR Band | Channel bandwidth (MHz) | | | | | | | | | | | | | | | BCS |
| 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 200 | 400 |
| CA\_n40A-n41A-n258A | - | n40 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 |  | 80 |  |  |  |  | 0 |
| n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 |  | 80 | 90 | 100 |  |  |
| n258 |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |

6.106.3 Co-existence studies

The coexistence studies of harmonic interference have been captured in the constituent fallback modes in TR 38.716-02-00.

6.106.4 ∆TIB and ∆RIB values

For CA\_n40A-n41A-n258A, ΔTIB,c and ΔRIB,c values are set to zero for n258, and the values for constituent FR1 NR bands are same as those for the corresponding inter-band CA\_n40A-n41A for band n41 and band n41, where band n40 and n41 are synchronization operation in these configuration, which means simultaneous Rx/Tx is not supported between band n40 and band n41.

6.106.5 MSD

MSD studies can be omitted because harmonic interference between FR1 bands have been already studied for CA\_n40-n41, and harmonic interference between FR1 bands and FR2 band are negligible

6.107 CA\_n3-n5-n78

6.107.1 Operating bands for CA

**Table 6.107.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n3-n5-n78 | n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

6.107.2 Channel bandwidths per operating band for CA

**Table 6.107.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA config** | **Uplink config** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **BCS** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |
| CA\_n3A-n5A-n78A | - | n3 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 0 |
| n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

6.107.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.107.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. As can be seen, 2nd harmonic/harmonic mixing from n3 UL might affect n78 DL and 4th harmonic/harmonic mixing from n5 might affect n78 DL, which are addressed in lower order combinations.

**Table 6.107.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n3 | 1710 | 1785 | 1805 | 1880 | 3420 | 3570 | 5130 | 5355 | 6840 | 7140 |
| n5 | 824 | 849 | 869 | 894 | 1648 | 1698 | 2472 | 2547 | 3296 | 3396 |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 | 13200 | 15200 |

Table 6.107.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. No issues can be seen.

**Table 6.107.3-2 Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n3 | 1710 | 1785 | 1805 | 1880 | 3610 | 3760 | 5415 | 5640 | 7220 | 7520 |
| n5 | 824 | 849 | 869 | 894 | 1738 | 1788 | 2607 | 2682 | 3476 | 3576 |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 | 13200 | 15200 |

6.107.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n3, n5 and n78, the ΔTIB,c and ΔRIB,c  values are shown in table 6.1.x.4-1 and table 6.1.x.4-2, respectively. Values are derived from DC\_3-5\_n78.

**Table 6.107.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n5-n78 | n3 | 0.6 |
| n5 | 0.6 |
| n78 | 0.8 |

**Table 6.107.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n5-n78 | n3 | 0.2 |
| n5 | 0.2 |
| n78 | 0.5 |

6.107.5 MSD

The 2nd harmonic/harmonic mixing issues from n3 UL into n78 DL and the 4th harmonic/harmonic mixing from n5 into n78 DL will be addressed in lower order combination.

6.108 CA\_n25-n41-n78

6.108.1 Operating bands for CA

**Table 6.108.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n25-n41-n78 | n25 | 1850 MHz | – | 1915 MHz | 1930 MHz | – | 1995 MHz | FDD |
| n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

6.108.2 Channel bandwidths per operating band for CA

**Table 6.108.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n25A-n41A-n78A | - | n25 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 0 |
| n41 | 5 | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

6.108.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.108.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. As can be seen, 2nd harmonic/harmonic mixing from n25 UL might affect n78 DL, which are addressed in lower order combinations.

**Table 6.108.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n25 | 1850 | 1915 | 1930 | 1995 | 3700 | 3830 | 5550 | 5745 | 7400 | 7660 |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 | 9984 | 10760 |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 | 13200 | 15200 |

Table 6.108.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. No issues can be seen.

**Table 6.108.3-2 Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n25 | 1850 | 1915 | 1930 | 1995 | 3860 | 3990 | 5790 | 5985 | 7720 | 7980 |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 | 9984 | 10760 |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 | 13200 | 15200 |

6.108.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n25, n41 and n78, the ΔTIB,c and ΔRIB,c  values are shown in table 6.1.x.4-1 and table 6.1.x.4-2, respectively. Values are derived from CA\_n7-n25-n78.

**Table 6.108.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n25-n41-n78 | n25 | 0.6 |
| n41 | 0.5 |
| n78 | 0.8 |

**Table 6.108.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n25-n41-n78 | n25 | 0.2 |
| n41 | 0.5 |
| n78 | 0.5 |

6.108.5 MSD

The 2nd harmonic/harmonic mixing issues from n25 UL into n78 DL are addressed in lower order combination.

6.109 CA\_n41-n66-n78

6.109.1 Operating bands for CA

**Table 6.109.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n41-n66-n78 | n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

6.109.2 Channel bandwidths per operating band for CA

**Table 6.109.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA Config** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n41A-n66A-n78A | - | n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

6.109.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.109.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. As can be seen, 2nd harmonic from n66 might affect n78 DL, which are addressed in lower order combinations.

**Table 6.109.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 | 9984 | 10760 |
| n66 | 1710 | 1780 | 2110 | 2200 | 3420 | 3560 | 5130 | 5340 | 6840 | 7120 |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 | 13200 | 15200 |

Table 6.109.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. As can be seen, there are no harmonic mixing issues.

**Table 6.109.3-2 Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 | 9984 | 10760 |
| n66 | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 | 8440 | 8800 |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 | 13200 | 15200 |

6.109.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n41, n66 and n78, the ΔTIB,c and ΔRIB,c  values are shown in table 6.1.x.4-1 and table 6.1.x.4-2, respectively. Values are derived from CA\_n41-n66-n77.

**Table 6.109.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n41-n66-n78 | n41 | 0.5 |
| n66 | 0.6 |
| n78 | 0.8 |

**Table 6.109.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n41-n66-n78 | n41 | 0.2 |
| n66 | 0.2 |
| n78 | 0.5 |

6.109.5 MSD

The 2nd harmonic issues from n66 UL into n78 are addressed in lower order combination.

## 6.110 CA\_n1A-n28A-n40

6.110.1 Operating bands for CA

Table 6.110.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n28-n40 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |
| n40 | 2300 MHz | – | 2400 MHz | 2300 MHz | – | 2400 MHz | TDD |

6.110.2 Channel bandwidths per operating band for CA

Table 6.110.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA Config** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n1A-n28A-n40A | - | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n28 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n40 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 |  | 80 |  |  |
| CA\_n1A-n28A-n40B | - | n1 |  |  |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n28 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n40 | See CA\_n40B Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | |

6.110.3 Co-existence studies

Table 6.110.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. There is 3rd HAM from n28 UL to n1 DL. MSD is already defined for this in 38.101-1.

Table 6.110.3-1: Harmonic Interference for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | |  | |  | | |  | |  | | **2nd Harmonic** | | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | | **UL High Band Edge** | | **DL Low Band Edge** | **DL High Band Edge** | | **UL Low Band Edge** | | **UL High Band Edge** | | **UL Low Band Edge** | **UL High Band Edge** | | **UL Low Band Edge** | | **UL High Band Edge** |
| **1** | 1920 | | 1980 | | 2110 | 2170 | | 3840 | | 3960 | | 5760 | 5940 | | 7680 | | 7920 |
| **28** | 703 | | 748 | | 758 | 803 | | 1406 | | 1496 | | 2109 | 2244 | | 2812 | | 2992 |
| **40** | 2300 | | 2400 | | 2300 | 2400 | | 4600 | | 4800 | | 6900 | 7200 | | 9200 | | 9600 |

Table 6.110.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. There is 3rd HAM from n28 DL to n40 UL. MSD is already defined for this in 38.101-1.

Table 6.110.3-2 Harmonic mixing for 3DLs/1UL

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | |  | |  | | |  | |  | | **2nd Harmonic** | | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | | **UL High Band Edge** | | **DL Low Band Edge** | **DL High Band Edge** | | **DL Low Band Edge** | | **DL High Band Edge** | | **DL Low Band Edge** | **DL High Band Edge** | | **DL Low Band Edge** | | **DL High Band Edge** |
| **1** | 1920 | | 1980 | | 2110 | 2170 | | 4220 | | 4340 | | 6330 | 6510 | | 8440 | | 8680 |
| **28** | 703 | | 748 | | 758 | 803 | | 1516 | | 1606 | | 2274 | 2409 | | 3032 | | 3212 |
| **40** | 2300 | | 2400 | | 2300 | 2400 | | 4600 | | 4800 | | 6900 | 7200 | | 9200 | | 9600 |

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1.

6.110.4 ∆TIB,c and ∆RIB,c values

It is proposed to re-use ΔTIB,c and ΔRIB,c  values from DC\_1-28\_n40.

Table 6.110.4-1: ΔTIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n28-n40 | n1 | 0.6 |
| n28 | 0.3 |
| n40 | 0.5 |

Table 6.110.4-2: ΔRIB,c for 3DL aggregation

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n28-n40 | n1 | 0 |
| n28 | 0.2 |
| n40 | 0 |

6.110.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.111 CA\_n26-n66-n70

### 6.111.1 Operating bands for CA

Table 6.7.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n26A-n66A-n70A | n26 | 814 MHz | – | 849 MHz | 859 MHz | – | 894 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n70 | 1695 MHz | – | 1710 MHz | 1995 MHz | – | 2020 MHz | FDD |

### 6.111.2 Channel bandwidths per operating band for CA

Table 6.111.2-1: Supported bandwidths per CA band combination for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA Config** | **Uplink config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n26A-n66A-n70A | - | n26 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n70 | 5 | 10 | 15 | 201 | 251 |  |  |  |  |  |  |  |  |
| CA\_n26A-n66(2A)-n70A | - | n26 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n70 | 5 | 10 | 15 | 201 | 251 |  |  |  |  |  |  |  |  |
| NOTE 1: This UE channel bandwidth is applicable only to downlink | | | | | | | | | | | | | | | | |

### 6.111.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference from n26 to n66 and n70, and from n66 to n26 and n70, and from n70 to n26 and n70 have been prepared along with this TP for 3DL/1UL fallback combinations CA\_n26-n66 and CA\_n26-n70 and CA\_n66-n70 is already in the 38.101-1 specification.

### 6.111.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n26, n66 and n70, the TIB,c and RIB,c values are shown in table 6.111.4-1 and table 6.111.4-2, respectively.

Table 6.111.4-1: ΔTIB,c for 3DL aggregation

|  |  |  |
| --- | --- | --- |
| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| CA\_n26-n66-n70 | n26 | 0.3 |
| n66 | 0.5 |
| n70 | 0.5 |

Table 6.111.4-2: ΔRIB,c for 3DL aggregation

|  |  |  |
| --- | --- | --- |
| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| CA\_n26-n66-n70 | n26 | 0 |
| n66 | 0 |
| n70 | 0 |

### 6.111.5 REFSENS requirements

MSD studies can be omitted because harmonic interference from n26 to n66 and n70, and from n66 to n26 and n70, and from n70 to n26 and n66 have been prepared along with this TP for 3DL/1UL fallback combinations CA\_n26-n66, CA\_n26-n70 and CA\_n66-n70 are already in the 38.101-1 specification

## 6.112 CA\_n48-n66-n70

### 6.112.1 Operating bands for CA

Table 6.7.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n48A-n66A-n70A | n48 | 3550 MHz | – | 3700 MHz | 3550 MHz | – | 3700 MHz | TDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n70 | 1695 MHz | – | 1710 MHz | 1995 MHz | – | 2020 MHz | FDD |

### 6.112.2 Channel bandwidths per operating band for CA

Table 6.112.2-1: Supported bandwidths per CA band combination for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA Config** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n48A-n66A-n70A | - | n48 | 5 | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n70 | 5 | 10 | 15 | 201 | 251 |  |  |  |  |  |  |  |  |
| CA\_n48A-n66(2A)-n70A | - | n48 | 5 | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 0 |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n70 | 5 | 10 | 15 | 201 | 251 |  |  |  |  |  |  |  |  |
| CA\_n48(2A)-n66A-n70A | - | n48 | See CA\_n48(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n70 | 5 | 10 | 15 | 201 | 251 |  |  |  |  |  |  |  |  |
| CA\_n48B-n66A-n70A | - | n48 | See CA\_n48B Bandwidth Combination Set 2 in Table 5.5A.1-1 | | | | | | | | | | | | | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n70 | 5 | 10 | 15 | 201 | 251 |  |  |  |  |  |  |  |  |
| NOTE 1: This UE channel bandwidth is applicable only to downlink | | | | | | | | | | | | | | | | |

### 6.112.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference from n48 to n66 and n70, and from n66 to n48 and n70, and from n70 to n48 and n70 have been prepared along with this TP for 3DL/1UL fallback combinations CA\_n48-n66 and CA\_n48-n70 and CA\_n66-n70 is already in the 38.101-1 specification.

### 6.112.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n48, n66 and n70, the TIB,c and RIB,c values are shown in table 6.112.4-1 and table 6.112.4-2, respectively.

Table 6.112.4-1: ΔTIB,c for 3DL aggregation

|  |  |  |
| --- | --- | --- |
| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| CA\_n48-n66-n70 | n48 | 0.8 |
| n66 | 0.6 |
| n70 | 0.6 |

Table 6.112.4-2: ΔRIB,c for 3DL aggregation

|  |  |  |
| --- | --- | --- |
| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| CA\_n48-n66-n70 | n48 | 0.5 |
| n66 | 0.2 |
| n70 | 0.2 |

### 6.112.5 REFSENS requirements

MSD studies can be omitted because harmonic interference from n48 to n66 and n70, and from n66 to n48 and n70, and from n70 to n48 and n66 have been prepared along with this TP for 3DL/1UL fallback combinations CA\_n48-n66 and CA\_n48-n70 and CA\_n48-n70 is already in the 38.101-1 specification

## 6.113 CA\_n48-n66-n71

### 6.113.1 Operating bands for CA

Table 6.7.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n48A-n66A-n71A | n48 | 3550 MHz | – | 3700 MHz | 3550 MHz | – | 3700 MHz | TDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n71 | 663 MHz | – | 698 MHz | 617 MHz | – | 652 MHz | FDD |

### 6.113.2 Channel bandwidths per operating band for CA

Table 6.113.2-1: Supported bandwidths per CA band combination for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA Config** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n48A-n66A-n71A | - | n48 | 5 | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| CA\_n48(2A)-n66A-n71A | - | n48 | See CA\_n48(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| CA\_n48B-n66A-n71A | - | n48 | See CA\_n48B Bandwidth Combination Set 2 in Table 5.5A.1-1 | | | | | | | | | | | | | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| CA\_n48A-n66(2A)-n71A | - | n48 | 5 | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 0 |
| n66 | See CA\_n66(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| CA\_n48A-n66A-n71(2A) | - | n48 | 5 | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n71 | See CA\_n71(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | |

### 6.113.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference from n48 to n66 and n71, and from n66 to n48 and n71, and from n71 to n48 and n71 have been prepared along with this TP for 3DL/1UL fallback combinations CA\_n48-n66 and CA\_n48-n71 and CA\_n66-n71 is already in the 38.101-1 specification.

### 6.113.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n48, n66 and n71, the TIB,c and RIB,c values are shown in table 6.113.4-1 and table 6.113.4-2, respectively.

Table 6.113.4-1: ΔTIB,c for 3DL aggregation

|  |  |  |
| --- | --- | --- |
| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| CA\_n48-n66-n71 | n48 | 0.5 |
| n66 | 0.5 |
| n71 | 0.3 |

Table 6.113.4-2: ΔRIB,c for 3DL aggregation

|  |  |  |
| --- | --- | --- |
| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| CA\_n48-n66-n71 | n48 | 0.2 |
| n66 | 0.2 |
| n71 | 0.2 |

### 6.113.5 REFSENS requirements

MSD studies can be omitted because harmonic interference from n48 to n66 and n71, and from n66 to n48 and n71, and from n71 to n48 and n66 have been prepared along with this TP for 3DL/1UL fallback combinations CA\_n48-n66 and CA\_n48-n71 and CA\_n48-n71 is already in the 38.101-1 specification

## 6.114 CA\_n48-n70-n71

### 6.114.1 Operating bands for CA

Table 6.7.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n48A-n70A-n71A | n48 | 3550 MHz | – | 3700 MHz | 3550 MHz | – | 3700 MHz | TDD |
| n70 | 1695 MHz | – | 1710 MHz | 1995 MHz | – | 2020 MHz | FDD |
| n71 | 663 MHz | – | 698 MHz | 617 MHz | – | 652 MHz | FDD |

### 6.114.2 Channel bandwidths per operating band for CA

Table 6.114.2-1: Supported bandwidths per CA band combination for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA Config** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n48A-n70A-n71A | - | n48 | 5 | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 0 |
| n70 | 5 | 10 | 15 | 201 | 251 |  |  |  |  |  |  |  |  |
| n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| CA\_n48(2A)-n70A-n71 | - | n48 | See CA\_n48(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | | 0 |
| n70 | 5 | 10 | 15 | 201 | 251 |  |  |  |  |  |  |  |  |
| n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| CA\_n48B-n70A-n71 | - | n48 | See CA\_n48B Bandwidth Combination Set 2 in Table 5.5A.1-1 | | | | | | | | | | | | | 0 |
| n70 | 5 | 10 | 15 | 20 | 25 |  |  |  |  |  |  |  |  |
| n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| CA\_n48A-n70A-n71(2A) | - | n48 | 5 | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 0 |
| n70 | 5 | 10 | 15 | 201 | 251 |  |  |  |  |  |  |  |  |
| n71 | See CA\_n71(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | |
| NOTE 1: This UE channel bandwidth is applicable only to downlink | | | | | | | | | | | | | | | | |

### 6.114.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference between n48 and n70, and between n48 and n71 have been prepared along with this TP for 3DL/1UL fallback combinations CA\_n48-n66 and CA\_n48-n70 and CA\_n70-n71 is already in the 38.101-1 specification.

### 6.114.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n48, n70 and n71, the TIB,c and RIB,c values are shown in table 6.114.4-1 and table 6.114.4-2, respectively.

Table 6.114.4-1: ΔTIB,c for 3DL aggregation

|  |  |  |
| --- | --- | --- |
| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| CA\_n48-n70-n71 | n48 | 0.5 |
| n70 | 0.5 |
| n71 | 0.3 |

Table 6.114.4-2: ΔRIB,c for 3DL aggregation

|  |  |  |
| --- | --- | --- |
| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| CA\_n48-n70-n71 | n48 | 0.2 |
| n70 | 0.2 |
| n71 | 0.2 |

### 6.114.5 REFSENS requirements

MSD studies can be omitted because harmonic interference between n48 and n70, and between n48 and n71 have been prepared along with this TP for 3DL/1UL fallback combinations CA\_n48-n66 and CA\_n48-n71 and CA\_n70-n71 is already in the 38.101-1 specification

## 6.115 CA\_n66-n70-n71

6.115.1 Operating bands for CA

Table 6.7.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n66-n70-n71 | n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n70 | 1695 MHz | – | 1710 MHz | 1995 MHz | – | 2020 MHz | FDD |
| n71 | 663 MHz | – | 698 MHz | 617 MHz | – | 652 MHz | FDD |

6.115.2 Channel bandwidths per operating band for CA

Table 6.115.2-1: Supported bandwidths per CA band combination for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA Config** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n66A-n70A-n71(2A) | - | n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 0 |
| n70 | 5 | 10 | 15 | 201 | 251 |  |  |  |  |  |  |  |  |
| n71 | See CA\_n71(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | |
| NOTE 1: This UE channel bandwidth is applicable only to downlink | | | | | | | | | | | | | | | | |

6.116 CA\_n24-n41-n48

#### 6.116.1 Operating bands for CA

**Table 6.116.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **NR Band** | **Uplink (UL) band** | | | **Downlink (DL) band** | | | **Duplex**  **mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| n24 | 1626.5 MHz | – | 1660.5 MHz | 1525 MHz | – | 1559 MHz | FDD |
| n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |
| n48 | 3550 MHz | – | 3700 MHz | 3550 MHz | – | 3700 MHz | TDD |

#### 6.116.2 Channel bandwidths per operating band for CA

**Table 6.116.2-1: Supported bandwidths per CA band combination for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Configuration** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n24A-n41A-n48A |  | n24 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 |  | 80 | 90 | 100 |
| n48 | 5 | 10 | 15 | 20 |  |  | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n24A-n41(2A)-n48A |  | n24 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n41 | See CA\_n41(2A) BCS1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n48 | 5 | 10 | 15 | 20 |  |  | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n24A-n41A-n48(2A) |  | n24 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 |  | 80 | 90 | 100 |
| n48 | See CA\_n48(2A) BCS0 in Table 5.5A.2-1 | | | | | | | | | | | | |
| CA\_n24A-n41(2A)-n48(2A) |  | n24 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
|  | n41 | See CA\_n41(2A) BCS1 in Table 5.5A.2-1 | | | | | | | | | | | | |
|  | n48 | See CA\_n48(2A) BCS0 in Table 5.5A.2-1 | | | | | | | | | | | | |

#### 6.116.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis.

#### 6.116.4 ∆TIB and ∆RIB values

For CA\_n24-n41-n48, the ∆TIB,c and ∆RIB,c values are given according to corresponding 2 inter-band CA combination relaxation values.

**Table 6.116.4-1:** **ΔTIB,c for 3DL aggregation**

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n24-n41-n48 | n24 | 0.6 |
| n41 | 0.41 |
|  | 0.92 |
| n48 | 0.8 |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545-2690MHz.  NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2545MHz. | | |

**Table 6.116.4-2: ΔRIB,c for 3DL aggregation**

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n24-n41-n48 | n24 | 0.0 |
| n41 | 0.0 |
| n48 | 0.5 |

#### 6.116.5 REFSENS requirements

No additional MSD requirement needs to be defined for this CA combinations.

6.117 CA\_n24-n48-n77

#### 6.117.1 Operating bands for CA

**Table 6.117.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **NR Band** | **Uplink (UL) band** | | | **Downlink (DL) band** | | | **Duplex**  **mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| n24 | 1626.5 MHz | – | 1660.5 MHz | 1525 MHz | – | 1559 MHz | FDD |
| n48 | 3550 MHz | – | 3700 MHz | 3550 MHz | – | 3700 MHz | TDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

#### 6.117.2 Channel bandwidths per operating band for CA

**Table 6.117.2-1: Supported bandwidths per CA band combination for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Configuration** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n24A-n48A-n77A |  | n24 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n48 | 5 | 10 | 15 | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n24A-n48(2A)-n77A |  | n24 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n48 | See CA\_n48(2A) BCS0 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n24A-n48A-n77(2A) |  | n24 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n48 | 5 | 10 | 15 | 20 |  |  | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| n77 | See CA\_n77(2A) BCS0 in Table 5.5A.2-1 | | | | | | | | | | | | |
| CA\_n24A-n48(2A)-n77(2A) |  | n24 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
|  | n48 | See CA\_n48(2A) BCS0 in Table 5.5A.2-1 | | | | | | | | | | | | |
|  | n77 | See CA\_n77(2A) BCS0 in Table 5.5A.2-1 | | | | | | | | | | | | |

#### 6.117.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis.

#### 6.117.4 ∆TIB and ∆RIB values

For CA\_n24-n48-n77, the ∆TIB,c and ∆RIB,c values are given according to corresponding 2 inter-band CA combination relaxation values.

**Table 6.117.4-1: ΔTIB,c for 3DL aggregation**

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n24-n48-n77 | n24 | 0.6 |
| n48 | 0.8 |
| n77 | 0.8 |

**Table 6.117.4-2: ΔRIB,c for 3DL aggregation**

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n24-n48-n77 | n24 | 0.2 |
| n48 | 0.5 |
| n77 | 0.5 |

#### 6.117.5 REFSENS requirements

The 2nd harmonic issues from n24 UL into n77 DL is addressed in lower order combination.

## 6.118 CA\_n1-n3-n79

### 6.118.1 Operating band for CA

Table 6.118.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n3-n793 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| n79 | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |
| NOTE 3: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | | | | | | |

### 6.118.2 Channel bandwidths per operating band for CA

Table 6.118.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration | NR Band | Channel bandwidth (MHz) (NOTE 3) | | | | | | | | | | | | | Bandwidth combination set | |
|  |  |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | |  |
| CA\_n1A-n3A-n79A | - | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | | 0 |
|  |  | n3 | 5 | 10 | 15 | 20 | 25 | 30 |  |  |  |  |  |  |  | |  |
|  |  | n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 | |  |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | |

### 6.118.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference have been already studied for 2DL/1UL fallback combinations such as CA n1-n3, CA\_n1-n79 and n3-n79.

### 6.118.4 ∆TIB and ∆RIB values

For CA\_n1-n3-n79, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 6.118.4-1: ΔTIB,c

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n3-n79 | n1 | 0.3 |
| n3 | 0.3 |
| n79 | 0.8 |

Table 6.118.4-2: ΔRIB

| Inter-band CA Configuration | NR Band | ΔRIB [dB] |
| --- | --- | --- |
| CA\_n1-n3-n79 | n1 | 0 |
| n3 | 0 |
| n79 | 0.5 |

### 6.118.5 REFSENS requirements

Based on 6.118.3, there are no additional MSD requirements for this band combination.

## 6.119 CA\_n1-n28-n41

### 6.119.1 Operating band for CA

Table 6.119.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n28-n413 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |
| n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |
| NOTE 3: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | | | | | | |

### 6.119.2 Channel bandwidths per operating band for CA

Table 6.119.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration | NR Band | Channel bandwidth (MHz) (NOTE 3) | | | | | | | | | | | | | Bandwidth combination set | |
|  |  |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | |  |
| CA\_n1A-n28A-n41A | - | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | | 0 |
|  |  | n28 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | |  |
|  |  | n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 |  | 80 | 90 | 100 | |  |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | |

### 6.119.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference have been already studied for 2DL/1UL fallback combinations such as CA n1-n28, CA\_n1-n41 and n28-n41.

### 6.119.4 ∆TIB and ∆RIB values

For CA\_n1-n28-n41, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 6.119.4-1: ΔTIB,c

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n28-n41 | n1 | 0.5 |
| n28 | 0.6 |
| n41 | 0.5 |

Table 6.119.4-2: ΔRIB

| Inter-band CA Configuration | NR Band | ΔRIB [dB] |
| --- | --- | --- |
| CA\_n1-n28-n41 | n1 | 0 |
| n28 | 0.2 |
| n41 | 0 |

### 6.119.5 REFSENS requirements

Based on 6.119.3, there are no additional MSD requirements for this band combination.

## 6.120 CA\_n1-n28-n77

### 6.120.1 Operating band for CA

Table 6.120.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n28-n773 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |
| NOTE 3: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | | | | | | |

### 6.120.2 Channel bandwidths per operating band for CA

Table 6.120.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration | NR Band | Channel bandwidth (MHz) (NOTE 3) | | | | | | | | | | | | | Bandwidth combination set | |
|  |  |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | |  |
| CA\_n1A-n28A-n77A | - | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | | 0 |
|  |  | n28 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | |  |
|  |  | n77 |  | 10 | 15 | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 | |  |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | |

### 6.120.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference have been already studied for 2DL/1UL fallback combinations such as CA n1-n28, CA\_n1-n77 and n28-n77.

### 6.120.4 ∆TIB and ∆RIB values

For CA\_n1-n28-n77, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 6.120.4-1: ΔTIB,c

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n28-n77 | n1 | 0.6 |
| n28 | 0.6 |
| n77 | 0.8 |

Table 6.120.4-2: ΔRIB

| Inter-band CA Configuration | NR Band | ΔRIB [dB] |
| --- | --- | --- |
| CA\_n1-n28-n77 | n1 | 0.2 |
| n28 | 0.2 |
| n77 | 0.5 |

### 6.120.5 REFSENS requirements

Based on 6.120.3, there are no additional MSD requirements for this band combination.

## 6.121 CA\_n1-n28-n79

### 6.121.1 Operating band for CA

Table 6.121.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n28-n793 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |
| n79 | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |
| NOTE 3: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | | | | | | |

### 6.121.2 Channel bandwidths per operating band for CA

Table 6.121.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration | NR Band | Channel bandwidth (MHz) (NOTE 3) | | | | | | | | | | | | | Bandwidth combination set | |
|  |  |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | |  |
| CA\_n1A-n28A-n79A | - | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | | 0 |
|  |  | n28 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | |  |
|  |  | n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 | |  |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | |

### 6.121.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference have been already studied for 2DL/1UL fallback combinations such as CA n1-n28, CA\_n1-n79 and n28-n79.

### 6.121.4 ∆TIB and ∆RIB values

For CA\_n1-n28-n79, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 6.121.4-1: ΔTIB,c

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n28-n79 | n1 | 0.3 |
| n28 | 0.6 |
| n79 | 0.8 |

Table 6.121.4-2: ΔRIB

| Inter-band CA Configuration | NR Band | ΔRIB [dB] |
| --- | --- | --- |
| CA\_n1-n28-n79 | n1 | 0 |
| n28 | 0.2 |
| n79 | 0.5 |

### 6.121.5 REFSENS requirements

Based on 6.121.3, there are no additional MSD requirements for this band combination.

## 6.122 CA\_n1-n28-n257

### 6.122.1 Operating band for CA

Table 6.122.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n28-n2571 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |
| n257 | 26500 MHz | – | 29500 MHz | 26500 MHz | – | 29500 MHz | TDD |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability. | | | | | | | | |

### 6.122.2 Channel bandwidths per operating band for CA

Table 6.122.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration | NR Band | Channel bandwidth (MHz) (NOTE 1) | | | | | | | | | | | | | | | Bandwidth combination set | |
|  |  |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 200 | 400 | |  |
| CA\_n1A-n28A-n257A | - | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | | 0 |
|  |  | n28 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | |  |
|  |  | n257 |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 | |  |
| CA\_n1A-n28A-n257G | CA\_n257G | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | | 0 |
|  |  | n28 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | |  |
|  |  | n257 | CA\_n257G | | | | | | | | | | | | | | | |  |
| CA\_n1A-n28A-n257H | CA\_n257G  CA\_n257H | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | | 0 |
|  |  | n28 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | |  |
|  |  | n257 | CA\_n257H | | | | | | | | | | | | | | | |  |
| CA\_n1A-n28A-n257I | CA\_n257G  CA\_n257H  CA\_n257I | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | | 0 |
|  |  | n28 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | |  |
|  |  | n257 | CA\_n257I | | | | | | | | | | | | | | | |  |
| NOTE 1: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | | | |

### 6.122.3 Co-existence studies

### 6.122.4 ∆TIB and ∆RIB values

For CA\_n1-n28-n257, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 6.122.4-1: ΔTIB,c

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n28-n257 | n1 | 0.3 |
| n28 | 0.6 |
| n257 | 0 |

Table 6.122.4-2: ΔRIB

| Inter-band CA Configuration | NR Band | ΔRIB [dB] |
| --- | --- | --- |
| CA\_n1-n28-n257 | n1 | 0 |
| n28 | 0.2 |
| n257 | 0 |

### 6.122.5 REFSENS requirements

MSD studies can be omitted because harmonic interference between FR1 bands have been already studied in the fallback band combination and harmonic interference between FR1 bands and FR2 band are negligible.

## 6.123 CA\_n1-n41-n77

### 6.123.1 Operating band for CA

Table 6.123.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n41-n773 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability. | | | | | | | | |

### 6.123.2 Channel bandwidths per operating band for CA

Table 6.123.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration | NR Band | Channel bandwidth (MHz) (NOTE 3) | | | | | | | | | | | | | Bandwidth combination set | |
|  |  |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | |  |
| CA\_n1A-n41A-n77A | - | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | | 0 |
|  |  | n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 |  | 80 | 90 | 100 | |  |
|  |  | n77 |  | 10 | 15 | 20 |  |  | 40 | 50 | 60 |  | 80 | 90 | 100 | |  |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | |

### 6.123.3 Co-existence studies

Co-existence studies can be omitted because harmonic interference have been already studied for 2DL/1UL fallback combinations such as CA n1-n41, CA\_n1-n77 and n41-n77.

### 6.123.4 ∆TIB and ∆RIB values

For CA\_n1-n41-n77, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 6.123.4-1: ΔTIB,c

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n41-n77 | n1 | 0.6 |
| n41 | 0.5 |
| n77 | 0.8 |

Table 6.123.4-2: ΔRIB

| Inter-band CA Configuration | NR Band | ΔRIB [dB] |
| --- | --- | --- |
| CA\_n1-n41-n77 | n1 | 0.2 |
| n41 | 0 |
| n77 | 0.5 |

### 6.123.5 REFSENS requirements

Based on 6.123.3, there are no additional MSD requirements for this band combination.

## 6.124 CA\_n1-n41-n257

### 6.124.1 Operating band for CA

Table 6.124.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n41-n2571 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |
| n257 | 26500 MHz | – | 29500 MHz | 26500 MHz | – | 29500 MHz | TDD |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability. | | | | | | | | |

### 6.124.2 Channel bandwidths per operating band for CA

Table 6.124.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration | NR Band | Channel bandwidth (MHz) (NOTE 1) | | | | | | | | | | | | | | | Bandwidth combination set | |
|  |  |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 200 | 400 | |  |
| CA\_n1A-n41A-n257A | - | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | | 0 |
|  |  | n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 |  | 80 | 90 | 100 |  |  | |  |
|  |  | n257 |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 | |  |
| CA\_n1A-n41A-n257G | CA\_n257G | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | | 0 |
|  |  | n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 |  | 80 | 90 | 100 |  |  | |  |
|  |  | n257 | CA\_n257G | | | | | | | | | | | | | | | |  |
| CA\_n1A-n41A-n257H | CA\_n257G  CA\_n257H | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | | 0 |
|  |  | n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 |  | 80 | 90 | 100 |  |  | |  |
|  |  | n257 | CA\_n257H | | | | | | | | | | | | | | | |  |
| CA\_n1A-n41A-n257I | CA\_n257G  CA\_n257H  CA\_n257I | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | | 0 |
|  |  | n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 |  | 80 | 90 | 100 |  |  | |  |
|  |  | n257 | CA\_n257I | | | | | | | | | | | | | | | |  |
| NOTE 1: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | | | |

### 6.124.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

### 6.124.4 ∆TIB and ∆RIB values

For CA\_n1-n41-n257, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 6.124.4-1: ΔTIB,c

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n41-n257 | n1 | 0.5 |
| n41 | 0.5 |
| n257 | 0 |

Table 6.124.4-2: ΔRIB

| Inter-band CA Configuration | NR Band | ΔRIB [dB] |
| --- | --- | --- |
| CA\_n1-n41-n257 | n1 | 0 |
| n41 | 0 |
| n257 | 0 |

### 6.124.5 REFSENS requirements

MSD studies can be omitted because harmonic interference between FR1 bands have been already studied in the fallback band combination and harmonic interference between FR1 bands and FR2 band are negligible.

## 6.125 CA\_n1-n5-n28

### 6.125.1 Operating bands for CA

Table 6.125.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n5-n28 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |

### 6.125.2 Channel bandwidths per operating band for CA

Table 6.125.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** | **SCS**  **(kHz)** | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n1A-n5A-n28A | - | n1 | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 | 454 | 50 |  |  |  |  |  | 0 |
| 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 454 | 50 |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 454 | 50 |  |  |  |  |  |
| n5 | 15 | 5 | 10 | 15 | 20 | 253 |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 253 |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n28 | 15 | 5 | 10 | 15 | 207 |  | 307 |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 207 |  | 307 |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| NOTE 3: This UE channel bandwidth is applicable only to downlink.  NOTE 4: This UE channel bandwidth is optional in this release of the specification.  NOTE 7: For the 20 MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to either 713-723 MHz or 728-738 MHz. For the 30MHz bandwidth, the minimum requirements are specified for NR UL transmission bandwidth configuration confined to either 703-733 or 718-748 MHz. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.125.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

### 6.125.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL the ΔTIB,c and ΔRIB,c values are re-used from DC\_1-8\_n28.

Table 6.125.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n5-n28 | n1 | 0.3 |
| n5 | 0.6 |
| n28 | 0.6 |

Table 6.125.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n5-n28 | n5 | 0.2 |
| n28 | 0.2 |

### 6.125.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

## 6.126 CA\_n1-n7-n8

### 6.126.1 Operating bands for CA

Table 6.126.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n7-n8 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n7 | 2500 MHz | – | 2570 MHz | 2620 MHz | – | 2690 MHz | FDD |
| n8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |

### 6.126.2 Channel bandwidths per operating band for CA

Table 6.126.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** | **SCS**  **(kHz)** | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n1A-n7A-n8A | - | n1 | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 | 454 | 50 |  |  |  |  |  | 0 |
| 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 454 | 50 |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 454 | 50 |  |  |  |  |  |
| n7 | 15 | 5 | 10 | 15 | 20 | 25 | 30 | 354 | 40 |  | 50 |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 25 | 30 | 354 | 40 |  | 50 |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 | 354 | 40 |  | 50 |  |  |  |  |  |
| n8 | 15 | 5 | 10 | 15 | 20 |  |  | 353,4 |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  |  | 353,4 |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| NOTE 3: This UE channel bandwidth is applicable only to downlink.  NOTE 4: This UE channel bandwidth is optional in this release of the specification. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.126.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

### 6.126.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL the ΔTIB,c and ΔRIB,c values are re-used from DC\_1-7\_n8.

Table 6.126.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n7-n8 | n1 | 0.5 |
| n7 | 0.6 |
| n8 | 0.6 |

Table 6.126.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n7-n8 | n8 | 0.2 |

### 6.126.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

## 6.127 CA\_n1-n8-n28

### 6.127.1 Operating bands for CA

Table 6.127.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n8-n28 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |
| n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |

### 6.127.2 Channel bandwidths per operating band for CA

Table 6.127.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** | **SCS**  **(kHz)** | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n1A-n8A-n28A | - | n1 | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 | 454 | 50 |  |  |  |  |  | 0 |
| 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 454 | 50 |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 454 | 50 |  |  |  |  |  |
| n8 | 15 | 5 | 10 | 15 | 20 |  |  | 353,4 |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  |  | 353,4 |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n28 | 15 | 5 | 10 | 15 | 207 |  | 307 |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 207 |  | 307 |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| NOTE 3: This UE channel bandwidth is applicable only to downlink.  NOTE 4: This UE channel bandwidth is optional in this release of the specification.  NOTE 7: For the 20 MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to either 713-723 MHz or 728-738 MHz. For the 30MHz bandwidth, the minimum requirements are specified for NR UL transmission bandwidth configuration confined to either 703-733 or 718-748 MHz. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.127.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

### 6.127.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL the ΔTIB,c and ΔRIB,c values are re-used from DC\_1-8\_n28.

Table 6.127.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n8-n28 | n1 | 0.3 |
| n8 | 0.6 |
| n28 | 0.6 |

Table 6.127.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n1-n8-n28 | n8 | 0.2 |
| n28 | 0.2 |

### 6.127.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

## 6.128 CA\_n3-n5-n28

### 6.128.1 Operating bands for CA

Table 6.128.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n3-n5-n28 | n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |

### 6.128.2 Channel bandwidths per operating band for CA

Table 6.128.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** | **SCS**  **(kHz)** | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n3A-n5A-n28A | - | n3 | 15 | 5 | 10 | 15 | 20 | 25 | 30 | 354 | 40 | 454 | 50 |  |  |  |  |  | 0 |
| 30 |  | 10 | 15 | 20 | 25 | 30 | 354 | 40 | 454 | 50 |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 | 354 | 40 | 454 | 50 |  |  |  |  |  |
| n5 | 15 | 5 | 10 | 15 | 20 | 253 |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 253 |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n28 | 15 | 5 | 10 | 15 | 207 |  | 307 |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 207 |  | 307 |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| NOTE 3: This UE channel bandwidth is applicable only to downlink.  NOTE 4: This UE channel bandwidth is optional in this release of the specification.  NOTE 7: For the 20 MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to either 713-723 MHz or 728-738 MHz. For the 30MHz bandwidth, the minimum requirements are specified for NR UL transmission bandwidth configuration confined to either 703-733 or 718-748 MHz. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.128.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

### 6.128.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL the ΔTIB,c and ΔRIB,c values are re-used from DC\_3-8\_n28.

Table 6.128.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n3-n5-n28 | n3 | 0.3 |
| n5 | 0.6 |
| n28 | 0.5 |

Table 6.128.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n3-n5-n28 | n5 | 0.2 |
| n28 | 0.1 |

### 6.128.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

## 6.129 CA\_n3-n7-n8

### 6.129.1 Operating bands for CA

Table 6.129.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n3-n7-n8 | n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| n7 | 2500 MHz | – | 2570 MHz | 2620 MHz | – | 2690 MHz | FDD |
| n8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |

### 6.129.2 Channel bandwidths per operating band for CA

Table 6.129.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** | **SCS**  **(kHz)** | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n3A-n7A-n8A | - | n3 | 15 | 5 | 10 | 15 | 20 | 25 | 30 | 354 | 40 | 454 | 50 |  |  |  |  |  | 0 |
| 30 |  | 10 | 15 | 20 | 25 | 30 | 354 | 40 | 454 | 50 |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 | 354 | 40 | 454 | 50 |  |  |  |  |  |
| n7 | 15 | 5 | 10 | 15 | 20 | 25 | 30 | 354 | 40 |  | 50 |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 25 | 30 | 354 | 40 |  | 50 |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 | 354 | 40 |  | 50 |  |  |  |  |  |
| n8 | 15 | 5 | 10 | 15 | 20 |  |  | 353,4 |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  |  | 353,4 |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| NOTE 3: This UE channel bandwidth is applicable only to downlink.  NOTE 4: This UE channel bandwidth is optional in this release of the specification.  NOTE 7: For the 20 MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to either 713-723 MHz or 728-738 MHz. For the 30MHz bandwidth, the minimum requirements are specified for NR UL transmission bandwidth configuration confined to either 703-733 or 718-748 MHz. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.129.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

### 6.129.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL the ΔTIB,c and ΔRIB,c values are re-used from DC\_3-7\_n8

Table 6.129.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n3-n7-n8 | n3 | 0.5 |
| n7 | 0.5 |
| n8 | 0.6 |

Table 6.129.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n3-n7-n8 | n8 | 0.2 |

### 6.129.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

## 6.130 CA\_n3-n8-n28

### 6.130.1 Operating bands for CA

Table 6.130.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n3-n8-n28 | n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| n8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |
| n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |

### 6.130.2 Channel bandwidths per operating band for CA

Table 6.130.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** | **SCS**  **(kHz)** | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n3A-n8A-n28A | - | n3 | 15 | 5 | 10 | 15 | 20 | 25 | 30 | 354 | 40 | 454 | 50 |  |  |  |  |  | 0 |
| 30 |  | 10 | 15 | 20 | 25 | 30 | 354 | 40 | 454 | 50 |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 | 354 | 40 | 454 | 50 |  |  |  |  |  |
| n8 | 15 | 5 | 10 | 15 | 20 |  |  | 353,4 |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  |  | 353,4 |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n28 | 15 | 5 | 10 | 15 | 207 |  | 307 |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 207 |  | 307 |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| NOTE 3: This UE channel bandwidth is applicable only to downlink.  NOTE 4: This UE channel bandwidth is optional in this release of the specification.  NOTE 7: For the 20 MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to either 713-723 MHz or 728-738 MHz. For the 30MHz bandwidth, the minimum requirements are specified for NR UL transmission bandwidth configuration confined to either 703-733 or 718-748 MHz. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.130.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

### 6.130.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL the ΔTIB,c and ΔRIB,c values are re-used from DC\_3-8\_n28

Table 6.130.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n3-n8-n28 | n3 | 0.3 |
| n8 | 0.6 |
| n28 | 0.5 |

Table 6.130.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n3-n8-n28 | n8 | 0.2 |
| n28 | 0.1 |

### 6.130.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

## 6.131 CA\_n5-n7-n28

### 6.131.1 Operating bands for CA

Table 6.131.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n5-n7-n28 | n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n7 | 2500 MHz | – | 2570 MHz | 2620 MHz | – | 2690 MHz | FDD |
| n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |

### 6.131.2 Channel bandwidths per operating band for CA

Table 6.131.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** | **SCS**  **(kHz)** | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n5A-n7A-n28A | - | n5 | 15 | 5 | 10 | 15 | 20 | 253 |  |  |  |  |  |  |  |  |  |  | 0 |
| 30 |  | 10 | 15 | 20 | 253 |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n7 | 15 | 5 | 10 | 15 | 20 | 25 | 30 | 354 | 40 |  | 50 |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 25 | 30 | 354 | 40 |  | 50 |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 | 354 | 40 |  | 50 |  |  |  |  |  |
| n28 | 15 | 5 | 10 | 15 | 207 |  | 307 |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 207 |  | 307 |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| NOTE 3: This UE channel bandwidth is applicable only to downlink.  NOTE 4: This UE channel bandwidth is optional in this release of the specification.  NOTE 7: For the 20 MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to either 713-723 MHz or 728-738 MHz. For the 30MHz bandwidth, the minimum requirements are specified for NR UL transmission bandwidth configuration confined to either 703-733 or 718-748 MHz. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.131.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

### 6.131.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL the ΔTIB,c and ΔRIB,c values are re-used from DC\_5-7\_n71

Table 6.131.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n5-n7-n28 | n5 | 0.5 |
| n7 | 0.3 |
| n28 | 0.6 |

Table 6.131.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n5-n7-n28 | n28 | 0.2 |

### 6.131.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

## 6.132 CA\_n7-n8-n28

### 6.132.1 Operating bands for CA

Table 6.132.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n7-n8-n28 | n7 | 2500 MHz | – | 2570 MHz | 2620 MHz | – | 2690 MHz | FDD |
| n8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |
| n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |

### 6.132.2 Channel bandwidths per operating band for CA

Table 6.132.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** | **SCS**  **(kHz)** | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n7A-n8A-n28A | - | n7 | 15 | 5 | 10 | 15 | 20 | 25 | 30 | 354 | 40 |  | 50 |  |  |  |  |  | 0 |
| 30 |  | 10 | 15 | 20 | 25 | 30 | 354 | 40 |  | 50 |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 | 354 | 40 |  | 50 |  |  |  |  |  |
| n8 | 15 | 5 | 10 | 15 | 20 |  |  | 353,4 |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  |  | 353,4 |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n28 | 15 | 5 | 10 | 15 | 207 |  | 307 |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 207 |  | 307 |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| NOTE 3: This UE channel bandwidth is applicable only to downlink.  NOTE 4: This UE channel bandwidth is optional in this release of the specification.  NOTE 7: For the 20 MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to either 713-723 MHz or 728-738 MHz. For the 30MHz bandwidth, the minimum requirements are specified for NR UL transmission bandwidth configuration confined to either 703-733 or 718-748 MHz. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.132.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

### 6.132.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL the ΔTIB,c and ΔRIB,c values are re-used from DC\_7-8\_n28

Table 6.132.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n7-n8-n28 | n7 | 0.3 |
| n8 | 0.6 |
| n28 | 0.5 |

Table 6.132.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n7-n8-n28 | n8 | 0.2 |
| n28 | 0.1 |

### 6.132.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

## 6.133 CA\_n7-n8-n78

### 6.133.1 Operating bands for CA

Table 6.133.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n7-n8-n78 | n7 | 2500 MHz | – | 2570 MHz | 2620 MHz | – | 2690 MHz | FDD |
| n8 | 880 MHz | – | 915 MHz | 925 MHz | – | 960 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

### 6.133.2 Channel bandwidths per operating band for CA

Table 6.133.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** | **SCS**  **(kHz)** | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n7A-n8A-n78A | - | n7 | 15 | 5 | 10 | 15 | 20 | 25 | 30 | 354 | 40 |  | 50 |  |  |  |  |  | 0 |
| 30 |  | 10 | 15 | 20 | 25 | 30 | 354 | 40 |  | 50 |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 | 354 | 40 |  | 50 |  |  |  |  |  |
| n8 | 15 | 5 | 10 | 15 | 20 |  |  | 353,4 |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 |  |  | 353,4 |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n78 | 15 | 5 | 10 | 15 | 207 |  | 307 |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 207 |  | 307 |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| NOTE 3: This UE channel bandwidth is applicable only to downlink.  NOTE 4: This UE channel bandwidth is optional in this release of the specification.  NOTE 7: For the 20 MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to either 713-723 MHz or 728-738 MHz. For the 30MHz bandwidth, the minimum requirements are specified for NR UL transmission bandwidth configuration confined to either 703-733 or 718-748 MHz. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.133.3 Co-existence studies

For single uplink, the UE coexistence is already considered in the fallback combinations in TS 38.101-1.

### 6.133.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL the ΔTIB,c and ΔRIB,c values are re-used from DC\_7-8\_n78

Table 6.133.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n7-n8-n78 | n7 | 0.5 |
| n8 | 0.6 |
| n78 | 0.8 |

Table 6.133.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n7-n8-n78 | n8 | 0.2 |
| n78 | 0.5 |

### 6.133.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

6.134 CA\_n28-n40-n79

6.134.1 Operating bands for CA

**Table 6.134.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR Band** | **NR Band** | **Uplink (UL) band** | | | **Downlink (DL) band** | | | **Duplex**  **mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n28A-n40A-n79A3 | n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |
| n40 | 2300 MHz | – | 2400 MHz | 2300 MHz | – | 2400 MHz | TDD |
| n79 | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |
| NOTE 3: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | | | | | | |

6.134.2 Channel bandwidths per operating band for CA

Table 6.134.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration | NR Band | Channel bandwidth (MHz) | | | | | | | | | | | | | Bandwidth combination set |
|  |  |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |
| CA\_n28A-n40A-n79A | - | n28 | 5 | 10 | 15 | 20 |  | 30 |  |  |  |  |  |  |  | 0 |
|  |  | n40 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 |  | 80 | 90 | 100 |  |
|  |  | n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |  |

6.134.3 Co-existence studies

The coexistence studies of harmonic interference have been captured in the constituent fallback modes in TR 38.716-02-00, where no harmonic issues for the 1UL/3DL NR CA CA\_n28A-n40A-n79A.

6.134.4 ∆TIB and ∆RIB values

For CA\_n28A-n40A-n79A, ΔTIB,c and ΔRIB,c values are given in table 6.134.4.1 and 6.134.4.2

**6.134.4.1 ΔTIB,c**

|  |  |  |
| --- | --- | --- |
| **Inter-band CA combination** | **NR Band** | **ΔTIB,c (dB)** |
| CA\_n28-n40-n79 | n28 | 0.5 |
| n40 | 0.3 |
| n79 | 0.8 |

**6.134.4.2 ΔRIB,c**

|  |  |  |
| --- | --- | --- |
| **Inter-band CA combination** | **NR Band** | **ΔRIB,c (dB)** |
| CA\_n28-n40-n79 | n28 | 0.2 |
| n40 | 0 |
| n79 | 0.5 |

6.134.5 MSD

No additional MSD is needed for 1UL/3DL NR CA CA\_n28A-n40A-n79A since there are no additional harmonic issues. Also there are no cross band isolation MSD issues.

## 6.135 CA\_n28-n46-n78

### 6.135.1 Operating bands for CA

Table 6.135.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band Combination** | **NR Band** | **Uplink (UL) band** | | | **Downlink (DL) band** | | | **Duplex**  **mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n28-n46-n78 | n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |
| n46 | 5150 MHz | – | 5925 MHz | 5150 MHz | – | 5925 MHz | TDD |
| n78 | 3300MHz | – | 3800MHz | 3300MHz | – | 3800MHz | TDD |

#### 6.135.2 Channel bandwidths per operating band for CA

Table 6.135.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Configuration** | **NR Band** | **Channel bandwidth [MHz]** | | | | | | | | | | | | | |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n28A-n46A-n78A | n28A  n78A | n28 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n46 |  |  |  | 20 |  |  | 40 |  | 60 |  | 80 |  |  |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n28A-n46C-n78A | n28A  n78A | n28 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n46 | See CA\_n46C Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n28A-n46D-n78A | n28A  n78A | n28 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
| n46 | See CA\_n46D Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

#### 6.135.3 Co-existence studies

Co-existence studies of CA\_n28-n46-n78 with 1 UL are already covered in the constituent fallback modes.

### 6.135.4 ∆TIB,c and ∆RIB,c values

The same relaxation values for CA\_n28-n78 are reused.

Table 6.135.4-1: ΔTIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n28-n46-n78 | n28 | 0.5 |
| n46 | 0 |
| n78 | 0.8 |

Table 6.135.4-2: ΔRIB,c

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n28-n46-n78 | n28 | 0.2 |
| n46 | 0 |
| n78 | 0.5 |

### 6.135.5 REFSENS requirements

There are no additional MSD requirements for this band combination.

## 6.136 CA\_n7-n46-n78

### 6.136.1 Operating bands for CA

Table 6.136.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n7-n46-n78 | n7 | 2500 MHz | – | 2570 MHz | 2620 MHz | – | 2690 MHz | FDD |
| n46 | 5150 MHz | – | 5925 MHz | 5150 MHz | – | 5925 MHz | TDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

### 6.136.2 Channel bandwidths per operating band for CA

Table 6.136.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA Config** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n7A-n46A-n78A | - | n7 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 | 50 |  |  |  |  |  | 0 |
| n46 |  |  |  | 20 |  |  |  | 40 |  | 60 |  | 80 |  |  |
| n78 |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n7A-n46C-n78A | - | n7 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 | 50 |  |  |  |  |  | 0 |
| n46 | See CA\_n46C Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | | |
| n78 |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n7A-n46D-n78A | - | n7 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 | 50 |  |  |  |  |  | 0 |
| n46 | See CA\_n46D Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | | |
| n78 |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|  | | | | | | | | | | | | | | | | | |

### 6.136.3 Co-existence studies

For single uplink, the UE coexistence is already considered for these bands in TS 38.101-1.

Table below summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. As can be seen, 2nd harmonic from n7 might affect n46 DL, which are addressed in lower order combinations.

**Table 6.109.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n7 | 2500 | 2570 | 2620 | 2690 | 5000 | 5140 | 7500 | 7710 | 10000 | 10280 |
| n46 | 5150 | 5925 | 5150 | 5925 | 10300 | 11850 | 15450 | 17775 | 20600 | 23700 |
| n78 | 3800 | 4200 | 3300 | 4200 | 7600 | 8400 | 11400 | 12600 | 15200 | 16800 |

Table below summarizes frequency ranges where harmonics mixing occur due to 3DL bands CA with 1 UL. As can be seen, 2nd harmonic from n7 might affect n46 UL, which are addressed in lower order combinations. Further, mixing of 2nd and 3rd Harmonic of n7 and n78 as well as n46 and n78. This is also addressing in lower order combinations.

**Table 6.109.3-2 Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n7 | 2500 | 2570 | 2620 | 2690 | 5240 | 5380 | 7860 | 8070 | 10480 | 10760 |
| n46 | 5150 | 5925 | 5150 | 5925 | 10300 | 11850 | 15450 | 17775 | 20600 | 23700 |
| n78 | 3800 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

### 6.136.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL the ΔTIB,c and ΔRIB,c values are re-used from CA\_n7-n46, CA\_n7-n78 and CA\_n46-n78.

Table 6.136.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n7-n46-n78 | n7 | 0.5 |
| n46 | 0 |
| n78 | 0.8 |

Table 6.136.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n7-n46-n78 | n7 | 0.5 |
| n46 | 0 |
| n78 | 0.5 |

### 6.136.5 REFSENS requirements

Compared to its fall-back modes, there are no additional MSD requirements for this band combination.

## 6.137 CA\_n2-n29-n77

6. 137.1 Operating bands for CA

Table 6.7.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2A-n29A-n77A | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n29 |  | N/A |  | 717 MHz | – | 728 MHz | SDL |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

#### 6.137.2 Channel bandwidths per operating band for CA

Table 6.137.2-1: Supported bandwidths per CA band combination for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n2A-n29A-n77A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n29 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |
| CA\_n2(2A)-n29A-n77A | - | n2 | See CA\_n2(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | 0 |
|  |  | n29 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |
| CA\_n2A-n29A-n77(2A) | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n29 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |  |

### 6.137.3 Co-existence studies

Co-existence studies of CA\_n2-n29-n77 with 1UL are already covered in the constituent fall-back modes.

### 6.137.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n2, n29 and n77, the ΔTIB,c and ΔRIB,c values are shown in table 6.137.4-1 and table 6.137.4-2, respectively. They are taken from the existing combination DC\_n2-n29\_n77.

Table 6.137.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n2-n29-n77 | n2 | 0.6 |
| n77 | 0.8 |

Table 6.137.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n2-n29-n77 | n2 | 0.2 |
| n29 | 0.2 |
| n77 | 0.5 |

### 6.137.5 REFSENS requirements

There are no additional MSD requirements for this band combination.

## 6.138 CA\_n5-n29-n77

6. 138.1 Operating bands for CA

Table 6.7.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n5A-n29A-n77A | n5 | 824 MHz | – | 849 MHz | 869 MHz | – | 894 MHz | FDD |
| n29 |  | N/A |  | 717 MHz | – | 728 MHz | SDL |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

#### 6.138.2 Channel bandwidths per operating band for CA

Table 6.138.2-1: Supported bandwidths per CA band combination for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n5A-n29A-n77A | - | n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n29 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |
| CA\_n5A-n29A-n77(2A) | - | n5 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n29 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |  |

### 6.138.3 Co-existence studies

Co-existence studies of CA\_n5-n29-n77 with 1UL are already covered in the constituent fall-back modes.

### 6.138.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n5, n29 and n77, the ΔTIB,c and ΔRIB,c values are shown in table 6.138.4-1 and table 6.138.4-2, respectively. They are taken from the existing combination CA\_n5-n12-n77.

Table 6.138.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n5-n29-n77 | n5 | 0.8 |
| n77 | 0.5 |

Table 6.138.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n5-n29-n77 | n5 | 0.5 |
| n29 | 0.3 |
| n77 | 0.5 |

### 6.138.5 REFSENS requirements

There are no additional MSD requirements for this band combination.

## 6.139 CA\_n29-n30-n77

6. 139.1 Operating bands for CA

Table 6.7.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n29A-n30A-n77A | n29 |  | N/A |  | 717 MHz | – | 728 MHz | SDL |
| n30 | 2305 MHz | – | 2315 MHz | 2350 MHz | – | 2360 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

#### 6.139.2 Channel bandwidths per operating band for CA

Table 6.139.2-1: Supported bandwidths per CA band combination for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n29A-n30A-n77A | - | n29 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |
| CA\_n29A-n30A-n77(2A) | - | n29 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |  |

### 6.139.3 Co-existence studies

Co-existence studies of CA\_n29-n30-n77 with 1UL are already covered in the constituent fall-back modes.

### 6.139.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n29, n30 and n77, the ΔTIB,c and ΔRIB,c values are shown in table 6.139.4-1 and table 6.139.4-2, respectively. They are taken from the existing combination DC\_29-30\_n77.

Table 6.139.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n29-n30-n77 | n30 | 0.3 |
| n77 | 0.5 |

Table 6.139.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n29-n30-n77 | n29 | 0.2 |
| n30 | 0 |
| n77 | 0.5 |

### 6.139.5 REFSENS requirements

There are no additional MSD requirements for this band combination

## 6.140 CA\_n29-n66-n77

6. 140.1 Operating bands for CA

Table 6.7.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n29A-n66A-n77A | n29 |  | N/A |  | 717 MHz | – | 728 MHz | SDL |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

#### 6.140.2 Channel bandwidths per operating band for CA

Table 6.140.2-1: Supported bandwidths per CA band combination for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n29A-n66A-n77A | - | n29 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |
|  |  | n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |
| CA\_n29A-n66(2A)-n77A | - | n29 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |  |
|  |  | n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |
| CA\_n29A-n66A-n77(2A) | - | n29 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |
|  |  | n77 | See CA\_n77(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |  |

### 6.140.3 Co-existence studies

Co-existence studies of CA\_n29-n66-n77 with 1UL are already covered in the constituent fall-back modes.

### 6.140.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n29, n66 and n77, the ΔTIB,c and ΔRIB,c values are shown in table 6.140.4-1 and table 6.140.4-2, respectively. They are taken from the existing combination DC\_29-66\_n77.

Table 6.140.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n29-n66-n77 | n66 | 0.6 |
| n77 | 0.8 |

Table 6.140.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n29-n66-n77 | n29 | 0.5 |
| n66 | 0.5 |
| n77 | 0.5 |

### 6.140.5 REFSENS requirements

There are no additional MSD requirements for this band combination.

## 6.141 CA\_n41-n66-n260

### 6.141.1 Operating bands for CA

Table 6.141.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n41-n66-n260 | n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n260 | 37000 MHz | – | 40000 MHz | 37000 MHz | – | 40000 MHz | TDD |

### 6.141.2 Channel bandwidths per operating band for CA

Table 6.141.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

| **NR CA config** | **UL config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** | **Bandwidth combination set** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n41A-n66A-n260A | - | n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  |
| n260 |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| CA\_n41A-n66A-n260(2A) | - | n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  |
| n260 | CA\_n260(2A) | | | | | | | | | | | | | | |
| CA\_n41A-n66A-n260G | - | n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  |
| n260 | CA\_n260G | | | | | | | | | | | | | | |
| CA\_n41A-n66A-n260H | - | n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  |
| n260 |  | | | | | | | | | | | | | | |
| CA\_n41A-n66A-n260I | - | n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  |
| n260 | CA\_n260I | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, it means that all single carrier bandwidths for the constituent bands are supported as defined in Table 5.3.5-1 of TS 38.101-1 and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.141.3 Co-existence requirements

### 6.141.4 ∆TIB,c and ∆RIB,c values

dTib and dRib are based on CA\_n41-n66

Table 6.141.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n41-n66-n260 | n41 | 0.86 |
| 1.37 |
| n66 | 0.5 |
| n260 | 0 |
| NOTE 6: The requirement is applied for UE transmitting on the frequency range of 2545-2690 MHz.  NOTE 7: The requirement is applied for UE transmitting on the frequency range of 2496-2545 MHz. | | |

Table 6.141.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n41-n66-n260 | n41 | 0.56 |
| 17 |
| n66 | 0.5 |
| n260 | 0 |
| NOTE 6: The requirement is applied for UE transmitting on the frequency range of 2545-2690 MHz.  NOTE 7: The requirement is applied for UE transmitting on the frequency range of 2496-2545 MHz. | | |

### 6.141.5 REFSENS requirements

MSD studies can be omitted because harmonic interference between FR1 bands have been already studied for CA\_n41-n66, and harmonic interference between FR1 bands and FR2 band are negligible.

## 6.142 CA\_n1-n3-n18

### 6.142.1 Operating bands for CA

Table 6.142.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n1-n3-n18 | n1, n3, n18 |

### 6.142.2 Channel bandwidths per operating band for CA

Table 6.142.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration** | **NR Band** |  |  | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** | |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | |  |
| CA\_n1A-n3A-n18A | - | n1 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  | | 0 |
|  |  | n3 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  | |  |
|  |  | n18 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  | |  |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, the UE shall support all single carrier bandwidths for the constituent bands as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.142.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis

### 6.142.4 ∆TIB,c and ∆RIB,c values

For CA\_n1-n3-n18, the ΔTIB,c and ΔRIB,c values can reuse CA\_1-3-18 defined in TS 36.101.

Table 6.142.4-1: ΔTIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n3-n18 | n1 | 0.3 |
| n3 | 0.3 |
| n18 | 0.3 |

Table 6.142.4-2: ΔRIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n3-n18 | n1 | 0 |
| n3 | 0 |
| n18 | 0 |

### 6.142.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

## 6.143 CA\_n1-n18-n28

### 6.143.1 Operating bands for CA

Table 6.143.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n1-n18-n28 | n1, n18, n28 |

### 6.143.2 Channel bandwidths per operating band for CA

Table 6.143.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration** | **NR Band** |  |  | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** | |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | |  |
| CA\_n1A-n18A-n28A | - | n1 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  | | 0 |
|  |  | n18 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  | |  |
|  |  | n28 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, the UE shall support all single carrier bandwidths for the constituent bands as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.143.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis

### 6.143.4 ∆TIB,c and ∆RIB,c values

For CA\_n1-n18-n28, the ΔTIB,c and ΔRIB,c values can reuse CA\_1-18-28 defined in TS 36.101.

Table 6.143.4-1: ΔTIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n18-n28 | n1 | 0.3 |
| n18 | 0.5 |
| n28 | 0.5 |

Table 6.143.4-2: ΔRIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n18-n28 | n1 | 0 |
| n18 | 0 |
| n28 | 0 |

### 6.143.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

## 6.144 CA\_n1-n18-n41

### 6.144.1 Operating bands for CA

Table 6.144.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n1-n18-n41 | n1, n18, n41 |

### 6.144.2 Channel bandwidths per operating band for CA

Table 6.144.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration** | **NR Band** |  |  | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** | |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | |  |
| CA\_n1A-n18A-n41A | - | n1 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  | | 0 |
|  |  | n18 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  | |  |
|  |  | n41 |  | 10 | 15 | 20 |  | 30 |  | 40 |  | 50 | 60 |  | 80 | 90 | 100 | |  |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, the UE shall support all single carrier bandwidths for the constituent bands as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.144.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis

### 6.144.4 ∆TIB,c and ∆RIB,c values

For CA\_n1-n18-n41, the ΔTIB,c and ΔRIB,c values can reuse CA\_1-18-41 defined in TS 36.101.

Table 6.144.4-1: ΔTIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n18-n41 | n1 | 0.5 |
| n18 | 0.3 |
| n41 | 0.5 |

Table 6.144.4-2: ΔRIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n18-n41 | n1 | 0 |
| n18 | 0 |
| n41 | 0 |

### 6.144.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

## 6.145 CA\_n1-n18-n77

### 6.145.1 Operating bands for CA

Table 6.145.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n1-n18-n77 | n1, n18, n77 |

### 6.145.2 Channel bandwidths per operating band for CA

Table 6.145.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration** | **NR Band** |  |  | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** | |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | |  |
| CA\_n1A-n18A-n77A | - | n1 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  | | 0 |
|  |  | n18 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  | |  |
|  |  | n77 |  | 10 | 15 | 20 |  |  |  | 40 |  | 50 | 60 |  | 80 | 90 | 100 | |  |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, the UE shall support all single carrier bandwidths for the constituent bands as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.145.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis

### 6.145.4 ∆TIB,c and ∆RIB,c values

For CA\_n1-n18-n77, the ΔTIB,c and ΔRIB,c values can reuse CA\_1-18-42 defined in TS 36.101 and DC\_1-18\_n77 defined in 38.101-3.

Table 6.145.4-1: ΔTIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n18-n77 | n1 | 0.3 |
| n18 | 0.3 |
| n77 | 0.8 |

Table 6.145.4-2: ΔRIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n18-n77 | n1 | 0 |
| n18 | 0 |
| n77 | 0.5 |

### 6.145.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

## 6.146 CA\_n1-n28-n41

### 6.146.1 Operating bands for CA

Table 6.146.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n1-n28-n41 | n1, n28, n41 |

### 6.146.2 Channel bandwidths per operating band for CA

Table 6.146.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration** | **NR Band** |  |  | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** | |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | |  |
| CA\_n1A-n28A-n41A | - | n1 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  | | 0 |
|  |  | n28 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |
|  |  | n41 |  | 10 | 15 | 20 |  | 30 |  | 40 |  | 50 | 60 |  | 80 | 90 | 100 | |  |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, the UE shall support all single carrier bandwidths for the constituent bands as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.146.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis

### 6.146.4 ∆TIB,c and ∆RIB,c values

For CA\_n1-n28-n41, the ΔTIB,c and ΔRIB,c values can reuse DC\_1-28\_n7 defined in TS 38.101-3.

Table 6.146.4-1: ΔTIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n28-n41 | n1 | 0.5 |
| n28 | 0.6 |
| n41 | 0.6 |

Table 6.146.4-2: ΔRIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n28-n41 | n1 | 0 |
| n28 | 0.2 |
| n41 | 0 |

### 6.146.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

## 6.147 CA\_n1-n28-n77

### 6.147.1 Operating bands for CA

Table 6.147.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n1-n28-n77 | n1, n28, n77 |

### 6.147.2 Channel bandwidths per operating band for CA

Table 6.147.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration** | **NR Band** |  |  | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** | |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | |  |
| CA\_n1A-n28A-n77A | - | n1 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  | | 0 |
|  |  | n28 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |
|  |  | n77 |  | 10 | 15 | 20 |  |  |  | 40 |  | 50 | 60 |  | 80 | 90 | 100 | |  |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, the UE shall support all single carrier bandwidths for the constituent bands as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.147.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis

### 6.147.4 ∆TIB,c and ∆RIB,c values

For CA\_n1-n28-n77, the ΔTIB,c and ΔRIB,c values can reuse DC\_1\_n28-n77 defined in TS 38.101-3.

Table 6.147.4-1: ΔTIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n28-n77 | n1 | 0.6 |
| n28 | 0.6 |
| n77 | 0.8 |

Table 6.147.4-2: ΔRIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n28-n77 | n1 | 0.2 |
| n28 | 0.2 |
| n77 | 0.5 |

### 6.147.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

## 6.148 CA\_n1-n41-n77

### 6.148.1 Operating bands for CA

Table 6.148.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n1-n41-n77 | n1, n41, n77 |

### 6.148.2 Channel bandwidths per operating band for CA

Table 6.148.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration** | **NR Band** |  |  | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** | |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | |  |
| CA\_n1A-n41A-n77A | - | n1 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  | | 0 |
|  |  | n41 |  | 10 | 15 | 20 |  | 30 |  | 40 |  | 50 | 60 |  | 80 | 90 | 100 | |  |
|  |  | n77 |  | 10 | 15 | 20 |  |  |  | 40 |  | 50 | 60 |  | 80 | 90 | 100 | |  |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, the UE shall support all single carrier bandwidths for the constituent bands as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.148.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis

### 6.148.4 ∆TIB,c and ∆RIB,c values

For CA\_n1-n41-n77, the ΔTIB,c and ΔRIB,c values can reuse DC\_1-41\_n77 defined in TS 38.101-3.

Table 6.148.4-1: ΔTIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n41-n77 | n1 | 0.5 |
| n41 | 0.5 |
| n77 | 0.8 |

Table 6.148.4-2: ΔRIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n41-n77 | n1 | 0 |
| n41 | 0 |
| n77 | 0.5 |

### 6.148.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

## 6.149 CA\_n3-n18-n28

### 6.149.1 Operating bands for CA

Table 6.149.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n3-n18-n28 | n3, n18, n28 |

### 6.149.2 Channel bandwidths per operating band for CA

Table 6.149.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration** | **NR Band** |  |  | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** | |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | |  |
| CA\_n3A-n18A-n28A | - | n3 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  | | 0 |
|  |  | n18 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  | |  |
|  |  | n28 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, the UE shall support all single carrier bandwidths for the constituent bands as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.149.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis

### 6.149.4 ∆TIB,c and ∆RIB,c values

For CA\_n3-n18-n28, the ΔTIB,c and ΔRIB,c values can reuse DC\_3-18\_n28 defined in TS 38.101-3.

Table 6.149.4-1: ΔTIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n18-n28 | n3 | 0.3 |
| n18 | 0.5 |
| n28 | 0.3 |

Table 6.149.4-2: ΔRIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n18-n28 | n3 | 0 |
| n18 | 0 |
| n28 | 0 |

### 6.149.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

## 6.150 CA\_n3-n18-n77

### 6.150.1 Operating bands for CA

Table 6.150.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n3-n18-n77 | n3, n18, n77 |

### 6.150.2 Channel bandwidths per operating band for CA

Table 6.150.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration** | **NR Band** |  |  | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** | |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | |  |
| CA\_n3A-n18A-n77A | - | n3 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  | | 0 |
|  |  | n18 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  | |  |
|  |  | n77 |  | 10 | 15 | 20 |  |  |  | 40 |  | 50 | 60 |  | 80 | 90 | 100 | |  |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, the UE shall support all single carrier bandwidths for the constituent bands as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.150.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis

### 6.150.4 ∆TIB,c and ∆RIB,c values

For CA\_n3-n18-n77, the ΔTIB,c and ΔRIB,c values can reuse DC\_3-18\_n77 defined in 38.101-3.

Table 6.150.4-1: ΔTIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n18-n77 | n3 | 0.6 |
| n18 | 0.3 |
| n77 | 0.8 |

Table 6.150.4-2: ΔRIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n18-n77 | n3 | 0.2 |
| n18 | 0 |
| n77 | 0.5 |

### 6.150.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

## 6.151 CA\_n18-n28-n41

### 6.151.1 Operating bands for CA

Table 6.151.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n18-n28-n41 | n18, n28, n41 |

### 6.151.2 Channel bandwidths per operating band for CA

Table 6.151.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration** | **NR Band** |  |  | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** | |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | |  |
| CA\_n18A-n28A-n41A | - | n18 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  | | 0 |
|  |  | n28 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |
|  |  | n41 |  | 10 | 15 | 20 |  | 30 |  | 40 |  | 50 | 60 |  | 80 | 90 | 100 | |  |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, the UE shall support all single carrier bandwidths for the constituent bands as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.151.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis

### 6.151.4 ∆TIB,c and ∆RIB,c values

For CA\_n18-n28-n41, the ΔTIB,c and ΔRIB,c values are defined below.

Table 6.151.4-1: ΔTIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n18-n28-n41 | n18 | 0.4 |
| n28 | 0.4 |
| n41 | 0.3 |

Table 6.151.4-2: ΔRIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n18-n28-n41 | n18 | 0 |
| n28 | 0 |
| n41 | 0 |

### 6.151.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

## 6.152 CA\_n18-n28-n77

### 6.152.1 Operating bands for CA

Table 6.152.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n18-n28-n77 | n18, n28, n77 |

### 6.152.2 Channel bandwidths per operating band for CA

Table 6.152.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration** | **NR Band** |  |  | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** | |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | |  |
| CA\_n18A-n28A-n77A | - | n18 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  | | 0 |
|  |  | n28 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |
|  |  | n77 |  | 10 | 15 | 20 |  |  |  | 40 |  | 50 | 60 |  | 80 | 90 | 100 | |  |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, the UE shall support all single carrier bandwidths for the constituent bands as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.152.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis

### 6.152.4 ∆TIB,c and ∆RIB,c values

For CA\_n18-n28-n77, the ΔTIB,c and ΔRIB,c values can reuse DC\_18-28\_n77 defined in TS 38.101-3.

Table 6.152.4-1: ΔTIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n18-n28-n77 | n18 | 0.5 |
| n28 | 0.5 |
| n77 | 0.8 |

Table 6.152.4-2: ΔRIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n18-n28-n77 | n18 | 0 |
| n28 | 0 |
| n77 | 0.5 |

### 6.152.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

## 6.153 CA\_n18-n41-n77

### 6.153.1 Operating bands for CA

Table 6.153.1-1: Inter-band CA operating bands involving FR1 (three bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n18-n41-n77 | n18, n41, n77 |

### 6.153.2 Channel bandwidths per operating band for CA

Table 6.153.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration** | **NR Band** |  |  | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** | |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** | |  |
| CA\_n18A-n41A-n77A | - | n18 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  | | 0 |
|  |  | n41 |  | 10 | 15 | 20 |  | 30 |  | 40 |  | 50 | 60 |  | 80 | 90 | 100 | |  |
|  |  | n77 |  | 10 | 15 | 20 |  |  |  | 40 |  | 50 | 60 |  | 80 | 90 | 100 | |  |
| NOTE 3: The SCS of each channel bandwidth for NR band refer to Table 5.3.5-1. | | | | | | | | | | | | | | | | | | | |

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, the UE shall support all single carrier bandwidths for the constituent bands as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

### 6.153.3 Co-existence studies

Co-existence studies can be omitted because fallback combinations cover these requirements and analysis

### 6.153.4 ∆TIB,c and ∆RIB,c values

For CA\_n18-n41-n77, the ΔTIB,c and ΔRIB,c values can reuse DC\_18-41\_n77 defined in TS 38.101-3.

Table 6.153.4-1: ΔTIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n18-n41-n77 | n18 | 0.3 |
| n41 | 0.3 |
| n77 | 0.8 |

Table 6.153.4-2: ΔRIB,c due to NR CA (three bands)

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n18-n41-n77 | n18 | 0 |
| n41 | 0 |
| n77 | 0.5 |

### 6.153.5 REFSENS requirements

MSD requirements are captured in lower order combinations.

## 6.154 CA\_n12-n30-n66

6.154.1 Operating bands for CA

Table 6.154.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n12A-n30A-n66A | n12 | 699 MHz | – | 716 MHz | 729 MHz | – | 746 MHz | FDD |
| n30 | 2305 MHz | – | 2315 MHz | 2350 MHz | – | 2360 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |

#### 6.154.2 Channel bandwidths per operating band for CA

Table 6.154.2-1: Supported bandwidths per CA band combination for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n12A-n30A-n66A | - | n12 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |
| CA\_n12A-n30A-n66(2A) | - | n12 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |  |
| CA\_n12A-n30A-n66(3A) | - | n12 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n66 | See CA\_n66(3A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | |  |

### 6.154.3 Co-existence studies

Co-existence studies of CA\_n12-n30-n66 with 1UL are already covered in the constituent fall-back modes.

### 6.154.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n12, n30 and n66, the ΔTIB,c and ΔRIB,c values are shown in table 6.154.4-1 and table 6.154.4-2, respectively. They are taken from the existing combination E-UTRA CA\_12-30-66.

Table 6.154.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n12-n30-n66 | n12 | 0.8 |
| n30 | 0.3 |
| n66 | 0.5 |

Table 6.154.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n12-n30-n66 | n12 | 0.5 |
| n30 | 0.5 |
| n66 | 0.4 |

### 6.154.5 REFSENS requirements

There are no additional MSD requirements for this band combination

## 6.155 CA\_n29-n30-n66

6.155.1 Operating bands for CA

Table 6.155.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n29A-n30A-n66A | n29 | N/A | | | 717 MHz | – | 728 MHz | SDL |
| n30 | 2305 MHz | – | 2315 MHz | 2350 MHz | – | 2360 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |

#### 6.155.2 Channel bandwidths per operating band for CA

Table 6.155.2-1: Supported bandwidths per CA band combination for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n29A-n30A-n66A | - | n29 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |
| CA\_n29A-n30A-n66(2A) | - | n29 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |  |

### 6.155.3 Co-existence studies

Co-existence studies of CA\_n29-n30-n66 with 1UL are already covered in the constituent fall-back modes.

### 6.155.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n29, n30 and n66, the ΔTIB,c and ΔRIB,c values are shown in table 6.155.4-1 and table 6.155.4-2, respectively. They are taken from the existing combination DC\_29-30\_n66.

Table 6.155.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n29-n30-n66 | n30 | 0.3 |
| n66 | 0.5 |

Table 6.155.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n29-n30-n66 | n29 | 0 |
| n30 | 0.5 |
| n66 | 0.4 |

### 6.155.5 REFSENS requirements

There are no additional MSD requirements for this band combination

## 6.156 CA\_n2-n12-n30

6. 156.1 Operating bands for CA

Table 6.156.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2A-n12A-n30A | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n12 | 699 MHz | – | 716 MHz | 729 MHz | – | 746 MHz | FDD |
| n30 | 2305 MHz | – | 2315 MHz | 2350 MHz | – | 2360 MHz | FDD |

#### 6.156.2 Channel bandwidths per operating band for CA

Table 6.156.2-1: Supported bandwidths per CA band combination for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n2A-n12A-n30A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n12 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
| CA\_n2(2A)-n12A-n30A | - | n2 | See CA\_n2(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | 0 |
|  |  | n12 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |

### 6.156.3 Co-existence studies

Co-existence studies of CA\_n2-n12-n30 with 1UL are already covered in the constituent fall-back modes.

### 6.156.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n2, n12 and n30, the ΔTIB,c and ΔRIB,c values are shown in table 6.156.4-1 and table 6.156.4-2, respectively. They are taken from the existing combination DC\_2-12\_n30.

Table 6.156.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n2-n12-n30 | n2 | 0.5 |
| n12 | 0.3 |
| n30 | 0.3 |

Table 6.156.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n2-n12-n30 | n2 | 0.4 |
| n12 | 0 |
| n30 | 0.5 |

### 6.156.5 REFSENS requirements

There are no additional MSD requirements for this band combination

## 6.157 CA\_n2-n12-n66

6.157.1 Operating bands for CA

Table 6.157.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2A-n12A-n66A | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n12 | 699 MHz | – | 716 MHz | 729 MHz | – | 746 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |

6.157.2 Channel bandwidths per operating band for CA

Table 6.157.2-1: Supported bandwidths per CA band combination for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n2A-n12A-n66A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n12 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |
| CA\_n2(2A)-n12A-n66A | - | n2 | See CA\_n2(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | 0 |
|  |  | n12 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |
| CA\_n2A-n12A-n66(2A) | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n12 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |  |
| CA\_n2(2A)-n12A-n66(2A) | - | n2 | See CA\_n2(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | 0 |
|  |  | n12 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |  |
| CA\_n2A-n12A-n66(3A) | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n12 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n66 | See CA\_n66(3A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | |  |

### 6.157.3 Co-existence studies

Co-existence studies of CA\_n2-n12-n66 with 1UL are already covered in the constituent fall-back modes.

### 6.157.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n2, n12 and n66, the ΔTIB,c and ΔRIB,c values are shown in table 6.157.4-1 and table 6.157.4-2, respectively. They are taken from the existing combination DC\_2-12\_n66.

Table 6.157.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n2-n12-n66 | n2 | 0.5 |
| n12 | 0.8 |
| n66 | 0.5 |

Table 6.157.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n2-n12-n66 | n2 | 0.3 |
| n12 | 0.5 |
| n66 | 0.3 |

### 6.157.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.158 CA\_n2-n29-n30

6.158.1 Operating bands for CA

Table 6.158.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2A-n29A-n30A | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n29 | N/A | | | 717 MHz | – | 728 MHz | SDL |
| n30 | 2305 MHz | – | 2315 MHz | 2350 MHz | – | 2360 MHz | FDD |

#### 6.158.2 Channel bandwidths per operating band for CA

Table 6.158.2-1: Supported bandwidths per CA band combination for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n2A-n29A-n30A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n29 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
| CA\_n2(2A)-n29A-n30A | - | n2 | See CA\_n2(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | 0 |
|  |  | n29 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n30 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |

### 6.158.3 Co-existence studies

Co-existence studies of CA\_n2-n29-n30 with 1UL are already covered in the constituent fall-back modes.

### 6.158.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n2, n29 and n30, the ΔTIB,c and ΔRIB,c values are shown in table 6.158.4-1 and table 6.158.4-2, respectively. They are taken from the existing combination DC\_2-29\_n30.

Table 6.158.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n2-n29-n30 | n2 | 0.5 |
| n30 | 0.3 |

Table 6.158.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n2-n29-n30 | n2 | 0.3 |
| n29 | 0 |
| n30 | 0.3 |

### 6.158.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

## 6.159 CA\_n2-n29-n66

6.159.1 Operating bands for CA

Table 6.159.1-1: 3DL Inter-band CA operating bands

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2A-n29A-n66A | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n29 | N/A | | | 717 MHz | – | 728 MHz | SDL |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |

#### 6.159.2 Channel bandwidths per operating band for CA

Table 6.159.2-1: Supported bandwidths per CA band combination for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n2A-n29A-n66A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n29 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |
| CA\_n2(2A)-n29A-n66A | - | n2 | See CA\_n2(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | 0 |
|  |  | n29 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |
| CA\_n2A-n29A-n66(2A) | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n29 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |  |
| CA\_n2(2A)-n29A-n66(2A) | - | n2 | See CA\_n2(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | | | | | | | | | | | | | 0 |
|  |  | n29 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n66 | See CA\_n66(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |  |

### 6.159.3 Co-existence studies

Co-existence studies of CA\_n2-n29-n66 with 1UL are already covered in the constituent fall-back modes.

### 6.159.4 ∆TIB,c and ∆RIB,c values

For three simultaneous DLs and one UL of Band n2, n29 and n66, the ΔTIB,c and ΔRIB,c values are shown in table 6.159.4-1 and table 6.159.4-2, respectively. They are taken from the existing combination DC\_2-29\_n66.

Table 6.159.4-1: ΔTIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n2-n29-n66 | n2 | 0.5 |
| n66 | 0.5 |

Table 6.159.4-2: ΔRIB,c for 3DL aggregation

| Inter-band CA Configuration | NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| CA\_n2-n29-n66 | n2 | 0.3 |
| n29 | 0 |
| n66 | 0.3 |

### 6.159.5 REFSENS requirements

Compared to its fallback modes, there are no additional MSD requirements for this band combination.

6.160 CA\_n41-n70-n78

6.160.1 Operating bands for CA

**Table 6.160.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n41-n70-n78 | n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |
| n70 | 1695 MHz | – | 1710 MHz | 1995 MHz | – | 2020 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

6.160.2 Channel bandwidths per operating band for CA

**Table 6.160.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |  |
| CA\_n41A-n70A-n78A | - | n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 0 |
|  |  | n70 | 5 | 10 | 15 | 20 | 25 |  |  |  |  |  |  |  |  |  |
|  |  | n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |

6.160.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.160.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. As can be seen there are 2nd harmonic issues from UL n70 affecting DL n78., which are addressed in lower order combinations.

**Table 6.160.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 | 9984 | 10760 |
| n70 | 1695 | 1710 | 1995 | 2020 | 3390 | 3420 | 5085 | 5130 | 6780 | 6840 |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 | 13200 | 15200 |

Table 6.160.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. No issues can be seen.

**Table 6.160.3-2 Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 | 9984 | 10760 |
| n70 | 1695 | 1710 | 1995 | 2020 | 3990 | 4040 | 5985 | 6060 | 7980 | 8080 |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 | 13200 | 15200 |

6.160.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n41, n70 and n78, the ΔTIB,c and ΔRIB,c  values are shown in table 6.1.x.4-1 and table 6.1.x.4-2, respectively. Values are derived from CA\_n3-n7-n78.

**Table 6.160.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n41-n70-n78 | n41 | 0.6 |
| n70 | 0.6 |
| n78 | 0.8 |

**Table 6.160.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n41-n70-n78 | n41 | 0.2 |
| n70 | 0.2 |
| n78 | 0.5 |

6.160.5 MSD

The 2nd harmonic from n70 UL into n78 DL is addressed in lower order combination.

6.161 CA\_n1-n20-n67

6.161.1 Operating bands for CA

**Table 6.161.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n20-n67 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n20 | 832 MHz | – | 862 MHz | 791 MHz | – | 821 MHz | FDD |
| n67 | N/A | | | 738 MHz |  | 758 MHz | SDL |

6.161.2 Channel bandwidths per operating band for CA

**Table 6.161.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |  |
| CA\_n1A-n20A-n67A | CA\_n1A-n20A | n1 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |  |  |  |  |  | 0 |
|  |  | n20 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |
|  |  | n67 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |

6.161.3 Co-existence studies

Table 6.161.3-1 gives harmonic issue for the 3DL bands CA with 1 UL. No issues can be seen.

**Table 6.161.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n1 | 1920 | 1980 | 2110 | 2170 | 3840 | 3960 | 5760 | 5940 | 7680 | 7920 |
| n20 | 832 | 862 | 791 | 821 | 1664 | 1724 | 2496 | 2586 | 3328 | 3448 |
| n67 | N/A | N/A | 738 | 758 | N/A | N/A | N/A | N/A | N/A | N/A |

Table 6.161.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. It can be seen that 3rd harmonic mixing of n20 might affect DL n1.

**Table 6.161.3-2 Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n1 | 1920 | 1980 | 2110 | 2170 | 4220 | 4340 | 6330 | 6510 | 8440 | 8680 |
| n20 | 832 | 862 | 791 | 821 | 1582 | 1456 | 2151 | 2184 | 2868 | 2912 |
| n67 | N/A | N/A | 738 | 758 | 1476 | 1516 | 2214 | 2274 | 2952 | 3032 |

6.161.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n41, n70 and n78, the ΔTIB,c and ΔRIB,c  values are shown in table 6.1.x.4-1 and table 6.1.x.4-2, respectively. Values are derived from DC\_1-20\_n28.

**Table 6.161.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n20-n67 | n1 | 0.5 |
| n20 | 0.6 |
| n67 | 0.8 |

**Table 6.161.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n1-n20-n67 | n1 | 0 |
| n20 | 0.2 |
| n67 | 0.2 |

6.161.5 MSD

The 3rd harmonic mixing from n20 UL into n1 DL is addressed in lower order combination.

6.162 CA\_n3-n20-n67

6.162.1 Operating bands for CA

**Table 6.162.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n3-n20-n67 | n3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| n20 | 832 MHz | – | 862 MHz | 791 MHz | – | 821 MHz | FDD |
| n67 | N/A | | | 738 MHz |  | 758 MHz | SDL |

6.162.2 Channel bandwidths per operating band for CA

**Table 6.162.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |  |
| CA\_n3A-n20A-n67A | CA\_n3A-n20A | n3 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 0 |
|  |  | n20 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |
|  |  | n67 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |

6.162.3 Co-existence studies

Table 6.162.3-1 gives harmonic issue for the 3DL bands CA with 1 UL. It can be seen that 2nd harmonic UL of n20 might affect DL n3.

**Table 6.162.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n3 | 1710 | 1785 | 1805 | 1880 | 3420 | 3570 | 5130 | 5355 | 6840 | 7140 |
| n20 | 832 | 862 | 791 | 821 | 1664 | 1724 | 2496 | 2586 | 3328 | 3448 |
| n67 | N/A | N/A | 738 | 758 | N/A | N/A | N/A | N/A | N/A | N/A |

Table 6.162.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. No issues can be seen.

**Table 6.162.3-2 Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n3 | 1710 | 1785 | 1805 | 1880 | 3610 | 3760 | 5415 | 5640 | 7220 | 7520 |
| n20 | 832 | 862 | 791 | 821 | 1582 | 1456 | 2151 | 2184 | 2868 | 2912 |
| n67 | N/A | N/A | 738 | 758 | 1476 | 1516 | 2214 | 2274 | 2952 | 3032 |

6.162.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n41, n70 and n78, the ΔTIB,c and ΔRIB,c  values are shown in table 6.1.x.4-1 and table 6.1.x.4-2, respectively. Values are derived from DC\_3-20\_n28.

**Table 6.162.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n20-n67 | n3 | 0.3 |
| n20 | 0.5 |
| n67 | 0.5 |

**Table 6.162.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n3-n20-n67 | n3 | 0 |
| n20 | 0.1 |
| n67 | 0.1 |

6.162.5 MSD

The 2nd harmonic from n20 UL into n3 DL is addressed in lower order combination.

6.163 CA\_n2-n71-n78

6.163.1 Operating bands for CA

**Table 6.163.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2-n71-n78 | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n71 | 663 MHz | – | 698 MHz | 617 MHz | – | 652 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

6.163.2 Channel bandwidths per operating band for CA

**Table 6.163.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |  |
| CA\_n2A-n71A-n78A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |
|  |  | n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |
| CA\_n2A-n71A-n78(2A) | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |
|  |  | n78 | See CA\_n78(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 | | | | | | | | | | | | |  |

6.163.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.163.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. As can be seen there are 2nd harmonic issues from UL n2 affecting DL n78 and 3rd harmonic issues from UL n71 affecting DL n2, which are addressed in lower order combinations.

**Table 6.163.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n2 | 1850 | 1910 | 1930 | 1990 | 3700 | 3820 | 5550 | 5730 | 7400 | 7640 |
| n71 | 663 | 698 | 617 | 652 | 1326 | 1396 | 1989 | 2094 | 2652 | 2792 |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 | 13200 | 15200 |

Table 6.163.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. As can be seen there are 3rd harmonic issues from DL n71 affecting UL n2, which are addressed in lower order combinations.

**Table 6.163.3-2 Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n2 | 1850 | 1910 | 1930 | 1990 | 3860 | 3980 | 5790 | 5970 | 7720 | 7960 |
| n71 | 663 | 698 | 617 | 652 | 1234 | 1304 | 1851 | 1956 | 2468 | 2608 |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 | 13200 | 15200 |

6.163.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n2, n71 and n78, the ΔTIB,c and ΔRIB,c  values are shown in table 6.1.x.4-1 and table 6.1.x.4-2, respectively. Values are derived from DC\_2-71\_n78.

**Table 6.163.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n71-n78 | n2 | 0.6 |
| n71 | 0.6 |
| n78 | 0.8 |

**Table 6.163.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n71-n78 | n2 | 0.2 |
| n71 | 0.2 |
| n78 | 0.5 |

6.163.5 MSD

The harmonic and harmonic mixing issues are addressed in lower order combinations.

6.164 CA\_n2-n66-n78

6.164.1 Operating bands for CA

**Table 6.164.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n2-n66-n78 | n2 | 1850 MHz | – | 1910 MHz | 1930 MHz | – | 1990 MHz | FDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

6.164.2 Channel bandwidths per operating band for CA

**Table 6.164.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | **Bandwidth combination set** |
|  |  |  | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** |  |
| CA\_n2A-n66A-n78A | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |
|  |  | n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |
| CA\_n2A-n66A-n78(2A) | - | n2 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  | 0 |
|  |  | n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |
|  |  | n78 | See CA\_n78(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1 | | | | | | | | | | | | |  |

6.164.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.164.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. As can be seen there are 2nd harmonic issues from UL n2 affecting DL n78 and 2nd harmonic issues from UL n66 affecting DL n2, which are addressed in lower order combinations.

**Table 6.164.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** | **UL Low Band Edge** | **UL High Band Edge** |
| n2 | 1850 | 1910 | 1930 | 1990 | 3700 | 3820 | 5550 | 5730 | 7400 | 7640 |
| n66 | 1710 | 1780 | 2110 | 2200 | 3420 | 3560 | 5130 | 5340 | 6840 | 7120 |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 | 13200 | 15200 |

Table 6.164.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. As can be seen there are no harmonic mixing issues.

**Table 6.164.3-2 Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | |
| **Band** | **UL Low Band Edge** | **UL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** | **DL Low Band Edge** | **DL High Band Edge** |
| n2 | 1850 | 1910 | 1930 | 1990 | 3860 | 3980 | 5790 | 5970 | 7720 | 7960 |
| n66 | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 | 8440 | 8800 |
| n78 | 3300 | 3800 | 3300 | 3800 | 6600 | 7600 | 9900 | 11400 | 13200 | 15200 |

6.164.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n2, n66 and n78, the ΔTIB,c and ΔRIB,c  values are shown in table 6.1.x.4-1 and table 6.1.x.4-2, respectively. Values are derived from DC\_2-66\_n78.

**Table 6.164.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n66-n78 | n2 | 0.6 |
| n66 | 0.6 |
| n78 | 0.8 |

**Table 6.164.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n2-n66-n78 | n2 | 0.3 |
| n66 | 0.3 |
| n78 | 0.5 |

6.164.5 MSD

The harmonic issues are addressed in lower order combinations.

6.165 CA\_n28-n40-n41

6.165.1 Operating bands for CA

**Table 6.165.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR Band** | **NR Band** | **Uplink (UL) band** | | | **Downlink (DL) band** | | | **Duplex**  **mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n28A-n40A-n41A | n28 | 703 MHz | – | 748 MHz | 758 MHz | – | 803 MHz | FDD |
| n40 | 2300 MHz | – | 2400 MHz | 2300 MHz | – | 2400 MHz | TDD |
| n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |

6.165.2 Channel bandwidths per operating band for CA

Table 6.165.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration | NR Band | Channel bandwidth (MHz) | | | | | | | | | | | | | Bandwidth combination set |
|  |  |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |
| CA\_n28A-n40A-n41A | - | n28 | 5 | 10 | 15 | 20 |  | 30 |  |  |  |  |  |  |  | 0 |
|  |  | n40 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 |  | 80 | 90 | 100 |  |
|  |  | n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |

6.165.3 Co-existence studies

The coexistence studies of harmonic interference have been captured in the constituent fallback modes in TR 38.716-02-00, where:

- There is no harmonics issue and harmonics mixing issue for the band combination of n28 and n41.

- There is 3rd harmonic DL mixing from band n28 DL will affect band n40 UL.

6.165.4 ∆TIB and ∆RIB values

For CA\_n28A-n40A-n79A, ΔTIB,c and ΔRIB,c values are given in table 6.165.4.1 and 6.165.4.2

**6.165.4.1 ΔTIB,c**

|  |  |  |
| --- | --- | --- |
| **Inter-band CA combination** | **NR Band** | **ΔTIB,c (dB)** |
| CA\_n28-n40-n41 | n28 | 0.3 |
| n40 | 0.5 |
| n41 | 0.5 |

**6.165.4.2 ΔRIB,c**

|  |  |  |
| --- | --- | --- |
| **Inter-band CA combination** | **NR Band** | **ΔRIB,c (dB)** |
| CA\_n28-n40-n41 | n28 | 0 |
| n40 | 0 |
| n41 | 0 |

6.165.5 MSD

No additional MSD is needed for 1UL/3DL NR CA CA\_n28A-n40A-n41A since the MSD for 3rd harmonic DL mixing from band n28 DL affect band n40 UL were already defined in the fall back mode of CA\_n28A-n40A.

Annex A:  
Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Date** | **Meeting** | **TDoc.** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2020-08 | 3GPP RAN4#96e | R4-2009812 |  |  |  | Initial TR skeleton | 0.0.1 |
| 2020-08 | 3GPP RAN4#96e | R4-2011886 |  |  |  | The following approved TPs have been implemented,  R4-2010252, TP for TR 38.717-03-01 CA\_n3A-n28A-n41A, Samsung, KDDI  R4-2010253, TP for TR 38.717-03-01 CA\_n3A-n41A-n78A, KDDI  R4-2010528, TP to TR 38.717-03-01: CA\_n5-n25-n66, Nokia, Bell Mobility  R4-2010530, TP to TR 38.717-03-01: CA\_n5-n25-n78, Nokia, Bell Mobility  R4-2011674, TP for CA 3DL1UL n1-n77-n79 for TR 38.717-03-01, NTT DOCOMO INC.  R4-2011675, TP for CA 3DL1UL n1-n78-n79 for TR 38.717-03-01, NTT DOCOMO INC.  R4-2010642, TP for TR38.717-03-01\_CA\_n39A-n40A-n79A, ZTE  R4-2010643, TP for TR38.717-03-01\_CA\_n39A-n40A-n41A, ZTE  R4-2010687, TP to add CA\_n25A-n48A-n66A, CA\_n25A-n48(2A)-n66A, CA\_n25A-n48C-n66A, Ericsson, T-Mobile US  R4-2009687, TP for CA\_n1-n77-n257 3DL/1UL for TR38.717-03-01, NTT DOCOMO INC.  R4-2009688, TP for CA\_n1-n78-n257 3DL/1DL for TR38.717-03-01, NTT DOCOMO INC.  R4-2009689, TP for CA\_n1-n79-n257 3UL/1DL for TR38.717-03-01, NTT DOCOMO INC.  R4-2009813, Draft big CR on Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1, CATT  R4-2009814, Draft big CR on Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-3, CATT | 0.1.0 |
| 2020-11 | 3GPP RAN4#97e | R4-2014460 |  |  |  | The following approved TPs are implemented,  R4-2016752, TP for TR 38.717-03-01 CA\_n3-n41-n77, Samsunge, KDDI  R4-2016753, TP for TR 38.717-03-01 CA\_n3-n41-n78, Samsung, KDDI  R4-2014114, TP for TR 38.717-03-01 CA\_n28-n41-n77, Samsung, KDDI  R4-2014115, TP for TR 38.717-03-01 CA\_n28-n41-n78, Samsung, KDDI  R4-2014523, draft CR for NR inter-band CA for 3 bands DL, Nokia, T-mobile USA  R4-2016754, TP for TR 38.717-03-01: CA\_n1A-n8A-n78(2A), Nokia Telefonica  R4-2015051, TP for TR38.717-03-01\_ CA\_n8A-n40A-n41A, ZTE  R4-2015078, TP to TR 38.717-03-01: CA\_n5-n66-n77, Nokia, Nokia Shanghai Bell  R4-2015079, TP to TR 38.717-03-01: CA\_n2-n66-n77, Nokia, Nokia Shanghai Bell  R4-2015707, TP for TR 38.717-03-01: CA\_n66-n71-n78, Huawei, HiSilicon, Bell Mobility, Telus  R4-2015708, TP for TR 38.717-03-01: CA\_n38-n66-n78, Huawei, HiSilicon, Bell Mobility, Telus  R4-2015709, TP for TR 38.717-03-01: CA\_n25-n38-n78, Huawei, HiSilicon, Bell Mobility, Telus  R4-2016305, TP to add CA\_n3A-n5A-n7A, CA\_n3A-n5A-n7B, Ericsson, Telstra  R4-2016306, TP to add CA\_n5A-n7A-n78A, CA\_n5A-n7B-n78A, Ericsson, Telstra  R4-2016650, TP to add 3DL/1UL CA\_n25A-n66A-n77A, Ericsson, T-Mobile US  R4-2016651, TP to add 3DL/1UL CA\_n25A-n71A-n77A, Ericsson, T-Mobile US  R4-2016652, TP to add 3DL/1UL CA\_n41A-n66A-n77A, CA\_n41(2A)-n66A-n77A, CA\_n41C-n66A-n77A, Ericsson, T-Mobile US  R4-2016653, TP to add 3DL/1UL CA\_n41A-n71A-n77A, CA\_n41(2A)-n71A-n77A, CA\_n41C-n71A-n77A, Ericsson, T-Mobile US  R4-2016654, TP to add 3DL/1UL CA\_n66A-n71A-n77A, Ericsson, T-Mobile US | 0.2.0 |
| 2021-02 | 3GPP RAN4#98e | R4-2100492 |  |  |  | The following approved TPs are implemented,  R4-2103077, TP to TR 38.717-03-01 CA\_n5-n25-n77, Nokia, Nokia Shanghai Bell  R4-2103078, TP to TR 38.717-03-01 CA\_n25-n66-n77, Nokia, Nokia Shanghai Bell  R4-2100952, TP for TR 38.717-03-01: CA\_n3-n18-n41, Samsung, KDDI  R4-2100953, TP for TR 38.717-03-01: CA\_n3A-n28A-n77(2A), Samsung, KDDI  R4-2103079, TP for TR 38.717-03-01: CA\_n3A-n28A-n77(2A), Samsung, KDDI  R4-2103080, TP for TR 38.717-03-01: CA\_n3A-n28A-n78(2A), Samsung, KDDI  R4-2100955, TP for TR 38.717-03-01: CA\_n3A-n41A-n77(2A), Samsung, KDDI  R4-2100956, TP for TR 38.717-03-01: CA\_n3A-n41A-n78(2A), Samsung, KDDI  R4-2100957, TP for TR 38.717-03-01: CA\_n28A-n41A-n77(2A), Samsung, KDDI  R4-2103081, TP for TR 38.717-03-01: CA\_n13-n25-n66, Samsung, TELUS, Bell mobility  R4-2100980, TP for TR 38.717-03-01: CA\_n25A-n29A-n66A, Samsung, TELUS, Bell mobility  R4-2101113, TP for TR 38.717-03-01: support of CA\_n1-n78-n257, CHTTL  R4-2101188, TP for CA\_n28-n77-n79 for TR 38.717-03-01, NTT DOCOMO INC.  R4-2101189, TP for CA\_n28-n78-n79 for TR 38.717-03-01, NTT DOCOMO INC.  R4-2101595, DraftCR for 38.101-1 to add BCS1 for CA\_n1A-n8A-n78A, Huawei, HiSilicon  R4-2101596, TP for TR 38.717-03-01: CA\_n1A-n8A-n79A, Huawei, HiSilicon  R4-2101597, Updated TP for TR 38.717-03-01: to add configuration CA\_n1A-n78(2A)-n79A and CA\_n1A-n78A-n79A\_BCS1, Huawei, HiSilicon  R4-2101598, TP for TR 38.717-03-01: CA\_n8A-n78A-n79A/CA\_n8A-n78(2A)-n79A, Huawei, HiSilicon  R4-2102217, TP for TR38.717-03-01\_ CA\_n8A-n39A-n41A, ZTE | 0.3.0 |
| 2021-04 | 3GPP RAN4#98bis-e | R4-2104807 |  |  |  | The following approved TPs are implemented,  R4-2104424, TP to TR 38.717-03-01: CA\_n25-n48-n66 combinations, Nokia, T-Mobile USA  R4-2104643, TP for TR 38.717-03-01: CA\_n1-n3-n20, VODAFONE Group Plc.  R4-2104644, TP for TR 38.717-03-01: CA\_n1-n20-n78, VODAFONE Group Plc.  R4-2104645, TP for TR 38.717-03-01: CA\_n3-n20-n78, VODAFONE Group Plc.  R4-2104646, TP for TR 38.717-03-01: CA\_n8-n28-n78, VODAFONE Group Plc.  R4-2104912, TP for TR 38.717-03-01: NR CA\_n3-n28-n79, SoftBank Corp.  R4-2104915, TP for TR 38.717-03-01: NR CA\_n3-n79-n25  7, SoftBank Corp.  R4-2104916, TP for TR 38.717-03-01: NR CA\_n28-n79-n257, SoftBank Corp.  R4-2104917, TP update for TR 38.717-03-01: NR CA\_n28-n77-n79, SoftBank Corp.  R4-2105070, TP for TR 38.717-03-01: CA\_n7-n25-n77, Samsung, TELUS, Bell mobility  R4-2105071, TP for TR 38.717-03-01: CA\_n7-n66-n77, Samsung, TELUS, Bell mobility  R4-2105072, TP for TR 38.717-03-01: CA\_n25-n66-n77, Samsung, TELUS, Bell mobility  R4-2106652, TP for TR 38.717-03-01: CA\_n1A-n3A-n7A, Huawei, HiSilicon  R4-2106718, TP for 37.717-03-01 to include n2-n5-n66, Ericsson, AT&T  R4-2106720, TP for 37.717-03-01 to include n2-n5-n30, Ericsson, AT&T  R4-2106729, TP for 37.717-03-01 to include n13-n25-n77, Ericsson, Bell Mobility  R4-2106731, TP for 37.717-03-01 to include n13-n66-n77, Ericsson, Bell Mobility | 0.4.0 |
| 2021-05 | 3GPP RAN4#99-e | R4-2109121 |  |  |  | The following approved TPs are implemented,  R4-2108935, TP to TR 38.717-03-01: CA\_n2-n30-n66, Nokia, AT&T  R4-2108936, TP to TR 38.717-03-01: CA\_n5-n30-n66, Nokia, AT&T  R4-2107705, TP to TR 38.717-03-01: CA\_n5-n30-n66, Nokia, AT&T  R4-2108979, TP for TR 38.717-03-01 for single uplink CA\_n2-n77-n260 Carrier Aggregation requirements, Verizon Demark  R4-2108980, TP for TR 38.717-03-01 for single uplink CA\_n2-n77-n261 Carrier Aggregation requirements, Verizon Demark  R4-2108981, TP for TR 38.717-03-01 for single uplink CA\_n5-n77-n260 Carrier Aggregation requirements, Verizon Demark  R4-2108982, TP for TR 38.717-03-01 for single uplink CA\_n5-n77-n261 Carrier Aggregation requirements, Verizon Demark  R4-2108983, TP for TR 38.717-03-01 for single uplink CA\_n66-n77-n260 Carrier Aggregation requirements, Verizon Demark  R4-2108984, TP for TR 38.717-03-01 for single uplink CA\_n66-n77-n261 Carrier Aggregation requirements, Verizon Demark  R4-2108985, DraftCR for inter band 3DL/1UL NR CA combinations for 38.101-3, Verizon Demark  R4-2107707, TP for TR 38.717-03-01: CA\_n24-n41-n77 combinations, Ligardo network  R4-2107709, TP for TR 38.717-03-01: CA\_n3-n77-n79, SoftBank  R4-2107710, TP for TR38.717-03-01\_CA\_n41A-n79A-n258A, ZTE  R4-2110676, TP for TR 38.717-03-01: CA\_n25-n71-n78, Huawei, HiSilicon, Bell Mobility, Telus  R4-2110702, TP to TR 38.717-03-01 Addition of CA\_n14-n66-n77, Nokia, AT&T  R4-2110703 TP to TR 38.717-03-01 Addition of CA\_n14-n30-n77, Nokia, AT&T  R4-2107711 TP to TR 38.717-03-01 Addition of CA\_n5-n14-n77, Nokia, AT&T  R4-2107712 TP to TR 38.717-03-01 Addition of CA\_n2-n14-n77, Nokia, AT&T  R4-2110706 TP to TR 38.717-03-01 Addition of CA\_n12-n66-n77, Nokia, AT&T  R4-2110707 TP to TR 38.717-03-01 Addition of CA\_n12-n30-n77, Nokia, AT&T  R4-2110708 TP to TR 38.717-03-01 Addition of CA\_n2-n12-n77, Nokia, AT&T  R4-2110709 TP to TR 38.717-03-01 Addition of CA\_n5-n12-n77, Nokia, AT&T  R4-2110710 TP to TR 38.717-03-01 Addition of CA\_n2-n5-n77, Nokia, AT&T  R4-2110711 TP to TR 38.717-03-01 Addition of CA\_n5-n30-n77, Nokia, AT&T  R4-2110712 TP to TR 38.717-03-01 Addition of CA\_n2-n30-n77, Nokia, AT&T  R4-2110713 TP to TR 38.717-03-01 Addition of CA\_n30-n66-n77, Nokia, AT&T  R4-2111099, TP for TR 38.717-03-01 to include CA\_n7-n25-n78, Ericsson, Bell Mobility  R4-2111160 TP for TR 38.717-03-01 to include CA\_n7-n78-n258, Ericsson, Bell Mobility | 0.5.0 |
| 2021-08 | 3GPP RAN4#100-e | R4-2112008 |  |  |  | The following approved TPs are implemented,  [R4-2114826](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2114826.zip), TP to TR 38.717-03-01: Addition of CA\_n2-n14-n30, Nokia, AT&T  [R4-2114827](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2114827.zip), TP to TR 38.717-03-01: Addition of CA\_n2-n14-n66, Nokia, AT&T  [R4-2114828](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2114828.zip), TP to TR 38.717-03-01: Addition of CA\_n14-n30-n66, Nokia, AT&T  [R4-2112160](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112160.zip), TP for TR 38.717-03-01 CA\_n1A-n3A-n8A, Huawei,HiSilicon  [R4-2112161](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112161.zip), TP for TR 38.717-03-01 CA\_n1A-n3A-n77A and CA\_n1A-n3A-n77(2A), Huawei,HiSilicon  [R4-2112162](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112162.zip), TP for TR 38.717-03-01 CA\_n1A-n3A-n257GHIJKLMA, Huawei,HiSilicon  [R4-2112163](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112163.zip), TP for TR 38.717-03-01 CA\_n1A-n8A-n77A and CA\_n1A-n8A-n77(2A), Huawei,HiSilicon  [R4-2112164](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112164.zip), TP for TR 38.717-03-01 CA\_n1A-n8A-n257GHIJKLMA, Huawei,HiSilicon  [R4-2112165](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112165.zip), TP for TR 38.717-03-01 CA\_n3A-n8A-n77A and CA\_n3A-n8A-n77(2A), Huawei,HiSilicon  [R4-2112166](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112166.zip), TP for TR 38.717-03-01 CA\_n3A-n8A-n257GHIJKLMA, Huawei,HiSilicon  [R4-2112167](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112167.zip), TP for TR 38.717-03-01 CA\_n8A-n77A-n257GHIJKLMA and CA\_n8A-n77(2A)-n257GHIJKLMA, Huawei,HiSilicon  [R4-2112464](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112464.zip), Draft CR for 38.101-1 to introduce new configurations to CA\_n41-n66-n71 and CA\_n41-n71-n77 with 1UL, Samsung, Telus, Bell mobility  [R4-2112661](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112661.zip), TP for TR 38.717-03-01 for CA\_n48-n66-n77, Verizon, Samsung  [R4-2112662](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112662.zip), TP for TR 38.717-03-01 for CA\_n5-n48-n77, Verizon, Samsung  [R4-2112663](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112663.zip), TP for TR 38.717-03-01 for CA\_n5-n48-n66, Verizon, Samsung  [R4-2112664](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112664.zip), TP for TR 38.717-03-01 for CA\_n2-n48-n77, Verizon, Samsung  [R4-2112665](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112665.zip), TP for TR 38.717-03-01 for CA\_n2-n48-n66, Verizon, Samsung  [R4-2112666](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112666.zip), TP for TR 38.717-03-01 for CA\_n2A-n5A-n66A, Verizon, Samsung  [R4-2112667](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112667.zip), TP for TR 38.717-03-01 for CA\_n2-n5-n48, Verizon, Samsung  [R4-2112744](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112744.zip), TP for TR 38.717-03-01 to include CA\_n1-n3-n5, Ericsson, Telstra  [R4-2114846](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2114846.zip), TP for TR 38.717-03-01 to include CA\_n1-n5-n7, Ericsson, Telstra  [R4-2112746](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112746.zip), TP for TR 38.717-03-01 to include CA\_n1-n5-n78, Ericsson, Telstra  [R4-2112858](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112858.zip), TP for TR38.717-03-01\_CA\_n28A-n41A-n79A, CMCC, ZTE Corporation  [R4-2112938](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2112938.zip), TP for TR38.717-03-01\_CA\_n40A-n41A-n258A, ZTE Corporation  [R4-2113058](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2113058.zip), TP for TR 38.717-03-01: CA\_n25-n38-n66, Huawei, HiSilicon, Bell Mobility, Telus  [R4-2113059](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2113059.zip), TP for TR 38.717-03-01: CA\_n66A-n77A-n260A, Huawei, HiSilicon, Bell Mobility, Telus  [R4-2113167](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2113167.zip), TP for TR 38.717-03-01 CA\_n41-n71-n78, Samsung, Ericsson,Telus, Bell mobility  [R4-2113580](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2113580.zip), TP for TR 38.717-03-01 to include CA\_n3-n5-n78, Ericsson, Telstra  [R4-2113601](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2113601.zip), TP for TR 38.717-03-01 to include CA\_n25-n41-n78, Ericsson, Bell Mobility  [R4-2113604](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2113604.zip), TP for TR 38.717-03-01 to include CA\_n41-n66-n78, Ericsson, Bell Mobility  [R4-2113697](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2113697.zip), draftCR to introduce 40B to 3 bands combinations already in 38.101-1, Nokia  [R4-2113698](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2113698.zip), TP to TR 38.717-03-01 Addition of CA\_n1A-n28A-n40, Nokia  [R4-2113723](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2113723.zip), TP to TR 38.717-03-01 Addition of CA\_n26\_n66\_n70, Nokia, DISH Network  [R4-2113724](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2113724.zip), TP to TR 38.717-03-01 Addition of CA\_n48\_n66\_n70, Nokia, DISH Network  [R4-2113725](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2113725.zip), TP to TR 38.717-03-01 Addition of CA\_n48\_n66\_n71, Nokia, DISH Network  [R4-2113726](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2113726.zip), TP to TR 38.717-03-01 Addition of CA\_n48-n70-n71, Nokia, DISH Network  [R4-2113727](ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_eBis/Docs/R4-2113727.zip), TP to TR 38.717-03-01 Addition of CA\_n66-n70-n71, Nokia, DISH Network | 0.6.0 |
| 2021-11 | 3GPP RAN4#101-e | R4-2117385 |  |  |  | R4-2119754, TP for TR 38.717-03-01: CA\_n24-n41-n48 combinations, Ligado Networks  R4-2119755, TP for TR 38.717-03-01: CA\_n24-n48-n77 combinations,Ligado Networks  R4-2117514, TP for TR 38.717-03-01: NR CA\_n1-n3-n79, SoftBank Corp.  R4-2117515, TP for TR 38.717-03-01: NR CA\_n1-n28-n41, SoftBank Corp.  R4-2117516, TP for TR 38.717-03-01: NR CA\_n1-n28-n77, SoftBank Corp.  R4-2117517, TP for TR 38.717-03-01: NR CA\_n1-n28-n79, SoftBank Corp.  R4-2117518, TP for TR 38.717-03-01: NR CA\_n1-n28-n257, SoftBank Corp.  R4-2117519, TP for TR 38.717-03-01: NR CA\_n1-n41-n77, SoftBank Corp.  R4-2117520, TP for TR 38.717-03-01: NR CA\_n1-n41-n257, SoftBank Corp.  R4-2117572, TP to TR 38.717-03-01: CA\_n1A-n5An28A, Nokia  R4-2117573, TP to TR 38.717-03-01: CA\_n1A-n7A-n8A, Nokia  R4-2117574, TP to TR 38.717-03-01: CA\_n1A-n8A-n28A, Nokia  R4-2117575, TP to TR 38.717-03-01: CA\_n3A-n5An28A, Nokia  R4-2117576, TP to TR 38.717-03-01: CA\_n3A-n7A-n8A, Nokia  R4-2117577, TP to TR 38.717-03-01: CA\_n3A-n8A-n28A, Nokia  R4-2117578, TP to TR 38.717-03-01: CA\_n5A-n7A-n28A, Nokia  R4-2117579, TP to TR 38.717-03-01: CA\_n7A-n8A-n28A, Nokia  R4-2117580, TP to TR 38.717-03-01: CA\_n7A-n8A-n78A, Nokia  R4-2119756, TP for TR38.717-03-01\_CA\_n28A-n40A-n79A, ZTE Corporation  R4-2118542, TP to TR 38.717-03-01 for CA\_n28-n46-n78 with 1UL, Huawei,HiSilicon, BT  R4-2118644, TP to TR 38.717-03-01 Addition of CA\_n7A-n46-n78A, Nokia, BT  R4-2118666, TP to TR 38.717-03-01 Addition of CA\_n2-n29-n77, Nokia, AT&T  R4-2118667, TP to TR 38.717-03-01 Addition of CA\_n5-n29-n77, Nokia, AT&T  R4-2118668, TP to TR 38.717-03-01 Addition of CA\_n29-n30-n77, Nokia, AT&T |  |