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Technical Report

3rd Generation Partnership Project;

Technical Specification Group Radio Access Networks;

Dual Connectivity (EN-DC) of 2 bands LTE inter-band CA (2DL/1UL) and 1 NR band (1DL/1UL)

(Release 16)

** 

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Contents

Foreword 8

1 Scope 9

2 References 9

3 Definitions, symbols and abbreviations 9

3.1 Definitions 9

3.2 Symbols 9

3.3 Abbreviations 9

4 Background 9

4.1 TR Maintenance 10

5 EN-DC of 2 bands LTE inter-band CA and 1 NR band: Specific Band Combination Part 10

5.1 Inter-band EN-DC within FR1 10

5.1.1 DC\_3-18\_n77 10

5.1.2 DC\_3-18\_n78 11

5.1.3 DC\_3-18\_n79 12

5.1.4 DC\_3-41\_n77 13

5.1.5 DC\_3-41\_n79 16

5.1.6 DC\_1-5\_n79 19

5.1.7 DC\_3-5\_n79 21

5.1.8 DC\_5-41\_n79 23

5.1.9 DC\_1-7\_n78 25

5.1.10 DC\_3-8\_n77 27

5.1.11 DC\_3-8\_n79 28

5.1.12 DC\_28-41\_n77 29

5.1.13 DC\_28-41\_n78 30

5.1.14 DC\_28-41\_n79 31

5.1.15 DC\_1-8\_n77 32

5.1.16 DC\_1-8\_n79 33

5.1.17 DC\_3-3-7\_n78, DC\_3-3-7-7\_n78 35

5.1.18 DC\_18-42\_n77 36

5.1.19 DC\_18-42\_n78 37

5.1.20 DC\_18-42\_n79 38

5.1.21 DC\_8-20\_n78 39

5.1.22 DC\_20-38\_n78 40

5.1.23 DC\_66-(n)71 41

5.1.24 DC\_2-(n)71 42

5.1.25 DC\_7-8\_n77 42

5.1.26 DC\_7-8\_n78, DC\_7-7-8\_n78 43

5.1.27 DC\_2-7\_n78 45

5.1.28 DC\_7-66\_n78 48

5.1.29 DC\_3-8\_n78 52

5.1.30 DC\_3-28\_n78 53

5.1.31 DC\_5-7\_n71 54

5.1.32 DC\_2-7\_n71 57

5.1.33 DC\_2-66\_n78 60

5.1.34 DC\_1-3\_n7 64

5.1.35 DC\_3-28\_n41 65

5.1.36 DC\_1-11\_n78 66

5.1.37 DC\_8-11\_n77 67

5.1.38 DC\_8-11\_n78 69

5.1.39 DC\_2-30\_n5 and DC\_2-2-30\_n5 70

5.1.40 DC\_30-66\_n5, DC\_30-66-66\_n5 and DC\_30-66-66-66\_n5 71

5.1.41 DC\_3-7\_n1, DC\_3-3-7\_n1, DC\_3-7-7\_n1, DC\_3-3-7-7\_n1 73

5.1.42 DC\_1-3\_n5 74

5.1.43 DC\_1-7\_n5 75

5.1.44 DC\_1-28\_n5 76

5.1.45 DC\_3-7\_n5 79

5.1.46 DC\_3-28\_n5 80

5.1.47 DC\_7-28\_n5 81

5.1.48 DC\_1-11\_n77 84

5.1.49 DC\_3-20\_n1 85

5.1.50 DC\_1-20\_n3 86

5.1.51 DC\_2-66\_n5, DC\_2-2-66\_n5, DC\_2-66-66\_n5 DC\_2-2-66-66\_n5, and DC\_2-66-66-66\_n5 88

5.1.52 DC\_3-7\_n77, DC\_3-3-7\_n77, DC\_3-7-7\_n77, DC\_3-3-7-7\_n77 89

5.1.53 DC\_2-13\_n66 and DC\_2-2-13\_n66 91

5.1.54 DC\_2-7\_n66, DC\_2-7-7\_n66 93

5.1.55 DC\_2-66\_n66 94

5.1.56 DC\_7-66\_n66, DC\_7-7-66\_n66 95

5.1.57 DC\_3-8\_n1, DC\_3-3-8\_n1 96

5.1.58 DC\_7-8\_n1, DC\_7-7-8\_n1 97

5.1.59 DC\_1-8\_n3 98

5.1.60 DC\_8-42\_n77 99

5.1.61 DC\_3-40\_n1 100

5.1.62 DC\_7-40\_n1 104

5.1.63 DC\_2-66\_n66 107

5.1.64 DC\_5-66\_n5 and DC\_5-66-66\_n5 108

5.1.65 DC\_2-5\_n66 and DC\_2-5-5\_n66 109

5.1.66 DC\_13-66\_n66 and DC\_13A-66A-66A\_n66A 110

5.1.67 DC\_2-7\_n66 111

5.1.68 DC\_7-13\_n66 114

5.1.69 DC\_2-66\_n41 117

5.1.70 DC\_12-30\_n2 118

5.1.71 DC\_12-66\_n2 12-66-66\_n2 119

5.1.72 DC\_30-66\_n2, DC\_30-66-66\_n2 120

5.1.73 DC\_1-8\_n28 121

5.1.74 DC\_3-3-8\_n78 123

5.1.75 DC\_2-46\_n41 124

5.1.76 DC\_2-46\_n71 125

5.1.77 DC\_46-66\_n41 126

5.1.78 DC\_46-66A\_n71 127

5.1.79 DC\_1-3\_n38 128

5.1.80 DC\_7-20\_n3 129

5.1.81 DC\_25-41\_n41, DC\_25-(n)41, DC\_25-25-41\_n41, DC\_25-25-(n)41 130

5.1.82 DC\_1-8\_n3 131

5.1.83 DC\_13-48\_n2 132

5.1.84 DC\_13-48\_n66 133

5.1.85 DC\_48-66\_n5 134

5.1.86 DC\_1-7\_n3 135

5.1.87 DC\_1-20\_n3 136

5.1.88 DC\_3-20\_n38 137

5.1.89 DC\_1-20\_n38 138

5.1.90 DC\_3-20\_n38 139

5.1.91 DC\_1-3\_n77 139

5.1.92 DC\_2-4\_n38 140

5.1.93 DC\_2-4\_n41 143

5.1.94 DC\_1-3\_n41 147

5.1.95 DC\_7-20\_n1 151

5.1.96 DC\_2-12\_n2 154

5.1.97 DC\_3-28\_n7, DC\_3-3-28\_n7 155

5.1.98 DC\_1-7\_n7, DC\_1-1-7\_n7 157

5.1.99 DC\_3-7\_n7, DC\_3-3-7\_n7 158

5.1.100 DC\_7-28\_n7 159

5.1.101 DC\_12-66\_n66 160

5.1.102 DC\_1-28\_n7 161

5.1.103 DC\_2-5\_n66 162

5.1.104 DC\_2-5\_n2 and DC\_2-5-5\_n2 163

5.1.105 DC\_2-5\_n5 and DC\_2-2-5\_n5 164

5.1.106 DC\_2-13\_n2 165

5.1.107 DC\_2-13\_n5 and DC\_2-2-13\_n5 166

5.1.108 DC\_5-5-66\_n66 and DC\_5-5-66-66\_n66 167

5.1.109 DC\_5-13\_n2 168

5.1.110 DC\_5-66\_n66 and DC\_5-66-66\_n66 169

5.1.111 DC\_5-66\_n78 170

5.1.112 DC\_2-5\_n71 172

5.1.113 DC\_2-48\_n71 175

5.1.114 DC\_5-48\_n71 178

5.1.115 DC\_48\_(n)12 181

5.1.116 DC\_66\_(n)12 182

5.1.117 DC\_2-66\_n38 183

5.1.118 DC\_1-18\_n3 184

5.1.119 DC\_1-28\_n3 185

5.1.120 DC\_3-20\_n7 186

5.1.121 DC\_1-3\_n8 187

5.1.122 DC\_1-7\_n8 191

5.1.123 DC\_1-20\_n8 194

5.1.124 DC\_3-7\_n8 198

5.1.125 DC\_3-20\_n8 201

5.1.126 DC\_7-20\_n8 205

5.1.127 DC\_1-41\_n41 209

5.1.128 DC\_1-(n)41 211

5.1.129 DC\_2-66\_n25 213

5.1.130 DC\_12-66\_n25 214

5.1.131 DC\_2-7\_n38 216

5.1.132 DC\_2-71\_n38 217

5.1.133 DC\_7-66\_n38 218

5.1.134 DC\_66-71\_n38 219

5.1.135 DC\_2-66\_n38 220

5.1.136 DC\_7-66\_n71 221

5.1.137 DC\_2-71\_n66 222

5.1.138 DC\_66-71\_n66 223

5.1.139 DC\_2-71\_n78 224

5.1.140 DC\_66-71\_n78 225

5.1.141 DC\_2-48\_n12 226

5.1.142 DC\_2-66\_n12 227

5.1.143 DC\_5-66\_n71 228

5.1.144 DC\_48-66\_n12 229

5.1.145 DC\_7-28\_n3 230

5.1.146 DC\_2-46\_n66 231

5.1.147 DC\_2-66\_n48 and DC\_2-66-66\_n48 232

5.1.148 DC\_5-66\_n2, DC\_5-5-66\_n2, DC\_5-66-66\_n2 and DC\_5-5-66-66\_n2 234

5.1.149 DC\_13-46\_n5 235

5.1.150 DC\_13-66\_n2 and DC\_13-66-66\_n2 236

5.1.151 DC\_13-66\_n48 and DC\_13-66-66\_n48 238

5.1.152 DC\_46-66\_n25 239

5.1.153 DC\_1-41\_n28 240

5.1.154 DC\_11-18\_n77 242

5.1.155 DC\_11-18\_n78 243

5.1.156 DC\_18-41\_n3 244

5.1.157 DC\_2-48\_n66 246

5.1.158 DC\_1-11\_n3 247

5.1.159 DC\_3-8\_n28 249

5.1.160 DC\_8-11\_n3 250

5.1.161 DC\_1-20\_n41 250

5.1.162 DC\_3-20\_n41 251

5.1.163 DC\_7-8\_n3 253

5.1.164 DC\_1-(n)38 257

5.1.165 DC\_20-(n)38 259

5.1.166 DC\_20-(n)41 261

5.1.167 DC\_1-32\_n78 263

5.1.168 DC\_3-32\_n78 265

5.1.169 DC\_20-32\_n78 268

5.1.170 DC\_1-3\_n40 270

5.1.171 DC\_1-28\_n40 271

5.1.172 DC\_3-28\_n40 272

5.1.173 DC\_1-41\_n3 273

5.1.174 DC\_3-41\_n28 274

5.1.175 DC\_18-41\_n77 276

5.1.176 DC\_18-41\_n78 277

5.1.177 DC\_1-3\_n71 278

5.1.178 DC\_1-7\_n40 282

5.1.179 DC\_3-7\_n40 283

5.1.180 DC\_7-28\_n40 284

5.1.181 DC\_2\_(n)12 286

5.1.182 DC\_5\_(n)12 287

5.1.183 12\_(n)5 288

5.1.184 48\_(n)5 288

5.1.185 DC\_48-66\_n71 289

5.1.186 DC\_2-29\_n66 and DC\_2-2-29\_n66 291

5.1.187 DC\_29-66\_n2 and DC\_29-66-66\_n2 292

5.1.188 DC\_1-42\_n28 293

5.1.189 DC\_3-42\_n28 294

5.1.190 DC\_8-42\_n28 295

5.1.191 DC\_2-14\_n66 296

5.1.192 DC\_2-14\_n2 297

5.1.193 DC\_14-66\_n2 298

5.1.194 DC\_46-66\_n5 299

5.1.195 DC\_14-66\_n66 300

5.1.196 DC\_3-(n)41 301

5.1.197 DC\_3-41\_n41 303

5.1.198 DC\_2-66\_n2 306

5.1.198.1 Configurations for DC 306

5.1.198.2 Co-existence studies 306

5.1.198.3 ∆TIB and ∆RIB values 306

5.1.198.4 Reference sensitivity exceptions 306

5.1.199 DC\_29-30\_n66 307

5.1.199.1 Configurations for DC 307

5.1.199.2 Co-existence studies 307

5.1.199.3 ∆TIB and ∆RIB values 307

5.1.199.4 Reference sensitivity exceptions 307

5.1.200 DC\_2-30\_n2 308

5.1.200.1 Configurations for DC 308

5.1.200.2 Co-existence studies 308

5.1.200.3 ∆TIB and ∆RIB values 308

5.1.200.4 Reference sensitivity exceptions 308

5.1.201 DC\_29-30\_n2 308

5.1.201.1 Configurations for DC 308

5.1.201.2 Co-existence studies 308

5.1.201.3 ∆TIB and ∆RIB values 309

5.1.201.4 Reference sensitivity exceptions 309

5.1.202 DC\_30-66-n66 309

5.1.202.1 Configurations for DC 309

5.1.202.2 Co-existence studies 309

5.1.202.3 ∆TIB and ∆RIB values 309

5.1.202.4 Reference sensitivity exceptions 310

5.2 Inter-band EN-DC including FR2 310

5.2.1 DC\_3-18\_n257 310

5.2.2 DC\_3-8\_n257 311

5.2.3 DC\_28-41\_n257 312

5.2.4 DC\_2-66\_n257 313

5.2.5 DC\_2-66\_n261 314

5.2.6 DC\_2-66\_n260 316

5.2.7 DC\_46-66\_n261 318

5.2.8 DC\_18-42\_n257 320

5.2.9 DC\_1-18\_n257 321

5.2.10 DC\_3-18\_n257 322

5.2.11 DC\_1-41\_n257 323

5.2.12 DC\_3-41\_n257 324

5.2.13 DC\_41-42\_n257 325

5.2.14 DC\_46-66\_n260 326

5.2.15 DC\_2-29\_n260, DC\_29-30\_n260 328

5.2.16 DC\_1-3\_n257 329

5.2.17 DC\_1-5\_n257 330

5.2.18 DC\_1-7\_n257 331

5.2.19 DC\_1-7-7\_n257 332

5.2.20 DC\_3-5\_n257 333

5.2.21 DC\_3-7\_n257 334

5.2.22 DC\_3-7-7\_n257 335

5.2.23 DC\_5-7\_n257 336

5.2.24 DC\_5-7-7\_n257 337

5.2.25 DC\_1-11\_n257 337

5.2.26 DC\_8-11\_n257 338

5.2.27 DC\_3-3-7\_n257, DC\_3-3-7-7\_n257 339

5.2.28 DC\_2-46\_n261 340

5.2.29 DC\_46-48\_n261 341

5.2.30 DC\_46-48\_n260 343

5.2.31 DC\_14-30\_n260 344

5.2.32 DC\_14-66\_n260, DC\_14-66-66\_n260 345

5.2.33 DC\_2-14\_n260, DC\_2-2-14\_n260 346

5.2.34 DC\_2-46\_n258 348

5.2.35 DC\_46-66\_n258 349

5.2.36 DC\_13-66\_n260, DC\_13-66-66\_n260 350

5.2.37 DC\_13-66\_n261 and DC\_13-66-66\_n261 353

5.2.38 DC\_2-66\_n260 and DC\_2-66-66\_n260 358

5.2.39 DC\_2-66\_n261 and DC\_2-66-66\_n261 359

5.2.40 DC\_2-13\_n260 362

5.2.41 DC\_2-13\_n261 364

5.2.42 DC\_2-5\_n260 365

5.2.43 DC\_2-5\_n261 366

5.2.44 DC\_5-66\_n260 and DC\_5-66-66\_n260 367

5.2.45 DC\_5-66\_n261and DC\_5-66-66\_n261 368

5.2.46 DC\_11-18\_n257 371

5.2.47 DC\_18-41\_n257 372

5.2.48 DC\_2-46\_n260 373

Annex A: Change history 377

# 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:

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x the first digit:

1 presented to TSG for information;

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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.

# 1 Scope

The present document is a technical report for Dual Connectivity (EN-DC) of 2 bands LTE inter-band CA (2DL/1UL) and 1 NR band (1DL/1UL) under Rel-16 time frame. The purpose is to gather the relevant background information and studies in order to address Dual connectivity (DC) band combinations of 3 different bands DL with 2 different bands UL (2 different LTE bands and 1 NR band) for the Rel-16 band combinations.

This TR 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".

# 3 Definitions, symbols and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions 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].

## 3.2 Symbols

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

<symbol> <Explanation>

## 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].

# 4 Background

The present document is a technical report for Dual Connectivity (EN-DC) of 2 bands LTE inter-band CA and 1 NR band under Rel-16 timeframe. The document covers each band combination specific issues (i.e. one sub-clause defined per band combination)

## 4.1 TR Maintenance

A single company is responsible for introducing all approved TPs in the current TR, i.e. TR editor. 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 EN-DC of 2 bands LTE inter-band CA and 1 NR band: Specific Band Combination Part

## 5.1 Inter-band EN-DC within FR1

## 5.1.1 DC\_3-18\_n77

5.1.1.1 Operating bands for DC

**Table 5.1.1.1-1: Band combinations EN-DC (three bands)**

| **EN-DC Band** | **E-UTRA Band** | **NR Band** | **Single UL allowed** |
| --- | --- | --- | --- |
| DC\_3-18\_n77 | CA\_3-18 | n77 | DC\_3\_n77 |

5.1.1.2 Configurations for DC

**Table 5.1.1.2-1: Inter-band EN-DC configurations (three bands)**

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration**  **(NOTE 1)** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_3A-18A\_n77A | DC\_3A\_n77A  DC\_18A\_n77A | CA\_3A-18A | n77 |

5.1.1.3 Co-existence studies

Based on co-existence studies of Band 3 + Band n77 and Band-18 + Band n77 captured in TR 37.863-01-01, own Rx impact of the 3rd band is the followings.

- IMD generated by dual uplink of Band 3 + Band n77 doesn’t fall into own Rx of band 18.

- 3rd order IMD generated by dual uplink of Band 18 + Band n77 may fall into own Rx of band 3.

Since Band 18 is only by one operator in Japan, frequency range of n77 can be constrained to 3.6GHz – 4.2GHz according to Japanese spectrum allocation. Then own Rx impact of 3rd band can be simplified as follows.

- IMD generated by dual uplink of Band 3 + Band n77 doesn’t fall into own Rx of band 18.

- IMD generated by dual uplink of Band 18 + Band n77 doesn’t fall into own Rx of band 3.

5.1.1.4 ∆TIB and ∆RIB values

**Table 5.1.1.4-1: ΔTIB,c**

| **Inter-band DC Configuration** | **E-UTRA and NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| DC\_3-18-n77 | 3 | 0.6 |
| 18 | 0.3 |
| n77 | 0.8 |

**Table 5.1.1.4-2: ΔRIB**

| **Inter-band DC Configuration** | **E-UTRA and NR Band** | **ΔRIB [dB]** |
| --- | --- | --- |
| DC\_3-18-n77 | 3 | 0.2 |
| 18 | 0 |
| n77 | 0.5 |

5.1.1.5 REFSENS requirements

As stated in 5.1.1.3, there is no additional MSD requirement for this configuration according to Japanese spectrum allocation.

## 5.1.2 DC\_3-18\_n78

5.1.2.1 Operating bands for DC

Table 5.1.2.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-18\_n78 | CA\_3-18 | n78 | DC\_3\_n78 |

5.1.2.2 Configurations for DC

Table 5.1.2.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-18A\_n78A | DC\_3A\_n78A  DC\_18A\_n78A | CA\_3A-18A | n78 |

5.1.2.3 Co-existence studies

Based on co-existence studies of Band 3 + Band n78 and Band-18 + Band n78 captured in TR 37.863-01-01, own Rx impact of the 3rd band is the followings.

- IMD generated by dual uplink of Band 3 + Band n78 doesn’t fall into own Rx of band 18.

- 3rd order IMD generated by dual uplink of Band 18 + Band n78 may fall into own Rx of band 3.

Since Band 18 is only by one operator in Japan, frequency range of n78 can be constrained to 3.6GHz – 3.8GHz according to Japanese spectrum allocation. Then own Rx impact of 3rd band can be simplified as follows.

- IMD generated by dual uplink of Band 3 + Band n78 doesn’t fall into own Rx of band 18.

- IMD generated by dual uplink of Band 18 + Band n78 doesn’t fall into own Rx of band 3.

5.1.2.4 ∆TIB and ∆RIB values

Table 5.1.2.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-18-n78 | 3 | 0.6 |
| 18 | 0.3 |
| n78 | 0.8 |

**Table 5.1.2.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-18-n78 | 3 | 0.2 |
| 18 | 0 |
| n78 | 0.5 |

5.1.2.5 REFSENS requirements

As stated in 5.1.2.3, there is no additional MSD requirement for this configuration according to Japanese spectrum allocation.

## 5.1.3 DC\_3-18\_n79

5.1.3.1 Operating bands for DC

Table 5.1.3.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-18\_n79 | CA\_3-18 | n79 |  |

5.1.3.2 Configurations for DC

Table 5.1.3.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-18A\_n79A | DC\_3A\_n79A  DC\_18A\_n79A | CA\_3A-18A | n79 |

5.1.3.3 Co-existence studies

Based on co-existence studies of Band 3 + Band n79 and Band-18 + Band n79 captured in TR 37.863-01-01, own Rx impact of the 3rd band is the followings.

- 3rd and 4th order IMD generated by dual uplink of Band 3 + Band n79 may also fall into own Rx of band 19

- IMD generated by dual uplink of Band 18 + Band n79 doesn’t fall into own Rx of band 3

Taking into account that Band 18 is currently operated only by a certain operator in Japan, the frequency range of Band 3 can be limited to UL/DL = 1710-1730/1805-1825 MHz. Then own Rx impact can be simplified as below.

- IMD generated by dual uplink of Band 3 + Band n79 doesn’t fall into own Rx of band 18

- IMD generated by dual uplink of Band 18 + Band n79 doesn’t fall into own Rx of band 3

5.1.3.4 ∆TIB and ∆RIB values

Table 5.1.3.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-18-n79 | 3 | 0.3 |
| 18 | 0.3 |
| n79 | 0 |

**Table 5.1.3.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-18-n79 | 3 | 0 |
| 18 | 0 |
| n79 | 0 |

5.1.3.5 REFSENS requirements

No REFSENS requirements are expected for this DC configuration.

## 5.1.4 DC\_3-41\_n77

5.1.4.1 Operating bands for DC

Table 5.1.4.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-41\_n77 | CA\_3-41 | n77 | DC\_3\_n77 |

5.1.4.2 Configurations for DC

Table 5.1.4.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-41A\_n77A | DC\_3A\_n77A  DC\_41A\_n77A | CA\_3A-41A | n77A |
| DC\_3A-41C\_n77A | DC\_3A\_n77A  DC\_41A\_n77A | CA\_3A-41C | n77A |

5.1.4.3 Co-existence studies

Based on co-existence studies of Band 3 + Band n77 and Band-41 + Band n77 captured in TR 37.863-01-01, own Rx impact of the 3rd band is the followings.

- IMD generated by dual uplink of Band 3 + Band n77 doesn’t fall into own Rx of band 41.

- 3rd order IMD generated by dual uplink of Band 41 + Band n77 may fall into own Rx of band 3.

5.1.4.4 ∆TIB and ∆RIB values

Table 5.1.4.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-41-n77 | 3 | 0.6 |
| 41 | 0.31 |
| 0.82 |
| 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 5.1.4.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-41-n77 | 3 | 0.2 |
| 41 | 01 |
| 0.52 |
| n77 | 0.5 |
| 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. | | |

5.1.4.5 REFSENS requirements

Table 5.1.4.5-1 lists the required MSD test configurations and Table 5.1.4.5-2 proposed the MSD levels from interested companies for the EN-DC 3A-41A\_n77A band combination.

Table 5.1.4.5-1: MSD test configurations

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC bands | UL DC | IMD | | UL Fc (MHz) | UL BW (MHz) | UL  RB # | DL Fc (MHz) | DL BW (MHz) |
| DC\_3A-41A\_n77A | 3 | IMD5 | |3\*fB3 -2\*fn77| | 1720 | 5 | 25 | 1815 | 5 |
| n77 | 3900 | 10 | 52 | 3900 | 10 |
| 41 | 2640 | 5 | 25 | 2640 | 5 |
| 41 | IMD3 | |2\*fB41 –fn77| | 2620 | 5 | 25 | 2620 | 5 |
| n77 | 3400 | 10 | 52 | 3400 | 10 |
| 3 | 1745 | 5 | 25 | 1840 | 5 |
| 41 | IMD4 | |2\*fB41 –2\*fn77| | 2520 | 5 | 25 | 2520 | 5 |
| n77 | 3445 | 10 | 52 | 3445 | 10 |
| 3 | 1755 | 5 | 25 | 1850 | 5 |

Table 5.1.4.5-2: MSD results from each company

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
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| --- | --- | --- | --- |
| **E-UTRA and NR Band** | | | |
| **DC**  **Configuration** | **EUTRA and NR band** | **MSD  (LGE)** | **Source of IMD** |
| DC\_3A-41A\_n77A | 3 | 5.3 | IMD5  |3\*fB3-2\*fn77| |
| n77 |
| 41 |
| 41 | 16.4 | IMD3  |2\*fB41 -fn77| |
| n77 |
| 3 |
| 41 | 10.9 | IMD4  |2\*fB41 - 2\*fn77| |
| n77 |
| 3 |

Table 5.1.4.5-3 propose the required MSD levels for the dual connectivity configuration as average manner.

Table 5.1.4.5-3: Proposed MSD requirements

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC bands | UL DC | IMD | | UL Fc (MHz) | UL BW (MHz) | UL  RB # | DL Fc (MHz) | DL BW (MHz) | CF (dB) | MSD (dB) |
| DC\_3A-41A\_n77A | 3 | IMD5 | |3\*fB3 -2\*fn77| | 1720 | 5 | 25 | 1815 | 5 | 0.3 | N/A |
| n77 | 3900 | 10 | 52 | 3900 | 10 |
| 41 | 2640 | 5 | 25 | 2640 | 5 | **5.3** |
| 41 | IMD3 | |2\*fB41 –fn77| | 2620 | 5 | 25 | 2620 | 5 | 1.4 | N/A |
| n77 | 3400 | 10 | 52 | 3400 | 10 |
| 3 | 1745 | 5 | 25 | 1840 | 5 | **16.4** |

## 5.1.5 DC\_3-41\_n79

5.1.5.1 Operating bands for DC

**Table 5.1.5.1-1: Band combinations EN-DC (three bands)**

| **EN-DC Band** | **E-UTRA Band** | **NR Band** | **Single UL allowed** |
| --- | --- | --- | --- |
| DC\_3-41\_n79 | CA\_3-41 | n79 | No |

5.1.5.2 Configurations for DC

**Table 5.1.5.2-1: Inter-band EN-DC configurations (three bands)**

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration**  **(NOTE 1)** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_3A-41A\_n79A | DC\_3A\_n79A  DC\_41A\_n79A | CA\_3A-41A | n79A |
| DC\_3A-41C\_n79A | DC\_3A\_n79A  DC\_41A\_n79A | CA\_3A-41C | n79A |

5.1.5.3 Co-existence studies

Based on co-existence studies of Band 3 + Band n79 and Band 41 + Band n79 captured in TR 37.863-01-01, own Rx impact of the 3rd band is the followings.

- 2nd and 5th order IMD generated by dual uplink of Band 3 + Band n79 may fall into own Rx of band 41.

- 2nd and 5th order IMD generated by dual uplink of Band 41 + Band n79 may fall into own Rx of band 3.

5.1.5.4 ∆TIB and ∆RIB values

**Table 5.1.5.4-1: ΔTIB,c**

| **Inter-band DC Configuration** | **E-UTRA and NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| DC\_3-41-n79 | 3 | 0.6 |
| 41 | 0.31 |
| 0.82 |
| n79 | 0 |
| 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 5.1.5.4-2: ΔRIB**

| **Inter-band DC Configuration** | **E-UTRA and NR Band** | **ΔRIB [dB]** |
| --- | --- | --- |
| DC\_3-41-n79 | 3 | 0.2 |
| 41 | 01 |
| 0.52 |
| n79 | 0 |
| 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. | | |

5.1.5.5 REFSENS requirements

Table 5.1.5.5-1 lists the required MSD test configurations and Table 5.1.5.5-2 proposed the MSD levels from interested companies for the EN-DC 3A-41A\_n79A band combination.

**Table 5.1.5.5-1: MSD test configurations**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC bands | UL DC | IMD | | UL Fc (MHz) | UL BW (MHz) | UL  RB # | DL Fc (MHz) | DL BW (MHz) |
| DC\_3A-41A\_n79A | 3 | IMD2 | |fB3 -fn79| | 1770 | 5 | 25 | 1865 | 5 |
| n79 | 4440 | 40 | 216 | 4440 | 40 |
| 41 | 2670 | 5 | 25 | 2670 | 5 |
| 3 | IMD5 | |4\*fB3 –fn79| | 1770 | 5 | 25 | 1865 | 5 |
| n79 | 4440 | 40 | 216 | 4440 | 40 |
| 41 | 2640 | 5 | 25 | 2640 | 5 |
| 41 | IMD2 | |fB41 -fn79| | 2570 | 5 | 25 | 2570 | 5 |
| n79 | 4420 | 40 | 216 | 4420 | 40 |
| 3 | 1755 | 5 | 25 | 1850 | 5 |
| 41 | IMD5 | |3\*fB41 –2\*fn79| | 2550 | 5 | 25 | 2550 | 5 |
| n79 | 4745 | 40 | 216 | 4745 | 40 |
| 3 | 1745 | 5 | 25 | 1840 | 5 |

**Table 5.1.5.5-2: MSD results from each companies**

|  |  |  |  |  |  |
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| --- | --- | --- | --- |
| **EUTRA and NR Band** | | | |
| **DC**  **Configuration** | **EUTRA and NR band** | **MSD  (LGE)** | **Source of IMD** |
| DC\_3A-41A\_n79A | 3 | 30.2 | IMD2  |fB3-fn79| |
| n79 |
| 41 |
| 3 | 5.0 | IMD5  |4\*fB3-fn79| |
| n79 |
| 41 |
| 41 | 29.4 | IMD2  |fB41-fn79| |
| n79 |
| 3 |
| 41 | 4.8 | IMD5  |3\*fB41 –2\*fn79| |
| n79 |
| 3 |

Table 5.1.5.5-3 propose the required MSD levels for the dual connectivity configuration as average manner.

**Table 5.1.5.5-3: Proposed MSD requirements**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC bands | UL DC | IMD | | UL Fc (MHz) | UL BW (MHz) | UL  RB # | DL Fc (MHz) | DL BW (MHz) | CF (dB) | MSD (dB) |
| DC\_3A-41A\_n79A | 3 | IMD2 | |fB3 -fn79| | 1770 | 5 | 25 | 1865 | 5 | 2.2 | **N/A** |
| n79 | 4440 | 40 | 216 | 4440 | 40 |
| 41 | 2670 | 5 | 25 | 2670 | 5 | **30.2** |
| 41 | IMD2 | |fB41 -fn79| | 2570 | 5 | 25 | 2570 | 5 | 2.3 | **N/A** |
| n79 | 4420 | 40 | 216 | 4420 | 40 |
| 3 | 1755 | 5 | 25 | 1850 | 5 | **29.4** |

## 5.1.6 DC\_1-5\_n79

5.1.6.1 Operating bands for DC

Table 5.1.6.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-5\_n79 | CA\_1-5 | n79 | No |

5.1.6.2 Configurations for DC

Table 5.1.6.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-5A\_n79A | DC\_1A\_n79A  DC\_5A\_n79A | CA\_1A-5A | n79A |

5.1.6.3 ∆TIB and ∆RIB values

For DC\_1A-5A\_n79A, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 5.1.6.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-5\_n79 | 1 | 0.3 |
| 5 | 0.3 |
| n79 | 0 |

Table 5.1.6.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-5\_n79 | 1 | 0 |
| 5 | 0 |
| n79 | 0 |

5.1.6.4 REFSENS requirements

For UE coexistence study of Band 5 + Band n79, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.6.4-1

Table 5.1.6.4-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 824 | 849 | 4400 | 5000 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 1648 | 1698 | 8800 | 10000 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 2472 | 2547 | 13200 | 15000 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 3296 | 3396 | 17600 | 20000 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 4120 | 4245 | 22000 | 25000 |
| Two tone 2nd order IMD products | fy\_low – fx\_high | fy\_high – fx\_low | fx\_low + fy\_low | fx\_high + fy\_high |
| IMD frequency limits (MHz) | 3551 | 4176 | 5224 | 5849 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | 2\*fy\_low – fx\_high | 2\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 2702 | 3352 | 7951 | 9176 |
| Two-tone 3rd order IMD products | 2\*fx\_low + fy\_low | 2\*fx\_high + fy\_high | 2\*fy\_low + fx\_low | 2\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 6048 | 6698 | 9624 | 10849 |
| Two-tone 4th order IMD products | |3\*fx\_low – fy\_high| | |3\*fx\_high – fy\_low| | 3\*fy\_low – fx\_high | 3\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 1853 | 2528 | 12351 | 14176 |
| Two-tone 4th order IMD products | 3\*fx\_low + fy\_low | 3\*fx\_high + fy\_high | 3\*fy\_low + fx\_low | 3\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 6872 | 7547 | 14024 | 15849 |
| Two-tone 4th order IMD products | 2\*fy\_low – 2\*fx\_high | 2\*fy\_high – 2\*fx\_low | 2\*fx\_low + 2\*fy\_low | 2\*fx\_high + 2\*fy\_high |
| IMD frequency limits (MHz) | 7102 | 8352 | 10448 | 11698 |
| Two-tone 5th order IMD products | |4\*fx\_low – fy\_high| | |4\*fx\_high – fy\_low| | 4\*fy\_low – fx\_high | 4\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 1004 | 1704 | 16751 | 19176 |
| Two-tone 5th order IMD products | 4\*fx\_low + fy\_low | 4\*fx\_high + fy\_high | 4\*fy\_low + fx\_low | 4\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 7696 | 8396 | 18424 | 20849 |
| Two-tone 5th order IMD products | |3\*fx\_low – 2\*fy\_high| | |3\*fx\_high – 2\*fy\_low| | 3\*fy\_low – 2\*fx\_high | 3\*fy\_high – 2\*fx\_low |
| IMD frequency limits (MHz) | 6253 | 7528 | 11502 | 13352 |
| Two-tone 5th order IMD products | 2\*fx\_low + 3\*fy\_low | 2\*fx\_high + 3\*fy\_high | 2\*fy\_low + 3\*fx\_low | 2\*fy\_high + 3\*fx\_high |
| IMD frequency limits (MHz) | 14848 | 16698 | 11272 | 12547 |

Based on co-existence study of Band 5 + Band n79 as presented in the table 5.1.6.4-1 and co-existence study of Band 1 + Band n79 captured in TR 37.863-01-01, own Rx impact of the 3rd band is shown as the followings.

- 3rd and 4th order IMD generated by dual uplink of Band 1 + Band n79 may also fall into own Rx of band 5

- 4th order IMD generated by dual uplink of Band 5 + Band n79 may also fall into own Rx of band 1

The MSD requirement for DC\_1A-5A\_n79A can reuse the requirements for DC\_1A-18A\_n79A and DC\_1A-19A\_n79A since the frequency range of Band5 are almost overlapped with Band 18 + Band 19 which means the architecture and components date will keep same between each other. Further, by adjusting the centre frequency point according to the specific combination of DC\_1A-5A\_n79A, the CF can also be reused with considering the same test channel bandwidth and same worst case that the victim channel bandwidth is just in the centre of total aggressive IMD bandwidth.

Table 5.1.6.4-2 lists the MSD required for DC\_1A-5A\_n79A. The same requirements of DC\_1A-18A-n79 can be reused for this DC configuration.

Table 5.1.6.4-2: MSD for DC\_1A-5A\_n79A due to IMD issue

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** | Single UL allowed |
| DC\_1A-5A\_n79A | 1 | 1950 | 5 | 25 | 2140 | N/A | FDD | N/A |  |
| 5 | 837.5 | 5 | 25 | 882.5 | 18.3 | FDD | IMD3 |  |
| n79 | 4782.5 | 40 | 216 | 4782.5 | N/A | TDD | N/A |  |
| 1 | 1930 | 5 | 25 | 2120 | N/A | FDD | N/A |  |
| 5 | 837.5 | 5 | 25 | 882.5 | 8.9 | FDD | IMD4 |  |
| n79 | 4907.5 | 40 | 216 | 4907.5 | N/A | TDD | N/A |  |
| 1 | 1950 | 5 | 25 | 2140 | 8.1 | FDD | IMD4 |  |
| 5 | 837.5 | 5 | 25 | 882.5 | N/A | FDD | N/A |  |
| n79 | 4652.5 | 40 | 216 | 4652.5 | N/A | TDD | N/A |  |

## 5.1.7 DC\_3-5\_n79

5.1.7.1 Operating bands for DC

Table 5.1.7.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-5\_n79 | CA\_3-5 | n79 | No |

5.1.7.2 Configurations for DC

Table 5.1.7.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-5A\_n79A | DC\_3A\_n79A  DC\_5A\_n79A | CA\_3A-5A | n79A |

5.1.7.3 ∆TIB and ∆RIB values

For DC\_3A-5A\_n79A, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 5.1.7.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-5\_n79 | 3 | 0.3 |
| 5 | 0.3 |
| n79 | 0 |

Table 5.1.7.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-5\_n79 | 3 | 0 |
| 5 | 0 |
| n79 | 0 |

5.1.7.4 REFSENS requirements

For UE coexistence study of Band 5 + Band n79, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.7.4-1

Table 5.1.7.4-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 824 | 849 | 4400 | 5000 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 1648 | 1698 | 8800 | 10000 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 2472 | 2547 | 13200 | 15000 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 3296 | 3396 | 17600 | 20000 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 4120 | 4245 | 22000 | 25000 |
| Two tone 2nd order IMD products | fy\_low – fx\_high | fy\_high – fx\_low | fx\_low + fy\_low | fx\_high + fy\_high |
| IMD frequency limits (MHz) | 3551 | 4176 | 5224 | 5849 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | 2\*fy\_low – fx\_high | 2\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 2702 | 3352 | 7951 | 9176 |
| Two-tone 3rd order IMD products | 2\*fx\_low + fy\_low | 2\*fx\_high + fy\_high | 2\*fy\_low + fx\_low | 2\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 6048 | 6698 | 9624 | 10849 |
| Two-tone 4th order IMD products | |3\*fx\_low – fy\_high| | |3\*fx\_high – fy\_low| | 3\*fy\_low – fx\_high | 3\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 1853 | 2528 | 12351 | 14176 |
| Two-tone 4th order IMD products | 3\*fx\_low + fy\_low | 3\*fx\_high + fy\_high | 3\*fy\_low + fx\_low | 3\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 6872 | 7547 | 14024 | 15849 |
| Two-tone 4th order IMD products | 2\*fy\_low – 2\*fx\_high | 2\*fy\_high – 2\*fx\_low | 2\*fx\_low + 2\*fy\_low | 2\*fx\_high + 2\*fy\_high |
| IMD frequency limits (MHz) | 7102 | 8352 | 10448 | 11698 |
| Two-tone 5th order IMD products | |4\*fx\_low – fy\_high| | |4\*fx\_high – fy\_low| | 4\*fy\_low – fx\_high | 4\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 1004 | 1704 | 16751 | 19176 |
| Two-tone 5th order IMD products | 4\*fx\_low + fy\_low | 4\*fx\_high + fy\_high | 4\*fy\_low + fx\_low | 4\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 7696 | 8396 | 18424 | 20849 |
| Two-tone 5th order IMD products | |3\*fx\_low – 2\*fy\_high| | |3\*fx\_high – 2\*fy\_low| | 3\*fy\_low – 2\*fx\_high | 3\*fy\_high – 2\*fx\_low |
| IMD frequency limits (MHz) | 6253 | 7528 | 11502 | 13352 |
| Two-tone 5th order IMD products | 2\*fx\_low + 3\*fy\_low | 2\*fx\_high + 3\*fy\_high | 2\*fy\_low + 3\*fx\_low | 2\*fy\_high + 3\*fx\_high |
| IMD frequency limits (MHz) | 14848 | 16698 | 11272 | 12547 |

Based on co-existence study of Band 5 + Band n79 as presented in the table 5.1.7.4-1 and co-existence study of Band 3 + Band n79 captured in TR 37.863-01-01, own Rx impact of the 3rd band is shown as the followings.

- 3rd and 4th order IMD generated by dual uplink of Band 3 + Band n79 may also fall into own Rx of band 5

- 4th order IMD generated by dual uplink of Band 5 + Band n79 may also fall into own Rx of band 3

The MSD requirement for DC\_3A-5A\_n79A can reuse the requirements for DC\_3A-19A\_n79A since the frequency range of Band5 are almost overlapped with Band 19 which means the architecture and components date will keep same between each other. Further, by adjusting the centre frequency point according to the specific combination of DC\_3A-5A\_n79A, the CF can also be reused with considering the same test channel bandwidth and same worst case that the victim channel bandwidth is just in the centre of total aggressive IMD bandwidth.

Table 5.1.7.4-2 lists the MSD required for DC\_3A-5A\_n79A. The same requirements of DC\_3A-19A-n79 can be reused for this DC configuration.

**Table 5.1.7.4-2: MSD for the DC configuration due to IMD issue**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_3A-5A\_n79A | 3 | 1775 | 5 | 25 | 1870 | N/A | FDD | N/A |
| 5 | 840 | 5 | 25 | 885 | 18.5 | IMD3 |
| n79 | 4435 | 40 | 216 | 4435 | N/A | TDD | N/A |
| 3 | 1782.5 | 5 | 25 | 1877.5 | 0.2 | FDD | IMD4 |
| 5 | 842.5 | 5 | 25 | 887.5 | N/A | N/A |
| n79 | 4420 | 40 | 216 | 4420 | N/A | TDD | N/A |

## 5.1.8 DC\_5-41\_n79

5.1.8.1 Operating bands for DC

**Table 5.1.8.1-1: Band combinations EN-DC (three bands)**

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_5-41\_n79 | CA\_5-41 | n79 | No |

5.1.8.2 Configurations for DC

Table 5.1.8.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_5A-41A\_n79A | DC\_5A\_n79A  DC\_41A\_n79A | CA\_5A-41A | n79A |

5.1.8.3 ∆TIB and ∆RIB values

For DC\_5A-41A\_n79A, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 5.1.8.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_5-41\_n79 | 5 | 0.3 |
| 41 | 0.3 |
| n79 | 0 |

Table 5.1.8.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_5-41\_n79 | 5 | 0 |
| 41 | 0 |
| n79 | 0 |

5.1.8.4 REFSENS requirements

For UE coexistence study of Band 5 + Band n79, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.8.4-1

Table 5.1.8.4-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 824 | 849 | 4400 | 5000 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 1648 | 1698 | 8800 | 10000 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 2472 | 2547 | 13200 | 15000 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 3296 | 3396 | 17600 | 20000 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 4120 | 4245 | 22000 | 25000 |
| Two tone 2nd order IMD products | fy\_low – fx\_high | fy\_high – fx\_low | fx\_low + fy\_low | fx\_high + fy\_high |
| IMD frequency limits (MHz) | 3551 | 4176 | 5224 | 5849 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | 2\*fy\_low – fx\_high | 2\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 2702 | 3352 | 7951 | 9176 |
| Two-tone 3rd order IMD products | 2\*fx\_low + fy\_low | 2\*fx\_high + fy\_high | 2\*fy\_low + fx\_low | 2\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 6048 | 6698 | 9624 | 10849 |
| Two-tone 4th order IMD products | |3\*fx\_low – fy\_high| | |3\*fx\_high – fy\_low| | 3\*fy\_low – fx\_high | 3\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 1853 | 2528 | 12351 | 14176 |
| Two-tone 4th order IMD products | 3\*fx\_low + fy\_low | 3\*fx\_high + fy\_high | 3\*fy\_low + fx\_low | 3\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 6872 | 7547 | 14024 | 15849 |
| Two-tone 4th order IMD products | 2\*fy\_low – 2\*fx\_high | 2\*fy\_high – 2\*fx\_low | 2\*fx\_low + 2\*fy\_low | 2\*fx\_high + 2\*fy\_high |
| IMD frequency limits (MHz) | 7102 | 8352 | 10448 | 11698 |
| Two-tone 5th order IMD products | |4\*fx\_low – fy\_high| | |4\*fx\_high – fy\_low| | 4\*fy\_low – fx\_high | 4\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 1004 | 1704 | 16751 | 19176 |
| Two-tone 5th order IMD products | 4\*fx\_low + fy\_low | 4\*fx\_high + fy\_high | 4\*fy\_low + fx\_low | 4\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 7696 | 8396 | 18424 | 20849 |
| Two-tone 5th order IMD products | |3\*fx\_low – 2\*fy\_high| | |3\*fx\_high – 2\*fy\_low| | 3\*fy\_low – 2\*fx\_high | 3\*fy\_high – 2\*fx\_low |
| IMD frequency limits (MHz) | 6253 | 7528 | 11502 | 13352 |
| Two-tone 5th order IMD products | 2\*fx\_low + 3\*fy\_low | 2\*fx\_high + 3\*fy\_high | 2\*fy\_low + 3\*fx\_low | 2\*fy\_high + 3\*fx\_high |
| IMD frequency limits (MHz) | 14848 | 16698 | 11272 | 12547 |

Based on co-existence study of Band 5 + Band n79 as presented in the table 6.x.3-1 and co-existence study of Band 41 + Band n79 captured in TR 37.863-01-01, own Rx impact of the 3rd band is shown as the followings.

- 3rd and 5th order IMD generated by dual uplink of Band 41 + Band n79 may also fall into own Rx of band 5

- 4th order IMD generated by dual uplink of Band 5 + Band n79 may also fall into own Rx of band 41

Table 5.1.8.4-2 lists the MSD required for DC\_5A-41A\_n79A. It is worth to note that the harmonic and harmonic mixing issues for LTE CA\_5-41 are covered in clause 7.3.1A of 36.101. For the MSD case of the IMD4 falling into Band 41, there are two companies’ results proposed in R4-1814459 and R4-1815961. So the final MSD requirement is an average value based on these two results.

Table 5.1.8.4-2: MSD for the DC configuration due to IMD issue

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_5A-41A\_n79A | 5 | 835 | 5 | 25 | 880 | 23.9 | FDD | IMD3  |2\*fB41-fBn79| |
| 41 | 2665 | 5 | 25 | 2665 | N/A | TDD | N/A |
| n79 | 4450 | 40 | 216 | 4450 | N/A | TDD | N/A |
| DC\_5A-41A\_n79A | 5 | 835 | 5 | 25 | 880 | 0.9 | FDD | IMD5  |2\*fBn79-3\*fB41| |
| 41 | 2665 | 5 | 25 | 2665 | N/A | TDD | N/A |
| n79 | 4437.5 | 40 | 216 | 4437.5 | N/A | TDD | N/A |
| DC\_5A-41A\_n79A | 5 | 826.5 | 5 | 25 | 871.5 | N/A | FDD | N/A |
| 41 | 2517.5 | 5 | 25 | 2517.5 | 1.8 | TDD | IMD4  |fBn79-3\*fB5| |
| n79 | 4980 | 40 | 216 | 4980 | N/A | TDD | N/A |

## 5.1.9 DC\_1-7\_n78

5.1.9.1 Operating bands for DC

**Table 5.1.9.1-1: Band combinations EN-DC (three bands)**

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-7\_n78 | CA\_1-7 | n78 | - |

5.1.9.2 Channel bandwidths per operating band for DC

**Table 5.1.9.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC configuration | Uplink EN-DC configuration | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-7C\_n78A | DC\_1A\_n78A DC\_7A\_n78A DC\_7C\_n78A | CA\_1A-7C | n78A |

5.1.9.3 Co-existence studies

Co-existence was studied for DC\_1A-7A\_n78A in Rel-15 and the results are captured in 37.863-02-01. No further studies needed for DC\_1A-7C\_n78A.

5.1.9.4 ∆TIB and ∆RIB values

For DC\_1A-7C\_n78A the ΔTIB,c and ΔRIB values are same as for DC\_1A-7A\_n78A given in the tables below.

**Table 5.1.9..4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1A-7C\_n78A | 1 | 0.6 |
| 7 | 0.6 |
| n78 | 0.8 |

**Table 5.1.9.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1A-7C\_n78A | 1 | 0.2 |
| 7 | 0.2 |
| n78 | 0.5 |

5.1.9.5 REFSENS

Table 5.1.9.5-1 lists the MSD required for the dual connectivity configuration.

**Table 5.1.9.5-1: MSD for the DC configuration**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_1A-7C\_n78A | 1 | 1930 | 5 | 25 | 2120 | 8.3 | FDD | IMD4  |fB78-3\*fB1| |
| 7 | 2550 | 5 | 25 | 2670 | N/A | FDD | N/A |
| n78 | 3670 | 10 | 52 | 3670 | N/A | TDD | N/A |
| DC\_1A-7C\_n78A | 1 | 1977.5 | 5 | 25 | 2167.5 | N/A | FDD | N/A |
| 7 | 2507.5 | 5 | 25 | 2627.5 | 9.1 | FDD | IMD4  |fB78-3\*fB1| |
| n78 | 3305 | 10 | 52 | 3305 | N/A | TDD | N/A |
| DC\_1A-7C\_n78A | 1 | 1950 | 5 | 25 | 2140 | 8.7 | FDD | IMD4  |2\*fB78-2\*fB7| |
| 7 | 2510 | 10 | 50 | 2630 | N/A | FDD | N/A |
| n78 | 3310 | 10 | 52 | 3310 | N/A | TDD | N/A |

## 5.1.10 DC\_3-8\_n77

5.1.10.1 Operating bands for DC\_3-8\_n77

Table 5.1.10.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-8\_n77 | CA\_3-8 | n77 | DC\_3\_n77 |

5.1.10.2 Configurations for DC\_3-8\_n77

Table 5.1.10.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-8A\_n77A | DC\_3A\_n77A  DC\_8A\_n77A | CA\_3A-8A | n77A |

5.1.10.3 ∆TIB and ∆RIB values

*Based on the study results of lower order combinations, the following values are proposed*:

Table 5.1.10.3-1: ΔTIB,c due to EN-DC (three bands)

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_3-8\_n77 | 3 | 0.6 |
| 8 | 0.6 |
| n77 | 0.8 |

Table 5.1.10.3-2: ΔRIB,c due to EN-DC (three bands)

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_3-8\_n77 | 3 | 0.2 |
| 8 | 0.2 |
| n77 | 0.5 |

5.1.10.4 REFSENS requirements

For this EN-DC, REFSENS exceptions due to IMD3 and IMD4 are specified as below:

Table 5.1.10.4-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** | Single UL allowed |
| DC\_3A-8A\_n77A | 3 | 1715 | 5 | 25 | 1810 | N/A | FDD | N/A | No |
| n77 | 4190 | 10 | 50 | 4190 | N/A | TDD | N/A |
| 8 | 910 | 5 | 25 | 955 | 9.7 | FDD | IMD4 |
| DC\_3A-8A\_n77A | 8 | 910 | 5 | 25 | 955 | N/A | FDD | N/A | No |
| n77 | 3640 | 10 | 50 | 3640 | N/A | TDD | N/A |
| 3 | 1725 | 5 | 25 | 1820 | 16.5 | FDD | IMD3 |

## 5.1.11 DC\_3-8\_n79

5.1.11.1 Operating bands for DC\_3-8\_n79

Table 5.1.11.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-8\_n79 | CA\_3-8 | n79 | - |

5.1.11.2 Configurations for DC\_3-8\_n79

Table 5.1.11.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-8A\_n79A | DC\_3A\_n79A  DC\_8A\_n79A | CA\_3A-8A | n79A |

5.1.11.3 ∆TIB and ∆RIB values

*Based on the study results of lower order combinations, the following values are proposed*:

Table 5.1.11.3-1: ΔTIB,c due to EN-DC (three bands)

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_3-8\_n79 | 3 | 0.3 |
| 8 | 0.3 |
| n79 | 0 |

Table 5.1.11.3-2: ΔRIB,c due to EN-DC (three bands)

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_3-8\_n79 | 3 | 0 |
| 8 | 0 |
| n79 | 0 |

5.1.11.4 REFSENS requirements

For this EN-DC, REFSENS exceptions due to IMD3 and IMD4 are specified as below:

Table 5.1.11.4-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** | Single UL allowed |
| DC\_3A-8A\_n79A | 3 | 1755 | 5 | 25 | 1850 | N/A | FDD | N/A | No |
| n79 | 4465 | 40 | 216 | 4465 | N/A | TDD | N/A |
| 8 | 910 | 5 | 25 | 955 | 15.3 | FDD | IMD3 |
| DC\_3A-8A\_n79A | 8 | 910 | 5 | 25 | 955 | N/A | FDD | N/A | No |
| n79 | 4580 | 40 | 216 | 4580 | N/A | TDD | N/A |
| 3 | 1755 | 5 | 25 | 1850 | 8.8 | FDD | IMD4 |

## 5.1.12 DC\_28-41\_n77

5.1.12.1 Operating bands for DC\_28-41\_n77

Table 5.1.12.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_28-41\_n77 | CA\_28-41 | n77 | No |

5.1.12.2 Configurations for DC\_28-41\_n77

Table 5.1.12.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_28A-41A\_n77A | DC\_28A\_n77A  DC\_41A\_n77A | CA\_28A-41A | n77A |

5.1.12.3 ∆TIB and ∆RIB values

*Based on the study results of lower order combinations, the following values are proposed*:

Table 5.1.12.3-1: ΔTIB,c due to EN-DC (three bands)

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_28-41\_n77 | 28 | 0.5 |
| 41 | 0.3 |
| n77 | 0.8 |

Table 5.1.12.3-2: ΔRIB,c due to EN-DC (three bands)

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_28-41\_n77 | 28 | 0.2 |
| 41 | 0 |
| n77 | 0.5 |

5.1.12.4 REFSENS requirements

For this EN-DC, REFSENS exceptions due to two IMD2 scenarios are specified as below:

Table 5.1.12.4-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** | Single UL allowed |
| DC\_28A-41A\_n77A | 28 | 738 | 5 | 25 | 793 | N/A | FDD | N/A | Yes |
| n77 | 3380 | 10 | 50 | 3380 | N/A | TDD | N/A |
| 41 | 2642 | 5 | 25 | 2642 | 29.5 | TDD | IMD2 |
| DC\_28A-41A\_n77A | 41 | 2642 | 5 | 25 | 2642 | N/A | TDD | N/A | Yes |
| n77 | 3440 | 10 | 50 | 3440 | N/A | TDD | N/A |
| 28 | 743 | 5 | 25 | 798 | 30.8 | FDD | IMD2 |

## 5.1.13 DC\_28-41\_n78

5.1.13.1 Operating bands for DC\_28-41\_n78

Table 5.1.13.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_28-41\_n78 | CA\_28-41 | n78 | No |

5.1.13.2 Configurations for DC\_28-41\_n78

Table 5.1.13.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_28A-41A\_n78A | DC\_28A\_n78A  DC\_41A\_n78A | CA\_28A-41A | n78A |

5.1.13.3 ∆TIB and ∆RIB values

*Based on the study results of lower order combinations, the following values are proposed*:

Table 5.1.13.3-1: ΔTIB,c due to EN-DC (three bands)

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_28-41\_n78 | 28 | 0.5 |
| 41 | 0.3 |
| n78 | 0.8 |

Table 5.1.13.3-2: ΔRIB,c due to EN-DC (three bands)

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_28-41\_n78 | 28 | 0.2 |
| 41 | 0 |
| n78 | 0.5 |

5.1.13.4 REFSENS requirements

For this EN-DC, REFSENS exceptions due to two IMD2 scenarios are specified as below:

Table 5.1.13.4-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** | Single UL allowed |
| DC\_28A-41A\_n78A | 28 | 738 | 5 | 25 | 793 | N/A | FDD | N/A | Yes |
| n78 | 3380 | 10 | 50 | 3380 | N/A | TDD | N/A |
| 41 | 2642 | 5 | 25 | 2642 | 29.5 | TDD | IMD2 |
| DC\_28A-41A\_n78A | 41 | 2642 | 5 | 25 | 2642 | N/A | TDD | N/A | Yes |
| n78 | 3440 | 10 | 50 | 3440 | N/A | TDD | N/A |
| 28 | 743 | 5 | 25 | 798 | 30.8 | FDD | IMD2 |

## 5.1.14 DC\_28-41\_n79

5.1.14.1 Operating bands for DC\_28-41\_n79

Table 5.1.14.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_28-41\_n79 | CA\_28-41 | n79 | No |

5.1.14.2 Configurations for DC\_28-41\_n79

Table 5.1.14.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_28A-41A\_n79A | DC\_28A\_n79A  DC\_41A\_n79A | CA\_28A-41A | n79A |

5.1.14.3 ∆TIB and ∆RIB values

*Based on the study results of lower order combinations, the following values are proposed*:

Table 5.1.14.3-1: ΔTIB,c due to EN-DC (three bands)

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_28-41\_n79 | 28 | 0.3 |
| 41 | 0.3 |
| n79 | 0.8 |

Table 5.1.14.3-2: ΔRIB,c due to EN-DC (three bands)

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_28-41\_n79 | 28 | 0 |
| 41 | 0 |
| n79 | 0.5 |

5.1.14.4 REFSENS requirements

For this EN-DC, REFSENS exceptions due to two IMD3 and IMD4 scenarios are specified as below:

Table 5.1.14.4-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** | Single UL allowed |
| DC\_28A-41A\_n79A | 28 | 743 | 5 | 25 | 798 | N/A | FDD | N/A | No |
| n79 | 4739 | 40 | 216 | 4739 | N/A | TDD | N/A |
| 41 | 2510 | 5 | 25 | 2510 | 8.6 | TDD | IMD4 |
| DC\_28A-41A\_n79A | 41 | 2650 | 5 | 25 | 2650 | N/A | TDD | N/A | No |
| n79 | 4502 | 40 | 216 | 4502 | N/A | TDD | N/A |
| 28 | 743 | 5 | 25 | 798 | 15.9 | FDD | IMD3 |

## 5.1.15 DC\_1-8\_n77

5.1.15.1 Operating bands for DC\_1-8\_n77

Table 5.1.15.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-8\_n77 | CA\_1-8 | n77 | DC\_1\_n77 |

5.1.15.2 Configurations for DC\_1-8\_n77

Table 5.1.15.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-8A\_n77A | DC\_1A\_n77A  DC\_8A\_n77A | CA\_1A-8A | n77A |

5.1.15.3 Co-existence studies

When Uplink EN-DC configuration is DC\_1A\_n77A, (1) IMD5 of (3\*B1 -2\* n77) will fall into Rx band of Band 8. When Uplink EN-DC configuration is DC\_8A\_n77A, (2) IMD3 of (2\*B8 - n77) will fall into Rx band of Band 1.

5.1.15.4 ∆TIB and ∆RIB values

The following relaxation values are proposed:

Table 5.1.15.4-1: ΔTIB,c

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_1-8\_n77 | 1 | 0.3 |
| 8 | 0.6 |
| n77 | 0.8 |

Table 5.1.15.4-2: ΔRIB

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_1-8\_n77 | 1 | 0 |
| 8 | 0.2 |
| n77 | 0.5 |

5.1.15.5 REFSENS requirements

As mentioned above, IMD5 of B1 and n77 to Band 8 Rx and IMD3 of B8 and n77 to Band 1 Rx need to be addressed for REFSENS relaxation. The following values are proposed:

Table 5.1.15.5-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** | Single UL allowed |
| DC\_1A-8A\_n77A | 1 | 1955 | 5 | 25 | 2145 | N/A | FDD | N/A | No |
| n77 | 3410 | 10 | 50 | 3410 | N/A | TDD | N/A |
| 8 | 910 | 5 | 25 | 955 | 3.3 | FDD | IMD5 |
| DC\_1A-8A\_n77A | 8 | 910 | 5 | 25 | 955 | N/A | FDD | N/A | No |
| n77 | 3960 | 10 | 50 | 3960 | N/A | TDD | N/A |
| 1 | 1950 | 5 | 25 | 2140 | 14.4 | FDD | IMD3 |

## 5.1.16 DC\_1-8\_n79

5.1.16.1 Operating bands for DC\_1-8\_n79

Table 5.1.16.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-8\_n79 | CA\_1-8 | n79 | no |

5.1.16.2 Configurations for DC\_1-8\_n79

Table 5.1.16.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-8A\_n79A | DC\_1A\_n79A  DC\_8A\_n79A | CA\_1A-8A | n79A |

5.1.16.3 Co-existence studies

When Uplink EN-DC configuration is DC\_1A\_n79A, IMD3 of (2\*B1 - n79) and IMD4 of (3\*B1 - n79) will fall into Rx band of Band 8. When Uplink EN-DC configuration is DC\_8A\_n79A, IMD4 of (3\*B8 - n79) will fall into Rx band of Band 1.

5.1.16.4 ∆TIB and ∆RIB values

The following relaxation values are proposed:

Table 5.1.16.4-1: ΔTIB,c

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_1-8\_n79 | 1 | 0.3 |
| 8 | 0.3 |
| n79 | 0 |

Table 5.1.16.4-2: ΔRIB

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_1-8\_n79 | 1 | 0 |
| 8 | 0 |
| n79 | 0 |

5.1.16.5 REFSENS requirements

As mentioned above, IMD3 of B1 and n79 to Band 8 Rx and IMD4 of B8 and n79 to Band 1 Rx need to be addressed for REFSENS relaxation. The following values are proposed:

Table 5.1.16.5-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** | Single UL allowed |
| DC\_1A-8A\_n79A | 1 | 1935 | 5 | 25 | 2125 | N/A | FDD | N/A | No |
| n79 | 4815 | 40 | 216 | 4815 | N/A | TDD | N/A |
| 8 | 900 | 5 | 25 | 945 | 15.8 | FDD | IMD3 |
| DC\_1A-8A\_n79A | 8 | 900 | 5 | 25 | 945 | N/A | FDD | N/A | No |
| n79 | 4845 | 40 | 216 | 4845 | N/A | TDD | N/A |
| 1 | 1955 | 5 | 25 | 2145 | 8.2 | FDD | IMD4 |

## 5.1.17 DC\_3-3-7\_n78, DC\_3-3-7-7\_n78

5.1.17.1 Operating bands for DC

**Table 5.1.17.1-1: Band combinations EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-3-7\_n782 | CA\_3-3-7 | n78 | DC\_3\_n78 |
| DC\_3-3-7-7\_n782 | CA\_3-3-7-7 | n78 | DC\_3\_n78 |
| NOTE 2: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | |

5.1.17.2 Configuration for DC

**Table 5.1.17.2-1: Inter-band EN-DC configurations of 1 LTE band + 1 NR band**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-3A-7A\_n78A | DC\_3A\_n78A, DC\_7A\_n78A | CA\_3A-3A-7A | n78A |
| DC\_3A-3A-7A-7A\_n78A | DC\_3A\_n78A, DC\_7A\_n78A | CA\_3A-3A-7A-7A | n78A |

5.1.17.3 ∆TIB and ∆RIB values

For DC\_3-3-7\_n78, DC\_3-3-7-7\_n78, the ΔTIB,c and ΔRIB,c values are given in the tables below.

**Table 5.1.17.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-3-7\_n78, DC\_3-3-7-7\_n78 | 3 | 0.6 |
| 7 | 0.6 |
| n78 | 0.8 |

**Table 5.1.17.3-2: ΔRIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-3-7\_n78, DC\_3-3-7-7\_n78 | 3 | 0.2 |
| 7 | 0.2 |
| n78 | 0.5 |

5.1.17.4 REFSENS requirements

When uplink DC configurations DC\_7A\_78A is paired with downlink DC configuration DC\_3A-3A-7A\_n78A or DC\_3A-3A-7A-7A\_n78A, the 3rd IMD and 4th IMD from 2 uplink operation would interfere the downlink of the Band 3.

However, these impacts are already covered in the fallback combination, DC\_3A-7A\_n78A, no further MSD analysis is needed.

## 5.1.18 DC\_18-42\_n77

5.1.18.1 Operating bands for DC

Table 5.1.18.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_18-42\_n77 | CA\_18-42 | n77 | No |

5.1.18.2 Configurations for DC

Table 5.1.18.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_18A-42A\_n77A | DC\_18A\_n77A | CA\_18A-42A | n77 |
| DC\_18A-42C\_n77A | DC\_18A\_n77A | CA\_18A-42C | n77 |

5.1.18.3 Co-existence studies

The co-existence studies for the lower order DC configurations are already captured in TR 37.863-01-01. For the additional 3rd receiver band, there is no MSD issue for this DC configuration based on the following conditions.

- LTE Band 42 and NR Band n77 are synchronized.

- Simultaneous transmission of LTE Band 42 and NR Band n77 are not supported

5.1.18.4 ∆TIB and ∆RIB values

The same ∆TIB and ∆RIB values of DC\_19-42\_n77 can be applied.

Table 5.1.18.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_18-42\_n77 | 18 | 0.3 |
| 42 | 0.8 |
| n77 | 0.8 |

**Table 5.1.18.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_18-42\_n77 | 18 | 0 |
| 42 | 0.5 |
| n77 | 0.5 |

5.1.18.5 REFSENS requirements

No REFSENS requirements are expected for this DC configuration.

## 5.1.19 DC\_18-42\_n78

5.1.19.1 Operating bands for DC

Table 5.1.19.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_18-42\_n78 | CA\_18-42 | n78 | No |

5.1.19.2 Configurations for DC

Table 5.1.19.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_18A-42A\_n78A | DC\_18A\_n78A | CA\_18A-42A | n78 |
| DC\_18A-42C\_n78A | DC\_18A\_n78A | CA\_18A-42C | n78 |

5.1.19.3 Co-existence studies

The co-existence studies for the lower order DC configurations are already captured in TR 37.863-01-01. For the additional 3rd receiver band, there is no MSD issue for this DC configuration based on the following conditions.

- LTE Band 42 and NR Band n78 are synchronized.

- Simultaneous transmission of LTE Band 42 and NR Band n78 are not supported

5.1.19.4 ∆TIB and ∆RIB values

The same ∆TIB and ∆RIB values of DC\_19-42\_n78 can be applied.

Table 5.1.19.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_18-42\_n78 | 18 | 0.3 |
| 42 | 0.8 |
| n78 | 0.8 |

**Table 5.1.19.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_18-42\_n78 | 18 | 0 |
| 42 | 0.5 |
| n78 | 0.5 |

5.1.19.5 REFSENS requirements

No REFSENS requirements are expected for this DC configuration.

## 5.1.20 DC\_18-42\_n79

5.1.20.1 Operating bands for DC

Table 5.1.20.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_18-42\_n79 | CA\_18-42 | n79 | No |

5.1.20.2 Configurations for DC

Table 5.1.20.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_18A-42A\_n79A | DC\_18A\_n79A | CA\_18A-42A | n79 |
| DC\_18A-42C\_n79A | DC\_18A\_n79A | CA\_18A-42C | n79 |

5.1.20.3 Co-existence studies

Based on co-existence studies of Band 18 + Band n79 and Band 42 + Band n79 captured in TR 37.863-01-01, own Rx impact of the 3rd band is the followings..

- 2nd order IMD generated by dual uplink of Band 18 + Band n79 may also fall into own Rx of band 42. However, since Band 18 is only used in Japan and considering actual spectrum holdings, no IMD issue is expected.

- 2nd and 5th order IMD generated by dual uplink of Band 42 + Band n79 may also fall into own Rx of band 18.

As approved in R4-1814167, UL of Band 42 is not used in this configuration. So there is no own Rx impact of 3rd band for this configuration.

5.1.20.4 ∆TIB and ∆RIB values

The same ∆TIB and ∆RIB values of DC\_19-42\_n79 can be applied.

Table 5.1.20.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_18-42\_n79 | 18 | 0.3 |
| 42 | 0.8 |
| n79 | 0 |

**Table 5.1.20.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_18-42\_n79 | 18 | 0 |
| 42 | 0.5 |
| n79 | 0 |

5.1.20.5 REFSENS requirements

There is no additional REFSENS requirement for this configuration.

## 5.1.21 DC\_8-20\_n78

5.1.21.1 Operating bands for DC\_8-20\_n78

Table 5.1.21.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_8-20\_n782 | CA\_8-20 | n78 | No |
| NOTE 2: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | |

5.1.21.2 Configurations for DC\_8-20\_n78

Table 5.1.21.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_8A-20A\_n78A | DC\_8A\_n78A  DC\_20A\_n78A | CA\_8A-20A | n78 |

5.1.21.3 Co-existence Studies

Based on co-existence studies of DC\_8\_n78 and DC\_20\_n78, as captured in TR 37.863-01-01, own Rx impact on the 3rd band are the following:

- 4th order IM generated by dual uplink of Band 8 and n78 may fall into Band 20

- 4th order IM generated by dual uplink of Band 20 and n78 may fall into Band 8

5.1.21.4 ∆TIB and ∆RIB values

Table 5.1.21.4-1: ΔTIB,c due to EN-DC (three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_8-20\_n78 | 8 | 0.6 |
| 20 | 0.6 |
| n78 | 0.8 |

Table 5.1.21.4-1: ΔRIB,c due to EN-DC (three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_8-20\_n78 | 8 | 0.2 |
| n78 | 0.5 |

5.1.21.5 REFSENS requirements

Table 5.1.21.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC\_8A-20A\_n78A | 8 | 890 | 5 | 25 | 935 | N/A | FDD | N/A |
| n78 | 3470 | 10 | 50 | 3470 | N/A | TDD | N/A |
| 20 | 841 | 5 | 25 | 800 | 12.1 | FDD | IMD4 |
| 8 | 895 | 5 | 25 | 940 | 12.1 | FDD | IMD4 |
| n78 | 3481 | 10 | 50 | 3481 | N/A | TDD | N/A |
| 20 | 847 | 5 | 25 | 806 | N/A | FDD | N/A |

## 5.1.22 DC\_20-38\_n78

5.1.22.1 Operating bands for DC\_20-38\_n78

Table 5.1.22.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_20-38\_n78 | CA\_20-38 | n78 | No |

5.1.22.2 Configurations for DC\_20-38\_n78

Table 5.1.22.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_20A-38A\_n78A | DC\_20A\_n78A  DC\_38A\_n78A | CA\_20A-38A | n78A |

5.1.22.3 Co-existence Studies

Based on co-existence studies of DC\_20\_n78, as captured in TR 37.863-01-01, own Rx impact on the 3rd band are the following:

- 2nd order IM generated by dual uplink of Band 20 and n78 may fall into Band 38

- 3rd order harmonic generated by Band 20 may fall into Band 38

5.1.22.4 ∆TIB and ∆RIB values

Table 5.1.22.4-1: ΔTIB,c due to EN-DC (three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_20-38\_n78 | 20 | 0.6 |
| n78 | 0.8 |

Table 5.1.22.4-1: ΔRIB,c due to EN-DC (three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_20-38\_n78 | 38 | 0.4 |
| n78 | 0.5 |

5.1.22.5 REFSENS requirements

Because B20 and B38 belong to LTE band. The reference sensitivity refers to TS 36.101 in Table 7.3.1A-0a (exceptions due to harmonic issue CA\_20A-38A). There is no change.

## 5.1.23 DC\_66-(n)71

5.1.23.1 Operating bands for EN-DC

Table 5.1.23.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_66-(n)71 | CA\_66-71 | n71 | No1 |
| NOTE 1: For UE(s) supporting dynamic power sharing it is mandatory to do dual simultaneous UL. For UE(s) not supporting dynamic power sharing single UL is allowed. | | | |

5.1.23.2 Configurations for EN-DC

Table 5.1.23.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_66A-(n)71AA | DC\_66A\_n71A | CA\_66A-71A | n71A |

5.1.23.3 ∆TIB and ∆RIB values

∆TIB values for DC\_66\_n71 are already specified in TS 38.101-3 and ∆RIB are zero.

5.1.23.4 REFSENS requirements

No REFSENS exceptions needed for DC\_66A-(n)71AA. Impact of contiguous intraband EN-DC operation on band 71 on REFSENS is already specified in Table 7.3B.2.1-1 of TS 38.101-3.

## 5.1.24 DC\_2-(n)71

5.1.24.1 Operating bands for EN-DC

Table 5.1.24.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-(n)71 | CA\_2-71 | n71 | No1 |
| NOTE 1: For UE(s) supporting dynamic power sharing it is mandatory to do dual simultaneous UL. For UE(s) not supporting dynamic power sharing single UL is allowed. | | | |

5.1.24.2 Configurations for EN-DC

Table 5.1.24.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_2A-(n)71AA | DC\_2A\_n71A | CA\_2A-71A | n71A |

5.1.24.3 ∆TIB and ∆RIB values

∆TIB values for DC\_2\_n71 are already specified in TS 38.101-3 and ∆RIB are zero.

5.1.24.4 REFSENS requirements

REFSENS exceptions needed for DC\_2A-(n)71AA due to band 71 uplink harmonic into band 2 is already specified in Table 7.3B.2.3.1-1 of TS 38.101-3. Impact of contiguous intraband EN-DC operation on band 71 on REFSENS is already specified in Table 7.3B.2.1-1 of TS 38.101-3.

## 5.1.25 DC\_7-8\_n77

5.1.25.1 Operating bands for DC

**Table 5.1.25.1-1: Band combinations EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_7-8\_n77 | CA\_7-8 | n77 | No |

5.1.25.2 Configuration for DC

**Table 5.1.25.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_7A-8A\_n77A | DC\_7A\_n77A, DC\_8A\_n77A | CA\_7A-8A | n77A |

5.1.25.3 Co-existence Studies

Based on co-existence studies of DC\_7\_n77 and DC\_8\_n77, as captured in TR 37.716-11-11 and TR 37.863-01-01, own Rx impact on the 3rd band are the following:

- 2nd and 5th order IM generated by dual uplink of Band 7 and n77 may fall into Band 8

- 2nd order IM generated by dual uplink of Band 8 and n77 may fall into Band 7

5.1.25.4 ∆TIB and ∆RIB values

For DC\_7-8\_n77 the ΔTIB,c and ΔRIB,c values are given in the tables below.

**Table 5.1.25.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_7-8\_n77 | 7 | 0.5 |
| 8 | 0.6 |
| n77 | 0.8 |

**Table 5.1.25.4-2: ΔRIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_7-8\_n77 | 7 | 0 |
| 8 | 0.2 |
| n77 | 0.5 |

5.1.25.5 REFSENS requirements

Table below lists the MSD required for the dual connectivity configuration.

**Table 5.1.25.5-1: MSD for the DC configuration**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_7A-8A\_n77A | 7 | 2530 | 5 | 25 | 2650 | N/A | FDD | IMD2  |fB77-fB7| |
| 8 | 895 | 5 | 25 | 940 | 30.5 | FDD |
| n77 | 3470 | 10 | 50 | 3470 | N/A | TDD |
| DC\_7A-8A\_n77A | 7 | 2520 | 5 | 25 | 2640 | N/A | FDD | IMD5  |2\*fB77-3fB7| |
| 8 | 895 | 5 | 25 | 940 | 3.1 | FDD |
| n77 | 3310 | 10 | 50 | 3310 | N/A | TDD |
| DC\_7A-8A\_n77A | 7 | 2530 | 5 | 25 | 2650 | 28 | FDD | IMD2  |fB77-fB8| |
| 8 | 895 | 5 | 25 | 940 | N/A | FDD |
| n77 | 3545 | 10 | 50 | 3545 | N/A | TDD |

## 5.1.26 DC\_7-8\_n78, DC\_7-7-8\_n78

5.1.26.1 Operating bands for DC

**Table 5.1.26.1-1: Band combinations EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_7-8\_n78 | CA\_7-8 | n78 | No |
| DC\_7-7-8\_n78 | CA\_7-7-8 | n78 | No |

5.1.26.2 Configuration for DC

**Table 5.1.26.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_7A-8A\_n78A | DC\_7A\_n78A, DC\_8A\_n78A | CA\_7A-8A | n78A |
| DC\_7A-7A-8A\_n78A | DC\_7A\_n78A, DC\_8A\_n78A | CA\_7A-8A | n78A |

5.1.26.3 Co-existence Studies

Based on co-existence studies of DC\_7\_n78 and DC\_8\_n78, as captured in TR 37.863-01-01, own Rx impact on the 3rd band are the following:

- 2nd and 5th order IM generated by dual uplink of Band 7 and n78 may fall into Band 8

- 2nd order IM generated by dual uplink of Band 8 and n78 may fall into Band 7

5.1.26.4 ∆TIB and ∆RIB values

For DC\_7-8\_n78 the ΔTIB,c and ΔRIB,c values are given in the tables below.

**Table 5.1.26.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_7-8\_n78, DC\_7-7-8\_n78 | 7 | 0.5 |
| 8 | 0.6 |
| n78 | 0.8 |

**Table 5.1.26.4-2: ΔRIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_7-8\_n78, DC\_7-7-8\_n78 | 7 | 0 |
| 8 | 0.2 |
| n78 | 0.5 |

5.1.26.5 REFSENS requirements

Table below lists the MSD required for the dual connectivity configuration.

**Table 5.1.26.5-1: MSD for the DC configuration**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_7A-8A\_n78A | 7 | 2530 | 5 | 25 | 2650 | N/A | FDD | IMD2  |fB78-fB7| |
| 8 | 895 | 5 | 25 | 940 | 30.5 | FDD |
| n78 | 3470 | 10 | 50 | 3470 | N/A | TDD |
| DC\_7A-8A\_n78A | 7 | 2520 | 5 | 25 | 2640 | N/A | FDD | IMD5  |2\*fB78-3fB7| |
| 8 | 895 | 5 | 25 | 940 | 3.1 | FDD |
| n78 | 3310 | 10 | 50 | 3310 | N/A | TDD |
| DC\_7A-8A\_n78A | 7 | 2530 | 5 | 25 | 2650 | 28 | FDD | IMD2  |fB78-fB8| |
| 8 | 895 | 5 | 25 | 940 | N/A | FDD |
| n78 | 3545 | 10 | 50 | 3545 | N/A | TDD |

## 5.1.27 DC\_2-7\_n78

5.1.27.1 Operating bands for DC

Table 5.1.27.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-7\_n78 | CA\_2-7 | n78 | DC\_2\_n78 |
| DC\_2-7-7\_n78 | CA\_2-7 | n78 | DC\_2\_n78 |

5.1.27.2 Configurations for DC

Table 5.1.27.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_2A-7A\_n78A  DC\_2A-7C\_n78A  DC\_2A-7A\_n78(2A)  DC\_2A-7C\_n78(2A) | DC\_2A\_n78A  DC\_7A\_n78A  DC\_7C\_n78A | CA\_2A-7A  CA\_2A-7C | n78A |
| DC\_2A-7A-7A\_n78A  DC\_2A-7A-7A\_n78(2A) | DC\_2A\_n78A  DC\_7A\_n78A | CA\_2A-7A-7A | n78A |

5.1.27.3 ∆TIB and ∆RIB values

For DC\_2-7\_n78, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 5.1.27.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-7\_n78 | 2 | 0.5 |
| 7 | 0.5 |
| n78 | 0 |

Table 5.1.27.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-7\_n78 | 2 | 0 |
| 7 | 0 |
| n78 | 0 |

5.1.27.4 REFSENS requirements

For UE coexistence study of Band 7 + Band n78, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.27.4-1.

Table 5.1.27.4-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 2500 | 2570 | 3300 | 3800 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 5000 | 5140 | 6600 | 7600 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 7500 | 7710 | 9900 | 11400 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 10000 | 10280 | 13200 | 15200 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 12500 | 12850 | 16500 | 19000 |
| Two tone 2nd order IMD products | fy\_low – fx\_high | fy\_high – fx\_low | fx\_low + fy\_low | fx\_high + fy\_high |
| IMD frequency limits (MHz) | 730 | 1300 | 5800 | 6370 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | 2\*fy\_low – fx\_high | 2\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 1200 | 1840 | 4030 | 5100 |
| Two-tone 3rd order IMD products | 2\*fx\_low + fy\_low | 2\*fx\_high + fy\_high | 2\*fy\_low + fx\_low | 2\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 8300 | 8940 | 9100 | 10170 |
| Two-tone 4th order IMD products | |3\*fx\_low – fy\_high| | |3\*fx\_high – fy\_low| | 3\*fy\_low – fx\_high | 3\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 3700 | 4410 | 7330 | 8900 |
| Two-tone 4th order IMD products | 3\*fx\_low + fy\_low | 3\*fx\_high + fy\_high | 3\*fy\_low + fx\_low | 3\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 10800 | 11510 | 12400 | 13900 |
| Two-tone 4th order IMD products | 2\*fy\_low – 2\*fx\_high | 2\*fy\_high – 2\*fx\_low | 2\*fx\_low + 2\*fy\_low | 2\*fx\_high + 2\*fy\_high |
| IMD frequency limits (MHz) | 1460 | 2600 | 11600 | 12740 |
| Two-tone 5th order IMD products | |4\*fx\_low – fy\_high| | |4\*fx\_high – fy\_low| | 4\*fy\_low – fx\_high | 4\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 6200 | 6980 | 10630 | 12700 |
| Two-tone 5th order IMD products | 4\*fx\_low + fy\_low | 4\*fx\_high + fy\_high | 4\*fy\_low + fx\_low | 4\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 13300 | 14080 | 15700 | 17770 |
| Two-tone 5th order IMD products | |3\*fx\_low – 2\*fy\_high| | |3\*fx\_high – 2\*fy\_low| | 3\*fy\_low – 2\*fx\_high | 3\*fy\_high – 2\*fx\_low |
| IMD frequency limits (MHz) | 100 | 1110 | 4760 | 6400 |
| Two-tone 5th order IMD products | 2\*fx\_low + 3\*fy\_low | 2\*fx\_high + 3\*fy\_high | 2\*fy\_low + 3\*fx\_low | 2\*fy\_high + 3\*fx\_high |
| IMD frequency limits (MHz) | 14900 | 16540 | 14100 | 15310 |

For UE coexistence study of Band 2 + Band n78, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.27.4-2

Table 5.1.27.4-2: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1850 | 1910 | 3300 | 3800 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3700 | 3820 | 6600 | 7600 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5550 | 5730 | 9900 | 11400 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 7400 | 7640 | 13200 | 15200 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 9250 | 9550 | 16500 | 19000 |
| Two tone 2nd order IMD products | fy\_low – fx\_high | fy\_high – fx\_low | fx\_low + fy\_low | fx\_high + fy\_high |
| IMD frequency limits (MHz) | 1390 | 1950 | 5150 | 5710 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | 2\*fy\_low – fx\_high | 2\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 100 | 520 | 4690 | 5750 |
| Two-tone 3rd order IMD products | 2\*fx\_low + fy\_low | 2\*fx\_high + fy\_high | 2\*fy\_low + fx\_low | 2\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 7000 | 7620 | 8450 | 9510 |
| Two-tone 4th order IMD products | |3\*fx\_low – fy\_high| | |3\*fx\_high – fy\_low| | 3\*fy\_low – fx\_high | 3\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 1750 | 2430 | 7990 | 9550 |
| Two-tone 4th order IMD products | 3\*fx\_low + fy\_low | 3\*fx\_high + fy\_high | 3\*fy\_low + fx\_low | 3\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 8850 | 9530 | 11750 | 13250 |
| Two-tone 4th order IMD products | 2\*fy\_low – 2\*fx\_high | 2\*fy\_high – 2\*fx\_low | 2\*fx\_low + 2\*fy\_low | 2\*fx\_high + 2\*fy\_high |
| IMD frequency limits (MHz) | 2780 | 3900 | 10300 | 11420 |
| Two-tone 5th order IMD products | |4\*fx\_low – fy\_high| | |4\*fx\_high – fy\_low| | 4\*fy\_low – fx\_high | 4\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 3600 | 4340 | 11290 | 13350 |
| Two-tone 5th order IMD products | 4\*fx\_low + fy\_low | 4\*fx\_high + fy\_high | 4\*fy\_low + fx\_low | 4\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 10700 | 11440 | 15050 | 17110 |
| Two-tone 5th order IMD products | |3\*fx\_low – 2\*fy\_high| | |3\*fx\_high – 2\*fy\_low| | 3\*fy\_low – 2\*fx\_high | 3\*fy\_high – 2\*fx\_low |
| IMD frequency limits (MHz) | 2050 | 870 | 6080 | 7700 |
| Two-tone 5th order IMD products | 2\*fx\_low + 3\*fy\_low | 2\*fx\_high + 3\*fy\_high | 2\*fy\_low + 3\*fx\_low | 2\*fy\_high + 3\*fx\_high |
| IMD frequency limits (MHz) | 13600 | 15220 | 12150 | 13330 |

Based on co-existence study as presented in the table 5.1.27.4-1 and 5.1.27.4-2, own Rx impact of the 3rd band is shown as the followings.

- 4th order IMD generated by dual uplink of Band 7 + Band n78 may also fall into own Rx of band 2

By adjusting the centre frequency of uplink of Band 7 + Band n78, the MSD requirement due to 4th order IMD for DC\_2-7\_n78 can be similar as the requirements of DC\_3-7\_n78 since the source of IMD is the same.

Table 5.1.27.4-3 lists the MSD required for DC\_2-7\_n78A.

Table 5.1.27.4-3: MSD for the DC configuration due to IMD issue (three bands)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_2A-7A\_n78A  DC\_2A-7C\_n78A  DC\_2A-7A-7A\_n78A  DC\_2A-7A\_n78(2A)  DC\_2A-7C\_n78(2A)  DC\_2A-7A-7A\_n78(2A) | 2 | 1870 | 5 | 25 | 1950 | 8.6 | FDD | IMD4  |2\*fB78-2\*fB7| |
| 7 | 2550 | 5 | 25 | 2685 | N/A | FDD | N/A |
| n78 | 3525 | 10 | 52 | 3475 | N/A | TDD | N/A |

## 5.1.28 DC\_7-66\_n78

5.1.28.1 Operating bands for DC

Table 5.1.28.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_7-66\_n78 | CA\_7-66 | n78 | No |
| DC\_7-7-66\_n78 | CA\_7-7-66 | n78 | No |
| DC\_7-66-66\_n78 | CA\_7-66-66 | n78 | No |
| DC\_7-7-66-66\_n78 | CA\_7-7-66-66 | n78 | No |

5.1.28.2 Configurations for DC

Table 5.1.28.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_7A-66A\_n78A  DC\_7C-66A\_n78A  DC\_7A-66A\_n78(2A)  DC\_7C-66A\_n78(2A) | DC\_7A\_n78A  DC\_7C\_n78A  DC\_66A\_n78A | CA\_7A-66A  CA\_7C-66A | n78A  CA\_n78(2A) |
| DC\_7A-7A-66A\_n78A  DC\_7A-7A-66A\_n78(2A) | DC\_7A\_n78A  DC\_66A\_n78A | CA\_7A-7A-66A | n78A  CA\_n78(2A) |
| DC\_7A-66A-66A\_n78A  DC\_7A-66A-66A\_n78(2A) | DC\_7A\_n78A  DC\_66A\_n78A | CA\_7A-66A-66A | n78A  CA\_n78(2A) |
| DC\_7A-7A-66A-66A\_n78A  DC\_7A-7A-66A-66A\_n78(2A) | DC\_7A\_n78A  DC\_66A\_n78A | CA\_7A-7A-66A-66A | n78A  CA\_n78(2A) |
| DC\_7C-66A-66A\_n78A  DC\_7C-66A-66A\_n78(2A) | DC\_7A\_n78A  DC\_66A\_n78A | CA\_7C-66A-66A | n78A  CA\_n78(2A) |

5.1.28.3 ∆TIB and ∆RIB values

For DC\_7-66\_n78, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 5.1.28.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_7-66\_n78  DC\_7-7-66\_n78  DC\_7-66-66\_n78  DC\_7-7-66-66\_n78 | 7 | 0.5 |
| 66 | 0.5 |
| n78 | 0 |

Table 5.1.28.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_7-66\_n78  DC\_7-7-66\_n78  DC\_7-66-66\_n78  DC\_7-7-66-66\_n78 | 7 | 0 |
| 66 | 0 |
| n78 | 0 |

5.1.28.4 REFSENS requirements

For UE coexistence study of Band 7 + Band n78, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.28.4-1.

Table 5.1.28.4-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 2500 | 2570 | 3300 | 3800 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 5000 | 5140 | 6600 | 7600 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 7500 | 7710 | 9900 | 11400 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 10000 | 10280 | 13200 | 15200 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 12500 | 12850 | 16500 | 19000 |
| Two tone 2nd order IMD products | fy\_low – fx\_high | fy\_high – fx\_low | fx\_low + fy\_low | fx\_high + fy\_high |
| IMD frequency limits (MHz) | 730 | 1300 | 5800 | 6370 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | 2\*fy\_low – fx\_high | 2\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 1200 | 1840 | 4030 | 5100 |
| Two-tone 3rd order IMD products | 2\*fx\_low + fy\_low | 2\*fx\_high + fy\_high | 2\*fy\_low + fx\_low | 2\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 8300 | 8940 | 9100 | 10170 |
| Two-tone 4th order IMD products | |3\*fx\_low – fy\_high| | |3\*fx\_high – fy\_low| | 3\*fy\_low – fx\_high | 3\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 3700 | 4410 | 7330 | 8900 |
| Two-tone 4th order IMD products | 3\*fx\_low + fy\_low | 3\*fx\_high + fy\_high | 3\*fy\_low + fx\_low | 3\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 10800 | 11510 | 12400 | 13900 |
| Two-tone 4th order IMD products | 2\*fy\_low – 2\*fx\_high | 2\*fy\_high – 2\*fx\_low | 2\*fx\_low + 2\*fy\_low | 2\*fx\_high + 2\*fy\_high |
| IMD frequency limits (MHz) | 1460 | 2600 | 11600 | 12740 |
| Two-tone 5th order IMD products | |4\*fx\_low – fy\_high| | |4\*fx\_high – fy\_low| | 4\*fy\_low – fx\_high | 4\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 6200 | 6980 | 10630 | 12700 |
| Two-tone 5th order IMD products | 4\*fx\_low + fy\_low | 4\*fx\_high + fy\_high | 4\*fy\_low + fx\_low | 4\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 13300 | 14080 | 15700 | 17770 |
| Two-tone 5th order IMD products | |3\*fx\_low – 2\*fy\_high| | |3\*fx\_high – 2\*fy\_low| | 3\*fy\_low – 2\*fx\_high | 3\*fy\_high – 2\*fx\_low |
| IMD frequency limits (MHz) | 100 | 1110 | 4760 | 6400 |
| Two-tone 5th order IMD products | 2\*fx\_low + 3\*fy\_low | 2\*fx\_high + 3\*fy\_high | 2\*fy\_low + 3\*fx\_low | 2\*fy\_high + 3\*fx\_high |
| IMD frequency limits (MHz) | 14900 | 16540 | 14100 | 15310 |

For UE coexistence study of Band 66 + Band n78, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.28.4-2

Table 5.1.28.4-2: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1710 | 1780 | 3300 | 3800 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3420 | 3560 | 6600 | 7600 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5130 | 5340 | 9900 | 11400 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 6840 | 7120 | 13200 | 15200 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 8550 | 8900 | 16500 | 19000 |
| Two tone 2nd order IMD products | fy\_low – fx\_high | fy\_high – fx\_low | fx\_low + fy\_low | fx\_high + fy\_high |
| IMD frequency limits (MHz) | 1520 | 2090 | 5010 | 5580 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | 2\*fy\_low – fx\_high | 2\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 380 | -260 | 4820 | 5890 |
| Two-tone 3rd order IMD products | 2\*fx\_low + fy\_low | 2\*fx\_high + fy\_high | 2\*fy\_low + fx\_low | 2\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 6720 | 7360 | 8310 | 9380 |
| Two-tone 4th order IMD products | |3\*fx\_low – fy\_high| | |3\*fx\_high – fy\_low| | 3\*fy\_low – fx\_high | 3\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | -1330 | -2040 | 8120 | 9690 |
| Two-tone 4th order IMD products | 3\*fx\_low + fy\_low | 3\*fx\_high + fy\_high | 3\*fy\_low + fx\_low | 3\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 8430 | 9140 | 11610 | 13110 |
| Two-tone 4th order IMD products | 2\*fy\_low – 2\*fx\_high | 2\*fy\_high – 2\*fx\_low | 2\*fx\_low + 2\*fy\_low | 2\*fx\_high + 2\*fy\_high |
| IMD frequency limits (MHz) | 3040 | 4180 | 10020 | 11160 |
| Two-tone 5th order IMD products | |4\*fx\_low – fy\_high| | |4\*fx\_high – fy\_low| | 4\*fy\_low – fx\_high | 4\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | -3040 | -3820 | 11420 | 13490 |
| Two-tone 5th order IMD products | 4\*fx\_low + fy\_low | 4\*fx\_high + fy\_high | 4\*fy\_low + fx\_low | 4\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 10140 | 10920 | 14910 | 16980 |
| Two-tone 5th order IMD products | |3\*fx\_low – 2\*fy\_high| | |3\*fx\_high – 2\*fy\_low| | 3\*fy\_low – 2\*fx\_high | 3\*fy\_high – 2\*fx\_low |
| IMD frequency limits (MHz) | 2470 | 1260 | 6340 | 7980 |
| Two-tone 5th order IMD products | 2\*fx\_low + 3\*fy\_low | 2\*fx\_high + 3\*fy\_high | 2\*fy\_low + 3\*fx\_low | 2\*fy\_high + 3\*fx\_high |
| IMD frequency limits (MHz) | 13320 | 14960 | 11730 | 12940 |

Based on co-existence study as presented in the table 5.1.28.4-1 and 5.1.28.4-2, own Rx impact of the 3rd band is shown as the followings.

- 4th order IMD generated by dual uplink of Band 7 + Band n78 may also fall into own Rx of band 2

By adjusting the centre frequency of uplink of Band 7 + Band n78, the MSD requirement due to 4th order IMD for DC\_7-66\_n78 can be similar as the requirements of DC\_1-7\_n78 since the source of IMD is the same.

Table 5.1.28.4-3 lists the MSD required for DC\_7-66\_n78.

Table 5.1.28.4-3: MSD for the DC configuration due to IMD issue (three bands)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_7A-66A\_n78A  DC\_7C-66A\_n78A  DC\_7A-7A-66A\_n78A  DC\_7A-66A-66A\_n78A  DC\_7A-7A-66A-66A\_n78A  DC\_7C-66A-66A\_n78A  DC\_7A-66A\_n78(2A)  DC\_7C-66A\_n78(2A)  DC\_7A-7A-66A\_n78(2A)  DC\_7A-66A-66A\_n78(2A)  DC\_7A-7A-66A-66A\_n78(2A)  DC\_7C-66A-66A\_n78(2A) | 7 | 2550 | 5 | 25 | 2685 | N/A | FDD | N/A |
| 66 | 1750 | 5 | 25 | 2150 | 8.7 | FDD | IMD4  |2\*fB78-2\*fB7| |
| n78 | 3625 | 10 | 52 | 3475 | N/A | TDD | N/A |

## 5.1.29 DC\_3-8\_n78

5.1.29.1 Operating bands for DC

Table 5.1.29.1-1: DC band combination of LTE 2DL/1UL + one NR band

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR DC Band** | **E-UTRA and 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** | | |
| DC\_3C-8A-n78A | 3 | 1710 MHz | – | 1785 MHz | 1805 MHz | – | 1880 MHz | FDD |
| 8 | 880 MHz | – | 915MHz | 925 MHz | – | 960 MHz |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |

5.1.29.2 Channel bandwidths per operating band for DC

Table 5.1.29.2-1: Supported bandwidths per DC band combination of LTE 2DL/1UL + one NR band

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR DC Configuration** | **E-UTRA and NR Band** | **Subcarrier spacing**  **[kHz]** | **5**  **MHz** | **10**  **MHz** | **15**  **MHz** | **20**  **MHz** | **40**  **MHz** | **50**  **MHz** | **60**  **MHz** | **80**  **MHz** | **100 MHz** | **Maximum aggregated bandwidth**  **[MHz]** |
| DC\_3C-8A-n78A | 3 | 15 | See CA\_3C Bandwidth Combination Set 0 in Table 5.6A.1-1 of TS 36.101 | | | | | | | | | 150 |
| 8 | 15 | Yes | Yes |  |  |  |  |  |  |  |
| n78 | 15 |  | Yes | Yes | Yes | Yes | Yes |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

5.1.29.3 Co-existence studies

Co-existence was studied for DC\_3A-8A\_n78A in Rel-15 and the results are captured in TR 37.863-02-01. No further studies needed for DC\_3C-8A\_n78A.

5.1.29.4 ∆TIB and ∆RIB values

For DC\_3C-8A-n78A, the ΔTIB,c and ΔRIB values are given in the tables below.

Table 5.1.29.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3C-8A-n78A | 3 | 0.6 |
| 8 | 0.6 |
| n78 | 0.8 |

Table 5.1.29.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3C-8A-n78A | 3 | 0.2 |
| 8 | 0.2 |
| n78 | 0.5 |

5.1.29.5 REFSENS

According the co-existing studies and REFSENS study in TR 37.863-02-01, although 2nd harmonic generated by dual uplink of Band 8 + Band n78 may also fall into own Rx of band 3, there is significant opportunity to avoid the harmonic interference from the transmitter into the receiver. Therefore, it is no need to specific additional MSD for Band 3 caused by 2nd order harmonic of Band 8 for DC\_3C-8A\_n78A.

## 5.1.30 DC\_3-28\_n78

5.1.30.1 Operating bands for DC

**Table 5.1.30.1-1: Band combinations EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-28\_n782 | CA\_3-28 | n78 | DC\_3\_n78 |
| DC\_3-3-28\_n782 | CA\_3-3-28 | n78 | DC\_3\_n78 |
| NOTE 2: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | |

5.1.30.2 Configuration for DC

**Table 5.1.30.2-1: Inter-band EN-DC configurations of 1 LTE band + 1 NR band**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-3A-28A\_n78A DC\_3C-28A\_n78A | DC\_3A\_n78A  DC\_28A\_n78A | CA\_3A-3A-28A  CA\_3C-28A | n78A |

5.1.30.3 ∆TIB and ∆RIB values

For DC\_3-28\_n78 the ΔTIB,c and ΔRIB,c values are given in the tables below.

**Table 5.1.30.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-28\_n78 | 3 | 0.5 |
| 28 | 0.3 |
| n78 | 0.8 |

**Table 5.1.30.3-2: ΔRIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-28\_n78 | 3 | 0.2 |
| n78 | 0.5 |

5.1.30.4 REFSENS requirements

The impacts are covered in the fallback combination DC\_3A-28A\_n78A and will also apply for DC\_3C-28A\_n78A and need to be included in Table 7.3B.2.3.5.2-1 of TS 38.101-3.

Table 5.1.30.4-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC\_3A-3A-28A\_n78A DC\_3C-28A\_n78A | 3 | 1775 | 5 | 25 | 1870 | 17.3 | FDD | IMD3 |
| 28 | 740 | 5 | 25 | 760 | N/A |  | N/A |
| n78 | 3350 | 10 | 25 | 3350 | N/A | TDD | N/A |

## 5.1.31 DC\_5-7\_n71

5.1.31.1 Operating bands for DC

Table 5.1.31.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_5-7\_n71 | CA\_5-7 | n71 | No |

5.1.31.2 Configurations for DC

Table 5.1.31.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_5A-7A\_n71A | DC\_5A\_n71A  DC\_7A\_n71A | CA\_5A-7A | n71A |

5.1.31.3 ∆TIB and ∆RIB values

For DC\_2-7\_n71, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 5.1.31.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_5-7\_n71 | 5 | 0.5 |
| 7 | 0.3 |
| n71 | 0.6 |

Table 5.1.31.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_5-7\_n71 | 5 | 0 |
| 7 | 0 |
| n71 | 0.2 |

5.1.31.4 REFSENS requirements

For UE coexistence study of Band 7 + Band n71, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.31.4-1.

Table 5.1.31.4-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 663 | 698 | 2500 | 2570 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 1326 | 1396 | 5000 | 5140 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 1989 | 2094 | 7500 | 7710 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 2652 | 2792 | 10000 | 10280 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 3315 | 3490 | 12500 | 12850 |
| Two tone 2nd order IMD products | fy\_low – fx\_high | fy\_high – fx\_low | fx\_low + fy\_low | fx\_high + fy\_high |
| IMD frequency limits (MHz) | 1802 | 1907 | 3163 | 3268 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | 2\*fy\_low – fx\_high | 2\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 1244 | 1104 | 4302 | 4477 |
| Two-tone 3rd order IMD products | 2\*fx\_low + fy\_low | 2\*fx\_high + fy\_high | 2\*fy\_low + fx\_low | 2\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 3826 | 3966 | 5663 | 5838 |
| Two-tone 4th order IMD products | |3\*fx\_low – fy\_high| | |3\*fx\_high – fy\_low| | 3\*fy\_low – fx\_high | 3\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 581 | 406 | 6802 | 7047 |
| Two-tone 4th order IMD products | 3\*fx\_low + fy\_low | 3\*fx\_high + fy\_high | 3\*fy\_low + fx\_low | 3\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 4489 | 4664 | 8163 | 8373 |
| Two-tone 4th order IMD products | 2\*fy\_low – 2\*fx\_high | 2\*fy\_high – 2\*fx\_low | 2\*fx\_low + 2\*fy\_low | 2\*fx\_high + 2\*fy\_high |
| IMD frequency limits (MHz) | 3604 | 3814 | 6326 | 6536 |
| Two-tone 5th order IMD products | |4\*fx\_low – fy\_high| | |4\*fx\_high – fy\_low| | 4\*fy\_low – fx\_high | 4\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 82 | 292 | 9302 | 9617 |
| Two-tone 5th order IMD products | 4\*fx\_low + fy\_low | 4\*fx\_high + fy\_high | 4\*fy\_low + fx\_low | 4\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 5152 | 5362 | 10663 | 10978 |
| Two-tone 5th order IMD products | |3\*fx\_low – 2\*fy\_high| | |3\*fx\_high – 2\*fy\_low| | 3\*fy\_low – 2\*fx\_high | 3\*fy\_high – 2\*fx\_low |
| IMD frequency limits (MHz) | 3151 | 2906 | 6104 | 6384 |
| Two-tone 5th order IMD products | 2\*fx\_low + 3\*fy\_low | 2\*fx\_high + 3\*fy\_high | 2\*fy\_low + 3\*fx\_low | 2\*fy\_high + 3\*fx\_high |
| IMD frequency limits (MHz) | 8826 | 9106 | 6989 | 7234 |

For UE coexistence study of Band 5 + Band n71, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.31.4-2

Table 5.1.31.4-2: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 663 | 698 | 824 | 849 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 1326 | 1396 | 1648 | 1698 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 1989 | 2094 | 2472 | 2547 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 2652 | 2792 | 3296 | 3396 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 3315 | 3490 | 4120 | 4245 |
| Two tone 2nd order IMD products | fy\_low – fx\_high | fy\_high – fx\_low | fx\_low + fy\_low | fx\_high + fy\_high |
| IMD frequency limits (MHz) | 126 | 186 | 1487 | 1547 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | 2\*fy\_low – fx\_high | 2\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 477 | 572 | 950 | 1035 |
| Two-tone 3rd order IMD products | 2\*fx\_low + fy\_low | 2\*fx\_high + fy\_high | 2\*fy\_low + fx\_low | 2\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 2150 | 2245 | 2311 | 2396 |
| Two-tone 4th order IMD products | |3\*fx\_low – fy\_high| | |3\*fx\_high – fy\_low| | 3\*fy\_low – fx\_high | 3\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 1140 | 1270 | 1774 | 1884 |
| Two-tone 4th order IMD products | 3\*fx\_low + fy\_low | 3\*fx\_high + fy\_high | 3\*fy\_low + fx\_low | 3\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 2813 | 2943 | 3135 | 3210 |
| Two-tone 4th order IMD products | 2\*fy\_low – 2\*fx\_high | 2\*fy\_high – 2\*fx\_low | 2\*fx\_low + 2\*fy\_low | 2\*fx\_high + 2\*fy\_high |
| IMD frequency limits (MHz) | 252 | 372 | 2974 | 3094 |
| Two-tone 5th order IMD products | |4\*fx\_low – fy\_high| | |4\*fx\_high – fy\_low| | 4\*fy\_low – fx\_high | 4\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 1803 | 1968 | 2598 | 2733 |
| Two-tone 5th order IMD products | 4\*fx\_low + fy\_low | 4\*fx\_high + fy\_high | 4\*fy\_low + fx\_low | 4\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 3476 | 3641 | 3959 | 4094 |
| Two-tone 5th order IMD products | |3\*fx\_low – 2\*fy\_high| | |3\*fx\_high – 2\*fy\_low| | 3\*fy\_low – 2\*fx\_high | 3\*fy\_high – 2\*fx\_low |
| IMD frequency limits (MHz) | -291 | -446 | 1076 | 1221 |
| Two-tone 5th order IMD products | 2\*fx\_low + 3\*fy\_low | 2\*fx\_high + 3\*fy\_high | 2\*fy\_low + 3\*fx\_low | 2\*fy\_high + 3\*fx\_high |
| IMD frequency limits (MHz) | 3798 | 3943 | 3637 | 3792 |

Based on co-existence study as presented in the table 5.1.31.4-1 and 5.1.31.4-2, own Rx impact of the 3rd band is shown as the followings.

- 5th order IMD generated by dual uplink of Band 5 + Band n71 may fall into own Rx of band 7

Table 5.1.31.4-3 lists the MSD required for DC\_5-7\_n71A.

Table 5.1.31.4-3: MSD for the DC configuration due to IMD issue (three bands)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_5A-7A\_n71A | 5 | 835 | 5 | 25 | 880 | N/A | FDD |  |
| 7 | 2540 | 5 | 25 | 2660 | 6.5 | FDD | IMD5  |4\*fB5-fBn71| |
| n71 | 680 | 5 | 52 | 634 | N/A | TDD | N/A |

## 5.1.32 DC\_2-7\_n71

5.1.32.1 Operating bands for DC

Table 5.1.32.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-7\_n71 | CA\_2-7 | n71 | No |

5.1.32.2 Configurations for DC

Table 5.1.32.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_2A-7A\_n71A | DC\_2A\_n71A  DC\_7A\_n71A | CA\_2A-7A | n71A |

5.1.32.3 ∆TIB and ∆RIB values

For DC\_2-7\_n71, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 5.1.32.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-7\_n71 | 2 | 0.5 |
| 7 | 0.5 |
| n71 | 0.6 |

Table 5.1.32.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-7\_n71 | 2 | 0 |
| 7 | 0 |
| n71 | 0.2 |

5.1.32.4 REFSENS requirements

For UE coexistence study of Band 7 + Band n71, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.32.4-1.

Table 5.1.32.4-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 663 | 698 | 2500 | 2570 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 1326 | 1396 | 5000 | 5140 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 1989 | 2094 | 7500 | 7710 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 2652 | 2792 | 10000 | 10280 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 3315 | 3490 | 12500 | 12850 |
| Two tone 2nd order IMD products | fy\_low – fx\_high | fy\_high – fx\_low | fx\_low + fy\_low | fx\_high + fy\_high |
| IMD frequency limits (MHz) | 1802 | 1907 | 3163 | 3268 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | 2\*fy\_low – fx\_high | 2\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 1244 | 1104 | 4302 | 4477 |
| Two-tone 3rd order IMD products | 2\*fx\_low + fy\_low | 2\*fx\_high + fy\_high | 2\*fy\_low + fx\_low | 2\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 3826 | 3966 | 5663 | 5838 |
| Two-tone 4th order IMD products | |3\*fx\_low – fy\_high| | |3\*fx\_high – fy\_low| | 3\*fy\_low – fx\_high | 3\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 581 | 406 | 6802 | 7047 |
| Two-tone 4th order IMD products | 3\*fx\_low + fy\_low | 3\*fx\_high + fy\_high | 3\*fy\_low + fx\_low | 3\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 4489 | 4664 | 8163 | 8373 |
| Two-tone 4th order IMD products | 2\*fy\_low – 2\*fx\_high | 2\*fy\_high – 2\*fx\_low | 2\*fx\_low + 2\*fy\_low | 2\*fx\_high + 2\*fy\_high |
| IMD frequency limits (MHz) | 3604 | 3814 | 6326 | 6536 |
| Two-tone 5th order IMD products | |4\*fx\_low – fy\_high| | |4\*fx\_high – fy\_low| | 4\*fy\_low – fx\_high | 4\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 82 | 292 | 9302 | 9617 |
| Two-tone 5th order IMD products | 4\*fx\_low + fy\_low | 4\*fx\_high + fy\_high | 4\*fy\_low + fx\_low | 4\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 5152 | 5362 | 10663 | 10978 |
| Two-tone 5th order IMD products | |3\*fx\_low – 2\*fy\_high| | |3\*fx\_high – 2\*fy\_low| | 3\*fy\_low – 2\*fx\_high | 3\*fy\_high – 2\*fx\_low |
| IMD frequency limits (MHz) | 3151 | 2906 | 6104 | 6384 |
| Two-tone 5th order IMD products | 2\*fx\_low + 3\*fy\_low | 2\*fx\_high + 3\*fy\_high | 2\*fy\_low + 3\*fx\_low | 2\*fy\_high + 3\*fx\_high |
| IMD frequency limits (MHz) | 8826 | 9106 | 6989 | 7234 |

For UE coexistence study of Band 2 + Band n71, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.32.4-2

Table 5.1.32.4-2: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 663 | 698 | 1850 | 1910 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 1326 | 1396 | 3700 | 3820 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 1989 | 2094 | 5550 | 5730 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 2652 | 2792 | 7400 | 7640 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 3315 | 3490 | 9250 | 9550 |
| Two tone 2nd order IMD products | fy\_low – fx\_high | fy\_high – fx\_low | fx\_low + fy\_low | fx\_high + fy\_high |
| IMD frequency limits (MHz) | 1152 | 1247 | 2513 | 2608 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | 2\*fy\_low – fx\_high | 2\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 584 | 454 | 3002 | 3157 |
| Two-tone 3rd order IMD products | 2\*fx\_low + fy\_low | 2\*fx\_high + fy\_high | 2\*fy\_low + fx\_low | 2\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 3176 | 3306 | 4363 | 4518 |
| Two-tone 4th order IMD products | |3\*fx\_low – fy\_high| | |3\*fx\_high – fy\_low| | 3\*fy\_low – fx\_high | 3\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 79 | 244 | 4852 | 5067 |
| Two-tone 4th order IMD products | 3\*fx\_low + fy\_low | 3\*fx\_high + fy\_high | 3\*fy\_low + fx\_low | 3\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 3839 | 4004 | 6213 | 6393 |
| Two-tone 4th order IMD products | 2\*fy\_low – 2\*fx\_high | 2\*fy\_high – 2\*fx\_low | 2\*fx\_low + 2\*fy\_low | 2\*fx\_high + 2\*fy\_high |
| IMD frequency limits (MHz) | 2304 | 2494 | 5026 | 5216 |
| Two-tone 5th order IMD products | |4\*fx\_low – fy\_high| | |4\*fx\_high – fy\_low| | 4\*fy\_low – fx\_high | 4\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 742 | 942 | 6702 | 6977 |
| Two-tone 5th order IMD products | 4\*fx\_low + fy\_low | 4\*fx\_high + fy\_high | 4\*fy\_low + fx\_low | 4\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 4502 | 4702 | 8063 | 8338 |
| Two-tone 5th order IMD products | |3\*fx\_low – 2\*fy\_high| | |3\*fx\_high – 2\*fy\_low| | 3\*fy\_low – 2\*fx\_high | 3\*fy\_high – 2\*fx\_low |
| IMD frequency limits (MHz) | 1831 | 1606 | 4154 | 4404 |
| Two-tone 5th order IMD products | 2\*fx\_low + 3\*fy\_low | 2\*fx\_high + 3\*fy\_high | 2\*fy\_low + 3\*fx\_low | 2\*fy\_high + 3\*fx\_high |
| IMD frequency limits (MHz) | 6876 | 7126 | 5689 | 5914 |

Based on co-existence study as presented in the table 5.1.32.4-1 and 5.1.32.4-2, there is no MSD issue on the own Rx impact of the 3rd band.

## 5.1.33 DC\_2-66\_n78

5.1.33.1 Operating bands for DC

Table 5.1.33.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-66\_n78 | CA\_2-66 | n78 | No |
| DC\_2-66-66\_n78 | CA\_2-66-66 | n78 | No |

5.1.33.2 Configurations for DC

Table 5.1.33.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_2A-66A\_n78A  DC\_2A-66A\_n78(2A) | DC\_2A\_n78A  DC\_66A\_n78A | CA\_2A-66A | n78A |
| DC\_2A-66A-66A\_n78A  DC\_2A-66A-66A\_n78(2A) | DC\_2A\_n78A  DC\_66A\_n78A | CA\_2A-66A-66A | n78A |

5.1.33.3 ∆TIB and ∆RIB values

For DC\_2-66\_n78, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 5.1.33.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n78  DC\_2-66-66\_n78 | 2 | 0.6 |
| 66 | 0.6 |
| n78 | 0.8 |

Table 5.1.33.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-66\_n78  DC\_2-66-66\_n78 | 2 | 0.3 |
| 66 | 0.3 |
| n78 | 0.5 |

5.1.33.4 REFSENS requirements

For UE coexistence study of Band 2 + Band n78, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.33.4-1.

Table 5.1.33.4-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 3300 | 3800 | 1850 | 1910 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 6600 | 7600 | 3700 | 3820 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 9900 | 11400 | 5550 | 5730 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 13200 | 15200 | 7400 | 7640 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 16500 | 19000 | 9250 | 9550 |
| Two tone 2nd order IMD products | fy\_low – fx\_high | fy\_high – fx\_low | fx\_low + fy\_low | fx\_high + fy\_high |
| IMD frequency limits (MHz) | 1950 | 1390 | 5150 | 5710 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | 2\*fy\_low – fx\_high | 2\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 4690 | 5750 | 100 | 520 |
| Two-tone 3rd order IMD products | 2\*fx\_low + fy\_low | 2\*fx\_high + fy\_high | 2\*fy\_low + fx\_low | 2\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 8450 | 9510 | 7000 | 7620 |
| Two-tone 4th order IMD products | |3\*fx\_low – fy\_high| | |3\*fx\_high – fy\_low| | 3\*fy\_low – fx\_high | 3\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 7990 | 9550 | 1750 | 2430 |
| Two-tone 4th order IMD products | 3\*fx\_low + fy\_low | 3\*fx\_high + fy\_high | 3\*fy\_low + fx\_low | 3\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 11750 | 13310 | 8850 | 9030 |
| Two-tone 4th order IMD products | 2\*fy\_low – 2\*fx\_high | 2\*fy\_high – 2\*fx\_low | 2\*fx\_low + 2\*fy\_low | 2\*fx\_high + 2\*fy\_high |
| IMD frequency limits (MHz) | 3900 | 2780 | 10300 | 11420 |
| Two-tone 5th order IMD products | |4\*fx\_low – fy\_high| | |4\*fx\_high – fy\_low| | 4\*fy\_low – fx\_high | 4\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 11290 | 13350 | 3600 | 4340 |
| Two-tone 5th order IMD products | 4\*fx\_low + fy\_low | 4\*fx\_high + fy\_high | 4\*fy\_low + fx\_low | 4\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 15050 | 17110 | 10700 | 11440 |
| Two-tone 5th order IMD products | |3\*fx\_low – 2\*fy\_high| | |3\*fx\_high – 2\*fy\_low| | 3\*fy\_low – 2\*fx\_high | 3\*fy\_high – 2\*fx\_low |
| IMD frequency limits (MHz) | 6080 | 7700 | 2050 | 870 |
| Two-tone 5th order IMD products | 2\*fx\_low + 3\*fy\_low | 2\*fx\_high + 3\*fy\_high | 2\*fy\_low + 3\*fx\_low | 2\*fy\_high + 3\*fx\_high |
| IMD frequency limits (MHz) | 12150 | 13330 | 13600 | 15220 |

For UE coexistence study of Band 66 + Band n78, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.33.4-2

Table 5.1.33.4-2: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1710 | 1780 | 3300 | 3800 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3420 | 3560 | 6600 | 7600 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5130 | 5340 | 9900 | 11400 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 6840 | 7120 | 13200 | 15200 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 8550 | 8900 | 16500 | 19000 |
| Two tone 2nd order IMD products | fy\_low – fx\_high | fy\_high – fx\_low | fx\_low + fy\_low | fx\_high + fy\_high |
| IMD frequency limits (MHz) | 1520 | 2090 | 5010 | 5580 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | 2\*fy\_low – fx\_high | 2\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 380 | 260 | 4820 | 5890 |
| Two-tone 3rd order IMD products | 2\*fx\_low + fy\_low | 2\*fx\_high + fy\_high | 2\*fy\_low + fx\_low | 2\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 6720 | 7360 | 8310 | 9380 |
| Two-tone 4th order IMD products | |3\*fx\_low – fy\_high| | |3\*fx\_high – fy\_low| | 3\*fy\_low – fx\_high | 3\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 1330 | 2040 | 8120 | 9690 |
| Two-tone 4th order IMD products | 3\*fx\_low + fy\_low | 3\*fx\_high + fy\_high | 3\*fy\_low + fx\_low | 3\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 8430 | 9140 | 11610 | 13110 |
| Two-tone 4th order IMD products | 2\*fy\_low – 2\*fx\_high | 2\*fy\_high – 2\*fx\_low | 2\*fx\_low + 2\*fy\_low | 2\*fx\_high + 2\*fy\_high |
| IMD frequency limits (MHz) | 3040 | 4180 | 10020 | 11160 |
| Two-tone 5th order IMD products | |4\*fx\_low – fy\_high| | |4\*fx\_high – fy\_low| | 4\*fy\_low – fx\_high | 4\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 3040 | 3820 | 11420 | 13490 |
| Two-tone 5th order IMD products | 4\*fx\_low + fy\_low | 4\*fx\_high + fy\_high | 4\*fy\_low + fx\_low | 4\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 10140 | 10920 | 14910 | 16980 |
| Two-tone 5th order IMD products | |3\*fx\_low – 2\*fy\_high| | |3\*fx\_high – 2\*fy\_low| | 3\*fy\_low – 2\*fx\_high | 3\*fy\_high – 2\*fx\_low |
| IMD frequency limits (MHz) | 2470 | 1260 | 6340 | 7980 |
| Two-tone 5th order IMD products | 2\*fx\_low + 3\*fy\_low | 2\*fx\_high + 3\*fy\_high | 2\*fy\_low + 3\*fx\_low | 2\*fy\_high + 3\*fx\_high |
| IMD frequency limits (MHz) | 13320 | 14960 | 11730 | 12940 |

Based on co-existence study as presented in the table 5.1.33.4-1 and 5.1.33.4-2, own Rx impact of the 3rd band is shown as the followings.

- 4th order IMD generated by dual uplink of Band 2 + Band n78 may fall into own Rx of band 66

- 2nd order IMD generated by dual uplink of Band 66 + Band n78 may fall into own Rx of band 2

- 4th order IMD generated by dual uplink of Band 66 + Band n78 may fall into own Rx of band 2

- 5th order IMD generated by dual uplink of Band 66 + Band n78 may fall into own Rx of band 2

Table5.1.33.4-3 propose the required MSD levels for the DC configuration.

Table 5.1.33.4-3: Proposed MSD requirements

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_2A-66A\_n78A  DC\_2A-66A\_n78(2A)  DC\_2A-66A-66A\_n78A  DC\_2A-66A-66A\_n78(2A) | 2 | 1880 | 5 | 25 | 1960 | N/A | FDD | N/A |
| 66 | 1760 | 5 | 25 | 2160 | [10.3] | FDD | IMD4  |3\*fB2-fBn78| |
| n78 | 3480 | 10 | 52 | 3480 | N/A | TDD | N/A |
| DC\_2A-66A\_n78A  DC\_2A-66A\_n78(2A)  DC\_2A-66A-66A\_n78A  DC\_2A-66A-66A\_n78(2A) | 2 | 1880 | 5 | 25 | 1960 | [32.1] | FDD | IMD2  |fBn78-fB66| |
| 66 | 1740 | 5 | 25 | 2140 | N/A | FDD | N/A |
| n78 | 3700 | 10 | 52 | 3700 | N/A | TDD | N/A |
| DC\_2A-66A\_n78A  DC\_2A-66A\_n78(2A)  DC\_2A-66A-66A\_n78A  DC\_2A-66A-66A\_n78(2A) | 2 | 1880 | 5 | 25 | 1960 | [9.1] | FDD | IMD4  |3\*fB66-fBn78| |
| 66 | 1770 | 5 | 25 | 2170 | N/A | FDD | N/A |
| n78 | 3350 | 10 | 52 | 3350 | N/A | TDD | N/A |
| DC\_2A-66A\_n78A  DC\_2A-66A\_n78(2A)  DC\_2A-66A-66A\_n78A  DC\_2A-66A-66A\_n78(2A) | 2 | 1880 | 5 | 25 | 1960 | [2.1] | FDD | IMD5  |2\*fBn78-3\*fB66| |
| 66 | 1760 | 5 | 25 | 2160 | N/A | FDD | N/A |
| n78 | 3620 | 10 | 52 | 3620 | N/A | TDD | N/A |

## 5.1.34 DC\_1-3\_n7

5.1.34.1 Operating bands for EN-DC

Table 5.2B.5.3-1: Band combinations EN-DC (four bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 1-3\_n7 | CA\_1-3 | n7 | No |

5.1.34.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (four bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-3A\_n7A  DC\_1A-3C\_n7A | DC\_1A\_n7A  DC\_3A\_n7A  DC\_3C\_n7A | CA\_1A-3A  CA\_1A-3C | n7 |

5.1.34.3 ∆TIB and ∆RIB values

For DC\_1-3\_n7, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_1-3-7, and are given in the tables below.

**Table 6.x.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-3\_n7 | 1 | 0.6 |
| 3 | 0.6 |
| n7 | 0.6 |

**Table 6.x.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-3\_n7 | 1 | 0 |
| 3 | 0 |
| n7 | 0 |

## 5.1.35 DC\_3-28\_n41

5.1.35.1 Operating bands for DC

**Table 5.1.35.1-1: band combination EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3A-28A\_n41A | CA\_3-28 | n41 |  |

5.1.35.2 Configuration for DC

**Table 5.1.35.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  Configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-28A\_n41A | DC\_3A\_n41  DC\_28A\_n41 | CA\_3A-28A | n41A |

5.1.35.3 ∆TIB and ∆RIB values

For DC\_3A-28A\_n41A, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 5.1.35.5-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-28\_n41 | 3 | 0.5 |
| 28 | 0.5 |
| n41 | 0.31/0.82 |
| NOTE 1**:** The requirement is specified for the frequency range of 2545-2690MHz.  NOTE 2**:** The requirement is specified for the frequency range of 2496-2545MHz. | | |

Table 5.1.35.5-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-28\_n41 | 3 | 0 |
| 28 | 0 |
| n41 | 01/0.52 |
| NOTE 1: The requirement is specified for the frequency range of 2545-2690MHz.  NOTE 2: The requirement is specified for the frequency range of 2496-2545MHz. | | |

5.1.35.4 REFSENS requirements

Based on co-existence studies of Band 3 + Band 28 and Band 41 captured in TR 36.101, own Rx impact of the 3rd band is IMD2 into own Rx of band 41.

Table 5.1.35.6-1: 3DL/2UL inter band Reference sensitivity QPSK PREFSENS and uplink/downlink configurations

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| E-UTRA Band / Channel bandwidth / NRB / Duplex mode | | | | | | | | | | Source of IMD |
| EUTRA CA | EUTRA CA | EUTRA band | UL Fc | UL BW | UL | DL Fc | DL BW | MSD | Duplex mode |
| DL Configuration | UL Configuration | (MHz) | (MHz) | CLRB | (MHz) | (MHz) | (dB) |
| DC\_3A-28A\_n41A | DC\_3A\_n41A | 3 | 1720 | 5 | 25 | 1815 | 5 | N/A | FDD | N/A |
| 41 | 2510 | 5 | 25 | 2510 | 5 | N/A | TDD | N/A |
| 28 | 735 | 5 | 25 | 790 | 5 | 26.0 | FDD | IMD21 |
| NOTE 1: This band is subject to IMD3 also which MSD is not specified. | | | | | | | | | | |

## 5.1.36 DC\_1-11\_n78

5.1.36.1 Operating bands for DC\_1-11\_n78

Table 5.1.36.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-11\_n78 | CA\_1-11 | n78 |  |

5.1.36.2 Configurations for DC\_1-11\_n78

Table 5.1.36.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-11A\_n78A | DC\_1A\_n78A  DC\_11A\_n78A | CA\_1A-11A | n78A |

5.1.36.3 Co-existence studies

When Uplink EN-DC configuration is DC\_1A\_n78A, (1) IMD2 of (B1 - n78) will fall into Rx band of Band 11. When Uplink EN-DC configuration is DC\_11A\_n78A, (2) IMD2 of (B11 - n78) will fall into Rx band of Band 1.

5.1.36.4 ∆TIB and ∆RIB values

The following relaxation values are proposed:

Table 5.1.36.4-1: ΔTIB,c

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_1-11\_n78 | 1 | 0.3 |
| 11 | 0.4 |
| n78 | 0.8 |

Table 5.1.36.4-2: ΔRIB

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_1-11\_n78 | 1 | 0 |
| 11 | 0 |
| n78 | 0.5 |

5.1.36.5 REFSENS requirements

As mentioned above, IMD2 of B1 and n78 to Band 11 Rx and IMD2 of B11 and n78 to Band 1 Rx need to be addressed for REFSENS relaxation. The following values are proposed:

Table 5.1.36.5-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** | Single UL allowed |
| DC\_1A-11A\_n78A | 1 | 1955 | 5 | 25 | 2145 | N/A | FDD | N/A |  |
| n78 | 3441 | 10 | 50 | 3441 | N/A | TDD | N/A |  |
| 11 | 1438 | 5 | 25 | 1486 | 31.4 | FDD | IMD2 |  |
| DC\_1A-11A\_n78A | 11 | 1438 | 5 | 25 | 1486 | N/A | FDD | N/A |  |
| n78 | 3578 | 10 | 50 | 3578 | N/A | TDD | N/A |  |
| 1 | 1950 | 5 | 25 | 2140 | 30.8 | FDD | IMD2 |  |

## 5.1.37 DC\_8-11\_n77

5.1.37.1 Operating bands for DC\_8-11\_n77

Table 5.1.37.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_8-11\_n77 | CA\_8-11 | n77 |  |

5.1.37.2 Configurations for DC\_8-11\_n77

Table 5.1.37.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_8A-11A\_n77A | DC\_8A\_n77A  DC\_11A\_n77A | CA\_8A-11A | n77A |

5.1.37.3 Co-existence studies

When Uplink EN-DC configuration is DC\_8A\_n77A, (1) IMD3 of (2\*B8 - n77) will fall into Rx band of Band 11. When Uplink EN-DC configuration is DC\_11A\_n77A, (2) IMD4 of (3\*B11 - n77) will fall into Rx band of Band 8.

5.1.37.4 ∆TIB and ∆RIB values

The following relaxation values are proposed:

Table 5.1.37.4-1: ΔTIB,c

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_8-11\_n77 | 8 | 0.6 |
| 11 | 0.4 |
| n77 | 0.8 |

Table 5.1.37.4-2: ΔRIB

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_8-11\_n77 | 8 | 0.2 |
| 11 | 0 |
| n77 | 0.5 |

5.1.37.5 REFSENS requirements

As mentioned above, IMD3 of B8 and n77 to Band 11 Rx and IMD3 of B11 and n77 to Band 8 Rx need to be addressed for REFSENS relaxation. The following values are proposed:

Table 5.1.37.5-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** | Single UL allowed |
| DC\_8A-11A\_n77A | 8 | 910 | 5 | 25 | 955 | N/A | FDD | N/A |  |
| n77 | 3311 | 10 | 50 | 3311 | N/A | TDD | N/A |  |
| 11 | 1443 | 5 | 25 | 1491 | 18.8 | FDD | IMD3 |  |
| DC\_8A-11A\_n77A | 11 | 1430.5 | 5 | 25 | 1478.5 | N/A | FDD | N/A |  |
| n77 | 3791 | 10 | 50 | 3791 | N/A | TDD | N/A |  |
| 8 | 885 | 5 | 25 | 930 | 18.2 | FDD | IMD3 |  |

## 5.1.38 DC\_8-11\_n78

5.1.38.1 Operating bands for DC\_8-11\_n78

Table 5.1.38.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_8-11\_n78 | CA\_8-11 | n78 |  |

5.1.38.2 Configurations for DC\_8-11\_n78

Table 5.1.38.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_8A-11A\_n78A | DC\_8A\_n78A  DC\_11A\_n78A | CA\_8A-11A | n78A |

5.1.38.3 Co-existence studies

When Uplink EN-DC configuration is DC\_8A\_n78A, (1) IMD3 of (2\*B11 - n78) will fall into Rx band of Band 8.

5.1.38.4 ∆TIB and ∆RIB values

The following relaxation values are proposed:

Table 5.1.38.4-1: ΔTIB,c

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_8-11\_n78 | 8 | 0.6 |
| 11 | 0.4 |
| n78 | 0.8 |

Table 5.1.38.4-2: ΔRIB

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_8-11\_n78 | 8 | 0.2 |
| 11 | 0 |
| n78 | 0.2 |

5.1.38.5 REFSENS requirements

As mentioned above, IMD3 of B11 and n78 to Band 8 Rx need to be addressed for REFSENS relaxation. The following values are proposed:

Table 5.1.38.5-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** | Single UL allowed |
| DC\_8A-11A\_n78A | 8 | 910 | 5 | 25 | 955 | N/A | FDD | N/A |  |
| n78 | 3311 | 10 | 50 | 3311 | N/A | TDD | N/A |  |
| 11 | 1443 | 5 | 25 | 1491 | 18.8 | FDD | IMD3 |  |
| DC\_8A-11A\_n78A | 11 | 1430.5 | 5 | 25 | 1478.5 | N/A | FDD | N/A |  |
| n78 | 3791 | 10 | 50 | 3791 | N/A | TDD | N/A |  |
| 8 | 885 | 5 | 25 | 930 | 18.2 | FDD | IMD3 |  |

## 5.1.39 DC\_2-30\_n5 and DC\_2-2-30\_n5

5.1.39.1 Operating bands for DC

Table 5.1.39.1-1: Band combinations EN-DC (two bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-30\_n5 | CA\_2-30 | n5 | No |

5.1.39.2 Configuration for DC

Table 5.1.39.2-1: Inter-band EN-DC configurations (two bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_2A-30A\_n5A | DC\_2A\_n5A  DC\_30A\_n5A | CA\_2A-30A | n5A |
| DC\_2A-2A-30A\_n5A | DC\_2A\_n5A  DC\_30A\_n5A | CA\_2A-2A-30A | n5A |

5.1.39.3 Coexistence studies

Based on co-existence studies of DC\_2A\_n5A and DC\_30A\_n5A in TR 37.863-01-01, there is no harmonic or IMD impact to any of three own Rx bands.

5.1.39.4 ∆TIB and ∆RIB values

For DC\_2-30\_n5 and DC\_2-2-30\_n5, the ΔTIB,c and ΔRIB,c values are derived from CA\_2-5-30 in TS 36.101.

Table 5.X.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-30\_n5, DC\_2-2-30\_n5 | 2 | 0.5 |
| 30 | 0.3 |
| n5 | 0.3 |

Table 5.X.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-30\_n5, DC\_2-2-30\_n5 | 2 | 0.4 |
| 30 | 0.5 |
| n5 | 0 |

5.1.39.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.40 DC\_30-66\_n5, DC\_30-66-66\_n5 and DC\_30-66-66-66\_n5

5.1.40.1 Operating bands for DC

Table 5.1.40.1-1: Band combinations EN-DC (two bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_30-66\_n5 | CA\_30-66 | n5 | No |

5.1.40.2 Configuration for DC

Table 6.1.X.2-1: Inter-band EN-DC configurations (two bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_30A-66A\_n5A | DC\_30A\_n5A  DC\_66A\_n5A | CA\_30A-66A | n5A |
| DC\_30A-66A-66A\_n5A | DC\_30A\_n5A  DC\_66A\_n5A | CA\_30A-66A-66A | n5A |
| DC\_30A-66A-66A-66A\_n5A | DC\_30A\_n5A  DC\_66A\_n5A | CA\_30A-66A-66A-66A | n5A |

5.1.40.3 Coexistence studies

Based on co-existence studies of DC\_66A\_n5A in TR 37.863-01-01, the 2nd and 5th IMD of 66+n5 may fall into the band n5 downlink and Pcell REFSENS excpetions can be represented by the REFSENS expcetion already specified for DC\_66A-n5A.

Based on co-existence studies of DC\_30A\_n5A in TR 37.863-01-01, 5th IMD product of 30+n5 may fall into band 66 downlink.

5.1.40.4 ∆TIB and ∆RIB values

For DC\_30-66\_n5, DC\_30-66-66\_n5 and DC\_30-66-66-66\_n5, the ΔTIB,c and ΔRIB,c values are derived from CA\_5-30-66 in TS 36.101.

Table 5.X.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_30-66\_n5, DC\_30-66-66\_n5, DC\_30-66-66-66\_n5 | 30 | 0.3 |
| 66 | 0.5 |
| n5 | 0.3 |

Table 5.X.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_30-66\_n5, DC\_30-66-66\_n5, DC\_30-66-66-66\_n5 | 30 | 0 |
| 66 | 0.4 |
| n5 | 0.5 |

5.1.40.5 Refsens requirements

Pcell REFSENS exceptions for band n5 due to 2 uplink of band 66 and band n5 can be represented by the REFSENS expcetion already specified for DC\_66A-n5A in TS 38.101-3.

Scell REFSENS exceptions for band 66 due to 2 uplink of band 30 and band n5, MSD is specified in Table 5.1.40.5-1

Table 5.1.40.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC\_30A-66A\_n5A | 30 | 2310 | 5 | 25 | 2355 | N/A | FDD | N/A |
| 66 | 1730 | 5 | 25 | 2130 | [2.5 dB] | FDD | IMD5 |
| n5 | 830 | 5 | 25 | 875 | N/A | FDD | N/A |

## 5.1.41 DC\_3-7\_n1, DC\_3-3-7\_n1, DC\_3-7-7\_n1, DC\_3-3-7-7\_n1

5.1.41.1 Operating bands for DC

**Table 5.1.41.1-1: Band combinations EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-7\_n1 | CA\_3-7 | n1 | DC\_3\_n1 |
| DC\_3-3-7\_n1 | CA\_3-3-7 | n1 | DC\_3\_n1 |
| DC\_3-7-7\_n1 | CA\_3-7-7 | n1 | DC\_3\_n1 |
| DC\_3-3-7-7\_n1 | CA\_3-3-7-7 | n1 | DC\_3\_n1 |

5.1.41.2 Configuration for DC

**Table 5.1.41.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-7A\_n1A | DC\_3A\_n1A, DC\_7A\_n1A | CA\_3A-7A | n1A |
| DC\_3A-7C\_n1A | DC\_3A\_n1A, DC\_7A\_n1A,  DC\_7C\_n1A | CA\_3A-7C | n1A |
| DC\_3C-7A\_n1A | DC\_3A\_n1A,  DC\_3C\_n1A,  DC\_7A\_n1A | CA\_3C-7A | n1A |
| DC\_3C-7C\_n1A | DC\_3A\_n1A,  DC\_3C\_n1A,  DC\_7A\_n1A,  DC\_7C\_n1A | CA\_3C-7C | n1A |
| DC\_3A-3A-7A\_n1A | DC\_3A\_n1A, DC\_7A\_n1A | CA\_3A-3A-7A | n1A |
| DC\_3A-7A-7A\_n1A | DC\_3A\_n1A, DC\_7A\_n1A | CA\_3A-7A-7A | n1A |
| DC\_3A-3A-7A-7A\_n1A | DC\_3A\_n1A, DC\_7A\_n1A | CA\_3A-3A-7A-7A | n1A |

5.1.41.3 Co-existence Studies

Based on co-existence studies of DC\_3\_n1 and DC\_7\_n1, as captured in TR 37.716-11-11, no own Rx impact on the 3rd band is observed.

5.1.41.4 ∆TIB and ∆RIB values

The ΔTIB,c and ΔRIB,c values are given in the tables below.

**Table 5.1.41.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-7\_n1,  DC\_3-3-7\_n1, DC\_3-7-7\_n1, DC\_3-3-7-7\_n1 | 3 | 0.3 |
| 7 | 0.6 |
| n1 | 0.5 |

**Table 5.1.41.4-2: ΔRIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-7\_n1,  DC\_3-3-7\_n1, DC\_3-7-7\_n1, DC\_3-3-7-7\_n1 | 3 | 0 |
| 7 | 0 |
| n1 | 0 |

5.1.41.5 REFSENS requirements

No REFSENS requirements are expected for this DC configuration.

## 5.1.42 DC\_1-3\_n5

5.1.42.1 Operating bands for EN-DC

Table 5.2B.5.3-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-3\_n5 | CA\_1-3 | n5 | DC\_3\_n5 |

5.1.42.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-3A\_n5A  DC\_1A-3C\_n5A | DC\_1A\_n5A  DC\_3A\_n5A  DC\_3C\_n5A | CA\_1A-3A  CA\_1A-3C | n5 |

5.1.42.3 Co-existence Studies

Co-existence analysis from DC\_3\_n5 shows that there is no impact from DC\_3\_n5 UL to Band 1 DL.

Co-existence analysis from DC\_1\_n5 shows that there is no impact from DC\_1\_n5 UL to Band 3 DL.

5.1.42.4 ∆TIB and ∆RIB values

For DC\_1-3\_n5, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_1-3-5, and are given in the tables below.

**Table 5.1.42.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-3\_n5 | 1 | 0.3 |
| 3 | 0.3 |
| n5 | 0.3 |

**Table 5.1.42.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-3\_n5 | 1 | 0 |
| 3 | 0 |
| n5 | 0 |

5.1.42.5 REFSENS requirements

MSD does not need to be defined.

## 5.1.43 DC\_1-7\_n5

5.1.43.1 Operating bands for EN-DC

Table 5.2B.5.3-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-7\_n5 | CA\_1-7 | n5 | DC\_7\_n5 |

5.1.43.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-7A\_n5A  DC\_1A-7C\_n5A | DC\_1A\_n5A  DC\_7A\_n5A  DC\_7C\_n5A | CA\_1A-7A  CA\_1A-7C | n5 |

5.1.43.3 Co-existence Studies

Co-existence analysis from DC\_7\_n5 shows that there is no impact from DC\_7\_n5 UL to Band 1 DL.

Co-existence analysis from DC\_1\_n5 shows that there is no impact from DC\_1\_n5 UL to Band 7 DL.

5.1.43.4 ∆TIB and ∆RIB values

For DC\_1-7\_n5, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_1-5-7, and are given in the tables below.

**Table 5.1.43.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-7\_n5 | 1 | 0.5 |
| 7 | 0.6 |
| n5 | 0.3 |

**Table 5.1.43.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-7\_n5 | 1 | 0 |
| 7 | 0 |
| n5 | 0 |

5.1.43.5 REFSENS requirements

MSD does not need to be defined.

## 5.1.44 DC\_1-28\_n5

5.1.44.1 Operating bands for EN-DC

Table 5.2B.5.3-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-28\_n53 | CA\_1-28 | n5 | No |
| NOTE 3: The frequency range in band n28 is restricted for this band combination to 703-733 MHz for the UL and 758-788 MHz for the DL. | | | |

5.1.44.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-28A\_n5A4 | DC\_1A\_n5A  DC\_28A\_n5A | CA\_1A-28A | n5 |
| NOTE 4: The frequency range in band n28 is restricted for this band combination to 703-733 MHz for the UL and 758-788 MHz for the DL. | | | |

5.1.44.3 Co-existence Studies

In these analyses the frequency range in band n28 is restricted to 703-733 MHz for the UL and 758-788 MHz for the DL

Co-existence for DC\_28A\_n5A UL into band 1 DL is investigated in Table 5.1.44.3-1.

**Table 5.1.44.3-1: Harmonic and IMD analysis DC\_28A\_n5A UL**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 703 | 733 | 824 | 849 |
| 2nd harmonics frequency limits | 2\* fy\_low | 2\* fy\_high | 2\*fx\_low | 2\*fx\_high |
| 2nd harmonics frequency limits (MHz) | 1406 | 1466 | 1648 | 1698 |
| 3rd harmonics frequency limits | 3\* fy\_low | 3\* fy\_high | 3\*fx\_low | 3\*fx\_high |
| 3rd harmonics frequency limits (MHz) | 2109 | 2199 | 2472 | 2547 |
| 4th harmonics frequency limits | 4\* fy\_low | 4\* fy\_high | 4\*fx\_low | 4\*fx\_high |
| 4th harmonics frequency limits (MHz) | 2812 | 2932 | 3296 | 3396 |
| 5th harmonics frequency limits | 5\* fy\_low | 5\* fy\_high | 5\*fx\_low | 5\*fx\_high |
| 5th harmonics frequency limits (MHz) | 3515 | 3665 | 4120 | 4245 |
| 6th harmonics frequency limits | 6\* fy\_low | 6\* fy\_high | 6\*fx\_low | 6\*fx\_high |
| 6th harmonics frequency limits (MHz) | 4218 | 4398 | 4944 | 5094 |
| 7th harmonics frequency limits | 7\* fy\_low | 7\* fy\_high | 7\*fx\_low | 7\*fx\_high |
| 7th harmonics frequency limits (MHz) | 4921 | 5131 | 5768 | 5943 |
| 2nd order IMD products | |fy\_high – fx\_low| | |fy\_low – fx\_high| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 146 | 91 | 1527 | 1582 |
| 3rd order IMD products | |fy\_high – 2\*fx\_low| | |fy\_low – 2\*fx\_high| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 557 | 642 | 915 | 995 |
| 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 2230 | 2315 | 2351 | 2431 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high – 2\*fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 292 | 182 | 3054 | 3164 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 1260 | 1375 | 1739 | 1844 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high +1\* fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 2933 | 3048 | 3175 | 3280 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 2693 | 2563 | 2108 | 1963 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 3999 | 4129 | 3636 | 3781 |
| Two-tone 5th order IMD products | |2\*fx\_low – 3\*fy\_high| | |2\*fx\_high – 3\*fy\_low| | |2\*fy\_low – 3\*fx\_high| | |2\*fy\_high – 3\*fx\_low| |
| IMD frequency limits (MHz) | 1141 | 1006 | 551 | 411 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 3878 | 4013 | 3757 | 3897 |

Co-existence analysis in Table 5.1.44.3-1shows that there is no impact from DC\_28\_n5 UL to Band 1 DL.

Co-existence for DC\_1A\_n5A UL into band 28 DL is investigated in Table 5.1.44.3-2.

**Table 5.1.44.3-2: Harmonic and IMD analysis DC\_1A\_n5A UL**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 824 | 849 | 1920 | 1980 |
| 2nd harmonics frequency limits | 2\* fy\_low | 2\* fy\_high | 2\*fx\_low | 2\*fx\_high |
| 2nd harmonics frequency limits (MHz) | 1648 | 1698 | 3840 | 3960 |
| 3rd harmonics frequency limits | 3\* fy\_low | 3\* fy\_high | 3\*fx\_low | 3\*fx\_high |
| 3rd harmonics frequency limits (MHz) | 2472 | 2547 | 5760 | 5940 |
| 4th harmonics frequency limits | 4\* fy\_low | 4\* fy\_high | 4\*fx\_low | 4\*fx\_high |
| 4th harmonics frequency limits (MHz) | 3296 | 3396 | 7680 | 7920 |
| 5th harmonics frequency limits | 5\* fy\_low | 5\* fy\_high | 5\*fx\_low | 5\*fx\_high |
| 5th harmonics frequency limits (MHz) | 4120 | 4245 | 9600 | 9900 |
| 6th harmonics frequency limits | 6\* fy\_low | 6\* fy\_high | 6\*fx\_low | 6\*fx\_high |
| 6th harmonics frequency limits (MHz) | 4944 | 5094 | 11520 | 11880 |
| 7th harmonics frequency limits | 7\* fy\_low | 7\* fy\_high | 7\*fx\_low | 7\*fx\_high |
| 7th harmonics frequency limits (MHz) | 5768 | 5943 | 13440 | 13860 |
| 2nd order IMD products | |fy\_high – fx\_low| | |fy\_low – fx\_high| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 1156 | 1071 | 2744 | 2829 |
| 3rd order IMD products | |fy\_high – 2\*fx\_low| | |fy\_low – 2\*fx\_high| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 332 | 222 | 2991 | 3136 |
| 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 3568 | 3678 | 4664 | 4809 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high – 2\*fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 2312 | 2142 | 5488 | 5658 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 492 | 627 | 4911 | 5116 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high +1\* fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 4392 | 4527 | 6584 | 6789 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 7096 | 6831 | 1476 | 1316 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 8504 | 8769 | 5216 | 5376 |
| Two-tone 5th order IMD products | |2\*fx\_low – 3\*fy\_high| | |2\*fx\_high – 3\*fy\_low| | |2\*fy\_low – 3\*fx\_high| | |2\*fy\_high – 3\*fx\_low| |
| IMD frequency limits (MHz) | 4292 | 4062 | 1293 | 1488 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 7408 | 7638 | 6312 | 6507 |

Co-existence analysis in Table 5.1.44.3-2shows that there is no impact from DC\_1\_n5 UL to Band 28 DL.

5.1.44.4 ∆TIB and ∆RIB values

For DC\_1-28\_n5, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_1-18-28, and are given in the tables below.

**Table 5.1.44.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-28\_n5 | 1 | 0.3 |
| 28 | 0.5 |
| n5 | 0.5 |

**Table 5.1.44.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-28\_n5 | 1 | 0 |
| 28 | 0 |
| n5 | 0 |

5.1.44.5 REFSENS requirements

As shown in the co-existence analysis in 5.1.44.3, MSD is not needed to be defined.

## 5.1.45 DC\_3-7\_n5

5.1.45.1 Operating bands for EN-DC

Table 5.2B.5.3-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-7\_n5 | CA\_3-7 | n5 | DC\_3\_n5  DC\_7\_n5 |

5.1.45.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_3A-7A\_n5A DC\_3C-7A\_n5A  DC\_3A-7C\_n5A  DC\_3C-7C\_n5A | DC\_3A\_n5A  DC\_3C\_n5A  DC\_7A\_n5A  DC\_7C\_n5A | CA\_3A-7A  CA\_3C-7A  CA\_3A-7C  CA\_3C-7C | n5 |

5.1.45.3 Co-existence Studies

Co-existence analysis from DC\_3\_n5 shows that there is IMD2 and IMD3 impact from DC\_3\_n5 UL to Band 7 DL.

Co-existence analysis from DC\_7\_n5 shows that there is no impact from DC\_7\_n5 UL to Band 3 DL.

5.1.45.4 ∆TIB and ∆RIB values

For DC\_3-7\_n5, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_3-5-7, and are given in the tables below.

**Table 5.1.45.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-7\_n5 | 3 | 0.5 |
| 7 | 0.5 |
| n5 | 0.3 |

**Table 5.1.45.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-7\_n5 | 3 | 0 |
| 7 | 0 |
| n5 | 0 |

5.1.45.5 REFSENS requirements

MSD need to be defined in TS 38.101-3, see below.

Table 7.3B.2.3.5.2-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC\_3A-7A\_n5A | 3 | 1780 | 10 | 50 | 1875 | N/A | FDD | N/A |
| 7 | 2505 | 10 | 50 | 2625 | 30.0 | IMD21 |
| n5 | 845 | 5 | 25 | 890 | N/A | N/A |
| NOTE 1: This band is subject to IMD3 also which MSD is not specified. | | | | | | | | |

## 5.1.46 DC\_3-28\_n5

5.1.46.1 Operating bands for EN-DC

Table 5.2B.5.3-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-28\_n5 | CA\_3-28 | n5 | DC\_3\_n5 |

5.1.46.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_3A-28A\_n5A DC\_3C-28A\_n5A | DC\_3A\_n5A  DC\_3C\_n5A DC\_28A\_n5A | CA\_3A-28A  CA\_3C-28A | n5 |

5.1.46.3 Co-existence Studies

Co-existence analysis from DC\_28\_n5 shows that there is IMD4 impact from DC\_28\_n5 UL to Band 3 DL.

Co-existence analysis from DC\_3\_n5 shows that there is IMD4 impact from DC\_3\_n5 UL to Band 28 DL.

5.1.46.4 ∆TIB and ∆RIB values

For DC\_3-28\_n5, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_3-5-28, and are given in the tables below.

**Table 5.1.46.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-28\_n5 | 3 | 0.3 |
| 28 | 0.5 |
| n5 | 0.5 |

**Table 5.1.46.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-28\_n5 | 3 | 0 |
| 28 | 0.1 |
| n5 | 0.1 |

5.1.46.5 REFSENS requirements

Co-existence analysis from shows that there is IMD4 impact from DC\_28\_n5 UL to Band 3 DL, as well as IMD4 impact from DC\_3\_n5 UL to Band 28 DL. Therefore, MSD values are needed to be introduced in 38.101-3.

MSD values are reused from DC\_20\_n28-n78 which has IMD4 in n28 DL and n78 DL.

Table 7.3B.2.3.5.2-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC\_3A-28A\_n5A  DC\_3C-28A\_n5A | 3 | 1735 | 5 | 25 | 1830 | 8.7 | FDD | IMD4 |
| 28 | 705 | 5 | 25 | 798 | N/A | FDD | N/A |
| n5 | 845 | 5 | 25 | 874 | N/A | FDD | N/A |
| 3 | 1750 | 5 | 25 | 1845 | N/A | FDD | N/A |
| 28 | 730 | 5 | 25 | 785 | 9.4 | FDD | IMD4 |
| n5 | 845 | 5 | 25 | 874 | N/A | FDD | N/A |

## 5.1.47 DC\_7-28\_n5

5.1.47.1 Operating bands for EN-DC

Table 5.2B.5.3-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_7-28\_n53 | CA\_7-28 | n5 | DC\_7\_n5 |
| NOTE 3: The frequency range in band n28 is restricted for this band combination to 703-733 MHz for the UL and 758-788 MHz for the DL. | | | |

5.1.47.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_7A-28A\_n5A4 DC\_7C-28A\_n5A4 | DC\_7A\_n5A  DC\_7C\_n5A  DC\_28A\_n5A | CA\_7A-28A  CA\_7C-28A | n5 |
| NOTE 4: The frequency range in band n28 is restricted for this band combination to 703-733 MHz for the UL and 758-788 MHz for the DL. | | | |

5.1.47.3 Co-existence Studies

In these analyses the frequency range in band n28 is restricted to 703-733 MHz for the UL and 758-788 MHz for the DL

Co-existence for DC\_28A\_n5A UL into band 7 DL is investigated in Table 5.1.47.3-1.

**Table 5.1.47.3-1: Harmonic and IMD analysis DC\_28A\_n5A UL**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 703 | 733 | 824 | 849 |
| 2nd harmonics frequency limits | 2\* fy\_low | 2\* fy\_high | 2\*fx\_low | 2\*fx\_high |
| 2nd harmonics frequency limits (MHz) | 1406 | 1466 | 1648 | 1698 |
| 3rd harmonics frequency limits | 3\* fy\_low | 3\* fy\_high | 3\*fx\_low | 3\*fx\_high |
| 3rd harmonics frequency limits (MHz) | 2109 | 2199 | 2472 | 2547 |
| 4th harmonics frequency limits | 4\* fy\_low | 4\* fy\_high | 4\*fx\_low | 4\*fx\_high |
| 4th harmonics frequency limits (MHz) | 2812 | 2932 | 3296 | 3396 |
| 5th harmonics frequency limits | 5\* fy\_low | 5\* fy\_high | 5\*fx\_low | 5\*fx\_high |
| 5th harmonics frequency limits (MHz) | 3515 | 3665 | 4120 | 4245 |
| 6th harmonics frequency limits | 6\* fy\_low | 6\* fy\_high | 6\*fx\_low | 6\*fx\_high |
| 6th harmonics frequency limits (MHz) | 4218 | 4398 | 4944 | 5094 |
| 7th harmonics frequency limits | 7\* fy\_low | 7\* fy\_high | 7\*fx\_low | 7\*fx\_high |
| 7th harmonics frequency limits (MHz) | 4921 | 5131 | 5768 | 5943 |
| 2nd order IMD products | |fy\_high – fx\_low| | |fy\_low – fx\_high| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 146 | 91 | 1527 | 1582 |
| 3rd order IMD products | |fy\_high – 2\*fx\_low| | |fy\_low – 2\*fx\_high| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 557 | 642 | 915 | 995 |
| 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 2230 | 2315 | 2351 | 2431 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high – 2\*fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 292 | 182 | 3054 | 3164 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 1260 | 1375 | 1739 | 1844 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high +1\* fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 2933 | 3048 | 3175 | 3280 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 2693 | 2563 | 2108 | 1963 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 3999 | 4129 | 3636 | 3781 |
| Two-tone 5th order IMD products | |2\*fx\_low – 3\*fy\_high| | |2\*fx\_high – 3\*fy\_low| | |2\*fy\_low – 3\*fx\_high| | |2\*fy\_high – 3\*fx\_low| |
| IMD frequency limits (MHz) | 1141 | 1006 | 551 | 411 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 3878 | 4013 | 3757 | 3897 |

Co-existence analysis in Table 5.1.47.3-1shows that there is IMD5 impact from DC\_28\_n5 UL to Band 7 DL.

Co-existence for DC\_7A\_n5A UL into band 28 DL is investigated in Table 5.1.47.3-2.

**Table 5.1.47.3-2: Harmonic and IMD analysis DC\_7A\_n5A UL**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 824 | 849 | 2500 | 2570 |
| 2nd harmonics frequency limits | 2\* fy\_low | 2\* fy\_high | 2\*fx\_low | 2\*fx\_high |
| 2nd harmonics frequency limits (MHz) | 1648 | 1698 | 5000 | 5140 |
| 3rd harmonics frequency limits | 3\* fy\_low | 3\* fy\_high | 3\*fx\_low | 3\*fx\_high |
| 3rd harmonics frequency limits (MHz) | 2472 | 2547 | 7500 | 7710 |
| 4th harmonics frequency limits | 4\* fy\_low | 4\* fy\_high | 4\*fx\_low | 4\*fx\_high |
| 4th harmonics frequency limits (MHz) | 3296 | 3396 | 10000 | 10280 |
| 5th harmonics frequency limits | 5\* fy\_low | 5\* fy\_high | 5\*fx\_low | 5\*fx\_high |
| 5th harmonics frequency limits (MHz) | 4120 | 4245 | 12500 | 12850 |
| 6th harmonics frequency limits | 6\* fy\_low | 6\* fy\_high | 6\*fx\_low | 6\*fx\_high |
| 6th harmonics frequency limits (MHz) | 4944 | 5094 | 15000 | 15420 |
| 7th harmonics frequency limits | 7\* fy\_low | 7\* fy\_high | 7\*fx\_low | 7\*fx\_high |
| 7th harmonics frequency limits (MHz) | 5768 | 5943 | 17500 | 17990 |
| 2nd order IMD products | |fy\_high – fx\_low| | |fy\_low – fx\_high| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 1746 | 1651 | 3324 | 3419 |
| 3rd order IMD products | |fy\_high – 2\*fx\_low| | |fy\_low – 2\*fx\_high| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 922 | 802 | 4151 | 4316 |
| 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 4148 | 4268 | 5824 | 5989 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high – 2\*fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 3492 | 3302 | 6648 | 6838 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 98 | 47 | 6651 | 6886 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high +1\* fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 4972 | 5117 | 8324 | 8559 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 9456 | 9151 | 896 | 726 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 10824 | 11129 | 5796 | 5966 |
| Two-tone 5th order IMD products | |2\*fx\_low – 3\*fy\_high| | |2\*fx\_high – 3\*fy\_low| | |2\*fy\_low – 3\*fx\_high| | |2\*fy\_high – 3\*fx\_low| |
| IMD frequency limits (MHz) | 6062 | 5802 | 2453 | 2668 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 9148 | 9408 | 7472 | 7687 |

Co-existence analysis in Table 5.1.47.3-2shows that there is IMD5 impact from DC\_7\_n5 UL to Band 28 DL.

5.1.47.4 ∆TIB and ∆RIB values

For DC\_7-28\_n5, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_5-7-28, and are given in the tables below.

**Table 6.x.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_7-28\_n5 | 7 | 0.3 |
| 28 | 0.5 |
| n5 | 0.5 |

**Table 6.x.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_7-28\_n5 | 7 | 0 |
| 28 | 0 |
| n5 | 0 |

5.1.47.5 REFSENS requirements

Co-existence analysis in 5.1.47.3 shows that there is IMD5 impact from DC\_7\_n5 UL to Band 28 DL, as well as IMD5 impact from DC\_28\_n5 UL to Band 7 DL. Therefore, MSD values are needed in 38.101-3.

For band 28 it is used the IMD5 MSD value for band 28 in DC\_18A-28A\_n77A.

For band 7 it is used the IMD5 MSD value for band 7 in DC\_7A-20A\_n28A.

Table 7.3B.2.3.5.2-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC\_7A-28A\_n5A DC\_7C-28A\_n5A | 7 | 2540 | 5 | 25 | 2725 | N/A | FDD | N/A |
| 28 | 721 | 5 | 25 | 776 | 4.4 | FDD | IMD5 |
| n5 | 829 | 5 | 25 | 854 | N/A | FDD | N/A |
| 7 | 2510 | 5 | 25 | 2630 | 5.9 | FDD | IMD5 |
| 28 | 730 | 5 | 25 | 785 | N/A | FDD | N/A |
| n5 | 840 | 5 | 25 | 874 | N/A | FDD | N/A |

## 5.1.48 DC\_1-11\_n77

5.1.48.1 Operating bands for DC\_1-11\_n77

Table 5.1.48.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-11\_n77 | CA\_1-11 | n77 | DC\_1\_n77 |

5.1.48.2 Configurations for DC\_1-11\_n77

Table 5.1.48.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-11A\_n77A | DC\_1A\_n77A  DC\_11A\_n77A | CA\_1A-11A | n77A |

5.1.48.3 Co-existence studies

When Uplink EN-DC configuration is DC\_1A\_n77A, (1) IMD2 of (B1 - n77) will fall into Rx band of Band 11. When Uplink EN-DC configuration is DC\_11A\_n77A, (2) IMD2 of (B11 - n77) will fall into Rx band of Band 1.

5.1.48.4 ∆TIB and ∆RIB values

The following relaxation values are proposed:

Table 5.1.48.4-1: ΔTIB,c

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_1-11\_n77 | 1 | 0.6 |
| 11 | 0.4 |
| n77 | 0.8 |

Table 5.1.48.4-2: ΔRIB

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_1-11\_n77 | 1 | 0.2 |
| 11 | 0 |
| n77 | 0.5 |

5.1.48.5 REFSENS requirements

As mentioned above, IMD2 of B1 and n77 to Band 11 Rx and IMD2 of B11 and n77 to Band 1 Rx need to be addressed for REFSENS relaxation. The following values are proposed:

Table 5.1.48.5-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** | Single UL allowed |
| DC\_1A-11A\_n77A | 1 | 1955 | 5 | 25 | 2145 | N/A | FDD | N/A |  |
| n77 | 3441 | 10 | 50 | 3441 | N/A | TDD | N/A |  |
| 11 | 1438 | 5 | 25 | 1486 | 31.4 | FDD | IMD2 |  |
| DC\_1A-11A\_n77A | 11 | 1438 | 5 | 25 | 1486 | N/A | FDD | N/A |  |
| n77 | 3578 | 10 | 50 | 3578 | N/A | TDD | N/A |  |
| 1 | 1950 | 5 | 25 | 2140 | 30.8 | FDD | IMD2 |  |

## 5.1.49 DC\_3-20\_n1

5.1.49.1 Operating bands for EN-DC

Table 5.1B.5.3-1: Band combinations EN-DC (four bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 3-20\_n1 | CA\_3-20 | n1 | DC\_3\_n1 |

5.1.49.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (four bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_3A-20A\_n1A | DC\_3A\_n1A  DC\_20A\_n1A | CA\_3A-20A | n1 |
| DC\_3C-20A\_n1A | DC\_3A\_n1A  DC\_3C\_n1A  DC\_20A\_n1A | CA\_3C-20A | n1 |

5.1.49.3 ∆TIB and ∆RIB values

For DC\_3-20\_n1, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_1-3-20, and are given in the tables below.

**Table 5.1.49.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-20\_n1 | 3 | 0.3 |
| 20 | 0.3 |
| n1 | 0.3 |

**Table 5.1.49.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-20\_n1 | 3 | 0 |
| 20 | 0 |
| n1 | 0 |

5.1.49.4 REFSENS requirements

Co-existence analysis from DC\_3\_n1 shows that there is no impact from DC\_3\_n1 UL to Band 20 DL.

Co-existence analysis from DC\_20\_n1 shows that there is no impact from DC\_20\_n1 UL to Band 3 DL.

Therefore, MSD does not need to be defined.

## 5.1.50 DC\_1-20\_n3

5.1.50.1 Operating bands for EN-DC

Table 5.1B.5.3-1: Band combinations EN-DC (four bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 1-20\_n3 | CA\_1-20 | n3 | 1\_n3 |

5.1.50.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (four bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-20A\_n3A | DC\_1A\_n3A  DC\_20A\_n3A | CA\_1A-20A | n3 |

5.1.50.3 ∆TIB and ∆RIB values

For DC\_1-20\_n3, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_1-3-20, and are given in the tables below.

**Table 5.1.50.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-20\_n3 | 1 | 0.3 |
| 20 | 0.3 |
| n3 | 0.3 |

**Table 5.1.50.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-20\_n3 | 1 | 0 |
| 20 | 0 |
| n3 | 0 |

5.1.50.4 REFSENS requirements

Co-existence analysis from DC\_1\_n3 shows that there is no impact from DC\_1\_n3 UL to Band 20 DL.

Co-existence analysis from DC\_20\_n3 shows that there is no impact from DC\_20\_n3 UL to Band 1 DL.

Therefore, MSD does not need to be defined.

## 5.1.51 DC\_2-66\_n5, DC\_2-2-66\_n5, DC\_2-66-66\_n5 DC\_2-2-66-66\_n5, and DC\_2-66-66-66\_n5

5.1.51.1 Operating bands for DC

Table 5.1.51.1-1: Band combinations EN-DC (two bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-66\_n5 | CA\_2-66 | n5 | No |

5.1.51.2 Configuration for DC

Table 5.1.51.2: Inter-band EN-DC configurations (two bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_2A-66A\_n5A | DC\_2A\_n5A  DC\_66A\_n5A | CA\_2A-66A | n5A |
| DC\_2A-2A-66A\_n5A | DC\_2A\_n5A  DC\_66A\_n5A | CA\_2A-2A-66A | n5A |
| DC\_2A-66A-66A\_n5A | DC\_2A\_n5A  DC\_66A\_n5A | CA\_2A-66A-66A | n5A |
| DC\_2A-2A-66A-66A\_n5A | DC\_2A\_n5A  DC\_66A\_n5A | CA\_2A-2A-66A-66A | n5A |
| DC\_2A-66A-66A-66A\_n5A | DC\_2A\_n5A  DC\_66A\_n5A | CA\_2A-66A-66A-66A | n5A |

5.1.51.3 Coexistence studies

Based on co-existence studies of DC\_66A\_n5A in TR 37.863-01-01, the 2nd and 5th IMD of 66+n5 may fall into the band n5 downlink and Pcell REFSENS excpetions can be represented by the REFSENS expcetion already specified for DC\_66A-n5A.

Co-existence studies for DC\_2A\_n5A is also available in TR 37.863-01-01. For this 4th IMD product of 2+n5 may fall into band 66 downlink.

5.1.51.4 ∆TIB and ∆RIB values

The ΔTIB,c and ΔRIB,c values are derived from CA\_2-5-66 in TS 36.101.

Table 5.1.51.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n5,  DC\_2A-2A-66A\_n5A,  DC\_2-66-66\_n5,  DC\_2A-2A-66A-66A\_n5A,  DC\_2-66-66-66\_n5 | 2 | 0.5 |
| 66 | 0.5 |
| n5 | 0.3 |

Table 5.1.51.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n5,  DC\_2A-2A-66A\_n5A,  DC\_2-66-66\_n5,  DC\_2A-2A-66A-66A\_n5A,  DC\_2-66-66-66\_n5 | 2 | 0.3 |
| 66 | 0.3 |
| n5 | 0 |

5.1.51.5 Refsens requirements

Pcell REFSENS exceptions for band n5 due to 2 uplink of band 66 and band n5 can be represented by the REFSENS expcetion already specified for DC\_66A-n5A in TS 38.101-3.

Scell REFSENS exceptions for band 66 due to 2 uplink of band 2 and band n5, MSD is specified in Table 5.1.51.5-1

Table 5.1.51.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC\_2A-66A\_n5A | 2 | 1900 | 5 | 25 | 1980 | N/A | FDD | N/A |
| 66 | 1740 | 5 | 25 | 2140 | 7.2 | FDD | IMD4 |
| n5 | 830 | 5 | 25 | 875 | N/A | FDD | N/A |

The MSD value is based on predefined value for LTE CA\_2A-2A-5A-66A-66A / CA\_2A-5A\_66A.

## 5.1.52 DC\_3-7\_n77, DC\_3-3-7\_n77, DC\_3-7-7\_n77, DC\_3-3-7-7\_n77

5.1.52.1 Operating bands for DC

**Table 5.1.52.1-1: Band combinations EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-7\_n77 | CA\_3-7 | n77 | DC\_3\_n77 |
| DC\_3-3-7\_n77 | CA\_3-3-7 | n77 | DC\_3\_n77 |
| DC\_3-7-7\_n77 | CA\_3-7-7 | n77 | DC\_3\_n77 |
| DC\_3-3-7-7\_n77 | CA\_3-3-7-7 | n77 | DC\_3\_n77 |

5.1.52.2 Configuration for DC

**Table 5.1.52.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-7A\_n77A | DC\_3A\_n77A, DC\_7A\_n77A | CA\_3A-7A | n77A |
| DC\_3A-3A-7A\_n77A | DC\_3A\_n77A, DC\_7A\_n77A | CA\_3A-3A-7A | n77A |
| DC\_3A-7A-7A\_n77A | DC\_3A\_n77A, DC\_7A\_n77A | CA\_3A-7A-7A | n77A |
| DC\_3A-3A-7A-7A\_n77A | DC\_3A\_n77A, DC\_7A\_n77A | CA\_3A-3A-7A-7A | n77A |

5.1.52.3 Co-existence Studies

Based on co-existence studies of DC\_7\_n77 and DC\_3\_n77, as captured in TR 37.716-11-11 and TR 37.863-01-01, own Rx impact on the 3rd band are the following:

- 5th order IM generated by dual uplink of Band 3 and n77 may fall into Band 7

- 3rd and 4th order IM generated by dual uplink of Band 7 and n77 may fall into Band 3

5.1.52.4 ∆TIB and ∆RIB values

The ΔTIB,c and ΔRIB,c values are given in the tables below.

**Table 5.1.52.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-7\_n77  DC\_3-3-7\_n77  DC\_3-7-7\_n77  DC\_3-3-7-7\_n77 | 3 | 0.6 |
| 7 | 0.6 |
| n77 | 0.8 |

**Table 5.1.52.4-2: ΔRIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-7\_n77  DC\_3-3-7\_n77  DC\_3-7-7\_n77  DC\_3-3-7-7\_n77 | 3 | 0.2 |
| 7 | 0.2 |
| n77 | 0.5 |

5.1.52.5 REFSENS requirements

Table below lists the MSD required for the dual connectivity configuration.

**Table 5.1.52.5-1: MSD for the DC configuration**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_3A-7A\_n77A | 3 | 1725 | 5 | 25 | 1820 | 17.6 | FDD | IMD3  |fB77-2\*fB7| |
| 7 | 2565 | 5 | 25 | 2685 | N/A | FDD |
| n77 | 3310 | 10 | 50 | 3310 | N/A | TDD |
| DC\_3A-7A\_n77A | 3 | 1725 | 5 | 25 | 1820 | 8.6 | FDD | IMD4  |2\*fB77-2\*fB7| |
| 7 | 2565 | 5 | 25 | 2685 | N/A | FDD |
| n77 | 3475 | 10 | 50 | 3475 | N/A | TDD |
| DC\_3A-7A\_n77A | 3 | 1715 | 5 | 25 | 1810 | N/A | FDD | IMD5  |fB77-4\*fB3| |
| 7 | 2550 | 5 | 25 | 2670 | 5.2 | FDD |
| n77 | 4190 | 10 | 50 | 4190 | N/A | TDD |
| DC\_3A-7A\_n77A | 3 | 1720 | 5 | 25 | 1815 | N/A | FDD | IMD5  |2\*fB77-3\*fB3| |
| 7 | 2520 | 5 | 25 | 2640 | 3.4 | FDD |
| n77 | 3900 | 10 | 50 | 3900 | N/A | TDD |

## 5.1.53 DC\_2-13\_n66 and DC\_2-2-13\_n66

5.1.53.1 Operating bands for DC

**Table 5.1.53.1-1: DC band combination of 1 LTE band + 1 NR band**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-13\_n66 | CA\_2-13 | n66 | No |
| DC\_2-2-13\_n66 | CA\_2-2-13 | n66 | No |

5.1.53.2 Configuration for DC

**Table 5.1.53.2-1: Inter-band EN-DC configurations of 1 LTE band + 1 NR band**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_2A-13A\_n66A | DC\_2A\_n66A  DC\_13A\_n66A | CA\_2A-13A | n66A |
| DC\_2A-2A-13A\_n66A | DC\_2A\_n66A  DC\_13A\_n66A | CA\_2A-2A-13A | n66A |

5.1.53.3 ∆TIB and ∆RIB values

For DC\_2-13\_n66 and DC\_2-2-13\_n66, the ΔTIB,c and ΔRIB,c values are given in the tables below. Numbers come from LTE CA\_2A-13A-66A

Table 5.1.53.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-13\_n66  DC\_2-2-13\_n66 | 2 | 0.5 |
| 13 | 0.3 |
| n66 | 0.5 |

Table 5.1.53.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-13\_n66  DC\_2-2-13\_n66 | 2 | 0.3 |
| 13 | 0 |
| n66 | 0.3 |

5.1.53.4 REFSENS requirements

From Band 2 +Band n66 analysis, harmonics up to 7th order and IMD up to 5th order does not fall into own 3rd receiving band. Thus Table 5.1.53.4-1 lists Band 13 +Band n66 2UL DC up to 7th order harmonics and 2nd, 3rd, 4th and 5th order IMD for the UE-to-UE coexistence analysis.

Table 5.1.53.4-1: Band 13 and Band n66 UL harmonics and IMD products

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 777 | 787 | 1710 | 1780 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\*fy\_low | 2\*fy\_high |
| 2nd harmonics frequency limits (MHz) | 1554 | 1574 | 3420 | 3560 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 2331 | 2361 | 5130 | 5340 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 3108 | 3148 | 6840 | 7120 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 3885 | 3935 | 8550 | 8900 |
| 6th harmonics frequency limits | 6\*fx\_low | 6\*fx\_high | 6\* fy\_low | 6\* fy\_high |
| 6th harmonics frequency limits (MHz) | 4662 | 4722 | 10260 | 10680 |
| 7th harmonics frequency limits | 7\*fx\_low | 7\*fx\_high | 7\* fy\_low | 7\* fy\_high |
| 7th harmonics frequency limits (MHz) | 5439 | 5509 | 11970 | 12460 |
| 2nd order IMD products | |fy\_high – fx\_low| | |fy\_low – fx\_high| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 1003 | 923 | 2487 | 2567 |
| 3rd order IMD products | |fy\_high – 2\*fx\_low| | |fy\_low – 2\*fx\_high| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 226 | 136 | 2633 | 797 |
| 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 3264 | 3354 | 4197 | 4347 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high – 2\*fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 2006 | 1846 | 4974 | 5134 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 551 | 651 | 4343 | 4563 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high +1\* fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 4041 | 4141 | 5907 | 6127 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 6343 | 6053 | 1438 | 1328 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 7617 | 7907 | 4818 | 4928 |
| Two-tone 5th order IMD products | |2\*fx\_low – 3\*fy\_high| | |2\*fx\_high – 3\*fy\_low| | |2\*fy\_low – 3\*fx\_high| | |2\*fy\_high – 3\*fx\_low| |
| IMD frequency limits (MHz) | 3786 | 3556 | 1059 | 1229 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 6684 | 6914 | 5751 | 5921 |

Based on Table 5.1.53.4-1;

- 4th order IMD may also fall into own Rx frequencies of band 2. MSD would be required as below table. The number re-use from LTE CA\_2A-4A-13A\_2UL\_4A-13A

Table 5.1.53.4-2: MSD for the DC configuration

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_2A-13A\_n66A  DC\_2A-2A-13A\_n66A | 2 | 1860 | 5 | 25 | 1940 | 6.2 | FDD | IMD4  |2\*fn66-2\*fB13| |
| 13 | 780 | 10 | 50 | 749 | N/A | FDD | N/A |
| n66 | 1750 | 5 | 25 | 2150 | N/A | TDD | N/A |

## 5.1.54 DC\_2-7\_n66, DC\_2-7-7\_n66

5.1.54.1 Operating bands for DC

Table 5.1.54.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-7\_n66 | CA\_2-7 | n66 |  |
| DC\_2-7-7\_n66 | CA\_2-7-7 | n66 |  |

5.1.54.2 Configurations for DC

Table 5.1.54.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_2A-7A\_n66A  DC\_2A-7C\_n66A  DC\_2A-7A-7A\_n66A | DC\_2A\_n66A1  DC\_7A\_n66A | CA\_2A-7A  CA\_2A-7C  CA\_2A-7A-7A | n66A |
| NOTE1: Single UL is allowed | | | |

5.1.54.3 Coexistence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there is no own Rx impact on the 3rd band.

5.1.54.4 ∆TIB and ∆RIB values

DC\_2-7\_n66 and DC\_2-7-7\_n66 could reuse the ΔTIB,c and ΔRIB,c values of CA\_2A-7A-66A as given in the below tables.

Table 5.1.54.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-7\_n66  DC\_2-7-7\_n66 | 2 | 0.5 |
| 7 | 0.5 |
| n66 | 0.5 |

Table 5.1.54.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-7\_n66  DC\_2-7-7\_n66 | 2 | 0.3 |
| 7 | 0.5 |
| n66 | 0.5 |

5.1.54.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.55 DC\_2-66\_n66

5.1.55.1 Operating bands for DC

Table 5.1.55.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-66\_n66 | CA\_2-66 | n66 |  |

5.1.55.2 Configurations for DC

Table 5.1.55.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_2A-66A\_n66A | DC\_2A\_n66A1  DC\_66A\_n66A2 | CA\_2A-66A | n66A |
| NOTE1: Single UL is allowed  NOTE2: Only single switched UL is supported | | | |

5.1.55.3 Coexistence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there is no own Rx impact on the 3rd band.

5.1.55.4 ∆TIB and ∆RIB values

For DC\_2-66\_n66, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 5.1.55.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n66 | 2 | 0.5 |
| 66 | 0.5 |
| n66 | 0.5 |

Table 5.1.55.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-66\_n66 | 2 | 0.3 |
| 66 | 0.3 |
| n66 | 0.3 |

5.1.55.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.56 DC\_7-66\_n66, DC\_7-7-66\_n66

5.1.56.1 Operating bands for DC

Table 5.1.56.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_7-66\_n66 | CA\_7-66 | n66 |  |
| DC\_7-7-66\_n66 | CA\_7-7-66 | n66 |  |

5.1.56.2 Configurations for DC

Table 5.1.56.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_7A-66A\_n66A  DC\_7C-66A\_n66A  DC\_7A-7A-66A\_n66A | DC\_7A\_n66A  DC\_66A\_n66A1 | CA\_7A-66A  CA\_7C-66A  CA\_7A-7A-66A | n66A |
| NOTE1: Only single switched UL is supported | | | |

5.1.56.3 Coexistence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there is no own Rx impact on the 3rd band.

5.1.56.4 ∆TIB and ∆RIB values

For DC\_7-66\_n66 and DC\_7-7-66\_n66, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 5.1.56.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_7-66\_n66  DC\_7-7-66\_n66 | 7 | 0.5 |
| 66 | 0.5 |
| n66 | 0.5 |

Table 5.1.56.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_7-66\_n66  DC\_7-7-66\_n66 | 7 | 0.5 |
| 66 | 0.5 |
| n66 | 0.5 |

5.1.56.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.57 DC\_3-8\_n1, DC\_3-3-8\_n1

5.1.57.1 Operating bands for DC

**Table 5.1.57.1-1: Band combinations EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-8\_n1 | CA\_3-8 | n1 | DC\_3\_n1 |
| DC\_3-3-8\_n1 | CA\_3-3-8 | n1 | DC\_3\_n1 |

5.1.57.2 Configuration for DC

**Table 5.1.57.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-8A\_n1A | DC\_3A\_n1A, DC\_8A\_n1A | CA\_3A-8A | n1A |
| DC\_3C-8A\_n1A | DC\_3A\_n1A, DC\_8A\_n1A | CA\_3C-8A | n1A |
| DC\_3A-3A-8A\_n1A | DC\_3A\_n1A, DC\_8A\_n1A | CA\_3A-3A-8A | n1A |

5.1.57.3 Co-existence Studies

Based on co-existence studies of DC\_3\_n1 and DC\_8\_n1, as captured in TR 37.716-11-11, no own Rx impact on the 3rd band is observed.

5.1.57.4 ∆TIB and ∆RIB values

The ΔTIB,c and ΔRIB,c values are given in the tables below.

**Table 5.1.57.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-8\_n1, DC\_3-3-8\_n1 | 3 | 0.3 |
| 8 | 0.3 |
| n1 | 0.3 |

**Table 5.1.57.4-2: ΔRIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-8\_n1, DC\_3-3-8\_n1 | 3 | 0 |
| 8 | 0 |
| n1 | 0 |

5.1.57.5 REFSENS requirements

No REFSENS requirements are expected for this DC configuration.

## 5.1.58 DC\_7-8\_n1, DC\_7-7-8\_n1

5.1.58.1 Operating bands for DC

**Table 5.1.58.1-1: Band combinations EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_7-8\_n1 | CA\_7-8 | n1 | No |
| DC\_7-7-8\_n1 | CA\_7-7-8 | n1 | No |

5.1.58.2 Configuration for DC

**Table 5.1.58.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_7A-8A\_n1A | DC\_7A\_n1A, DC\_8A\_n1A | CA\_7A-8A | n1A |
| DC\_7A-7A-8A\_n1A | DC\_7A\_n1A, DC\_8A\_n1A | CA\_7A-7A-8A | n1A |

5.1.58.3 Co-existence Studies

Based on co-existence studies of DC\_7\_n1 and DC\_8\_n1, as captured in TR 37.716-11-11, the following own Rx impact on the 3rd band is observed.

- 5th order IMD generated by dual uplink of Band 7 + Band n1 may fall into own Rx of band 8. However, based on the studies for DL CA\_1A-7A-8A paired with CA\_1A-7A in TR 36.714-00-02, the IMD5 is fairly small and the overlapped region is quite small portion, no MSD requirement is needed.

5.1.58.4 ∆TIB and ∆RIB values

The ΔTIB,c and ΔRIB,c values are given in the tables below.

**Table 5.1.58.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_7-8\_n1, DC\_7-7-8\_n1 | 7 | 0.6 |
| 8 | 0.6 |
| n1 | 0.5 |

**Table 5.1.58.4-2: ΔRIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_7-8\_n1, DC\_7-7-8\_n1 | 7 | 0 |
| 8 | 0.2 |
| n1 | 0 |

5.1.58.5 REFSENS requirements

No REFSENS requirements are expected for this DC configuration.

## 5.1.59 DC\_1-8\_n3

5.1.59.1 Operating bands for DC\_1-8\_n3

Table 5.1.59.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-8\_n3 | CA\_1-8 | n3 | DC\_1\_n3 |

5.1.59.2 Configurations for DC\_1-8\_n3

Table 5.1.59.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-8A\_n3A | DC\_1A\_n3A  DC\_8A\_n3A | CA\_1A-8A | n3A |

5.1.59.3 Co-existence studies

When Uplink EN-DC configuration is DC\_1\_n3, no IMDs will fall into Rx band of Band 8. When Uplink EN-DC configuration is DC\_8\_n3, no IMDs will fall into Rx band of Band 1.

Thus, it is not needed to evaluate.

5.1.59.4 ∆TIB and ∆RIB values

The following relaxation values are proposed:

Table 5.1.59.4-1: ΔTIB,c

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_1-8\_n3 | 1 | 0.3 |
| 8 | 0.3 |
| n3 | 0.3 |

Table 5.1.59.4-2: ΔRIB

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_1-8\_n3 | 1 | 0 |
| 8 | 0 |
| n3 | 0 |

5.1.59.5 REFSENS requirements

As mentioned in 5.1.59.3, REFSENS exceptions are not expected.

## 5.1.60 DC\_8-42\_n77

5.1.60.1 Operating bands for DC\_8-42\_n77

Table 5.1.60.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_8-42\_n77 | CA\_8-42 | n77 | No |

5.1.60.2 Configurations for DC\_8-42\_n77

Table 5.1.60.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_8A-42A\_n77A | DC\_8A\_n77A | CA\_8A-42A | n77A |
| DC\_8A-42C\_n77A | DC\_8A\_n77A | CA\_8A-42C | n77A |

5.1.60.3 Co-existence studies

The co-existence studies for the lower order 2DL/2UL DC configurations are already captured in TR 37.863-01-01. For the additional 3rd receiver band, there is no MSD issue for this DC configuration based on the following conditions.

- LTE Band 42 and NR Band n77 are synchronized.

- Simultaneous transmission of LTE Band 42 and NR Band n77 are not supported.

5.1.60.4 ∆TIB and ∆RIB values

The following relaxation values are proposed:

Table 5.1.60.4-1: ΔTIB,c

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_8-42\_n77 | 8 | 0.6 |
| 42 | 0.8 |
| n77 | 0.8 |

Table 5.1.60.4-2: ΔRIB

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_8-42\_n77 | 8 | 0.2 |
| 42 | 0.5 |
| n77 | 0.5 |

5.1.60.5 REFSENS requirements

As mentioned in 5.1.60.3, there is no need to specify additional MSD requirement for this UL DC configuration.

## 5.1.61 DC\_3-40\_n1

5.1.61.1 Operating bands for DC

Table 5.1.61.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-40\_n1 | CA\_3-40 | n1 | No |

5.1.61.2 Configurations for DC

Table 5.1.61.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-40A\_n1A | DC\_3A\_n1A  DC\_40A\_n1A | CA\_3A-40A | n1A |

5.1.61.3 ∆TIB and ∆RIB values

For DC\_3-40\_n1, the TIB,c and RIB,c values are given in the tables below.

Table 5.1.61.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-40\_n1 | 3 | 0.5 |
| 40 | 0.5 |
| n1 | 0.5 |

Table 5.1.61.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-40\_n1 | 3 | 0 |
| 40 | 0 |
| n1 | 0 |

5.1.61.4 REFSENS requirements

For UE coexistence study of Band 3 + Band n1, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.61.4-1.

Table 5.1.61.4-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1710 | 1785 | 1920 | 1980 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3420 | 3570 | 3840 | 3960 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5130 | 5355 | 5760 | 5940 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 6840 | 7140 | 7680 | 7920 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 8550 | 8925 | 9600 | 9900 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 135 | 270 | 3630 | 3765 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 1440 | 1650 | 2055 | 2250 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 5340 | 5550 | 5550 | 5745 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 3150 | 3435 | 3975 | 4230 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 7050 | 7335 | 7470 | 7725 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 540 | 270 | 7260 | 7530 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 6210 | 5895 | 5220 | 4860 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 2520 | 2190 | 1515 | 1170 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 9390 | 9705 | 8760 | 9120 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 9180 | 9510 | 8970 | 9315 |

For UE coexistence study of Band 40 + Band n1, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.61.4-2

Table 5.1.61.4-2: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1920 | 1980 | 2300 | 2400 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3840 | 3960 | 4600 | 4800 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5760 | 5940 | 6900 | 7200 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 7680 | 7920 | 9200 | 9600 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 9600 | 9900 | 11500 | 12000 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 320 | 480 | 4220 | 4380 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 1440 | 1660 | 2620 | 2880 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 6140 | 6360 | 6520 | 6780 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 3360 | 3640 | 4920 | 5280 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 8060 | 8340 | 8820 | 9180 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 960 | 640 | 8440 | 8760 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 7680 | 7220 | 5620 | 5280 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 3360 | 2940 | 1340 | 960 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 11120 | 11580 | 9980 | 10320 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 10740 | 11160 | 10360 | 10740 |

Based on co-existence study as presented in the table 5.1.61.4-1, IMD5 of band3 and band n1 will fall into band40 Rx.

Based on co-existence study as presented in the table 5.1.61.4-2, there is no MSD issue on the own Rx impact of the 3rd band when band40 and band n1 are uplink.

According to Table 7.3.1A-0g from TS 36.101, the MSD of CA\_1A-3A-40A caused by IMD5 can be reused. The MSD value is shown below.

Table 7.3B.2.3.5.2-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC\_3A-40A\_n1A | n1 | 1950 | 5 | 25 | 2140 | N/A | FDD | N/A |
| 3 | 1735 | 5 | 25 | 1830 | N/A | FDD | N/A |
| 40 | 2380 | 5 | 25 | 2380 | 8.0 | TDD | IMD5 |

## 5.1.62 DC\_7-40\_n1

5.1.62.1 Operating bands for DC

Table 5.1.62.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_7-40\_n1 | CA\_7-40 | n1 | No |

5.1.62.2 Configurations for DC

Table 5.1.62.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_7A-40A\_n1A | DC\_7A\_n1A  DC\_40A\_n1A | CA\_7A-40A | n1A |

5.1.62.3 ∆TIB and ∆RIB values

For DC\_7-40\_n1, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 5.1.62.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_7-40\_n1 | 7 | 0.8 |
| 40 | 0.9 |
| n1 | 0.6 |

Table 5.1.62.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_7-40\_n1 | 7 | 0.3 |
| 40 | 0.8 |
| n1 | 0 |

5.1.62.4 REFSENS requirements

For UE coexistence study of Band 40 + Band n1, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.62.4-1.

Table 5.1.62.4-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1920 | 1980 | 2300 | 2400 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3840 | 3960 | 4600 | 4800 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5760 | 5940 | 6900 | 7200 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 7680 | 7920 | 9200 | 9600 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 9600 | 9900 | 11500 | 12000 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 320 | 480 | 4220 | 4380 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 1440 | 1660 | 2620 | 2880 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 6140 | 6360 | 6520 | 6780 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 3360 | 3640 | 4920 | 5280 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 8060 | 8340 | 8820 | 9180 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 960 | 640 | 8440 | 8760 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 7680 | 7220 | 5620 | 5280 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 3360 | 2940 | 1340 | 960 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 11120 | 11580 | 9980 | 10320 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 10740 | 11160 | 10360 | 10740 |

For UE coexistence study of Band 7 + Band n1, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.62.4-2

Table 5.1.62.4-2: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1920 | 1980 | 2500 | 2570 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3840 | 3960 | 5000 | 5140 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5760 | 5940 | 7500 | 7710 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 7680 | 7920 | 10000 | 10280 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 9600 | 9900 | 12500 | 12850 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 520 | 650 | 4420 | 4550 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 1270 | 1460 | 3020 | 3220 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 6340 | 6530 | 6920 | 7120 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 3190 | 3440 | 5520 | 5790 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 8260 | 8510 | 9420 | 9690 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 1300 | 1040 | 8840 | 9100 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 8360 | 8020 | 5420 | 5110 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 3870 | 3540 | 940 | 620 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 11920 | 12260 | 10180 | 10490 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 11340 | 11670 | 10760 | 11080 |

Based on co-existence study as presented in the table 5.1.62.4-1, IMD3 of band40 and band n1 will fall into band7 Rx.

Based on co-existence study as presented in the table 5.1.62.4-2, there is no MSD issue on the own Rx impact of the 3rd band when band7 and band n1 are uplink.

According to the analysis, the MSD value is shown below, caused by IMD3 of band40 and n1.

Table 7.3B.2.3.5.2-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC\_7A-40A\_n1A | n1 | 1970 | 5 | 25 | 2160 | N/A | FDD | N/A |
| 7 | 2530 | 5 | 25 | 2650 | 32.1 | FDD | IMD3 |
| 40 | 2310 | 5 | 25 | 2310 | N/A | TDD | N/A |

## 5.1.63 DC\_2-66\_n66

5.1.63.1 Operating bands for DC

Table 5.1.63.1-1: Band combinations EN-DC (two bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-66\_n66 | CA\_2-66 | n66 | No |

5.1.63.2 Configuration for DC

Table 5.1.63.2-1: Inter-band EN-DC configurations (two bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_2A-66A\_n66A | DC\_2A\_n66A | CA\_2A-66A | n66A |

5.1.63.3 Coexistence studies

Based on co-existence studies of DC\_2A\_n66A in TR 37.863-01-01, the third order IMD may fall into band 2 and/or n66; the fifth order IMD may fall into band 66/n66.

5.1.63.4 ∆TIB and ∆RIB values

For DC\_2-66\_n66, the ΔTIB,c and ΔRIB,c values are derived from CA\_2-66 in TS 36.101.

Table 5.1.63.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n66 | 2 | 0.5 |
| 66 | 0.5 |
| n66 | 0.5 |

Table 5.1.63.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n66 | 2 | 0.3 |
| 66 | 0.3 |
| n66 | 0.3 |

5.1.63.5 REFSENS requirements

MSD due to IMD products are already specifed for 2DL2UL DC combos (DC\_2A\_n66A) in TS 38.101-3, where band 2 and n66 MSD are specified. To avoid the specification complexity, band 66 MSD is not specified as the same MSD is applied if band 66 carrier frequency is replaced by band n66 carrier frequency.

## 5.1.64 DC\_5-66\_n5 and DC\_5-66-66\_n5

5.1.64.1 Operating bands for DC

Table 5.1.64.1-1: Band combinations EN-DC (two bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_5-66\_n5 | CA\_5-66 | n5 | No |
| DC\_5-66-66\_n5 | CA\_5-66-66 | n5 | No |

5.1.64.2 Configuration for DC

Table 5.1.64.2-1: Inter-band EN-DC configurations (two bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_5A-66A\_n5A | DC\_66A\_n5A | CA\_5A-66A | n5A |
| DC\_5A-66A-66A\_n5A | DC\_66A\_n5A | CA\_5A-66A-66A | n5A |

5.1.64.3 Coexistence studies

Based on co-existence studies of DC\_66A\_n5A in TR 37.863-01-01, the second order IMD may fall into band 5 and/or n5.

5.1.64.4 ∆TIB and ∆RIB values

For DC\_5-66\_n5 and DC\_5-66-66\_n5, the ΔTIB,c and ΔRIB,c values are derived from CA\_5-66 in TS 36.101.

Table 5.1.64.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_5-66\_n5  DC\_5-66-66\_n5 | 5 | 0.3 |
| 66 | 0.3 |
| n5 | 0.3 |

Table 5.1.64.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_5-66\_n5  DC\_5-66-66\_n5 | 5 | 0 |
| 66 | 0 |
| n5 | 0 |

5.1.64.5 REFSENS requirements

MSD due to IMD products are already specifed for 2DL2UL DC combos (DC\_66A\_n5A) in TS 38.101-3, where band n5 MSD is specified. To avoid the specification complexity, band 5 MSD is not specified as the same MSD is applied if band n5 carrier frequency is replaced by band 5 carrier frequency.

## 5.1.65 DC\_2-5\_n66 and DC\_2-5-5\_n66

5.1.65.1 Operating bands for DC

Table 5.1.65.1-1: Band combinations EN-DC (two bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-5\_n66 | CA\_2-5 | n66 | No |
| DC\_2-5-5\_n66 | CA\_2-5-5 | n66 | No |

5.1.65.2 Configuration for DC

Table 5.1.65.2-1: Inter-band EN-DC configurations (two bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_2-5\_n66 | DC\_2A\_n66A  DC\_5A\_n66A | CA\_2A-5A | n66A |
| DC\_2A-5B\_n66A | DC\_2A\_n66A  DC\_5A\_n66A | CA\_2A-5B | n66A |
| DC\_2A-5A-5A\_n66A | DC\_2A\_n66A  DC\_5A\_n66A | CA\_2A-5A-5A | n66A |

5.1.65.3 Coexistence studies

Based on co-existence studies of DC\_2A\_n66A in TR 37.863-01-01, the third order IMD may fall into band 2 and/or n66; the fifth order IMD may fall into band n66.

Based on co-existence studies of DC\_5A\_n66A in TR 37.863-01-01, the second order IMD may fall into band 5.

5.1.65.4 ∆TIB and ∆RIB values

For DC\_2-5\_n66 and DC\_2-5-5\_n66, the ΔTIB,c and ΔRIB,c values are derived from CA\_2-5-66 in TS 36.101.

Table 5.1.65.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-5\_n66  DC\_2-5-5\_n66 | 2 | 0.5 |
| 5 | 0.3 |
| n66 | 0.5 |

Table 5.1.65.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-5\_n66  DC\_2-5-5\_n66 | 2 | 0.3 |
| 5 | 0 |
| n66 | 0.3 |

5.1.65.5 REFSENS requirements

The MSD due to IMD products are already specifed for 2DL2UL DC combos (DC\_2A\_n66A and DC\_5A\_n66A) in TS 38.101-3. There is no specific MSD for 3DL2UL DC.

## 5.1.66 DC\_13-66\_n66 and DC\_13A-66A-66A\_n66A

5.1.66.1 Operating bands for DC

Table 5.1.66.1-1: Band combinations EN-DC (two bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_13-66\_n66 | CA\_13-66 | n66 | No |
| DC\_13-66-66\_n66 | CA\_13-66-66 | n66 | No |

5.1.66.2 Configuration for DC

Table 5.1.66.2-1: Inter-band EN-DC configurations (two bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_13A-66A\_n66A | DC\_13A\_n66A | CA\_13A-66A | n66A |

5.1.66.3 Coexistence studies

Based on co-existence studies of DC\_13A\_n66A in TR 37.716-11-11 (or R4-1904907), there is no harmonic or IMD issues for this band combination.

5.1.66.4 ∆TIB and ∆RIB values

For DC\_13-66\_n66 and DC\_13-66-66\_n66, the ΔTIB,c and ΔRIB,c values are derived from CA\_13-66 in TS 36.101.

Table 5.1.66.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_13-66\_n66  DC\_13-66-66\_n66 | 13 | 0.3 |
| 66 | 0.3 |
| n66 | 0.3 |

Table 5.1.66.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_13-66\_n66  DC\_13-66-66\_n66 | 13 | 0 |
| 66 | 0 |
| n66 | 0 |

5.1.66.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.67 DC\_2-7\_n66

5.1.67.1 Configurations for DC

Table 5.1.67.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) |
| --- | --- |
| DC\_2A-7A\_n66A  DC\_2A-7A-7A\_n66A  DC\_2A-7C\_n66A | DC\_2A\_n66A  DC\_7A\_n66A |

5.1.67.2 ∆TIB and ∆RIB values

For DC\_2-7\_n66, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 5.1.67.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-7\_n66 | 2 | 0.5 |
| 7 | 0.5 |
| n66 | 0.5 |

Table 5.1.67.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-7\_n66 | 2 | 0.3 |
| 7 | 0.5 |
| n66 | 0.5 |

5.1.67.3 REFSENS requirements

For UE coexistence study of Band 7 + Band n66, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.67.4-1.

Table 5.1.67.4-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1710 | 1780 | 2500 | 2570 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3420 | 3560 | 5000 | 5140 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5130 | 5340 | 7500 | 7710 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 6840 | 7120 | 10000 | 10280 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 8550 | 8900 | 12500 | 12850 |
| Two tone 2nd order IMD products | fy\_low – fx\_high | fy\_high – fx\_low | fx\_low + fy\_low | fx\_high + fy\_high |
| IMD frequency limits (MHz) | 720 | 860 | 4210 | 4350 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | 2\*fy\_low – fx\_high | 2\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | -850 | -1060 | 3220 | 3430 |
| Two-tone 3rd order IMD products | 2\*fx\_low + fy\_low | 2\*fx\_high + fy\_high | 2\*fy\_low + fx\_low | 2\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 5920 | 6130 | 6710 | 6920 |
| Two-tone 4th order IMD products | |3\*fx\_low – fy\_high| | |3\*fx\_high – fy\_low| | 3\*fy\_low – fx\_high | 3\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | -2560 | -2840 | 5720 | 6000 |
| Two-tone 4th order IMD products | 3\*fx\_low + fy\_low | 3\*fx\_high + fy\_high | 3\*fy\_low + fx\_low | 3\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 7630 | 7910 | 9210 | 9420 |
| Two-tone 4th order IMD products | 2\*fy\_low – 2\*fx\_high | 2\*fy\_high – 2\*fx\_low | 2\*fx\_low + 2\*fy\_low | 2\*fx\_high + 2\*fy\_high |
| IMD frequency limits (MHz) | 1440 | 1720 | 8420 | 8700 |
| Two-tone 5th order IMD products | |4\*fx\_low – fy\_high| | |4\*fx\_high – fy\_low| | 4\*fy\_low – fx\_high | 4\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 4270 | 4620 | 8220 | 8570 |
| Two-tone 5th order IMD products | 4\*fx\_low + fy\_low | 4\*fx\_high + fy\_high | 4\*fy\_low + fx\_low | 4\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 9340 | 9690 | 11710 | 12060 |
| Two-tone 5th order IMD products | |3\*fx\_low – 2\*fy\_high| | |3\*fx\_high – 2\*fy\_low| | 3\*fy\_low – 2\*fx\_high | 3\*fy\_high – 2\*fx\_low |
| IMD frequency limits (MHz) | 10 | -340 | 3940 | 4290 |
| Two-tone 5th order IMD products | 2\*fx\_low + 3\*fy\_low | 2\*fx\_high + 3\*fy\_high | 2\*fy\_low + 3\*fx\_low | 2\*fy\_high + 3\*fx\_high |
| IMD frequency limits (MHz) | 10920 | 11270 | 10130 | 10480 |

For UE coexistence study of Band 2 + Band n66, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.67.4-2

Table 5.1.67.4-2: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1710 | 1780 | 1850 | 1910 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3420 | 3560 | 3700 | 3820 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5130 | 5340 | 5550 | 5730 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 6840 | 7120 | 7400 | 7640 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 8550 | 8900 | 9250 | 9550 |
| Two tone 2nd order IMD products | fy\_low – fx\_high | fy\_high – fx\_low | fx\_low + fy\_low | fx\_high + fy\_high |
| IMD frequency limits (MHz) | 70 | 200 | 3560 | 3690 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | 2\*fy\_low – fx\_high | 2\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | -1510 | -1710 | 1920 | 2110 |
| Two-tone 3rd order IMD products | 2\*fx\_low + fy\_low | 2\*fx\_high + fy\_high | 2\*fy\_low + fx\_low | 2\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 5270 | 5470 | 5410 | 5600 |
| Two-tone 4th order IMD products | |3\*fx\_low – fy\_high| | |3\*fx\_high – fy\_low| | 3\*fy\_low – fx\_high | 3\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | -3220 | -3490 | 3770 | 4020 |
| Two-tone 4th order IMD products | 3\*fx\_low + fy\_low | 3\*fx\_high + fy\_high | 3\*fy\_low + fx\_low | 3\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 6980 | 7250 | 7260 | 7440 |
| Two-tone 4th order IMD products | 2\*fy\_low – 2\*fx\_high | 2\*fy\_high – 2\*fx\_low | 2\*fx\_low + 2\*fy\_low | 2\*fx\_high + 2\*fy\_high |
| IMD frequency limits (MHz) | 140 | 400 | 7120 | 7380 |
| Two-tone 5th order IMD products | |4\*fx\_low – fy\_high| | |4\*fx\_high – fy\_low| | 4\*fy\_low – fx\_high | 4\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 4930 | 5270 | 5620 | 5930 |
| Two-tone 5th order IMD products | 4\*fx\_low + fy\_low | 4\*fx\_high + fy\_high | 4\*fy\_low + fx\_low | 4\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 8690 | 9030 | 9110 | 9420 |
| Two-tone 5th order IMD products | |3\*fx\_low – 2\*fy\_high| | |3\*fx\_high – 2\*fy\_low| | 3\*fy\_low – 2\*fx\_high | 3\*fy\_high – 2\*fx\_low |
| IMD frequency limits (MHz) | -1310 | -1640 | 1990 | 2310 |
| Two-tone 5th order IMD products | 2\*fx\_low + 3\*fy\_low | 2\*fx\_high + 3\*fy\_high | 2\*fy\_low + 3\*fx\_low | 2\*fy\_high + 3\*fx\_high |
| IMD frequency limits (MHz) | 8970 | 9290 | 8830 | 9160 |

Based on co-existence study as presented in the table 5.1.67.4-1 and 5.1.67.4-2, there is no MSD issue on the own Rx impact of the 3rd band.

## 5.1.68 DC\_7-13\_n66

5.1.68.1 Configurations for DC

Table 5.1.68.1-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) |
| --- | --- |
| DC\_7A-13A\_n66A  DC\_7A-7A-13A\_n66A  DC\_7C-13A\_n66A | DC\_7A\_n66A  DC\_13A\_n66A |

5.1.68.2 ∆TIB and ∆RIB values

For DC\_7-13\_n66, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 5.1.68.2-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_7-13\_n66 | 7 | 0.5 |
| 13 | 0.3 |
| n66 | 0.5 |

Table 5.1.68.2-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_7-13\_n66 | 7 | 0.5 |
| 13 | 0 |
| n66 | 0.5 |

5.1.68.3 REFSENS requirements

For UE coexistence study of Band 7 + Band n66, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.68.3-1.

Table 5.1.68.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1710 | 1780 | 2500 | 2570 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3420 | 3560 | 5000 | 5140 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5130 | 5340 | 7500 | 7710 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 6840 | 7120 | 10000 | 10280 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 8550 | 8900 | 12500 | 12850 |
| Two tone 2nd order IMD products | fy\_low – fx\_high | fy\_high – fx\_low | fx\_low + fy\_low | fx\_high + fy\_high |
| IMD frequency limits (MHz) | 720 | 860 | 4210 | 4350 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | 2\*fy\_low – fx\_high | 2\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | -850 | -1060 | 3220 | 3430 |
| Two-tone 3rd order IMD products | 2\*fx\_low + fy\_low | 2\*fx\_high + fy\_high | 2\*fy\_low + fx\_low | 2\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 5920 | 6130 | 6710 | 6920 |
| Two-tone 4th order IMD products | |3\*fx\_low – fy\_high| | |3\*fx\_high – fy\_low| | 3\*fy\_low – fx\_high | 3\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | -2560 | -2840 | 5720 | 6000 |
| Two-tone 4th order IMD products | 3\*fx\_low + fy\_low | 3\*fx\_high + fy\_high | 3\*fy\_low + fx\_low | 3\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 7630 | 7910 | 9210 | 9420 |
| Two-tone 4th order IMD products | 2\*fy\_low – 2\*fx\_high | 2\*fy\_high – 2\*fx\_low | 2\*fx\_low + 2\*fy\_low | 2\*fx\_high + 2\*fy\_high |
| IMD frequency limits (MHz) | 1440 | 1720 | 8420 | 8700 |
| Two-tone 5th order IMD products | |4\*fx\_low – fy\_high| | |4\*fx\_high – fy\_low| | 4\*fy\_low – fx\_high | 4\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 4270 | 4620 | 8220 | 8570 |
| Two-tone 5th order IMD products | 4\*fx\_low + fy\_low | 4\*fx\_high + fy\_high | 4\*fy\_low + fx\_low | 4\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 9340 | 9690 | 11710 | 12060 |
| Two-tone 5th order IMD products | |3\*fx\_low – 2\*fy\_high| | |3\*fx\_high – 2\*fy\_low| | 3\*fy\_low – 2\*fx\_high | 3\*fy\_high – 2\*fx\_low |
| IMD frequency limits (MHz) | 10 | -340 | 3940 | 4290 |
| Two-tone 5th order IMD products | 2\*fx\_low + 3\*fy\_low | 2\*fx\_high + 3\*fy\_high | 2\*fy\_low + 3\*fx\_low | 2\*fy\_high + 3\*fx\_high |
| IMD frequency limits (MHz) | 10920 | 11270 | 10130 | 10480 |

For UE coexistence study of Band 13 + Band n66, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.68.3-2

Table 5.1.68.3-2: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 777 | 787 | 1710 | 1780 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 1554 | 1574 | 3420 | 3560 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 2331 | 2361 | 5130 | 5340 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 3108 | 3148 | 6840 | 7120 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 3885 | 3935 | 8550 | 8900 |
| Two tone 2nd order IMD products | fy\_low – fx\_high | fy\_high – fx\_low | fx\_low + fy\_low | fx\_high + fy\_high |
| IMD frequency limits (MHz) | 923 | 1003 | 2487 | 2567 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | 2\*fy\_low – fx\_high | 2\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 226 | 136 | 2633 | 2783 |
| Two-tone 3rd order IMD products | 2\*fx\_low + fy\_low | 2\*fx\_high + fy\_high | 2\*fy\_low + fx\_low | 2\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 3264 | 3354 | 4197 | 4347 |
| Two-tone 4th order IMD products | |3\*fx\_low – fy\_high| | |3\*fx\_high – fy\_low| | 3\*fy\_low – fx\_high | 3\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 551 | 651 | 4343 | 4563 |
| Two-tone 4th order IMD products | 3\*fx\_low + fy\_low | 3\*fx\_high + fy\_high | 3\*fy\_low + fx\_low | 3\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 4041 | 4141 | 5907 | 6117 |
| Two-tone 4th order IMD products | 2\*fy\_low – 2\*fx\_high | 2\*fy\_high – 2\*fx\_low | 2\*fx\_low + 2\*fy\_low | 2\*fx\_high + 2\*fy\_high |
| IMD frequency limits (MHz) | 1846 | 2006 | 4974 | 5134 |
| Two-tone 5th order IMD products | |4\*fx\_low – fy\_high| | |4\*fx\_high – fy\_low| | 4\*fy\_low – fx\_high | 4\*fy\_high – fx\_low |
| IMD frequency limits (MHz) | 1328 | 1438 | 6053 | 6343 |
| Two-tone 5th order IMD products | 4\*fx\_low + fy\_low | 4\*fx\_high + fy\_high | 4\*fy\_low + fx\_low | 4\*fy\_high + fx\_high |
| IMD frequency limits (MHz) | 4818 | 4928 | 7617 | 7907 |
| Two-tone 5th order IMD products | |3\*fx\_low – 2\*fy\_high| | |3\*fx\_high – 2\*fy\_low| | 3\*fy\_low – 2\*fx\_high | 3\*fy\_high – 2\*fx\_low |
| IMD frequency limits (MHz) | 1229 | 1059 | 3556 | 3786 |
| Two-tone 5th order IMD products | 2\*fx\_low + 3\*fy\_low | 2\*fx\_high + 3\*fy\_high | 2\*fy\_low + 3\*fx\_low | 2\*fy\_high + 3\*fx\_high |
| IMD frequency limits (MHz) | 6684 | 6914 | 5751 | 5921 |

Based on co-existence study as presented in the table 5.1.68.3-1 and 5.1.68.3-2, own Rx impact of the 3rd band is shown as the followings.

- 2nd order IMD generated by dual uplink of Band 7 + Band n66 may fall into own Rx of band 13

- 3rd order IMD generated by dual uplink of Band 13+ Band n66 may fall into own Rx of band 7

MSD Values for DC\_7-13\_n66 are specified in Table 5.1.68.3-3.

Table 5.1.68.3-3: MSD due to IMD issue

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_7-13\_n66 | 7 | 2520 | 5 | 25 | 2640 | N/A | FDD | N/A |
| 13 | 781 | 5 | 25 | 750 | 31 | FDD | IMD2  |fB7-fB66| |
| n66 | 1770 | 5 | 25 | 2170 | N/A | FDD | N/A |
| DC\_7-13\_n66 | 7 | 2540 | 5 | 25 | 2660 | 18 | FDD | IMD3  |2\*fBn66-fB13| |
| 13 | 780 | 5 | 25 | 749 | N/A | FDD | N/A |
| n66 | 1720 | 5 | 25 | 2120 | N/A | TDD | N/A |

## 5.1.69 DC\_2-66\_n41

5.1.69.1 Operating bands for EN-DC

Table 5.1B.5.3-1: Band combinations EN-DC (four bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 2-66\_n41 | CA\_2-66 | n41 | No |

5.1.69.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (four bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_2A-66A\_n41A | DC\_2A\_n41A  DC\_66A\_n41A | CA\_2A-66A | n41 |

5.1.69.3 ∆TIB and ∆RIB values

For DC\_2-66\_n41, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_2-7-66, and are given in the tables below.

**Table 5.1.69.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n41 | 2 | 0.5 |
| 66 | 0.5 |
| n41 | 0.81 |
| 1.32 |
| 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 5.1.69.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-66\_n41 | 2 | 0.3 |
| 66 | 0.5 |
| n41 | 0.51 |
| 12 |
| 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. | | |

5.1.69.4 REFSENS requirements

Co-existence analysis for DC\_2\_n41 shows that there is no impact from DC\_2\_n41 UL to Band 66 DL.

Co-existence analysis for DC\_66\_n41 shows that there is IMD4 impact from DC\_66\_n41 UL to Band 2 DL.

The IMD4 MSD value for the impact on band 2 DL are same as for band n25 DL in DC\_66\_n25-n41.

Table 7.3B.2.3.5.2-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC\_2A-66A\_n41A | 2 | 1860 | 5 | 25 | 1940 | 11.0 | FDD | IMD4  |2\*fBn41-2\*fB66| |
| 66 | 1715 | 5 | 25 | 2115 | N/A | FDD | N/A |
| n41 | 2685 | 5 | 25 | 2685 | N/A | TDD | N/A |

## 5.1.70 DC\_12-30\_n2

5.1.70.1 Operating bands for EN-DC

Table 5.1B.5.3-1: Band combinations EN-DC (four bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 12-30\_n2 | CA\_12-30 | n2 | No |

5.1.70.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (four bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_12A-30A\_n2A | DC\_12A\_n2A  DC\_30A\_n2A | CA\_12A-30A | n2 |

5.1.70.3 ∆TIB and ∆RIB values

For DC\_12-30\_n2, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_2-12-30, and are given in the tables below.

**Table 5.1.70.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_12-30\_n2 | 12 | 0.3 |
| 30 | 0.3 |
| n2 | 0.5 |

**Table 5.1.70.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_12-30\_n2 | 12 | 0 |
| 30 | 0.5 |
| n2 | 0.4 |

5.1.70.4 REFSENS requirements

Co-existence analysis from DC\_30\_n2 shows that there is no impact from DC\_30\_n2 UL to Band 12 DL.

Co-existence analysis from DC\_12\_n2 shows that there is IMD4 impact from DC\_12\_n2 UL to Band 30 DL. The MSD values for the impact on band 30 DL are reused from CA\_2-12\_30.

Table 7.3B.2.3.5.2-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC\_12A-30A\_n2A | 12 | 708.5 | 5 | 25 | 738.5 | N/A | FDD | N/A |
| 30 | 2308 | 5 | 25 | 2353 | 12.0 | FDD | IMD4 |
| n2 | 1885 | 5 | 25 | 1965 | N/A | FDD | N/A |

## 5.1.71 DC\_12-66\_n2 12-66-66\_n2

5.1.71.1 Operating bands for EN-DC

Table 5.1B.5.3-1: Band combinations EN-DC (four bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 12-66\_n2 | CA\_12-66 | n2 | DC\_66\_n2 |

5.1.71.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (four bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_12A-66A\_n2A | DC\_12A\_n2A  DC\_66A\_n2A | CA\_12A-66A | n2 |
| DC\_12A-66A-66A\_n2A | DC\_12A\_n2A  DC\_66A\_n2A | CA\_12A-66A-66A | n2 |

5.1.71.3 ∆TIB and ∆RIB values

For DC\_12-66\_n2, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_2-12-66, and are given in the tables below.

**Table 5.1.71.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_12-66\_n2 | 12 | 0.8 |
| 66 | 0.5 |
| n2 | 0.5 |

**Table 5.1.71.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_12-66\_n2 | 12 | 0.5 |
| 66 | 0.3 |
| n2 | 0.3 |

5.1.71.4 REFSENS requirements

Co-existence analysis from DC\_12\_n2 shows that there is no impact from DC\_12\_n2 UL to Band 66 DL.

Co-existence analysis from DC\_66\_n2 shows that there is no impact from DC\_66\_n2 UL to Band 12 DL.

## 5.1.72 DC\_30-66\_n2, DC\_30-66-66\_n2

5.1.72.1 Operating bands for EN-DC

Table 5.1B.5.3-1: Band combinations EN-DC (four bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 30-66\_n2 | CA\_30-66 | n2 | DC\_66\_n2 |

5.1.72.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (four bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_30A-66A\_n2A | DC\_30A\_n2A  DC\_66A\_n2A | CA\_30A-66A | n2 |
| DC\_30A-66A-66A\_n2A | DC\_30A\_n2A  DC\_66A\_n2A | CA\_30A-66A-66A | n2 |

5.1.72.3 ∆TIB and ∆RIB values

For DC\_30-66\_n2, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_2-30-66, and are given in the tables below.

**Table 5.1.72.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_30-66\_n2 | 30 | 0.3 |
| 66 | 0.5 |
| n2 | 0.5 |

**Table 5.1.72.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_30-66\_n2 | 30 | 0.5 |
| 66 | 0.4 |
| n2 | 0.4 |

5.1.72.4 REFSENS requirements

Co-existence analysis from DC\_30\_n2 shows that there is no impact from DC\_30\_n2 UL to Band 66 DL.

Co-existence analysis from DC\_66\_n2 shows that there is no impact from DC\_66\_n2 UL to Band 30 DL.

## 5.1.73 DC\_1-8\_n28

5.1.73.1 Operating bands for DC\_1-8\_n28

Table 5.1.73.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-8\_n28 | CA\_1-8 | n28 | No |

5.1.73.2 Configurations for DC\_1-8\_n28

Table 5.1.73.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-8A\_n28A | DC\_1A\_n28A  DC\_8A\_n28A | CA\_1A-8A | n28A |

5.1.73.3 Co-existence studies

When Uplink EN-DC configuration is DC\_1\_n28, 5th IMD will fall into Rx band of Band 8. When Uplink EN-DC configuration is DC\_8\_n28, 5th IMD will fall into Rx band of Band 1.

However, when consider the 5MHz UL channel BW for DC\_8\_n28, the IMD5 does not fall into the B1 own Rx band.

5.1.73.4 ∆TIB and ∆RIB values

The following relaxation values are proposed:

Table 5.1.73.4-1: ΔTIB,c

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_1-8\_n28 | 1 | 0.3 |
| 8 | 0.6 |
| n28 | 0.6 |

Table 5.1.73.4-2: ΔRIB

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_1-8\_n28 | 1 | 0 |
| 8 | 0.2 |
| n28 | 0.2 |

5.1.73.5 REFSENS requirements

As mentioned in 5.1.73.3, IMD5 of B1 and n28 to Band 8 Rx need to be addressed for REFSENS relaxation. The following values are proposed:

Table 5.1.73.5-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** | Single UL allowed |
| DC\_1A-8A\_n28A | 1 | 1970 | 5 | 25 | 2160 | N/A | FDD | N/A |  |
| n28 | 730 | 5 | 25 | 785 | N/A | FDD | N/A |  |
| 8 | 905 | 5 | 25 | 950 | 3.3 | FDD | IMD5 |  |
| DC\_1A-8A\_n28A | 8 | 882.5 | 5 | 25 | 927.5 | N/A | FDD | N/A |  |
| n28 | 745.5 | 5 | 25 | 800.5 | N/A | FDD | N/A |  |
| 1 | 1922.5 | 5 | 25 | 2112.5 | 0 | FDD | IMD5 |  |

## 5.1.74 DC\_3-3-8\_n78

5.1.74.1 Operating bands for DC

**Table 5.1.74.1-1: Band combinations EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-3-8\_n78 | CA\_3-3-8 | n78 | No |

5.1.74.2 Configuration for DC

**Table 5.1.74.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-3A-8A\_n78A | DC\_3A\_n78A, DC\_8A\_n78A | CA\_3A-8A | n78A |

5.1.74.3 Co-existence Studies

Co-existence was studied for DC\_3A-8A\_n78A in Rel-15 and the results are captured in TR 37.863-02-01. No further studies needed for DC\_3A-3A-8A\_n78A.

5.1.74.4 ∆TIB and ∆RIB values

For DC\_3-3-8\_n78 the ΔTIB,c and ΔRIB,c values are given in the tables below.

**Table 5.1.74.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-3-8\_n78 | 3 | 0.6 |
| 8 | 0.6 |
| n78 | 0.8 |

**Table 5.1.74.4-2: ΔRIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-3-8\_n78 | 3 | 0.2 |
| 8 | 0.2 |
| n78 | 0.5 |

5.1.74.5 REFSENS requirements

According to the REFSENS study in TR 37.863-02-01 for DC\_3A-8A\_n78A, no additional MSD requirement is need.

## 5.1.75 DC\_2-46\_n41

5.1.75.1 Operating bands for DC

Table 5.1.75.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-46\_n41 | CA\_2-46 | n41 | No |

5.1.75.2 Configuration for DC

Table 5.1.75.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** |
| --- | --- |
| DC\_2A-46A\_n41A  DC\_2A-46C\_n41A  DC\_2A-46D\_n41A | DC\_2A\_n41A |

5.1.75.3 Coexistence studies

Co-existence studies of DC\_2A\_n41A are captured in TR 37.863-01-01.

5.1.75.4 ∆TIB and ∆RIB values

For DC\_2-46\_n41, the ΔTIB,c and ΔRIB,c values are derived from DC\_2-41 in TR 38.101-3.

Table 5.1.75.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-46\_n41 | 2 | 0.5 |
| 46 | 0 |
| n41 | 0.41 |
| 0.92 |
| 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 5.1.75.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-46\_n41 | 2 | 0 |
| 46 | 0 |
| n41 | 01 |
| 02 |
| 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. | | |

5.1.75.5 REFSENS requirements

No MSD is needed.

## 5.1.76 DC\_2-46\_n71

5.1.76.1 Operating bands for DC

Table 5.1.76.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-46\_n71 | CA\_2-46 | n71 | No |

5.1.76.2 Configuration for DC

Table 5.1.76.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** |
| --- | --- |
| DC\_2A-46A\_n71A  DC\_2A-46C\_n71A  DC\_2A-46D\_n71A | DC\_2A\_n71A |

5.1.76.3 Coexistence studies

Co-existence studies of DC\_2A\_n71A are captured in TR 37.863-01-01.

5.1.76.4 ∆TIB and ∆RIB values

For DC\_2-46\_n71, the ΔTIB,c and ΔRIB,c values are derived from CA\_2-46, CA\_2-71 and CA\_46-71 in TS 36.101.

Table 5.1.76.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-46\_n71 | 2 | 0 |
| 46 | 0 |
| n71 | 0 |

Table 5.1.76.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-46\_n71 | 2 | 0 |
| 46 | 0 |
| n71 | 0 |

5.1.76.5 REFSENS requirements

MSD due to harmonics that affects both Band 2 and Band n71 have been specified for DC\_2A\_n71A in TR 38.101-3. REFSENS have been specified for CA\_46A/C/D-71A in 36.101.

## 5.1.77 DC\_46-66\_n41

5.1.77.1 Operating bands for DC

Table 5.1.77.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_46-66\_n41 | CA\_46-66 | n41 | No |

5.1.77.2 Configuration for DC

Table 5.1.77.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** |
| --- | --- |
| DC\_46A-66A\_n41A  DC\_46C-66A\_n41A  DC\_46D-66A\_n41A | DC\_66A\_n41A |

5.1.77.3 ∆TIB and ∆RIB values

For DC\_46-66\_n41, the ΔTIB,c and ΔRIB,c values are derived from DC\_66-n41 in TR 38.101-3 and CA\_46-66 from 36.101.

Table 5.1.77.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_46-66\_n41 | 46 | 0 |
| 66 | 0.5 |
| n41 | 0.81 |
| 1.32 |
| 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 5.1.77.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_46-66\_n41 | 46 | 0 |
| 66 | 0.5 |
| n41 | 0.51 |
| 12 |
| 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. | | |

5.1.77.4 REFSENS requirements

MSD due to close proximity is needed and is already specified in TS 38.101-3 for DC\_66\_n41.

## 5.1.78 DC\_46-66A\_n71

5.1.78.1 Operating bands for DC

Table 5.1.78.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_46-66\_n71 | CA\_46-66 | n71 | No |

5.1.78.2 Configuration for DC

Table 5.1.78.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** |
| --- | --- |
| DC\_46A-66A\_n71A  DC\_46C-66A\_n71A  DC\_46D-66A\_n71A | DC\_66A\_n71A |

5.1.78.3 Coexistence studies

Co-existence studies of DC\_66A\_n71A are captured in TR 37.863-01-01.

5.1.78.4 ∆TIB and ∆RIB values

For DC\_46-66A\_n71, the ΔTIB,c and ΔRIB,c values are derived from DC\_66A\_n71A in TR 38.101-3 / TR 37.863-01-01.

Table 5.1.78.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_46-66A\_n71 | 46 | 0 |
| 66 | 0.3 |
| n71 | 0.3 |

Table 5.1.78.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_46-66A\_n71 | 46 | 0 |
| 66 | 0 |
| n71 | 0 |

5.1.78.5 REFSENS requirements

MSD have been specified for DC\_66A\_n71A in TR 38.101-3. REFSENS have been specified for CA\_46A/C/D-71A in 36.101.

## 5.1.79 DC\_1-3\_n38

5.1.79.1 Operating bands for EN-DC

Table 5.1B.5.3-1: Band combinations EN-DC (four bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 1-3\_n38 | CA\_1-3 | n38 | No |

5.1.79.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (four bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-3A\_n38A | DC\_1A\_n38A  DC\_3A\_n38A | CA\_1A-3A | n38 |

5.1.79.3 ∆TIB and ∆RIB values

For DC\_1-3\_n38, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_1-3-38, and are given in the tables below.

**Table 5.1.79.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-3\_n38 | 1 | 0.5 |
| 3 | 0.5 |
| n38 | 0.5 |

**Table 5.1.79.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-3\_n38 | 1 | 0 |
| 3 | 0 |
| n38 | 0 |

5.1.79.4 REFSENS requirements

Co-existence analysis from DC\_1\_n38 shows that there is no impact from DC\_1\_n38 UL to Band 3 DL.

Co-existence analysis from DC\_3\_n38 shows that there is no impact from DC\_3\_n38 UL to Band 1 DL.

## 5.1.80 DC\_7-20\_n3

5.1.80.1 Operating bands for EN-DC

Table 5.1B.5.3-1: Band combinations EN-DC (four bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 7-20\_n3 | CA\_7-20 | n3 | No |

5.1.80.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (four bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_7A-20A\_n3A | DC\_7A\_n3A  DC\_20A\_n3A | CA\_7A-20A | n3 |

5.1.80.3 ∆TIB and ∆RIB values

For DC\_7-20\_n3, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_3-7-20, and are given in the tables below.

**Table 5.1.80.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_7-20\_n3 | 7 | 0.5 |
| 20 | 0.3 |
| n3 | 0.5 |

**Table 5.1.80.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_7-20\_n3 | 7 | 0 |
| 20 | 0 |
| n3 | 0 |

5.1.80.4 REFSENS requirements

Co-existence analysis from DC\_7\_n3 shows that there are IMD2 impact from DC\_7\_n3 UL to Band 20 DL. The MSD values for the impact on band 20 DL are reused from CA\_3A-7A-20A.

Co-existence analysis from DC\_20\_n3 shows that there are IMD2 and IMD3 impact from DC\_20\_n3 UL to Band 7 DL. The MSD values for the impact on band 7 DL are reused from CA\_3A-7A-20A.

Table 7.3B.2.3.5.2-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC\_7A-20A\_n3A | 7 | 2543 | 10 | 50 | 2663 | N/A | FDD | N/A |
| 20 | 847 | 10 | 20 | 806 | 10.5 | FDD | IMD2 |
| n3 | 1737 | 5 | 25 | 1832 | N/A | FDD | N/A |
| 7 | 2510 | 10 | 50 | 2630 | 26.0 | FDD | IMD21 |
| 20 | 855 | 5 | 25 | 896 | N/A | FDD | N/A |
| n3 | 1775 | 10 | 50 | 1870 | N/A | FDD | N/A |
| NOTE 1: This band is subject to IMD3 also which MSD is not specified. | | | | | | | | |

## 5.1.81 DC\_25-41\_n41, DC\_25-(n)41, DC\_25-25-41\_n41, DC\_25-25-(n)41

5.1.81.1 Void

5.1.81.2 Inter-band EN-DC configurations within FR1 (three bands)

Table 5.1.81.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) |
| --- | --- |
| DC\_25A-41A\_n41A  DC\_25A-41C\_n41A  DC\_25A-41D\_n41A  DC\_25A-25A-41A\_n41A  DC\_25A-25A-41C\_n41A  DC\_25A-25A-41D\_n41A | DC\_25A\_n41A  DC\_41A\_n41A |
| DC\_25A-(n)41AA  DC\_25A-25A-(n)41AA | DC\_25A\_n41A  DC\_(n)41AA |
| DC\_25A-(n)41CA  DC\_25A-(n)41DA  DC\_25A-25A-(n)41CA  DC\_25A-25A-(n)41DA | DC\_25A\_n41A  DC\_(n)41AA  DC\_41A\_n41A |

5.1.81.3 ∆TIB and ∆RIB values

For DC\_25\_41\_n41 and DC\_25\_(n)41, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_25-41 and CA\_25-24-41, and are given in the tables below.

**Table 5.1.81.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_25-41\_n41  DC\_25\_(n)41  DC\_25-25-41\_n41  DC\_25-25\_(n)41 | 25 | 0.5 |
| 41 | 0.41 |
| 0.92 |
| n41 | 0.41 |
| 0.92 |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545 – 2690 MHz.  NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496 – 2545 MHz. | | |

**Table 5.1.81.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_25-41\_n41  DC\_25\_(n)41  DC\_25-25-41\_n41  DC\_25-25\_(n)41 | 41 | 01 |
| 0.52 |
| n41 | 01 |
| 0.52 |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545 – 2690 MHz.  NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496 – 2545 MHz. | | |

5.1.81.4 REFSENS requirements

Coexistence analysis of DC\_25A\_n41A shows there is no 2 UL IMD impacting the band 25 downlink.

Coexistence analysis of DC\_41A\_n41A and DC\_(n)41AA shows there is no 2 UL IMD impacting the band 25 downlink.

## 5.1.82 DC\_1-8\_n3

5.1.82.1 Operating bands for DC\_1-8\_n3

Table 5.1.82.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-8\_n3 | CA\_1-8 | n3 | DC\_1\_n3 |

5.1.82.2 Configurations for DC\_1-8\_n3

Table 5.1.82.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-8A\_n3A | DC\_1A\_n3A  DC\_8A\_n3A | CA\_1A-8A | n3A |

5.1.82.3 Co-existence studies

There is no additional harmonic and intermodulation impact for the additional band receiver.

5.1.82.4 ∆TIB and ∆RIB values

The following relaxation values are proposed:

Table 5.1.82.4-1: ΔTIB,c

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_1-8\_n3 | 1 | 0.3 |
| 8 | 0.3 |
| n3 | 0.3 |

Table 5.1.82.4-2: ΔRIB

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_1-8\_n3 | 1 | 0 |
| 8 | 0 |
| n3 | 0 |

5.1.82.5 REFSENS requirements

As mentioned in 5.1.82.3, REFSENS exceptions are not expected.

## 5.1.83 DC\_13-48\_n2

5.1.83.1 Operating bands for DC

Table 5.1.83.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_13-48\_n2 | CA\_13-48 | n2 | No |

5.1.83.2 Configurations for DC

Table 5.1.83.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_13A-48A\_n2A  DC\_13A-48B\_n2A  DC\_13A-48D\_n2A  DC\_13A-48E\_n2A | DC\_13A\_n2A | CA\_13A-48A  CA\_13A-48B  CA\_13A-48D  CA\_13A-48E | n2A |

5.1.83.3 Coexistence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there is no own Rx impact on the 3rd band.

5.1.83.4 ∆TIB and ∆RIB values

DC\_13-48\_n2 could reuse the ΔTIB,c and ΔRIB,c values of CA\_2A-13A-48A as given in the below tables.

Table 5.1.83.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_13-48\_n2 | 13 | 0.3 |
| 48 | 0.8 |
| n2 | 0.6 |

Table 5.1.83.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_13-48\_n2 | 13 | 0 |
| 48 | 0.5 |
| n2 | 0.2 |

5.1.83.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.84 DC\_13-48\_n66

5.1.84.1 Operating bands for DC

Table 5.1.84.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_13-48\_n66 | CA\_13-48 | n66 | No |

5.1.84.2 Configurations for DC

Table 5.1.84.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_13A-48A\_n66A  DC\_13A-48B\_n66A  DC\_13A-48D\_n66A  DC\_13A-48E\_n66A | DC\_13A\_n66A | CA\_13A-48A  CA\_13A-48B  CA\_13A-48D  CA\_13A-48E | n66A |

5.1.84.3 Coexistence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there is no own Rx impact on the 3rd band.

5.1.84.4 ∆TIB and ∆RIB values

DC\_13-48\_n66 could reuse the ΔTIB,c and ΔRIB,c values of CA\_13A-48A-66A as given in the below tables.

Table 5.1.84.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_13-48\_n66 | 13 | 0.3 |
| 48 | 0.8 |
| n66 | 0.6 |

Table 5.1.84.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_13-48\_n66 | 13 | 0 |
| 48 | 0.5 |
| n66 | 0.2 |

5.1.84.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.85 DC\_48-66\_n5

5.1.85.1 Operating bands for DC

Table 5.1.85.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_48-66\_n5 | CA\_48-66 | n5 | DC\_66-n5 |

5.1.85.2 Configurations for DC

Table 5.1.85.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_48A-66A\_n5A  DC\_48B-66A\_n5A  DC\_48D-66A\_n5A  DC\_48E-66A\_n5A | DC\_66A\_n5A | CA\_48A-n66A  CA\_48B-n66A  CA\_48D-n66A  CA\_48E-n66A | n5A |

5.1.85.3 Coexistence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there is no own Rx impact on the 3rd band.

5.1.85.4 ∆TIB and ∆RIB values

DC\_48-66\_n5 could reuse the ΔTIB,c and ΔRIB,c values of CA\_5A-48A-66A as given in the below tables.

Table 5.1.85.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_48-66\_n5 | 48 | 0.8 |
| 66 | 0.6 |
| n5 | 0.3 |

Table 5.1.85.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_48-66\_n5 | 48 | 0.5 |
| 66 | 0.2 |
| n5 | 0 |

5.1.85.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.86 DC\_1-7\_n3

5.1.86.1 Operating bands for EN-DC

Table 5.1B.5.3-1: Band combinations EN-DC (four bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 1-7\_n3 | CA\_1-7 | n3 | DC\_1\_n3 |

5.1.86.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (four bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-7A\_n3A | DC\_1A\_n3A  DC\_7A\_n3A | CA\_1A-7A | n3 |

5.1.86.3 ∆TIB and ∆RIB values

For DC\_1-7\_n3, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_1-3-7, and are given in the tables below.

**Table 5.1.86.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-7\_n3 | 1 | 0.6 |
| 7 | 0.6 |
| n3 | 0.6 |

**Table 5.1.86.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-7\_n3 | 1 | 0 |
| 7 | 0 |
| n3 | 0 |

5.1.86.4 REFSENS requirements

Co-existence analysis from DC\_1\_n3 shows that there is no impact from DC\_1\_n3 UL to Band 7 DL.

Co-existence analysis from DC\_7\_n3 shows that there is no impact from DC\_7\_n3 UL to Band 1 DL.

## 5.1.87 DC\_1-20\_n3

5.1.87.1 Operating bands for EN-DC

Table 5.1B.5.3-1: Band combinations EN-DC (four bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 1-20\_n3 | CA\_1-20 | n3 | DC\_1\_n3 |

5.1.87.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (four bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-20A\_n3A | DC\_1A\_n3A  DC\_20A\_n3A | CA\_1A-20A | n3 |
| DC\_1C-20A\_n3A | DC\_1A\_n3A  DC\_20A\_n3A | CA\_1C-20A | n3 |

5.1.87.3 ∆TIB and ∆RIB values

For DC\_1-20\_n3, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_1-3-20, and are given in the tables below.

**Table 5.1.87.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-20\_n3 | 1 | 0.3 |
| 20 | 0.3 |
| n3 | 0.3 |

**Table 5.1.87.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-20\_n3 | 1 | 0 |
| 20 | 0 |
| n3 | 0 |

5.1.87.4 REFSENS requirements

Co-existence analysis from DC\_1\_n3 shows that there is no impact from DC\_1\_n3 UL to Band 20 DL.

Co-existence analysis from DC\_20\_n3 shows that there is no impact from DC\_20\_n3 UL to Band 1 DL.

## 5.1.88 DC\_3-20\_n38

5.1.88.1 Operating bands for EN-DC

Table 5.1B.5.3-1: Band combinations EN-DC (four bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 3-20\_n38 | CA\_3-20 | n38 | No |

5.1.88.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (four bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_3A-20A\_n38A | DC\_3A\_n38A  DC\_20A\_n38A | CA\_3A-20A | n38 |

5.1.88.3 ∆TIB and ∆RIB values

For DC\_3-20\_n38, the ΔTIB,c and ΔRIB,c values are reused from the LTE combination CA\_3-7-20, and are given in the tables below.

**Table 5.1.88.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-20\_n38 | 3 | 0.5 |
| 20 | 0.3 |
| n38 | 0.5 |

**Table 5.1.88.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-20\_n38 | 3 | 0 |
| 20 | 0 |
| n38 | 0 |

5.1.88.4 REFSENS requirements

Co-existence analysis from DC\_3\_n38 shows that there are IMD2 and IMD3 impact from DC\_3\_n38 UL to Band 20 DL. The MSD values for the impact on band 20 DL are reused from DC\_3A-28A\_n41A, which also have IMD2 and IMD3 to the DL of the low band (but only have IMD2 specified).

Co-existence analysis from DC\_20\_n38 shows that there no impact from DC\_20\_n38 UL to Band 3 DL.

Table 7.3B.2.3.5.2-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC\_3A-20A\_n38A | 3 | 1779 | 5 | 25 | 1874 | N/A | FDD | N/A |
| 20 | 852 | 10 | 20 | 811 | 26.0 | FDD | IMD21 |
| n38 | 2590 | 10 | 50 | 2590 | N/A | FDD | N/A |
| NOTE 1: This band is subject to IMD3 also which MSD is not specified. | | | | | | | | |

## 5.1.89 DC\_1-20\_n38

5.1.89.1 Operating bands for DC

Table 5.1.89.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-20\_n38 | CA\_1-20 | n38 | NO |

5.1.89.2 Configurations for DC

Table 5.1.89.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-20A\_n38A | DC\_1A\_n38A  DC\_20A\_n38A | CA\_1A-20A | n38 |

5.1.89.3 Co-existence studies

The co-existence studies of band 20 + band n38 have been captured in TR 37.716-11-11, where there are no additional harmonic and IMD impact for the additional band receiver.

There is no additional harmonic and IMD impact for band 20 Rx with DC\_1A\_n38A uplink.

5.1.89.4 ∆TIB and ∆RIB values

Table 5.1.89.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-20\_n38 | 1 | 0.5 |
| 20 | 0.3 |
| n38 | 0.5 |

**Table 5.1.89.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_1-20\_n38 | 1 | 0 |
| 20 | 0 |
| n38 | 0 |

5.1.89.5 REFSENS requirements

According the co-existing studies, there is no need to specify additional MSD requirement for this UL DC configuration.

## 5.1.90 DC\_3-20\_n38

5.1.90.1 Operating bands for DC

Table 5.1.90.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-20\_n38 | CA\_3-20 | n38 | NO |

5.1.90.2 Configurations for DC

Table 5.1.90.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-20A\_n38A | DC\_20A\_n38A | CA\_3A-20A | n38 |

5.1.90.3 Co-existence studies

The co-existence studies of band 20 + band n38 have been captured in TR 37.716-11-11, where there are no additional harmonic and IMD impact for the additional band receiver.

## 5.1.91 DC\_1-3\_n77

5.1.91.1 Operating bands for EN-DC

Table 5.2B.5.3-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-3\_n77 | CA\_1-3 | n77 | DC\_1\_n77  DC\_3\_n77 |

5.1.91.2 Configuration for DC

Table 5.5B.5.3-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-3A\_n77(2A) | DC\_1A\_n77A  DC\_3A\_n77A | CA\_1A-3A | CA\_n77(2A) |

5.1.91.3 Co-existence Studies

Refer to TR 37.863-01-01 section 6.35.3 for DC\_1A-3A\_n77.

5.1.91.4 ∆TIB and ∆RIB values

Refer to TR 37.863-01-01 section 6.35.4 for DC\_1A-3A\_n77.

5.1.91.5 REFSENS requirements

Refer to TR 37.863-01-01 section 6.35.5 for DC\_1A-3A\_n77.

## 5.1.92 DC\_2-4\_n38

5.1.92.1 Operating bands for DC

Table 5.1.92.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-4\_n38 | CA\_2-4 | n38 | no |

5.1.92.2 Configuration for DC

Table 5.1.92.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_2A-4A\_n38A | DC\_2A\_n38A  DC\_4A\_n38A | CA\_2-4 | n38 |

5.1.92.3 Co-existence studies

For UE coexistence study of Band 2 + Band n38, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.92.3-1.

Table 5.1.92.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1850 | 1910 | 2570 | 2620 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3700 | 3820 | 5140 | 5240 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5550 | 5730 | 7710 | 7860 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 7400 | 7640 | 10280 | 10480 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 9250 | 9550 | 12850 | 13100 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 660 | 770 | 4420 | 4530 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 1080 | 1250 | 3230 | 3390 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 6270 | 6440 | 6990 | 7150 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 2930 | 3160 | 5800 | 6010 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 8120 | 8350 | 9560 | 9770 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 1540 | 1320 | 8840 | 9060 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 8630 | 8370 | 5070 | 4780 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 4160 | 3890 | 590 | 310 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 12130 | 12390 | 9970 | 10260 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 11410 | 11680 | 10690 | 10970 |

For UE coexistence study of Band 4 + Band n38, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.92.3-1.

**Table 5.1.92.3-2: Harmonic and IMD analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1710 | 1755 | 2570 | 2620 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3420 | 3510 | 5140 | 5240 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5130 | 5265 | 7710 | 7860 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 6840 | 7020 | 10280 | 10480 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 8550 | 8775 | 12850 | 13100 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 815 | 910 | 4280 | 4375 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 800 | 940 | 3385 | 3530 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 5990 | 6130 | 6850 | 6995 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 2510 | 2695 | 5955 | 6150 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 7700 | 7885 | 9420 | 9615 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 1820 | 1630 | 8560 | 8750 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 8770 | 8525 | 4450 | 4220 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 4440 | 4200 | 125 | 110 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 11990 | 12235 | 9410 | 9640 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 11130 | 11370 | 10270 | 10505 |

Based on the tables, there is no co-existence issue.

5.1.92.4 ∆TIB and ∆RIB values

Table 5.1.92.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-4\_n38 | 2 | 0.5 |
| 4 | 0.5 |
| n38 | 0.5 |

**Table 5.1.92.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-4\_n38 | 2 | 0.3 |
| 4 | 0.5 |
| n38 | 0.5 |

5.1.92.5 REFSENS requirements

There is no additional MSD requirement for this configuration.

## 5.1.93 DC\_2-4\_n41

5.1.93.1 Operating bands for DC

Table 5.1.93.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-4\_n41 | CA\_2-4 | n41 | no |

5.1.93.2 Configuration for DC

Table 5.1.93.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_2A-4A\_n41A | DC\_2A\_n41A  DC\_4A\_n41A | CA\_2-4 | n41 |

5.1.93.3 Co-existence studies

For UE coexistence study of Band 2 + Band n41, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.93.3-1.

Table 5.1.93.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1850 | 1910 | 2496 | 2690 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3700 | 3820 | 4992 | 5380 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5550 | 5730 | 7488 | 8070 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 7400 | 7640 | 9984 | 10760 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 9250 | 9550 | 12480 | 13450 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 586 | 840 | 4346 | 4600 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 1010 | 1324 | 3082 | 3530 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 6196 | 6510 | 6842 | 7290 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 2860 | 3234 | 5578 | 6220 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 8046 | 8420 | 9338 | 9980 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 1680 | 1172 | 8692 | 9200 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 8910 | 8074 | 5144 | 4710 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 4370 | 3668 | 738 | 170 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 11834 | 12670 | 9896 | 10330 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 11188 | 11890 | 10542 | 11110 |

For UE coexistence study of Band 4 + Band n41, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.93.3-1.

**Table 5.1.93.3-2: Harmonic and IMD analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1710 | 1755 | 2496 | 2690 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3420 | 3510 | 4992 | 5380 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5130 | 5265 | 7488 | 8070 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 6840 | 7020 | 9984 | 10760 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 8550 | 8775 | 12480 | 13450 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 741 | 980 | 4206 | 4445 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 730 | 1014 | 3237 | 3670 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 5916 | 6200 | 6702 | 7135 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 2440 | 2769 | 5733 | 6360 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 7626 | 7955 | 9198 | 9825 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 1960 | 1482 | 8412 | 8890 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 9050 | 8229 | 4524 | 4150 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 4650 | 3978 | 273 | 250 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 11694 | 12515 | 9336 | 9710 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 10908 | 11580 | 10122 | 10645 |

Based on the tables, 4th order IMD generated by dual uplink of Band 4 + Band n41 may also fall into own Rx of band 2.

5.1.93.4 ∆TIB and ∆RIB values

Table 5.1.93.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-4\_n41 | 2 | 0.5 |
| 4 | 0.5 |
| n41 | 0.5 |

**Table 5.1.93.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-4\_n41 | 2 | 0.3 |
| 4 | 0.5 |
| n41 | 0.5 |

5.1.93.5 REFSENS requirements

The MSD requirements are similar to DC\_2A-66A\_n41A which has specified in 38.101-3, so we can reuse it. Table 5.1.93.5-1 lists the required MSD test configurations for the EN-DC 2A-4A\_n41A band combination.

Table 5.1.93.5-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_2A-4A\_n41A | 2 | 1860 | 5 | 25 | 1940 | 11.0 | IMD4  |2\*fBn41-2\*fB4| |
| 4 | 1715 | 5 | 25 | 2115 | N/A | N/A |
| n41 | 2685 | 10 | 50 | 2685 | N/A | N/A |

## 5.1.94 DC\_1-3\_n41

5.1.94.1 Operating bands for DC

Table 5.1.94.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-3\_n41 | CA\_1-3 | n41 | no |

5.1.94.2 Configuration for DC

Table 5.1.94.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-3A\_n41A  DC\_1A-3C\_n41A | DC\_1A\_n41A  DC\_3A\_n41A  DC\_3C\_n41A | CA\_1-3 | n41 |

5.1.94.3 Co-existence studies

For UE coexistence study of Band 1 + Band n41, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.94.3-1.

Table 5.1.94.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1920 | 1980 | 2496 | 2690 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3840 | 3960 | 4992 | 5380 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5760 | 5940 | 7488 | 8070 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 7680 | 7920 | 9984 | 10760 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 9600 | 9900 | 12480 | 13450 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 516 | 770 | 4416 | 4670 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 1150 | 1464 | 3012 | 3460 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 6336 | 6650 | 6912 | 7360 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 3070 | 3444 | 5508 | 6150 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 8256 | 8630 | 9408 | 10050 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 1540 | 1032 | 8832 | 9340 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 8840 | 8004 | 5424 | 4990 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 4230 | 3528 | 948 | 380 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 11904 | 12740 | 10176 | 10610 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 11328 | 12030 | 10752 | 11320 |

For UE coexistence study of Band 3 + Band n41, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.94.3-1.

**Table 5.1.94.3-2: Harmonic and IMD analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1710 | 1785 | 2496 | 2690 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3420 | 3570 | 4992 | 5380 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5130 | 5355 | 7488 | 8070 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 6840 | 7140 | 9984 | 10760 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 8550 | 8925 | 12480 | 13450 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 711 | 980 | 4206 | 4475 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 730 | 1074 | 3207 | 3670 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 5916 | 6260 | 6702 | 7165 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 2440 | 2859 | 5703 | 6360 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 7626 | 8045 | 9198 | 9855 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 1960 | 1422 | 8412 | 8950 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 9050 | 8199 | 4644 | 4150 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 4650 | 3918 | 363 | 250 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 11694 | 12545 | 9336 | 9830 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 10908 | 11640 | 10122 | 10735 |

Based on the tables, there is no co-existence issue.

5.1.94.4 ∆TIB and ∆RIB values

Table 5.1.94.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-3\_n41 | 1 | 0.5 |
| 3 | 0.5 |
| n41 | 0.31 |
| 0.82 |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545 - 2690 MHz.  NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496 - 2545 MHz.  NOTE 3: The requirement is applied for UE transmitting on the frequency range of 2515 – 2690 MHz.  NOTE 4: The requirement is applied for UE transmitting on the frequency range of 2496 – 2515 MHz. | | |

**Table 5.1.94.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-3\_n41 | 1 | 0 |
| 3 | 0 |
| n41 | 01 |
| 0.52 |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545 – 2690 MHz.  NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496 – 2545 MHz.  NOTE 3: The requirement is applied for UE transmitting on the frequency range of 2496 – 2515 MHz. | | |

5.1.94.5 REFSENS requirements

There is no additional MSD requirements for DC\_1-3\_n41.

## 5.1.95 DC\_7-20\_n1

5.1.95.1 Operating bands for DC

Table 5.1.95.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_7-20\_n1 | CA\_7-20 | n1 | no |

5.1.95.2 Configuration for DC

Table 5.1.95.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_7A-20A\_n1A | DC\_7A\_n1A  DC\_20A\_n1A | CA\_7-20 | n1 |
| DC\_7C-20A\_n1A | DC\_7A\_n1A  DC\_20A\_n1A  DC\_7C\_n1A | CA\_7-20 | n1 |

5.1.95.3 Co-existence studies

For UE coexistence study of Band 7 + Band n1, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.95.3-1.

Table 5.1.95.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 2500 | 2570 | 1920 | 1980 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 5000 | 5140 | 3840 | 3960 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 7500 | 7710 | 5760 | 5940 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 10000 | 10280 | 7680 | 7920 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 12500 | 12850 | 9600 | 9900 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 650 | 520 | 4420 | 4550 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 3020 | 3220 | 1270 | 1460 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 6920 | 7120 | 6340 | 6530 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 5520 | 5790 | 3190 | 3440 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 9420 | 9690 | 8260 | 8510 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 1040 | 1300 | 8840 | 9100 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 5420 | 5110 | 8360 | 8020 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 940 | 620 | 3870 | 3540 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 10180 | 10490 | 11920 | 12260 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 10760 | 11080 | 11340 | 11670 |

For UE coexistence study of Band 20 + Band n1, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.95.3-2.

**Table 5.1.95.3-2: Harmonic and IMD analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 832 | 862 | 1920 | 1980 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 1664 | 1724 | 3840 | 3960 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 2496 | 2586 | 5760 | 5940 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 3328 | 3448 | 7680 | 7920 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 4160 | 4310 | 9600 | 9900 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 1058 | 1148 | 2752 | 2842 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 316 | 196 | 2978 | 3128 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 3584 | 3704 | 4672 | 4822 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 516 | 666 | 4898 | 5108 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 4416 | 4566 | 6592 | 6802 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 2296 | 2116 | 5504 | 5684 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 7088 | 6818 | 1528 | 1348 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 4276 | 4036 | 1254 | 1464 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 8512 | 8782 | 5248 | 5428 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 7424 | 7664 | 6336 | 6546 |

Based on the tables, 5th order IMD generated by dual uplink of Band 7 + Band n1 may also fall into own Rx of band 20.

5.1.95.4 ∆TIB and ∆RIB values

Table 5.1.95.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_7-20\_n1 | 7 | 0.6 |
| 20 | 0.3 |
| n1 | 0.5 |

**Table 5.1.95.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_7-20\_n1 | 7 | 0 |
| 20 | 0 |
| n1 | 0 |

5.1.95.5 REFSENS requirements

The MSD requirements are similar to CA\_1A-7A-28A with UL band 1 + band 7 which has specified in 36.101, so it can be reused. Table 5.1.95.5-1 lists the required MSD test configurations for the EN-DC 7A-20A\_n1A band combination.

Table 5.1.95.5-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_7A-20A\_n1A  DC\_7C-20A\_n1A | 7 | 2510 | 10 | 50 | 2630 | N/A | N/A |
| 20 | 841 | 10 | 50 | 800 | 4.5 | IMD5  |2\*fB7-3\*fBn1| |
| n1 | 1940 | 5 | 25 | 2130 | N/A | N/A |

## 5.1.96 DC\_2-12\_n2

5.1.96.1 Operating bands for DC

**Table 5.1.96.1-1: Band combinations EN-DC (three bands)**

| **EN-DC Band** | **E-UTRA Band** | **NR Band** | **Single UL allowed** |
| --- | --- | --- | --- |
| DC\_2-12\_n2 | CA\_2-12 | n2 | No |

5.1.96.2 Configuration for DC

**Table 5.1.96.2-1: Inter-band EN-DC configurations (three bands)**

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_2A-12A\_n2A | DC\_12A\_n2A | CA\_2A-12A | n2A |

5.1.96.3 Coexistence studies

Based on co-existence studies of DC\_12A\_n2A in TR 37.716-01-01, there is no harmonic or IMD impact to any of own Rx bands.

5.1.96.4 ∆TIB and ∆RIB values

For DC\_2-12\_n2, the ΔTIB,c and ΔRIB,c values are derived from CA\_2-2-12 in TS 36.101.

**Table 5.X.4-1: ΔTIB,c**

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-12\_n2 | 2 | 0.3 |
| 12 | 0.3 |
| n2 | 0.3 |

**Table 5.X.4-2: ΔRIB,c**

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-12\_n2 | 2 | 0 |
| 12 | 0 |
| n2 | 0 |

5.1.96.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.97 DC\_3-28\_n7, DC\_3-3-28\_n7

5.1.97.1 Operating bands for EN-DC

Table 5.1.97.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 3-28\_n7 | CA\_3-28 | n7 | No |

5.1.97.2 Configuration for DC

Table 5.1.97.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_3A-28A\_n7A  DC\_3C-28A\_n7A  DC\_3A-28A\_n7B  DC\_3C-28A\_n7B | DC\_3A\_n7A  DC\_3C\_n7A  DC\_28A\_n7A  DC\_3A\_n7B  DC\_3C\_n7B  DC\_28A\_n7B | CA\_3A-28A  CA\_3C-28A | n7 |
| DC\_3A-3A-28A\_n7A DC\_3A-3A-28A\_n7B | DC\_3A\_n7A  DC\_28A\_n7A  DC\_3A\_n7B  DC\_28A\_n7B | CA\_3A-28A  CA\_3C-28A | n7 |

5.1.97.3 ∆TIB and ∆RIB values

For DC\_3-28\_n7, the ΔTIB,c and ΔRIB,c values are reused from LTE combination CA\_3-7-28 and EN-DC combination DC\_3-7\_n28 and are given in the tables below.

**Table 5.1.97.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-28\_n7 | 3 | 0.5 |
| 28 | 0.3 |
| n7 | 0.5 |

**Table 5.1.97.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-28\_n7 | 3 | 0 |
| 28 | 0 |
| n7 | 0 |

5.1.97.4 REFSENS requirements

Co-existence analysis from DC\_3\_n7 shows that there is IMD2 impact from DC\_3\_n7 UL to Band 28 DL. MSD values are reused from CA\_3A-7A-28A with CA\_3A-7A as uplink.

Co-existence analysis from DC\_28\_n7 shows that there is IMD2 impact from DC\_28\_n7 UL to Band 3 DL. MSD values are reused from DC\_3A-7A\_n28A and CA\_3A-7A-28A with CA\_7A-28A as uplink.

Table 7.3B.2.3.5.2-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_3A-28A\_n7A  DC\_3C-28A\_n7A  DC\_3A-3A-28A\_n7A DC\_3A-28A\_n7B  DC\_3C-28A\_n7B  DC\_3A-3A-28A\_n7B | 3 | 1737.5 | 5 | 25 | 1832.5 | 26.0 | IMD2 |
| 28 | 710.5 | 5 | 25 | 765.5 | N/A | N/A |
| n7 | 2543 | 10 | 50 | 2663 | N/A | N/A |
| DC\_3A-28A\_n7A  DC\_3C-28A\_n7A  DC\_3A-3A-28A\_n7A DC\_3A-28A\_n7B  DC\_3C-28A\_n7B  DC\_3A-3A-28A\_n7B | 3 | 1747 | 5 | 25 | 1842 | N/A | N/A |
| 28 | 741 | 5 | 25 | 796.0 | 20.0 | IMD2 |
| n7 | 2543 | 5 | 25 | 2663 | N/A | N/A |

## 5.1.98 DC\_1-7\_n7, DC\_1-1-7\_n7

5.1.98.1 Operating bands for EN-DC

Table 5.1.98.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 1-7\_n7 | CA\_1-7 | n7 |  |

5.1.98.2 Configuration for DC

Table 5.1.98.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-7A\_n7A | DC\_1A\_n7A  DC\_7A\_n7A1 | CA\_1A-7A | n7 |
| DC\_1A-1A-7A\_n7A | DC\_1A\_n7A  DC\_7A\_n7A1 | CA\_1A-1A-7A | n7 |
| NOTE 1: Only single switched UL is supported | | | |

5.1.98.3 Coexistence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there is no own Rx impact on the 3rd band.

5.1.98.4 ∆TIB and ∆RIB values

For DC\_1-7\_n7 the ΔTIB,c and ΔRIB,c values are given in the tables below.

**Table 5.1.98.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-7\_n7 | 1 | 0.5 |
| 7 | 0.6 |
| n7 | 0.6 |

**Table 5.1.98.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-7\_n7 | 1 | 0 |
| 7 | 0 |
| n7 | 0 |

5.1.98.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.99 DC\_3-7\_n7, DC\_3-3-7\_n7

5.1.99.1 Operating bands for EN-DC

Table 5.1.99.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 3-7\_n7 | CA\_3-7 | n7 |  |

5.1.99.2 Configuration for DC

Table 5.1.99.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_3A-7A\_n7A DC\_3C-7A\_n7A | DC\_3A\_n7A  DC\_3C\_n7A  DC\_7A\_n7A1 | CA\_3A-7A  CA\_3C-7A | n7 |
| DC\_3A-3A-7A\_n7A | DC\_3A\_n7A  DC\_7A\_n7A1 | CA\_3A-3A-7A | n7 |
| NOTE 1: Only single switched UL is supported | | | |

5.1.99.3 Coexistence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there is no own Rx impact on the 3rd band.

5.1.99.4 ∆TIB and ∆RIB values

For DC\_3-7\_n7 the ΔTIB,c and ΔRIB,c values are given in the tables below.

**Table 5.1.99.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-7\_n7 | 3 | 0.5 |
| 7 | 0.5 |
| n7 | 0.5 |

**Table 5.1.99.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-7\_n7 | 3 | 0 |
| 7 | 0 |
| n7 | 0 |

5.1.99.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.100 DC\_7-28\_n7

5.1.100.1 Operating bands for EN-DC

Table 5.1.100.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 7-28\_n7 | CA\_7-28 | n7 |  |

5.1.100.2 Configuration for DC

Table 5.1.100.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_7A-28A\_n7A | DC\_7A\_n7A1  DC\_28A\_n7A | CA\_7A-28A | n7 |
| NOTE 1: Only single switched UL is supported | | | |

5.1.100.3 Coexistence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there is no own Rx impact on the 3rd band.

5.1.100.4 ∆TIB and ∆RIB values

For DC\_7-28\_n7 the ΔTIB,c and ΔRIB,c values are given in the tables below.

**Table 5.1.100.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_7-28\_n7 | 7 | 0.3 |
| 28 | 0.3 |
| n7 | 0.3 |

**Table 5.1.100.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_7-28\_n7 | 7 | 0 |
| 28 | 0 |
| n7 | 0 |

5.1.100.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.101 DC\_12-66\_n66

5.1.101.1 Operating bands for EN-DC

Table 5.1.101.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 12-66\_n66 | CA\_12-66 | n66 |  |

5.1.101.2 Configuration for DC

Table 5.1.101.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_12A-66A\_n66A | DC\_12A\_n66A  DC\_66A\_n66A1 | CA\_12A-66A | n66 |
| NOTE 1: Only single switched UL is supported | | | |

5.1.101.3 Coexistence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there is no own Rx impact on the 3rd band.

5.1.101.4 ∆TIB and ∆RIB values

For DC\_12-66\_n66 the ΔTIB,c and ΔRIB,c values are given in the tables below.

**Table 5.1.101.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_12-66\_n66 | 12 | 0.8 |
| 66 | 0.3 |
| n66 | 0.3 |

**Table 5.1.101.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_12-66\_n66 | 12 | 0 |
| 66 | 0 |
| n66 | 0 |

5.1.101.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.102 DC\_1-28\_n7

5.1.102.1 Operating bands for EN-DC

Table 5.1.102.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 1-28\_n7 | CA\_1-28 | n7 | No |

5.1.102.2 Configuration for DC

Table 5.1.102.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-28A\_n7A  DC\_1A-28A\_n7B | DC\_1A\_n7A  DC\_28A\_n7A  DC\_1A\_n7B  DC\_28A\_n7B | CA\_1A-28A | n7  CA\_n7B |
| DC\_1A-1A-28A\_n7A  DC\_1A-1A-28A\_n7B | DC\_1A\_n7A  DC\_28A\_n7A  DC\_1A\_n7B  DC\_28A\_n7B | CA\_1A-1A-28A | n7 CA\_n7B |

5.1.102.3 ∆TIB and ∆RIB values

For DC\_1-28\_n7, the ΔTIB,c and ΔRIB,c values are reused from LTE combination CA\_1-7-28 and DC\_1-7\_n28, and are given in the tables below.

**Table 5.1.102.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-28\_n7 | 1 | 0.5 |
| 28 | 0.6 |
| n7 | 0.6 |

**Table 5.1.102.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-28\_n7 | 1 | 0 |
| 28 | 0.2 |
| n7 | 0 |

5.1.102.4 REFSENS requirements

Co-existence analysis from DC\_28\_n7 shows that there is no impact from DC\_28\_n7 UL to Band 1 DL.

Co-existence analysis from DC\_1\_n7 shows that there is IMD5 impact from DC\_1\_n7 UL to Band 28 DL. MSD values are reused from CA\_1A-7A-28A with CA\_1A-7A in uplink.

Table 7.3B.2.3.5.2-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_1A-28A\_n7A  DC\_1A-1A-28A\_n7A  DC\_1A-28A\_n7B  DC\_1A-1A-28A\_n7B | 1 | 1935 | 5 | 25 | 2125 | N/A | N/A |
| 28 | 730 | 10 | 50 | 785 | 4.5 | IMD5 |
| n7 | 2510 | 10 | 50 | 2630 | N/A | N/A |

## 5.1.103 DC\_2-5\_n66

5.1.103.1 Operating bands for DC

Table 5.1.103.1-1: Band combinations EN-DC (two bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-5\_n66 | CA\_2-5 | n66 | No |

5.1.103.2 Configuration for DC

Table 5.1.103.2-1: Inter-band EN-DC configurations (two bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_2-5\_n66 | DC\_2A\_n66A  DC\_5A\_n66A | CA\_2A-5A | n66A |

5.1.103.3 Coexistence studies

Based on co-existence studies of DC\_2A\_n66A in TR 37.863-01-01, the third order IMD may fall into band 2 and/or n66; the fifth order IMD may fall into band n66.

Based on co-existence studies of DC\_5A\_n66A in TR 37.863-01-01, the second order IMD may fall into band 5.

5.1.103.4 ∆TIB and ∆RIB values

For DC\_2-5\_n66, the ΔTIB,c and ΔRIB,c values are derived from CA\_2-5-66 in TS 36.101.

Table 5..1.62.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-5\_n66 | 2 | 0.5 |
| 5 | 0.3 |
| n66 | 0.5 |

Table 5.1.103.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-5\_n66 | 2 | 0.3 |
| 5 | 0 |
| n66 | 0.3 |

5.1.103.5 REFSENS requirements

The MSD due to IMD products are already specifed for 2DL2UL DC combos (DC\_2A\_n66A and DC\_5A\_n66A) in TS 38.101-3. There is no specific MSD for 3DL2UL DC.

## 5.1.104 DC\_2-5\_n2 and DC\_2-5-5\_n2

5.1.104.1 Operating bands for DC

Table 5.1.104.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-5\_n2 | CA\_2-5 | n2 | No |
| DC\_2-5-5\_n2 | CA\_2-5-5 | n2 | No |

5.1.104.2 Configuration for DC

Table 5.1.104.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_2A-5A\_n2A | DC\_5A\_n2A | CA\_2A-5A | n2A |
| DC\_2A-5B\_n2A | DC\_5A\_n2A | CA\_2A-5B | n2A |
| DC\_2A-5A-5A\_n2A | DC\_5A\_n2A | CA\_2A-5A-5A | n2A |

5.1.104.3 Coexistence studies

Based on co-existence studies of DC\_5A\_n2A in TR 37.716-11-11, there is no harmonic or IMD issues for this band combination,.

5.1.104.4 ∆TIB and ∆RIB values

For DC\_2-5\_n2, the ∆TIB,c and ∆RIB,c values reused the values of DC\_5A\_n2A in TS 38.101-3.

Table 5.1.104.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-5\_n2  DC\_2-5-5\_n2 | 2 | 0.3 |
| 5 | 0.3 |
| n2 | 0.3 |

Table 5.1.104.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-5\_n2  DC\_2-5-5\_n2 | 2 | 0 |
| 5 | 0 |
| n2 | 0 |

5.1.104.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.105 DC\_2-5\_n5 and DC\_2-2-5\_n5

5.1.105.1 Operating bands for DC

**Table 5.1.105.1-1: Band combination EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-5\_n5 | CA\_2-5 | n5 | No |
| DC\_2-2-5\_n5 | CA\_2-2-5 | n5 | No |

5.1.105.2 Configuration for DC

**Table 5.1.105.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_2A-5A\_n5A | DC\_2A\_n5A | CA\_2A-5A | n5A |
| DC\_2A-2A-5A\_n5A | DC\_2A\_n5A | CA\_2A-2A-5A | n5A |

5.1.105.3 Co-existence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there is no harmonic or IMD issues for this band combination.

5.1.105.4 ∆TIB and ∆RIB values

For DC\_2-5\_n5 and DC\_2-2-5\_n5, the ∆TIB,c and ∆RIB,c values are given in the tables below. Numbers come from LTE CA\_2A-5A.

Table 5.1.105.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-5\_n5  DC\_2-2-5\_n5 | 2 | 0.3 |
| 5 | 0.3 |
| n5 | 0.3 |

Table 5.1.105.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-5\_n5  DC\_2-2-5\_n5 | 2 | 0 |
| 5 | 0 |
| n5 | 0 |

5.1.105.4 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.106 DC\_2-13\_n2

5.1.106.1 Operating bands for DC

Table 5.1.106.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-13\_n2 | CA\_2-13 | n2 | No |

5.1.106.2 Configuration for DC

Table 5.1.106.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_2A-13A\_n2A | DC\_13A\_n2A | CA\_2A-13A | n2A |

5.1.106.3 Coexistence studies

Based on co-existence studies of DC\_13A\_n2A, there is no harmonic or IMD issues for this band combination,.

5.1.106.4 ∆TIB and ∆RIB values

For DC\_2-13\_n2, the ∆TIB,c and ∆RIB,c values reused the values of CA\_2A-13A in TS 36.101.

Table 5.1.106.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-13\_n2 | 2 | 0.3 |
| 13 | 0.3 |
| n2 | 0.3 |

Table 5.1.106.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-13\_n2 | 2 | 0 |
| 13 | 0 |
| n2 | 0 |

5.1.106.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.107 DC\_2-13\_n5 and DC\_2-2-13\_n5

5.1.107.1 Operating bands for DC

**Table 5.1.107.1-1: Band combination EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-13\_n5 | CA\_2-13 | n5 | No |
| DC\_2-2-13\_n5 | CA\_2-2-13 | n5 | No |

5.1.107.2 Configuration for DC

**Table 5.1.107.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_2A-13A\_n5A | DC\_2A\_n5A | CA\_2A-13A | n5A |
| DC\_2A-2A-13A\_n5A | DC\_2A\_n5A | CA\_2A-2A-13A | n5A |

5.1.107.3 Co-existence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there is no harmonic or IMD issues for this band combination.

5.1.107.4 ∆TIB and ∆RIB values

For DC\_2-13\_n5 and DC\_2-2-13\_n5, the ∆TIB,c and ∆RIB,c values are given in the tables below. Numbers come from LTE CA\_2A-5A-13A

Table 5.1.107.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-13\_n5  DC\_2-2-13\_n5 | 2 | 0.3 |
| 13 | 0.5 |
| n5 | 0.5 |

Table 5.1.107.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-13\_n5  DC\_2-2-13\_n5 | 2 | 0 |
| 13 | 0 |
| n5 | 0 |

5.1.107.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.108 DC\_5-5-66\_n66 and DC\_5-5-66-66\_n66

5.1.108.1 Operating bands for DC

Table 5.1.108.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_5-5-66\_n66 | CA\_5-5-66 | n66 | No |
| DC\_5-5-66-66\_n66 | CA\_5-5-66-66 | n66 | No |

5.1.108.2 Configuration for DC

Table 5.1.108.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_5A-5A-66A\_n66A | DC\_5A\_n66A | CA\_5A-5A-66A | n66A |
| DC\_5A-5A-66A-66A\_n66A | DC\_5A\_n66A | CA\_5A-5A-66A-66A | n66A |

5.1.108.3 Coexistence studies

Based on co-existence studies of DC\_5A\_n66A in TR 37.863-01-01, there is no harmonic or IMD issues for this band combination.

5.1.108.4 ∆TIB and ∆RIB values

For DC\_5-5-66\_n66 and DC\_5-5-66-66\_n66, the ∆TIB,c and ∆RIB,c values reused the values for DC\_5\_n66 in TS 38.101-3.

Table 5.1.108.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_5-5-66\_n66  DC\_5-5-66-66\_n66 | 5 | 0.3 |
| 66 | 0.3 |
| n66 | 0.3 |

Table 5.1.108.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_5-5-66\_n66  DC\_5-5-66-66\_n66 | 5 | 0 |
| 66 | 0 |
| n66 | 0 |

5.1.108.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.109 DC\_5-13\_n2

5.1.109.1 Operating bands for DC

Table 5.1.109.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_5-13\_n2 | CA\_5-13 | n2 | No |

5.1.109.2 Configuration for DC

Table 5.1.109.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_5A-13A\_n2A | DC\_5A\_n2A  DC\_13A\_n2A | CA\_5A-13A | n2A |

5.1.109.3 Coexistence studies

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there is no harmonic or IMD issues for this band combination.

5.1.109.4 ∆TIB and ∆RIB values

For DC\_5-13\_n2, the TIB,c and RIB,c values reused the values of CA\_2A-5A-13A in TS 36.101.

Table 5.1.109.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_5-13\_n2 | 5 | 0.5 |
| 13 | 0.5 |
| n2 | 0.3 |

Table 5.1.109.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_5-13\_n2 | 5 | 0 |
| 13 | 0 |
| n2 | 0 |

5.1.109.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.110 DC\_5-66\_n66 and DC\_5-66-66\_n66

5.1.110.1 Operating bands for DC

Table 5.1.110.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_5-66\_n66 | CA\_5-66 | n66 | No |
| DC\_5-66-66\_n66 | CA\_5-66-66 | n66 | No |

5.1.110.2 Configuration for DC

Table 5.1.110.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_5B-66A\_n66A | DC\_5A\_n66A | CA\_5B-66A | n66A |
| DC\_5A-66A-66A\_n66A | DC\_5A\_n66A | CA\_5A-66A-66A | n66A |
| DC\_5B-66A-66A\_n66A | DC\_5A\_n66A | CA\_5B-66A-66A | n66A |

5.1.110.3 Coexistence studies

Based on co-existence studies of DC\_5A\_n66A in TR 37.863-01-01, there is no harmonic or IMD issues for this band combination.

5.1.110.4 ∆TIB and ∆RIB values

For DC\_5-66\_n66 and DC\_5-66-66\_n66, the TIB,c and RIB,c values reused the values for DC\_5\_n66 in TS 38.101-3.

Table 5.1.110.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_5-66\_n66  DC\_5-66-66\_n66 | 5 | 0.3 |
| 66 | 0.3 |
| n66 | 0.3 |

Table 5.1.110.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_5-66\_n66  DC\_5-66-66\_n66 | 5 | 0 |
| 66 | 0 |
| n66 | 0 |

5.1.110.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.111 DC\_5-66\_n78

5.1.111.1 Operating bands for DC

Table 5.1.111.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_5-66\_n78 | CA\_5-66 | n78 | NO |

5.1.111.2 Configurations for DC

Table 5.1.111.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_5A-66A\_n78A  DC\_5A-66A\_n78(2A) | DC\_5A\_n78A  DC\_66A\_n78A | CA\_5A-66A | n78 |

5.1.111.3 Co-existence studies

The co-existence studies of band 66 + band n78 are listed in table 5.1.111.3-1.

**Table 5.1.111.3-1 Band 66 and Band n78 UL harmonics and IMD products**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| **UL frequency** | **1710** | **1780** | **3300** | **3800** |
| 2nd order harmonics frequency range (MHz) | 2\*fx\_low | 2\*fx\_high | 2\*fy\_low | 2\*fy\_high |
| 2nd order harmonics frequency range (MHz) | 3420 | 3560 | 6600 | 7600 |
| 2nd order harmonics frequency range (MHz) | 3\*fx\_low | 3\*fx\_high | 3\*fy\_low | 3\*fy\_high |
| 3rd order harmonics frequency range (MHz) | 5130 | 5340 | 9900 | 11400 |
| 2nd order IMD products | |fy\_low-fx\_high| | |fy\_high-fx\_low| | |fy\_low+fx\_low| | |fy\_high+fx\_high| |
| IMD frequency limits (MHz) | 1520 | 2090 | 5010 | 5580 |
| Two-tone 3rd order IMD products | |fy\_high – 2\*fx\_low| | |fy\_low – 2\*fx\_high| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 380 | 260 | 4820 | 5890 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 6720 | 7360 | 8310 | 9380 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high – 2\*fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 4180 | 3040 | 10020 | 11160 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 1330 | 2040 | 8120 | 9690 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high +1\* fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 8430 | 9140 | 11610 | 13180 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 13490 | 11420 | 3820 | 3040 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 14910 | 16980 | 10140 | 10920 |
| Two-tone 5th order IMD products | |2\*fx\_low – 3\*fy\_high| | |2\*fx\_high – 3\*fy\_low| | |2\*fy\_low – 3\*fx\_high| | |2\*fy\_high – 3\*fx\_low| |
| IMD frequency limits (MHz) | 7980 | 6340 | 1260 | 2470 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 13320 | 14960 | 11730 | 12940 |

According to table 5.1.111.3-1, no additional harmonic and IMD product of band 66 + band n78 will fall into band 5 Rx(869MHz~894MHz).

The co-existence studies of band 5 + band n78 have been captured in TR 37.863-01-01 in Rel-15, where:

- the IMD3 of the frequency range from 1602MHz~2152MHz will fall into band 66 Rx (2110MHz~2200MHz).

5.1.111.4 ∆TIB and ∆RIB values

For DC\_5-66\_n78, the ∆TIB,c and ∆RIB,c values are given in the tables below.

Table 5.1.111.4-1: ΔTIB,c

| Inter-band EN-DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_5-66\_n78 | 5 | 0.6 |
| 66 | 0.6 |
| n78 | 0.8 |

**Table 5.1.111.4-2: ΔRIB,c**

| Inter-band EN-DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_5-66\_n78 | 5 | 0.2 |
| 66 | 0.2 |
| n78 | 0.5 |

5.1.111.5 REFSENS requirements

According the co-existing studies, it shall need to specify additional MSD requirement caused by IMD3 for this UL DC configuration. The requirement is proposed in the table 5.1.x.5-1.

**Table 5.1.111.5-1 MSD requirements for DC\_5A-66A\_n78A**

| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC\_5A-66A\_n78A  DC\_5A-66A\_n78(2A) | 5 | 826.5 | 5 | 25 | 871.5 | N/A | FDD | N/A |
| 66 | 1742 | 5 | 25 | 2142 | 13.2 | FDD | IMD3 |
| n78 | 3795 | 10 | 50 | 3795 | N/A | TDD | N/A |

## 5.1.112 DC\_2-5\_n71

5.1.112.1 Operating bands for DC

Table 5.1.112.1-1: Band combinations EN-DC (two bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-5\_n71 | CA\_2-5 | n71 |  |

5.1.112.2 Configuration for DC

Table 5.1.112.2-1: Inter-band EN-DC configurations (two bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_2A-5A\_n71A | DC\_2A\_n71A  DC\_5A\_n71A | CA\_2A-5A | n71A |

5.1.112.3 Coexistence studies

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes except the impact on own Rx on the 3rd band due to IMD. From Table 5.1.112.3-1 we can see that UL DC\_2A\_n71A has IMD5 interfering band 5 DL.

Table 5.1.112.3-1: UL DC\_2A\_n71A impact to band 5 DL

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| UE UL carriers | fx\_low | fx\_high | fy\_low | fy\_high |
| UL frequency (MHz) | 1850 | 1910 | 663 | 698 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | **3700** | **3820** | **1326** | **1396** |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | **5550** | **5730** | **1989** | **2094** |
| Two tone 2nd order IMD products | |fy\_low - fx\_high| | |fy\_high - fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | **1247** | **1152** | **2513** | **2608** |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | **3002** | **3157** | **584** | **454** |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | **4363** | **4518** | **3176** | **3306** |
| Two-tone 4th order IMD products | |3\*fx\_low - fy\_high| | |3\*fx\_high - fy\_low| | |3\*fy\_low - fx\_high| | |3\*fy\_high - fx\_low| |
| IMD frequency limits (MHz) | **4852** | **5067** | **79** | **244** |
| Two-tone 4th order IMD products | |3\*fx\_low + fy\_low| | |3\*fx\_high + fy\_high| | |3\*fy\_low + fx\_low| | |3\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | **6213** | **6428** | **3839** | **4004** |
| Two-tone 4th order IMD products | |2\*fx\_low - 2\*fy\_high| | |2\*fx\_high - 2\*fy\_low| | |2\*fx\_low + 2\*fy\_low| | |2\*fx\_high + 2\*fy\_high| |
| IMD frequency limits (MHz) | **2304** | **2494** | **5026** | **5216** |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | **942** | **742** | **6977** | **6702** |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | **4502** | **4702** | **8063** | **8338** |
| Two-tone 5th order IMD products | |2\*fx\_low – 3\*fy\_high| | |2\*fx\_high – 3\*fy\_low| | |2\*fy\_low – 3\*fx\_high| | |2\*fy\_high – 3\*fx\_low| |
| IMD frequency limits (MHz) | **1606** | **1831** | **4404** | **4154** |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | **5689** | **5914** | **6876** | **7126** |

Table 5.1.112.3-2: UL DC\_5A\_n71A impact to band 2 DL

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| UE UL carriers | fx\_low | fx\_high | fy\_low | fy\_high |
| UL frequency (MHz) | 824 | 849 | 663 | 698 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | **1648** | **1698** | **1326** | **1396** |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | **2472** | **2547** | **1989** | **2094** |
| Two tone 2nd order IMD products | |fy\_low - fx\_high| | |fy\_high - fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | **186** | **126** | **1487** | **1547** |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | **950** | **1035** | **477** | **572** |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | **2311** | **2396** | **2150** | **2245** |
| Two-tone 4th order IMD products | |3\*fx\_low - fy\_high| | |3\*fx\_high - fy\_low| | |3\*fy\_low - fx\_high| | |3\*fy\_high - fx\_low| |
| IMD frequency limits (MHz) | **1774** | **1884** | **1140** | **1270** |
| Two-tone 4th order IMD products | |3\*fx\_low + fy\_low| | |3\*fx\_high + fy\_high| | |3\*fy\_low + fx\_low| | |3\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | **3135** | **3245** | **2813** | **2943** |
| Two-tone 4th order IMD products | |2\*fx\_low - 2\*fy\_high| | |2\*fx\_high - 2\*fy\_low| | |2\*fx\_low + 2\*fy\_low| | |2\*fx\_high + 2\*fy\_high| |
| IMD frequency limits (MHz) | **252** | **372** | **2974** | **3094** |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | **1968** | **1803** | **2733** | **2598** |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | **3476** | **3641** | **3959** | **4094** |
| Two-tone 5th order IMD products | |2\*fx\_low – 3\*fy\_high| | |2\*fx\_high – 3\*fy\_low| | |2\*fy\_low – 3\*fx\_high| | |2\*fy\_high – 3\*fx\_low| |
| IMD frequency limits (MHz) | **446** | **291** | **1221** | **1076** |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | **3637** | **3792** | **3798** | **3943** |

5.1.112.4 ∆TIB and ∆RIB values

For DC\_2-5\_n71, the ∆TIB,c and ∆RIB,c values are derived from DC\_5\_n71 and DC\_5\_n2.

Table 5..1.62.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-5\_n71 | 2 | 0.3 |
| 5 | 0.5 |
| n71 | 0.5 |

Table 5.1.112.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-5\_n71 | 2 | 0 |
| 5 | 0 |
| n71 | 0 |

5.1.112.5 REFSENS requirements

MSD need to be specified for the case that UL DC\_2A\_n71A has IMD5 interfering band 5 DL. MSD value is reused from DC\_5A-66A\_n71.

Table 7.3B.2.3.5.2-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_2A-5A\_n71A | 2 | 1855 | 5 | 25 | 1935 | N/A | N/A |
| n71 | 686.5 | 5 | 25 | 640.5 | N/A | N/A |
| 5 | 846.5 | 5 | 25 | 891.5 | 4.2 | IMD5 |

## 5.1.113 DC\_2-48\_n71

5.1.113.1 Operating bands for DC

Table 5.1.113.1-1: Band combinations EN-DC (two bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-48\_n71 | CA\_2-48 | n71 |  |

5.1.113.2 Configuration for DC

Table 5.1.113.2-1: Inter-band EN-DC configurations (two bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_2A-48A\_n71A | DC\_2A\_n71A  DC\_48A\_n71A | CA\_2A-48A | n71A |

5.1.113.3 Coexistence studies

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes except the impact on own Rx on the 3rd band due to IMD. From Table 5.1.113.3-1 and Table 5.1.113.3-2 we can see that there are no IMD interfering the 3rd DL.

Table 5.1.113.3-1: UL DC\_2A\_n71A impact to band 48 DL

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| UE UL carriers | fx\_low | fx\_high | fy\_low | fy\_high |
| UL frequency (MHz) | 1850 | 1910 | 663 | 698 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | **3700** | **3820** | **1326** | **1396** |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | **5550** | **5730** | **1989** | **2094** |
| Two tone 2nd order IMD products | |fy\_low - fx\_high| | |fy\_high - fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | **1247** | **1152** | **2513** | **2608** |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | **3002** | **3157** | **584** | **454** |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | **4363** | **4518** | **3176** | **3306** |
| Two-tone 4th order IMD products | |3\*fx\_low - fy\_high| | |3\*fx\_high - fy\_low| | |3\*fy\_low - fx\_high| | |3\*fy\_high - fx\_low| |
| IMD frequency limits (MHz) | **4852** | **5067** | **79** | **244** |
| Two-tone 4th order IMD products | |3\*fx\_low + fy\_low| | |3\*fx\_high + fy\_high| | |3\*fy\_low + fx\_low| | |3\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | **6213** | **6428** | **3839** | **4004** |
| Two-tone 4th order IMD products | |2\*fx\_low - 2\*fy\_high| | |2\*fx\_high - 2\*fy\_low| | |2\*fx\_low + 2\*fy\_low| | |2\*fx\_high + 2\*fy\_high| |
| IMD frequency limits (MHz) | **2304** | **2494** | **5026** | **5216** |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | **942** | **742** | **6977** | **6702** |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | **4502** | **4702** | **8063** | **8338** |
| Two-tone 5th order IMD products | |2\*fx\_low – 3\*fy\_high| | |2\*fx\_high – 3\*fy\_low| | |2\*fy\_low – 3\*fx\_high| | |2\*fy\_high – 3\*fx\_low| |
| IMD frequency limits (MHz) | **1606** | **1831** | **4404** | **4154** |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | **5689** | **5914** | **6876** | **7126** |

Table 5.1.113.3-2: UL DC\_48A\_n71A impact to band 2 DL

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| UE UL carriers | fx\_low | fx\_high | fy\_low | fy\_high |
| UL frequency (MHz) | 3550 | 3700 | 663 | 698 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | **7100** | **7400** | **1326** | **1396** |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | **10650** | **11100** | **1989** | **2094** |
| Two tone 2nd order IMD products | |fy\_low - fx\_high| | |fy\_high - fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | **3037** | **2852** | **4213** | **4398** |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | **6402** | **6737** | **2374** | **2154** |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | **7763** | **8098** | **4876** | **5096** |
| Two-tone 4th order IMD products | |3\*fx\_low - fy\_high| | |3\*fx\_high - fy\_low| | |3\*fy\_low - fx\_high| | |3\*fy\_high - fx\_low| |
| IMD frequency limits (MHz) | **9952** | **10437** | **1711** | **1456** |
| Two-tone 4th order IMD products | |3\*fx\_low + fy\_low| | |3\*fx\_high + fy\_high| | |3\*fy\_low + fx\_low| | |3\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | **11313** | **11798** | **5539** | **5794** |
| Two-tone 4th order IMD products | |2\*fx\_low - 2\*fy\_high| | |2\*fx\_high - 2\*fy\_low| | |2\*fx\_low + 2\*fy\_low| | |2\*fx\_high + 2\*fy\_high| |
| IMD frequency limits (MHz) | **5704** | **6074** | **8426** | **8796** |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | **758** | **1048** | **14137** | **13502** |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | **6202** | **6492** | **14863** | **15498** |
| Two-tone 5th order IMD products | |2\*fx\_low – 3\*fy\_high| | |2\*fx\_high – 3\*fy\_low| | |2\*fy\_low – 3\*fx\_high| | |2\*fy\_high – 3\*fx\_low| |
| IMD frequency limits (MHz) | **5006** | **5411** | **9774** | **9254** |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | **9089** | **9494** | **11976** | **12496** |

5.1.113.4 ∆TIB and ∆RIB values

For DC\_2-48\_n71, the ∆TIB,c and ∆RIB,c values are derived from DC\_2\_n48 and DC\_2\_n71.

Table 5..1.62.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-48\_n71 | 2 | 0.6 |
| 48 | 0.8 |
| n71 | 0.3 |

Table 5.1.113.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-48\_n71 | 2 | 0.2 |
| 48 | 0.5 |
| n71 | 0 |

5.1.113.5 REFSENS requirements

No need for REFSENS requirement as shown in coexistence studies paragraph.

## 5.1.114 DC\_5-48\_n71

5.1.114.1 Operating bands for DC

Table 5.1.114.1-1: Band combinations EN-DC (two bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_5-48\_n71 | CA\_5-48 | n71 |  |

5.1.114.2 Configuration for DC

Table 5.1.114.2-1: Inter-band EN-DC configurations (two bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_5A-48A\_n71A | DC\_5A\_n71A  DC\_48A\_n71A | CA\_5A-48A | n71A |

5.1.114.3 Coexistence studies

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes except the impact on own Rx on the 3rd band due to IMD. From Table 5.1.114.3-1 and Table 5.1.114.3-2 we can see that DC\_5A\_n71A uplink has IMD5 to band 48 and from Table 5.1.114.3-2 we can see that DC\_48A\_n71A uplink has IMD5 to band 5.

Table 5.1.114.3-1: UL DC\_5A\_n71A impact to band 48 DL

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| UE UL carriers | fx\_low | fx\_high | fy\_low | fy\_high |
| UL frequency (MHz) | 824 | 849 | 663 | 698 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | **1648** | **1698** | **1326** | **1396** |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | **2472** | **2547** | **1989** | **2094** |
| Two tone 2nd order IMD products | |fy\_low - fx\_high| | |fy\_high - fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | **186** | **126** | **1487** | **1547** |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | **950** | **1035** | **477** | **572** |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | **2311** | **2396** | **2150** | **2245** |
| Two-tone 4th order IMD products | |3\*fx\_low - fy\_high| | |3\*fx\_high - fy\_low| | |3\*fy\_low - fx\_high| | |3\*fy\_high - fx\_low| |
| IMD frequency limits (MHz) | **1774** | **1884** | **1140** | **1270** |
| Two-tone 4th order IMD products | |3\*fx\_low + fy\_low| | |3\*fx\_high + fy\_high| | |3\*fy\_low + fx\_low| | |3\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | **3135** | **3245** | **2813** | **2943** |
| Two-tone 4th order IMD products | |2\*fx\_low - 2\*fy\_high| | |2\*fx\_high - 2\*fy\_low| | |2\*fx\_low + 2\*fy\_low| | |2\*fx\_high + 2\*fy\_high| |
| IMD frequency limits (MHz) | **252** | **372** | **2974** | **3094** |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | **1968** | **1803** | **2733** | **2598** |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | **3476** | **3641** | **3959** | **4094** |
| Two-tone 5th order IMD products | |2\*fx\_low – 3\*fy\_high| | |2\*fx\_high – 3\*fy\_low| | |2\*fy\_low – 3\*fx\_high| | |2\*fy\_high – 3\*fx\_low| |
| IMD frequency limits (MHz) | **446** | **291** | **1221** | **1076** |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | **3637** | **3792** | **3798** | **3943** |

Table 5.1.114.3-2: UL DC\_48A\_n71A impact to band 5 DL

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| UE UL carriers | fx\_low | fx\_high | fy\_low | fy\_high |
| UL frequency (MHz) | 3550 | 3700 | 663 | 698 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | **7100** | **7400** | **1326** | **1396** |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | **10650** | **11100** | **1989** | **2094** |
| Two tone 2nd order IMD products | |fy\_low - fx\_high| | |fy\_high - fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | **3037** | **2852** | **4213** | **4398** |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | **6402** | **6737** | **2374** | **2154** |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | **7763** | **8098** | **4876** | **5096** |
| Two-tone 4th order IMD products | |3\*fx\_low - fy\_high| | |3\*fx\_high - fy\_low| | |3\*fy\_low - fx\_high| | |3\*fy\_high - fx\_low| |
| IMD frequency limits (MHz) | **9952** | **10437** | **1711** | **1456** |
| Two-tone 4th order IMD products | |3\*fx\_low + fy\_low| | |3\*fx\_high + fy\_high| | |3\*fy\_low + fx\_low| | |3\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | **11313** | **11798** | **5539** | **5794** |
| Two-tone 4th order IMD products | |2\*fx\_low - 2\*fy\_high| | |2\*fx\_high - 2\*fy\_low| | |2\*fx\_low + 2\*fy\_low| | |2\*fx\_high + 2\*fy\_high| |
| IMD frequency limits (MHz) | **5704** | **6074** | **8426** | **8796** |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | **758** | **1048** | **14137** | **13502** |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | **6202** | **6492** | **14863** | **15498** |
| Two-tone 5th order IMD products | |2\*fx\_low – 3\*fy\_high| | |2\*fx\_high – 3\*fy\_low| | |2\*fy\_low – 3\*fx\_high| | |2\*fy\_high – 3\*fx\_low| |
| IMD frequency limits (MHz) | **5006** | **5411** | **9774** | **9254** |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | **9089** | **9494** | **11976** | **12496** |

5.1.114.4 ∆TIB and ∆RIB values

For DC\_5-48\_n71, the ΔTIB,c and ΔRIB,c values are derived from DC\_5\_n48 and DC\_5\_n71.

Table 5.1.1.114.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_5-48\_n71 | 5 | 0.5 |
| 48 | 0.3 |
| n71 | 0.5 |

Table 5.1.114.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_5-48\_n71 | 5 | 0 |
| 48 | 0 |
| n71 | 0 |

5.1.114.5 REFSENS requirements

MSD need to be specified for the case that UL DC\_5A\_n71A has IMD5 interfering band 48 DL and UL DC\_48A\_n71A has IMD5 interfering band 5 DL.

Table 7.3B.2.3.5.2-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_5A-48A\_n71A | 5 | TBD | 5 | 25 | TBD | N/A | N/A |
| n71 | TBD | 5 | 25 | TBD | N/A | N/A |
| 48 | TBD | 5 | 25 | TBD | TBD | IMD5 |
| 48 | TBD | 5 | 25 | TBD | N/A | N/A |
| n71 | TBD | 5 | 25 | TBD | N/A | N/A |
| 5 | TBD | 5 | 25 | TBD | TBD | IMD5 |

## 5.1.115 DC\_48\_(n)12

5.1.115.1 Operating bands for DC

Table 5.1.115.1-1: Band combinations EN-DC (two bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_48\_(n)12 | CA\_48-12 | n12 |  |

5.1.115.2 Configuration for DC

Table 5.1.115.2-1: Inter-band EN-DC configurations (two bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_48A\_(n)12AA | DC\_48A\_n12A  DC\_(n)12AA1 | CA\_48A-12A | n12A |
| NOTE1: Only single switched UL is supported | | | |

5.1.115.3 Coexistence studies

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes.

5.1.115.4 ∆TIB and ∆RIB values

For DC\_48\_(n)12 the ΔTIB,c and ΔRIB,c values are derived from high-low band combination agreement.

Table 5.1.115.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_48\_(n)12 | 12 | 0.3 |
| n12 | 0.3 |
| 48 | 0.3 |

Table 5.1.115.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_48\_(n)12 | 12 | 0 |
| n12 | 0 |
| 48 | 0 |

5.1.115.5 REFSENS requirements

No additional REFSENS requirement is needed.

## 5.1.116 DC\_66\_(n)12

5.1.116.1 Operating bands for DC

Table 5.1.116.1-1: Band combinations EN-DC (two bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_66\_(n)12 | CA\_66-12 | n12 |  |

5.1.116.2 Configuration for DC

Table 5.1.116.2-1: Inter-band EN-DC configurations (two bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_66A\_(n)12AA | DC\_66A\_n12A  DC\_(n)12AA1 | CA\_66A-12A | n12A |
| NOTE1: Only single switched UL is supported | | | |

5.1.116.3 Coexistence studies

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes.

5.1.116.4 ∆TIB and ∆RIB values

For DC\_66\_(n)12 the ΔTIB,c and ΔRIB,c values are derived from DC\_12\_n66 combination.

Table 5..1.62.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_66\_(n)12 | 12 | 0.8 |
| n12 | 0.8 |
| 66 | 0.5 |

Table 5.1.116.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_66\_(n)12 | 12 | 0 |
| n12 | 0 |
| 66 | 0 |

5.1.116.5 REFSENS requirements

No additional REFSENS requirement is needed.

## 5.1.117 DC\_2-66\_n38

5.1.117.1 Operating bands for DC

**Table 5.1.117.1-1: Band combinations EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-66\_n38 | CA\_2-66 | n38 | no |
| DC\_2-66-66\_n38 | CA\_2-66-66 | n38 | no |

5.1.117.2 Configuration for DC

**Table 5.1.117.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_2A-66A\_n38A | DC\_2A\_n38A  DC\_66A\_n38A | CA\_2A-66A | n38A |
| DC\_2A-66A-66A\_n38A | DC\_2A\_n38A  DC\_66A\_n38A | CA\_2A-66A-66A | n38A |

5.1.117.3 Co-existence Studies

Based on co-existence studies of DC\_2\_n38 and DC\_6\_n38, as captured in TR 37.716-11-11, no own Rx impact on the 3rd band is observed.

5.1.117.4 ∆TIB and ∆RIB values

The **Δ**TIB,c and **Δ**RIB,c values are given in the tables below.

**Table 5.1.117.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n38  DC\_2-66-66\_n38 | 2 | 0.5 |
| 66 | 0.5 |
| n38 | 0.9 |

**Table 5.1.117.4-2: ΔRIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-66\_n38  DC\_2-66-66\_n38 | 2 | 0.3 |
| 66 | 0.5 |
| n38 | 0.5 |

5.1.117.5 REFSENS requirements

No REFSENS requirements are expected for this DC configuration.

## 5.1.118 DC\_1-18\_n3

5.1.118.1 Operating bands for DC

Table 5.1.118.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-18\_n3 | CA\_1-18 | n3 | DC\_1\_n3 |

5.1.118.2 Configurations for DC

Table 5.1.118.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-18A\_n3A | DC\_1A\_n3A  DC\_18A\_n3A | CA\_1A-18A | n3 |

5.1.118.3 Co-existence studies

Based on co-existence studies of Band 1 + Band n3 and Band-18 + Band n3 captured in TR 37.716-11-11, own Rx impact of the 3rd band is the followings.

- IMD generated by dual uplink of Band 1 + Band n3 doesn’t fall into own Rx of band 18.

- IMD generated by dual uplink of Band 18 + Band n3 doesn’t fall into own Rx of band 1.

5.1.118.4 ∆TIB and ∆RIB values

Table 5.1.118.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-18-n3 | 1 | 0.3 |
| 18 | 0.3 |
| n3 | 0.3 |

**Table 5.1.118.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-18-n3 | 1 | 0 |
| 18 | 0 |
| n3 | 0 |

5.1.118.5 REFSENS requirements

As stated in 5.1.118.3, there is no additional MSD requirement for this configuration.

## 5.1.119 DC\_1-28\_n3

5.1.119.1 Operating bands for DC

Table 5.1.119.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-28\_n3 | CA\_1-28 | n3 | DC\_1\_n3 |

5.1.119.2 Configurations for DC

Table 5.1.119.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-28A\_n3A | DC\_1A\_n3A  DC\_28A\_n3A | CA\_1A-28A | n3 |

5.1.119.3 Co-existence studies

Based on co-existence studies of Band 1 + Band n3 and Band-28 + Band n3 captured in TR 37.716-11-11, own Rx impact of the 3rd band is the followings.

- IMD generated by dual uplink of Band 1 + Band n3 doesn’t fall into own Rx of band 28.

- 4th IMD generated by dual uplink of Band 28 + Band n3 falls into own Rx of band 1.

5.1.119.4 ∆TIB and ∆RIB values

Table 5.1.119.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-28-n3 | 1 | 0.3 |
| 28 | 0.6 |
| n3 | 0.3 |

**Table 5.1.119.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-28-n3 | 1 | 0 |
| 28 | 0.2 |
| n3 | 0 |

5.1.119.5 REFSENS requirements

The MSD value for the impact on band 1 DL by dual uplink of Band 28 + Band n3 stated in 5.1.119.3 is shown in the following table.

Table 7.3B.2.3.5.2-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC\_1A-28A\_n3A | 28 | 710.5 | 5 | 25 | 765.5 | N/A | FDD | N/A |
| n3 | 1780 | 5 | 25 | 1875 | N/A | FDD | N/A |
| 1 | 1949 | 5 | 25 | 2139 | 11.0 | FDD | IMD4 |
|  | | | | | | | | |

## 5.1.120 DC\_3-20\_n7

5.1.120.1 Operating bands for EN-DC

**Table 5.1.120.1-1: Band combinations EN-DC (three bands)**

| **EN-DC band** | **E-UTRA CA band** | **NR band** | **Single UL allowed** |
| --- | --- | --- | --- |
| 3-20\_n7 | CA\_3-20 | n7 | no |

5.1.120.2 Configuration for DC

**Table 5.1.120.2-1: Inter-band EN-DC configurations within FR1 (three bands)**

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration**  **(NOTE 1)** | **E-UTRA CA configuration** | **NR band** |
| --- | --- | --- | --- |
| DC\_3A-20A\_n7A  DC\_3C-20A\_n7A | DC\_3A\_n7A  DC\_3C\_n7A  DC\_20A\_n7A | CA\_3A-20A  CA\_3C-20A | n7 |

5.1.120.3 ∆TIB and ∆RIB values

For DC\_3-20\_n7, the TIB,c and RIB,c values are reused from the LTE combination CA\_3-7-20 given in the tables below.

**Table 5.1.120.3-1: ΔTIB,c**

| **Inter-band DC Configuration** | **E-UTRA and NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| DC\_3-20\_n7 | 3 | 0.5 |
| 20 | 0.3 |
| n7 | 0.5 |

**Table 5.1.120.3-2: ΔRIB**

| **Inter-band DC Configuration** | **E-UTRA and NR Band** | **ΔRIB [dB]** |
| --- | --- | --- |
| DC\_3-20\_n7 | 3 | 0 |
| 20 | 0 |
| n7 | 0 |

5.1.120.4 REFSENS requirements

There are IMD2 impacts from DC\_3\_n7 UL to Band 20 DL. The MSD value for band 20 DL is reused from LTE CA\_3-7-20 in TS 36.101.

Table 5.1.120.4-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC\_3A-20A\_n7A  DC\_3C-20A\_n7A | 3 | 1737 | 5 | 25 | 1832 | N/A | FDD | N/A |
| 20 | 847 | 10 | 20 | 806 | 10.5 | FDD | IMD2 |
| n7 | 2543 | 10 | 50 | 2663 | N/A | FDD | N/A |

## 5.1.121 DC\_1-3\_n8

5.1.121.1 Operating bands for DC

Table 5.1.121.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-3\_n8 | CA\_1-3 | n8 | no |

5.1.121.2 Configuration for DC

Table 5.1.121.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-3A\_n8A | DC\_1A\_n8A  DC\_3A\_n8A | CA\_1-3 | n8 |

5.1.121.3 Co-existence studies

For UE coexistence study of Band 3 + Band n8, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.121.3-1.

Table 5.1.121.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1710 | 1785 | 880 | 915 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3420 | 3570 | 1760 | 1830 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5130 | 5355 | 2640 | 2745 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 6840 | 7140 | 3520 | 3660 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 8550 | 8925 | 4400 | 4575 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 905 | 795 | 2590 | 2700 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 2505 | 2690 | 25 | 120 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 4300 | 4485 | 3470 | 3615 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 4215 | 4475 | 855 | 1035 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 6010 | 6270 | 4350 | 4530 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 1590 | 1810 | 5180 | 5400 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 1950 | 1735 | 6260 | 5925 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 675 | 930 | 3595 | 3300 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 5230 | 5445 | 7720 | 8055 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 6060 | 6315 | 6890 | 7185 |

For UE coexistence study of Band 1 + Band n8, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.121.3-1.

**Table 5.1.121.3-2: Harmonic and IMD analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1920 | 1980 | 880 | 915 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3840 | 3960 | 1760 | 1830 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5760 | 5940 | 2640 | 2745 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 7680 | 7920 | 3520 | 3660 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 9600 | 9900 | 4400 | 4575 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 1100 | 1005 | 2800 | 2895 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 2925 | 3080 | 220 | 90 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 4720 | 4875 | 3680 | 3810 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 4845 | 5060 | 660 | 825 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 6640 | 6855 | 4560 | 4725 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 2010 | 2200 | 5600 | 5790 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 1740 | 1540 | 7040 | 6765 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 1095 | 1320 | 4180 | 3930 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 5440 | 5640 | 8560 | 8835 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 6480 | 6705 | 7520 | 7770 |

Based on the tables, there is no co-existence issue.

5.1.121.4 ∆TIB and ∆RIB values

Table 5.1.121.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-3\_n8 | 1 | 0.3 |
| 3 | 0.3 |
| n8 | 0.3 |

**Table 5.1.121.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-3\_n8 | 1 | 0 |
| 3 | 0 |
| n8 | 0 |

5.1.121.5 REFSENS requirements

There is no additional MSD requirement for this configuration.

## 5.1.122 DC\_1-7\_n8

5.1.122.1 Operating bands for DC

Table 5.1.122.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-7\_n8 | CA\_1-7 | n8 | no |

5.1.122.2 Configuration for DC

Table 5.1.122.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-7A\_n8A | DC\_1A\_n8A  DC\_7A\_n8A | CA\_1-7 | n8 |

5.1.122.3 Co-existence studies

For UE coexistence study of Band 7 + Band n8, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.122.3-1.

Table 5.1.122.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 2500 | 2570 | 880 | 915 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 5000 | 5140 | 1760 | 1830 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 7500 | 7710 | 2640 | 2745 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 10000 | 10280 | 3520 | 3660 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 12500 | 12850 | 4400 | 4575 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 1690 | 1585 | 3380 | 3485 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 4085 | 4260 | 810 | 670 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 5880 | 6055 | 4260 | 4400 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 6585 | 6830 | 70 | 245 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 8380 | 8625 | 5140 | 5315 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 3170 | 3380 | 6760 | 6970 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 1160 | 950 | 9400 | 9085 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 2255 | 2500 | 5950 | 5670 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 6020 | 6230 | 10880 | 11195 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 7640 | 7885 | 9260 | 9540 |

For UE coexistence study of Band 1 + Band n8, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.122.3-1.

**Table 5.1.122.3-2: Harmonic and IMD analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1920 | 1980 | 880 | 915 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3840 | 3960 | 1760 | 1830 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5760 | 5940 | 2640 | 2745 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 7680 | 7920 | 3520 | 3660 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 9600 | 9900 | 4400 | 4575 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 1100 | 1005 | 2800 | 2895 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 2925 | 3080 | 220 | 90 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 4720 | 4875 | 3680 | 3810 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 4845 | 5060 | 660 | 825 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 6640 | 6855 | 4560 | 4725 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 2010 | 2200 | 5600 | 5790 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 1740 | 1540 | 7040 | 6765 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 1095 | 1320 | 4180 | 3930 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 5440 | 5640 | 8560 | 8835 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 6480 | 6705 | 7520 | 7770 |

Based on the tables, there is no co-existence issue.

5.1.122.4 ∆TIB and ∆RIB values

Table 5.1.122.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-7\_n8 | 1 | 0.5 |
| 7 | 0.6 |
| n8 | 0.6 |

**Table 5.1.122.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-7\_n8 | 1 | 0 |
| 7 | 0 |
| n8 | 0.2 |

5.1.122.5 REFSENS requirements

There is no additional MSD requirement for this configuration.

## 5.1.123 DC\_1-20\_n8

5.1.123.1 Operating bands for DC

Table 5.1.123.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-20\_n8 | CA\_1-20 | n8 | no |

5.1.123.2 Configuration for DC

Table 5.1.123.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-20A\_n8A | DC\_1A\_n8A  DC\_20A\_n8A | CA\_1-20 | n8 |

5.1.123.3 Co-existence studies

For UE coexistence study of Band 20 + Band n8, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.123.3-1.

Table 5.1.123.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 832 | 862 | 880 | 915 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 1664 | 1724 | 1760 | 1830 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 2496 | 2586 | 2640 | 2745 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 3328 | 3448 | 3520 | 3660 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 4160 | 4310 | 4400 | 4575 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 18 | 83 | 1712 | 1777 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 749 | 844 | 898 | 998 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 2544 | 2639 | 2592 | 2692 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 1581 | 1706 | 1778 | 1913 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 3376 | 3501 | 3472 | 3607 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 166 | 36 | 3424 | 3554 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 2828 | 2658 | 2568 | 2413 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 1081 | 916 | 826 | 666 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 4352 | 4522 | 4208 | 4363 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 4304 | 4469 | 4256 | 4416 |

For UE coexistence study of Band 1 + Band n8, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.123.3-1.

**Table 5.1.123.3-2: Harmonic and IMD analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1920 | 1980 | 880 | 915 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3840 | 3960 | 1760 | 1830 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5760 | 5940 | 2640 | 2745 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 7680 | 7920 | 3520 | 3660 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 9600 | 9900 | 4400 | 4575 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 1100 | 1005 | 2800 | 2895 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 2925 | 3080 | 220 | 90 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 4720 | 4875 | 3680 | 3810 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 4845 | 5060 | 660 | 825 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 6640 | 6855 | 4560 | 4725 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 2010 | 2200 | 5600 | 5790 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 1740 | 1540 | 7040 | 6765 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 1095 | 1320 | 4180 | 3930 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 5440 | 5640 | 8560 | 8835 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 6480 | 6705 | 7520 | 7770 |

IMD4 of Tx band 1 + band n8 may fall into Rx of band 20.

5.1.123.4 ∆TIB and ∆RIB values

Table 5.1.123.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-20\_n8 | 1 | 0.3 |
| 20 | 0.4 |
| n8 | 0.4 |

**Table 5.1.123.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-20\_n8 | 1 | 0 |
| 20 | 0 |
| n8 | 0 |

5.1.123.5 REFSENS requirements

Table 5.1.123.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| DC\_1-20\_n8 | 1 | 1925 | 5 | 25 | 2115 | N/A | N/A |
| n8 | 910 | 5 | 25 | 955 | N/A | N/A |
| 20 | 846 | 5 | 25 | 805 | 11.5 | IMD4 |

## 5.1.124 DC\_3-7\_n8

5.1.124.1 Operating bands for DC

Table 5.1.124.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-7\_n8 | CA\_3-7 | n8 | no |

5.1.124.2 Configuration for DC

Table 5.1.124.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_3A-7A\_n8A | DC\_3A\_n8A  DC\_7A\_n8A | CA\_1-7 | n8 |

5.1.124.3 Co-existence studies

For UE coexistence study of Band 7 + Band n8, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.124.3-1.

Table 5.1.124.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 2500 | 2570 | 880 | 915 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 5000 | 5140 | 1760 | 1830 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 7500 | 7710 | 2640 | 2745 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 10000 | 10280 | 3520 | 3660 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 12500 | 12850 | 4400 | 4575 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 1690 | 1585 | 3380 | 3485 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 4085 | 4260 | 810 | 670 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 5880 | 6055 | 4260 | 4400 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 6585 | 6830 | 70 | 245 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 8380 | 8625 | 5140 | 5315 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 3170 | 3380 | 6760 | 6970 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 1160 | 950 | 9400 | 9085 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 2255 | 2500 | 5950 | 5670 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 6020 | 6230 | 10880 | 11195 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 7640 | 7885 | 9260 | 9540 |

For UE coexistence study of Band 3 + Band n8, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.124.3-1.

**Table 5.1.124.3-2: Harmonic and IMD analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1710 | 1785 | 880 | 915 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3420 | 3570 | 1760 | 1830 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5130 | 5355 | 2640 | 2745 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 6840 | 7140 | 3520 | 3660 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 8550 | 8925 | 4400 | 4575 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 905 | 795 | 2590 | 2700 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 2505 | 2690 | 25 | 120 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 4300 | 4485 | 3470 | 3615 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 4215 | 4475 | 855 | 1035 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 6010 | 6270 | 4350 | 4530 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 1590 | 1810 | 5180 | 5400 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 1950 | 1735 | 6260 | 5925 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 675 | 930 | 3595 | 3300 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 5230 | 5445 | 7720 | 8055 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 6060 | 6315 | 6890 | 7185 |

Based on the tables, IMD2 and IMD3 for Tx band 3 + band n8 may fall into Rx of band 7.

5.1.124.4 ∆TIB and ∆RIB values

Table 5.1.124.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-7\_n8 | 3 | 0.5 |
| 7 | 0.5 |
| n8 | 0.6 |

**Table 5.1.124.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-7\_n8 | 3 | 0 |
| 7 | 0 |
| n8 | 0.2 |

5.1.124.5 REFSENS requirements

The reference sensitivity exception (MSD) due to IMD2 and IMD3 for DC\_3-7\_n8 with UL DC\_3\_n8 is specified as below referring to the MSD for CA\_3A-7A-8A from 36.101.

Table 5.1.124.5-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_3-7\_n8 | 3 | 1780 | 5 | 25 | 1875 | N/A | N/A |
| n8 | 890 | 5 | 25 | 935 | N/A | N/A |
| 7 | 2550 | 10 | 50 | 2670 | 29.0 | IMD2+IMD3x |
| NOTE x: This MSD requirement apply with both IMD2 and IMD3 products should be generated. | | | | | | | |

## 5.1.125 DC\_3-20\_n8

5.1.125.1 Operating bands for DC

Table 5.1.125.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-20\_n8 | CA\_3-20 | n8 | no |

5.1.125.2 Configuration for DC

Table 5.1.125.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_3A-20A\_n8A | DC\_3A\_n8A  DC\_20A\_n8A | CA\_1-20 | n8 |

5.1.125.3 Co-existence studies

For UE coexistence study of Band 20 + Band n8, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.125.3-1.

Table 5.1.125.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 832 | 862 | 880 | 915 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 1664 | 1724 | 1760 | 1830 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 2496 | 2586 | 2640 | 2745 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 3328 | 3448 | 3520 | 3660 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 4160 | 4310 | 4400 | 4575 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 18 | 83 | 1712 | 1777 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 749 | 844 | 898 | 998 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 2544 | 2639 | 2592 | 2692 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 1581 | 1706 | 1778 | 1913 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 3376 | 3501 | 3472 | 3607 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 166 | 36 | 3424 | 3554 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 2828 | 2658 | 2568 | 2413 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 1081 | 916 | 826 | 666 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 4352 | 4522 | 4208 | 4363 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 4304 | 4469 | 4256 | 4416 |

For UE coexistence study of Band 3 + Band n8, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.125.3-1.

**Table 5.1.125.3-2: Harmonic and IMD analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1710 | 1785 | 880 | 915 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3420 | 3570 | 1760 | 1830 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5130 | 5355 | 2640 | 2745 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 6840 | 7140 | 3520 | 3660 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 8550 | 8925 | 4400 | 4575 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 905 | 795 | 2590 | 2700 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 2505 | 2690 | 25 | 120 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 4300 | 4485 | 3470 | 3615 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 4215 | 4475 | 855 | 1035 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 6010 | 6270 | 4350 | 4530 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 1590 | 1810 | 5180 | 5400 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 1950 | 1735 | 6260 | 5925 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 675 | 930 | 3595 | 3300 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 5230 | 5445 | 7720 | 8055 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 6060 | 6315 | 6890 | 7185 |

Based on the tables：

IMD2 and IMD5 of Tx band 3 + band n8 may fall into Rx of band 20.

IMD4 of Tx band 20 + band n8 may fall into Rx of band 3.

5.1.125.4 ∆TIB and ∆RIB values

Table 5.1.125.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-20\_n8 | 3 | 0.3 |
| 20 | 0.4 |
| n8 | 0.4 |

**Table 5.1.125.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-20\_n8 | 3 | 0 |
| 20 | 0 |
| n8 | 0 |

5.1.125.5 REFSENS requirements

The reference sensitivity exception (MSD) due to IMD2 and IMD3 for DC\_3-20\_n8 with UL DC\_3\_n8 is specified as below

Table 5.1.125.5-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_3-20\_n8 | 3 | 1720 | 5 | 25 | 1815 | N/A | N/A |
| n8 | 910 | 5 | 25 | 955 | N/A | N/A |
| 20 | 851 | 5 | 25 | 810 | 27 | IMD2  |fn8-fB3| |
| DC\_3-20\_n8 | 3 | 1765 | 5 | 25 | 1860 | 14.5 | IMD4  |3\*fn8-fB20| |
| n8 | 900 | 5 | 25 | 945 | N/A | N/A |
| 20 | 840 | 5 | 25 | 799 | N/A | N/A |

## 5.1.126 DC\_7-20\_n8

5.1.126.1 Operating bands for DC

Table 5.1.126.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_7-20\_n8 | CA\_7-20 | n8 | no |

5.1.126.2 Configuration for DC

Table 5.1.126.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_7A-20A\_n8A | DC\_7A\_n8A  DC\_20A\_n8A | CA\_7-20 | n8 |

5.1.126.3 Co-existence studies

For UE coexistence study of Band 20 + Band n8, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.126.3-1.

Table 5.1.126.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 832 | 862 | 880 | 915 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 1664 | 1724 | 1760 | 1830 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 2496 | 2586 | 2640 | 2745 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 3328 | 3448 | 3520 | 3660 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 4160 | 4310 | 4400 | 4575 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 18 | 83 | 1712 | 1777 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 749 | 844 | 898 | 998 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 2544 | 2639 | 2592 | 2692 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 1581 | 1706 | 1778 | 1913 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 3376 | 3501 | 3472 | 3607 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 166 | 36 | 3424 | 3554 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 2828 | 2658 | 2568 | 2413 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 1081 | 916 | 826 | 666 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 4352 | 4522 | 4208 | 4363 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 4304 | 4469 | 4256 | 4416 |

For UE coexistence study of Band 7 + Band n8, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.126.3-1.

**Table 5.1.126.3-2: Harmonic and IMD analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 2500 | 2570 | 880 | 915 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 5000 | 5140 | 1760 | 1830 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 7500 | 7710 | 2640 | 2745 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 10000 | 10280 | 3520 | 3660 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 12500 | 12850 | 4400 | 4575 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 1690 | 1585 | 3380 | 3485 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 4085 | 4260 | 810 | 670 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 5880 | 6055 | 4260 | 4400 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 6585 | 6830 | 70 | 245 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 8380 | 8625 | 5140 | 5315 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 3170 | 3380 | 6760 | 6970 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 1160 | 950 | 9400 | 9085 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 2255 | 2500 | 5950 | 5670 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 6020 | 6230 | 10880 | 11195 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 7640 | 7885 | 9260 | 9540 |

Based on the tables：

IMD3 of Tx band 7 + band n8 may fall into Rx of band 20.

IMD3 and IMD5 of Tx band 20 + band n8 may fall into Rx of band 3.

5.1.126.4 ∆TIB and ∆RIB values

Table 5.1.126.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_7-20\_n8 | 7 | 0.3 |
| 20 | 0.4 |
| n8 | 0.4 |

**Table 5.1.126.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_7-20\_n8 | 7 | 0 |
| 20 | 0 |
| n8 | 0 |

5.1.126.5 REFSENS requirements

The reference sensitivity exception (MSD) due to IMD issues for DC\_7-20\_n8 with UL DC\_7\_n8 DC\_20\_n8 and is specified as below.

Table 5.1.126.5-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_7-20\_n8 | 7 | 2565 | 5 | 25 | 2685 | N/A | N/A |
| n8 | 885 | 5 | 25 | 930 | N/A | N/A |
| 20 | 836 | 5 | 25 | 795 | 17.4 | IMD3  |2\*fn8-fB7| |
| DC\_7-20\_n8 | 7 | 2520 | 5 | 25 | 2640 | 21.1 | IMD3  |2\*fn8+fB20| |
| n8 | 900 | 5 | 25 | 945 | N/A | N/A |
| 20 | 840 | 5 | 25 | 799 | N/A | N/A |
| DC\_7-20\_n8 | 7 | 2504 | 5 | 25 | 2624 | 18.8 | IMD3  |1\*fn8+2\*fB20| |
| n8 | 910 | 5 | 25 | 955 | N/A | N/A |
| 20 | 857 | 5 | 25 | 816 | N/A | N/A |

## 5.1.127 DC\_1-41\_n41

5.1.127.1 Operating bands for DC

Table 5.1.127.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-41\_n41 | CA\_1-41 | n41 | no |

5.1.127.2 Configuration for DC

Table 5.1.127.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-41A\_n41A  DC\_1A-41C\_n41A | DC\_1A\_n41A | CA\_1-41 | n41 |

5.1.127.3 Co-existence studies

For UE coexistence study of Band 1 + Band n41, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.127.3-1.

Table 5.1.127.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1920 | 1980 | 2496 | 2690 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3840 | 3960 | 4992 | 5380 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5760 | 5940 | 7488 | 8070 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 7680 | 7920 | 9984 | 10760 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 9600 | 9900 | 12480 | 13450 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 516 | 770 | 4416 | 4670 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 1150 | 1464 | 3012 | 3460 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 6336 | 6650 | 6912 | 7360 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 3070 | 3444 | 5508 | 6150 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 8256 | 8630 | 9408 | 10050 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 1540 | 1032 | 8832 | 9340 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 8840 | 8004 | 5424 | 4990 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 4230 | 3528 | 948 | 380 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 11904 | 12740 | 10176 | 10610 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 11328 | 12030 | 10752 | 11320 |

Based on the table, there is no harmonic and IMD issue.

5.1.127.4 ∆TIB and ∆RIB values

Table 5.1.127.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-41\_n41 | 1 | 0.5 |
| 41 | 0.5 |
| n41 | 0.5 |

**Table 5.1.127.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-41\_n41 | 1 | 0 |
| 41 | 0 |
| n41 | 0 |

5.1.127.5 REFSENS requirements

There is no the MSD requirements.

## 5.1.128 DC\_1-(n)41

5.1.128.1 Operating bands for DC

Table 5.1.128.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-(n)41 | CA\_1-41 | n41 | no |

5.1.128.2 Configuration for DC

Table 5.1.128.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-(n)41AA  DC\_1A-(n)41CA  DC\_1A-(n)41DA | DC\_1A\_n41A | CA\_1-41 | n41 |

5.1.128.3 Co-existence studies

For UE coexistence study of Band 1 + Band n41, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.128.3-1.

Table 5.1.128.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1920 | 1980 | 2496 | 2690 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3840 | 3960 | 4992 | 5380 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5760 | 5940 | 7488 | 8070 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 7680 | 7920 | 9984 | 10760 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 9600 | 9900 | 12480 | 13450 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 516 | 770 | 4416 | 4670 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 1150 | 1464 | 3012 | 3460 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 6336 | 6650 | 6912 | 7360 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 3070 | 3444 | 5508 | 6150 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 8256 | 8630 | 9408 | 10050 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 1540 | 1032 | 8832 | 9340 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 8840 | 8004 | 5424 | 4990 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 4230 | 3528 | 948 | 380 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 11904 | 12740 | 10176 | 10610 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 11328 | 12030 | 10752 | 11320 |

Based on the table, there is no harmonic and IMD issue.

5.1.128.4 ∆TIB and ∆RIB values

Table 5.1.128.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-(n)41 | 1 | 0.5 |
| 41 | 0.5 |
| n41 | 0.5 |

**Table 5.1.128.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-(n)41 | 1 | 0 |
| 41 | 0 |
| n41 | 0 |

5.1.128.5 REFSENS requirements

There is no the MSD requirements.

## 5.1.129 DC\_2-66\_n25

5.1.129.1 Operating bands for DC

Table 5.1.129.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-66\_n25 | CA\_2-66 | n25 | No |

5.1.129.2 Configuration for DC

Table 5.1.129.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** |
| --- | --- |
| DC\_2A-66A\_n25A | DC\_66A\_n25A |

5.1.129.3 Coexistence studies

Co-existence studies of DC\_66A\_n25A and DC\_66A\_n2A are captured in TR 37.716-11-11.

5.1.129.4 ∆TIB and ∆RIB values

For DC\_2-66\_n25, the TIB,c and RIB,c values are derived from CA\_2-66 in TS 36.101 and DC\_66A\_n25A in TR 37.716-11-11.

Table 5.1.129.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n25 | 2 | 0.5 |
| 66 | 0.5 |
| n25 | 0.5 |

Table 5.1.129.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n25 | 2 | 0.3 |
| 66 | 0.3 |
| n25 | 0.3 |

5.1.129.5 REFSENS requirements

MSD is derived from DC\_66A\_n25A and DC\_66A\_n2A captured in TR 37.716-11-11.

Table 5.1.129.5-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | |
| EN-DC  Configuration | EUTRA or NR band | UL Fc  (MHz) | UL/DL BW  (MHz) | UL  LCRB | DL Fc (MHz) | MSD  (dB) | Duplex mode | IMD order |
| DC\_2A-66A\_n25A | 2 | 1855 | 5 | 25 | 1935 | 20 | FDD | IMD3 |
| 66 | 1775 | 5 | 25 | 2175 | N/A | FDD | N/A |
| n25 | 1855 | 5 | 25 | 1935 | 20 | FDD | IMD3 |
| 2 | 1883.3 | 5 | 25 | 1963.3 | N/A | FDD | N/A |
| 66 | 1750 | 5 | 25 | 2150 | 4 | FDD | IMD5 |
| n25 | 1883.3 | 5 | 25 | 1963.3 | N/A | FDD | N/A |
| 2 | 1883.3 | 5 | 25 | 1963.3 | N/A | FDD | N/A |
| 66 | 1712.5 | 5 | 25 | 2112.5 | 23 | FDD | IMD3 |
| n25 | 1912.5 | 5 | 25 | 1992.5 | N/A | FDD | N/A |

## 5.1.130 DC\_12-66\_n25

5.1.130.1 Operating bands for DC

Table 5.1.130.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_12-66\_n25 | CA\_12-66 | n25 | No |

5.1.130.2 Configuration for DC

Table 5.1.130.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** |
| --- | --- |
| DC\_12A-66A\_n25A | DC\_12A\_n25A  DC\_66A\_n25A |

5.1.130.3 Coexistence studies

Co-existence analysis for DC\_66\_n25 in TR 37.716-11-11 shows that there is no impact to Band 12. However, 3rd and 5th IMD might fall in own Rx frequencies.

Co-existence analysis for DC\_12\_n25 in TR 37.716-11-11 shows that 3rd harmonics of Band 12 might fall in Band 66. This is already addressed in Table 7.3B.2.3.1-2 in TS 38.101-3 based on analysis of DC\_12A\_n66A in 37.863-01-01

5.1.130.4 ∆TIB and ∆RIB values

For DC\_12-66\_n25, the TIB,c and RIB,c values are derived from CA\_12-66 in TS 36.101 and DC\_66A\_n25A in TR 37.716-11-11.

Table 5.1.130.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_12-66\_n25 | 12 | 0.8 |
| 66 | 0.5 |
| n25 | 0.5 |

Table 5.1.130.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_12-66\_n25 | 12 | 0.5 |
| 66 | 0.3 |
| n25 | 0.3 |

5.1.130.5 REFSENS requirements

MSD is derived from DC\_66A\_n25A and DC\_12A\_n25A captured in TR 37.716-11-11.

Table 5.1.130.5-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | |
| EN-DC  Configuration | EUTRA or NR band | UL Fc  (MHz) | UL/DL BW  (MHz) | UL  LCRB | DL Fc (MHz) | MSD  (dB) | Duplex mode | IMD order |
| DC\_12A-66A\_n25A | 12 | 708.5 | 5 | 25 | 738.5 | N/A | FDD | N/A |
| 66 | 1775 | 5 | 25 | 2175 | N/A | FDD | N/A |
| n25 | 1855 | 5 | 25 | 1935 | 20 | FDD | IMD3 |
| 12 | 708.5 | 5 | 25 | 738.5 | N/A | FDD | N/A |
| 66 | 1750 | 5 | 25 | 2150 | 4 | FDD | IMD5 |
| n25 | 1883.3 | 5 | 25 | 1963.3 | N/A | FDD | N/A |
| 12 | 708.5 | 5 | 25 | 738.5 | N/A | FDD | N/A |
| 66 | 1712.5 | 5 | 25 | 2112.5 | 23 | FDD | IMD3 |
| n25 | 1912.5 | 5 | 25 | 1992.5 | N/A | FDD | N/A |

## 5.1.131 DC\_2-7\_n38

5.1.131.1 Operating bands for EN-DC

Table 5.1.131.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 2-7\_n381 | CA\_2-7 | n38 |  |
| NOTE 1: UL carrier shall be supported in Band 2 only. Power imbalance between downlink carriers on Band 7 and Band 38 is assumed to be within [6dB]. | | | |

5.1.131.2 Configuration for DC

Table 5.1.131.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_2A-7A\_n38A | 2A1 | CA\_2A-7A | n38 |
| DC\_2A-2A-7A\_n38A | 2A1 | CA\_2A-2A-7A | n38 |
| NOTE 1: UL carrier shall be supported in Band 2 only. Power imbalance between downlink carriers on Band 7 and Band 38 is assumed to be within [6dB]. | | | |

5.1.131.3 ∆TIB and ∆RIB values

For DC\_2-7\_n38, the TIB,c and RIB,c values are reused from LTE combination CA\_1-7-38, and are given in the tables below.

**Table 5.1.131.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-7\_n38 DC\_2-2-7\_n38 | 2 | 0.5 |

**Table 5.1.131.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-7\_n38 DC\_2-2-7\_n38 | 2 | 0 |
| 7 | 0 |
| n38 | 0.2 |

5.1.131.4 REFSENS requirements

There is no impact to consider.

## 5.1.132 DC\_2-71\_n38

5.1.132.1 Operating bands for EN-DC

Table 5.1.132.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 2-71\_n38 | CA\_2-71 | n38 | No |

5.1.132.2 Configuration for DC

Table 5.1.132.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_2A-71A\_n38A | DC\_71A\_n38A  DC\_2A\_n38A | CA\_2A-71A | n38 |
| DC\_2A-2A-71A\_n38A | DC\_71A\_n38A  DC\_2A\_n38A | CA\_2A-2A-71A | n38 |

5.1.132.3 ∆TIB and ∆RIB values

For DC\_2-71\_n38, the **Δ**TIB,c and **Δ**RIB,c values are reused from LTE combination CA\_2-7-12 and CA\_2-7-28, and are given in the tables below.

**Table 5.1.132.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-71\_n38 DC\_2-2-71\_n38 | 2 | 0.5 |
| 71 | 0.3 |
| n38 | 0.5 |

**Table 5.1.132.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-71\_n38  DC\_2-2-71\_n38 | 2 | 0 |
| 71 | 0 |
| n38 | 0 |

5.1.132.4 REFSENS requirements

Co-existence analysis from DC\_2\_n38 shows that there is no impact from DC\_2\_n38 UL to Band 71 DL.

Co-existence analysis from DC\_71\_n38 shows that there is IMD2 impact from DC\_71\_n38 UL to Band 2 DL.

MSD value for Band 2 DL affected by DC\_71\_n38 UL, are derived from CA\_7-28 affecting band 3 DL in CA\_3-7-28 and need to be defined in TS 38.101-3 like in table below:

Table 7.3B.2.3.5.2-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_2A-71A\_n38A DC\_2A-2A-71A\_n38A | 2 | 1862 | 5 | 25 | 1942 | 26 | IMD2 |
| 71 | 668 | 5 | 25 | 622 | N/A | N/A |
| n38 | 2610 | 10 | 50 | 2610 | N/A | N/A |

## 5.1.133 DC\_7-66\_n38

5.1.133.1 Operating bands for EN-DC

Table 5.1.133.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 7-66\_n381 | CA\_7-66 | n38 |  |
| NOTE 1: UL carrier shall be supported in Band 66 only. Power imbalance between downlink carriers on Band 7 and Band 38 is assumed to be within [6dB]. | | | |

5.1.133.2 Configuration for DC

Table 5.1.133.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_7A-66A\_n38A | 66A1 | CA\_7A-66A | n38 |
| NOTE 1: UL carrier shall be supported in Band 66 only. Power imbalance between downlink carriers on Band 7 and Band 38 is assumed to be within [6dB]. | | | |

5.1.133.3 ∆TIB and ∆RIB values

For DC\_7-66\_n38, the **Δ**TIB,c and **Δ**RIB,c values are reused from LTE combination CA\_1-7-38, and are given in the tables below.

**Table 5.1.133.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_7-66\_n38 | 66 | 0.5 |

**Table 5.1.133.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_7-66\_n38 | 7 | 0 |
| 66 | 0 |
| n38 | 0.2 |

5.1.133.4 REFSENS requirements

There is no impact to consider.

## 5.1.134 DC\_66-71\_n38

5.1.134.1 Operating bands for EN-DC

Table 5.1.134.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 66-71\_n38 | CA\_66-71 | n38 | No |

5.1.134.2 Configuration for DC

Table 5.1.134.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_66A-71A\_n38A | DC\_71A\_n38A  DC\_66A\_n38A | CA\_66A-71A | n38 |

5.1.134.3 ∆TIB and ∆RIB values

For DC\_66-71\_n38, the **Δ**TIB,c and **Δ**RIB,c values are reused from LTE combination CA\_4-7-12, and are given in the tables below.

**Table 5.1.134.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_66-71\_n38 | 66 | 0.5 |
| 71 | 0.5 |
| n38 | 0.8 |

**Table 5.1.134.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_66-71\_n38 | 66 | 0.5 |
| 71 | 0.5 |
| n38 | 0.5 |

5.1.134.4 REFSENS requirements

Co-existence analysis from DC\_66\_n38 shows that there is no impact from DC\_66\_n38 UL to Band 71 DL.

Co-existence analysis from DC\_71\_n38 shows that there is no impact from DC\_71\_n38 UL to Band 66 DL.

## 5.1.135 DC\_2-66\_n38

5.1.135.1 Operating bands for EN-DC

Table 5.1.135.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 2-66\_n38 | CA\_2-66 | n38 | No |

5.1.135.2 Configuration for DC

Table 5.1.135.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_2A-66A\_n38A | DC\_2A\_n38A  DC\_66A\_n38A | CA\_2A-66A | n38 |
| DC\_2A-2A-66A\_n38A | DC\_2A\_n38A  DC\_66A\_n38A | CA\_2A-2A-66A | n38 |

5.1.135.3 ∆TIB and ∆RIB values

For DC\_2-66\_n38, the TIB,c and RIB,c values are reused from LTE combination CA\_2-4-7, and are given in the tables below.

**Table 5.1.135.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n38 DC\_2-2-66\_n38 | 2 | 0.5 |
| 66 | 0.5 |
| n38 | 0.5 |

**Table 5.1.135.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-66\_n38 DC\_2-2-66\_n38 | 2 | 0.3 |
| 66 | 0.5 |
| n38 | 0.5 |

5.1.135.4 REFSENS requirements

Co-existence analysis from DC\_66\_n38 shows that there is no impact from DC\_66\_n38 UL to Band 2 DL.

Co-existence analysis from DC\_2\_n38 shows that there is no impact from DC\_2\_n38 UL to Band 66 DL.

## 5.1.136 DC\_7-66\_n71

5.1.136.1 Operating bands for EN-DC

Table 5.1.136.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 7-66\_n71 | CA\_7-66 | n71 | No |

5.1.136.2 Configuration for DC

Table 5.1.136.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_7A-66A\_n71A | DC\_7A\_n71A  DC\_66A\_n71A | CA\_7A-66A | n71 |
| DC\_7A-66A-66A\_n71A | DC\_7A\_n71A  DC\_66A\_n71A | CA\_7A-66A-66A | n71 |

5.1.136.3 ∆TIB and ∆RIB values

For DC\_7-66\_n71, the TIB,c and RIB,c values are given in the tables below.

**Table 5.1.136.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_7-66\_n71 DC\_7-66-66\_n71 | 7 | 0.5 |
| 66 | 0.5 |
| n71 | 0.5 |

**Table 5.1.136.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_7-66\_n71  DC\_7-66-66\_n71 | 7 | 0.5 |
| 66 | 0.5 |
| n71 | 0.1 |

5.1.136.4 REFSENS requirements

Co-existence analysis from DC\_66\_n71 shows that there is no impact from DC\_66\_n71 UL to Band 7 DL.

Co-existence analysis from DC\_7\_n71 shows that there is no impact from DC\_7\_n71 UL to Band 66 DL.

## 5.1.137 DC\_2-71\_n66

5.1.137.1 Operating bands for EN-DC

Table 5.1.137.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 2-71\_n66 | CA\_2-71 | n66 | No |

5.1.137.2 Configuration for DC

Table 5.1.137.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_2A-71A\_n66A | DC\_2A\_n66A  DC\_71A\_n66A | CA\_2A-71A | n66 |
| DC\_2A-2A-71A\_n66A | DC\_2A\_n66A  DC\_71A\_n66A | CA\_2A-2A-71A | n66 |

5.1.137.3 ∆TIB and ∆RIB values

For DC\_2-71\_n66, the TIB,c and RIB,c values are reused from DC\_2-66\_n71, and are given in the tables below.

**Table 5.1.137.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-71\_n66 DC\_2-2-71\_n66 | 2 | 0,5 |
| 71 | 0.3 |
| n66 | 0.5 |

**Table 5.1.137.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-71\_n66  DC\_2-2-71\_n66 | 2 | 0.3 |
| 71 | 0 |
| n66 | 0.3 |

5.1.137.4 REFSENS requirements

Co-existence analysis from DC\_71\_n66 shows that there is no impact from DC\_71\_n66 UL to Band 2 DL.

Co-existence analysis from DC\_2\_n66 shows that there is no impact from DC\_2\_n66 UL to Band 71 DL.

## 5.1.138 DC\_66-71\_n66

5.1.138.1 Operating bands for EN-DC

Table 5.1.138.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 66-71\_n66 | CA\_66-71 | n66 |  |

5.1.138.2 Configuration for DC

Table 5.1.138.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_66A-71A\_n66A | DC\_71A\_n66A  DC\_66A\_n66A1 | CA\_66A-71A | n66 |
| NOTE 1: Only single switched UL is supported | | | |

5.1.138.3 ∆TIB and ∆RIB values

For DC\_66-71\_n66, the TIB,c and RIB,c values are reused from LTE combination CA\_66-71, and are given in the tables below.

**Table 5.1.138.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_66-71\_n66 | 66 | 0.3 |
| 71 | 0.3 |
| n66 | 0.3 |

**Table 5.1.138.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_66-71\_n66 | 66 | 0 |
| 71 | 0 |
| n66 | 0 |

5.1.138.4 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.139 DC\_2-71\_n78

5.1.139.1 Operating bands for EN-DC

Table 5.1.139.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 2-71\_n78 | CA\_2-71 | n78 | No |

5.1.139.2 Configuration for DC

Table 5.1.139.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_2A-71A\_n78A | DC\_71A\_n78A  DC\_2A\_n78A | CA\_2A-71A | n78 |
| DC\_2A-2A-71A\_n78A | DC\_71A\_n78A  DC\_2A\_n78A | CA\_2A-2A-71A | n78 |

5.1.139.3 ∆TIB and ∆RIB values

For DC\_2-71\_n78, the TIB,c and RIB,c values are reused from DC\_3-8\_n78, and are given in the tables below.

**Table 5.1.139.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-71\_n78 DC\_2-2-71\_n78 | 2 | 0.6 |
| 71 | 0.6 |
| n78 | 0.8 |

**Table 5.1.139.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-71\_n78  DC\_2-2-71\_n78 | 2 | 0.2 |
| 71 | 0.2 |
| n78 | 0.5 |

5.1.139.4 REFSENS requirements

Co-existence analysis from DC\_2\_n78 shows that there is no impact from DC\_2\_n78 UL to Band 71 DL.

Co-existence analysis from DC\_71\_n78 shows that there is IMD3 impact from DC\_71\_n78 UL to Band 2 DL.

MSD value for band 2 DL affected by DC\_71\_n78 UL are derived from 8\_n78 UL affecting band 3 DL in DC\_3-8\_n78 and need to be defined in TS 38.101-3 like in table below:

Table 7.3B.2.3.5.2-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_2A-71A\_n78A DC\_2A-2A-71A\_n78A | 2 | 1874 | 5 | 25 | 1954 | 16.5 | IMD3 |
| 71 | 693 | 5 | 25 | 647 | N/A | N/A |
| n78 | 3340 | 10 | 50 | 3340 | N/A | N/A |

## 5.1.140 DC\_66-71\_n78

5.1.140.1 Operating bands for EN-DC

Table 5.1.140.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 66-71\_n78 | CA\_66-71 | n78 | No |

5.1.140.2 Configuration for DC

Table 5.1.140.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_66A-71A\_n78A | DC\_71A\_n78A  DC\_66A\_n78A | CA\_66A-71A | n78 |

5.1.140.3 ∆TIB and ∆RIB values

For DC\_66-71\_n78, the TIB,c and RIB,c values are reused from LTE combination DC\_3-8\_n78, and are given in the tables below.

**Table 5.1.140.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_66-71\_n78 | 66 | 0.6 |
| 71 | 0.6 |
| n78 | 0.8 |

**Table 5.1.140.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_66-71\_n78 | 66 | 0.2 |
| 71 | 0.2 |
| n78 | 0.5 |

5.1.140.4 REFSENS requirements

Co-existence analysis from DC\_66\_n78 shows that there is no impact from DC\_66\_n78 UL to Band 71 DL.

Co-existence analysis from DC\_71\_n78 shows that there is IMD3 impact from DC\_71\_n78 UL to Band 66 DL. MSD values need to be defined in TS 38.101-3 like in table below:

MSD value for band 66 DL affected by DC\_71\_n78 UL are derived from 8\_n78 UL affecting band 3 DL in DC\_3-8\_n78 and need to be defined in TS 38.101-3 like in table below:

Table 7.3B.2.3.5.2-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_66A-71A\_n78A | 66 | 1754 | 5 | 25 | 2154 | 16.5 | IMD3 |
| 71 | 693 | 5 | 25 | 647 | N/A | N/A |
| n78 | 3540 | 10 | 50 | 3540 | N/A | N/A |

## 5.1.141 DC\_2-48\_n12

5.1.141.1 Operating bands for EN-DC

Table 5.1.141.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 2-48\_n12 | CA\_2-48 | n12 | No |

5.1.141.2 Configuration for DC

Table 5.1.141.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_2A-48A\_n12A | DC\_2A\_n12A  DC\_48A\_n12A | CA\_2A-48A | n12 |

5.1.141.3 ∆TIB and ∆RIB values

For DC\_2-48\_n12, the TIB,c and RIB,c values are reused from LTE combination CA\_2-13-48, and are given in the tables below.

**Table 5.1.141.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-48\_n12 | 2 | 0.6 |
| 48 | 0.3 |
| n12 | 0.8 |

**Table 5.1.141.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-48\_n12 | 2 | 0.2 |
| 48 | 0.5 |
| n12 | 0 |

5.1.141.4 REFSENS requirements

Co-existence analysis from DC\_2\_n12 shows that there is no impact from DC\_2\_n12 UL to Band 48 DL.

Co-existence analysis from DC\_48\_n12 shows that there is no impact from DC\_48\_n12 UL to Band 2 DL.

## 5.1.142 DC\_2-66\_n12

5.1.142.1 Operating bands for EN-DC

Table 5.1.142.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 2-66\_n12 | CA\_2-66 | n12 | No |

5.1.142.2 Configuration for DC

Table 5.1.142.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_2A-66A\_n12A | DC\_2A\_n12A  DC\_66A\_n12A | CA\_2A-66A | n12 |

5.1.142.3 ∆TIB and ∆RIB values

For DC\_2-66\_n12, the TIB,c and RIB,c values are reused from LTE combination CA\_2-12-66, and are given in the tables below.

**Table 5.1.142.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n12 | 2 | 0.5 |
| 66 | 0.5 |
| n12 | 0.8 |

**Table 5.1.142.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-66\_n12 | 2 | 0.3 |
| 66 | 0.3 |
| n12 | 0.5 |

5.1.142.4 REFSENS requirements

Co-existence analysis from DC\_2\_n12 shows that there is no impact from DC\_2\_n12 UL to Band 66 DL.

Co-existence analysis from DC\_66\_n12 shows that there is no impact from DC\_66\_n12 UL to Band 2 DL.

## 5.1.143 DC\_5-66\_n71

5.1.143.1 Operating bands for EN-DC

Table 5.1.143.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 5-66\_n71 | CA\_5-66 | n71 | No |

5.1.143.2 Configuration for DC

Table 5.1.143.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_5A-66A\_n71A | DC\_5A\_n71A  DC\_66A\_n71A | CA\_5A-66A | n71 |

5.1.143.3 ∆TIB and ∆RIB values

For DC\_5-66\_n71, the TIB,c and RIB,c values for the 5\_n71 part are reused from CA\_4-5-13, and also checked with DC\_5\_n71 and DC\_71\_n5, and the values for 66 are checked from DC\_5-7\_n71 and DC\_66\_n71, and they are given in the tables below.

**Table 5.1.143.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_5-66\_n71 | 5 | 0.5 |
| 66 | 0.3 |
| n71 | 0.5 |

**Table 5.1.143.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_5-66\_n71 | 5 | 0 |
| 66 | 0 |
| n71 | 0 |

5.1.143.4 REFSENS requirements

Co-existence analysis from DC\_5\_n71 shows that there is IMD3 impact from DC\_5\_n71 UL to Band 66 DL. MSD value is 16.1 dB for 20\_n3 UL affecting band n78 DL in DC\_20\_n3-n78. But test bench simulations have shown values closer to 10 dB. Therefor an MSD level of 13 dB is proposed for IMD3 in band 66 in table below

Co-existence analysis from DC\_66\_n71 shows that there is IMD5 impact from DC\_66\_n71 UL to Band 5 DL. MSD value is 3.3 dB when 1\_n28 UL affecting band 8 DL in DC\_1-8\_n28. But since n71 TX frequency is lower than B28 that PA may have higher gain at lower frequency both wanted Tx and IMD spur level. Therefor an MSD level of 4.2 dB is proposed for IMD5 in band 5 in table below.

Table 7.3B.2.3.5.2-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_5A-66A\_n71A | 5 | 830 | 5 | 25 | 875 | N/A | N/A |
| 66 | 1761 | 5 | 25 | 2161 | 13 | IMD3 |
| n71 | 665.5 | 5 | 25 | 619.5 | N/A | N/A |
| 5 | 846.5 | 5 | 25 | 891.5 | 4.2 | IMD5 |
| 66 | 1770 | 5 | 25 | 2170 | N/A | N/A |
| n71 | 665.5 | 5 | 25 | 619.5 | N/A | N/A |

## 5.1.144 DC\_48-66\_n12

5.1.144.1 Operating bands for EN-DC

Table 5.1.144.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 48-66\_n12 | CA\_48-66 | n12 | No |

5.1.144.2 Configuration for DC

Table 5.1.144.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_48A-66A\_n12A | DC\_48A\_n12A  DC\_66A\_n12A | CA\_48A-66A | n12 |

5.1.144.3 ∆TIB and ∆RIB values

For DC\_48-66\_n12, the TIB,c and RIB,c values are reused from DC\_48-66\_n5, CA\_13-48-66 and CA\_5-48-66, and are given in the tables below.

**Table 5.1.144.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_48-66\_n12 | 48 | 0.8 |
| 66 | 0.6 |
| n12 | 0.3 |

**Table 5.1.144.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_48-66\_n12 | 48 | 0.5 |
| 66 | 0.2 |
| n12 | 0 |

5.1.144.4 REFSENS requirements

Co-existence analysis from DC\_48\_n12 shows that there is IMD3 impact from DC\_48\_n12 UL to Band 66 DL.

Co-existence analysis from DC\_66\_n12 shows that there is IMD5 impact from DC\_66\_n12 UL to Band 48 DL.

MSD value for band 66 DL affected by DC\_48\_n12 UL are derived from 13-48 UL affecting band 66 DL in CA\_13-48-66 and need to be defined in TS 38.101-3 like in table below:

Table 7.3B.2.3.5.2-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_48A-66A\_n12A | 48 | 3580 | 5 | 25 | 3580 | N/A | N/A |
| 66 | 1760 | 5 | 25 | 2160 | 17.1 | IMD3 |
| n12 | 710 | 5 | 25 | 740 | N/A | N/A |

## 5.1.145 DC\_7-28\_n3

5.1.145.1 Operating bands for EN-DC

Table 5.1.145.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 7-28\_n3 | CA\_7-28 | n3 |  |

5.1.145.2 Configuration for DC

Table 5.1.145.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_7A-28A\_n3A | DC\_7A\_n3A  DC\_28A\_n3A | CA\_7A-28A | n3 |
| DC\_7C-28A\_n3A | DC\_7A\_n3A  DC\_7C\_n3A  DC\_28A\_n3A | CA\_7C-28A | n3 |

5.1.145.3 ∆TIB and ∆RIB values

For DC\_7-28\_n3, the TIB,c and RIB,c values are same as for DC\_3-28\_n7 and are given in the tables below.

**Table 5.1.145.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_7-28\_n3 | 7 | 0.5 |
| 28 | 0.3 |
| n3 | 0.5 |

**Table 5.1.145.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_7-28\_n3 | 7 | 0 |
| 28 | 0 |
| n3 | 0 |

5.1.145.4 REFSENS requirements

Co-existence analysis shows that there is IMD2 impact from DC\_7\_n3 UL to Band 28 DL MSD value are same as for DC\_3-28\_n7.

Co-existence analysis shows that there is IMD3 impact from DC\_28\_n3 UL to Band 7 DL MSD value are same as for DC\_7-13\_n66.

Table 7.3B.2.3.5.2-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_7A-28A\_n3A  DC\_7C-28A\_n3A | 7 | 2543 | 5 | 25 | 2663 | N/A | N/A |
| 28 | 741 | 5 | 25 | 796.0 | 20.0 | IMD2 |
| n3 | 1747 | 5 | 25 | 1842 | N/A | N/A |
| 7 | 2540 | 5 | 25 | 2685 | 18 | IMD3 |
| 28 | 745 | 5 | 25 | 800 | N/A | N/A |
| n3 | 1715 | 5 | 25 | 1810 | N/A | N/A |

## 5.1.146 DC\_2-46\_n66

5.1.146.1 Operating bands for EN-DC

Table 5.1.146.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 2-46\_n66 | CA\_2-46 | n66 | No |

5.1.146.2 Configuration for DC

Table 5.1.146.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_2A-46A\_n66A | DC\_2A\_n66A | CA\_2A-46A | n66 |
| DC\_2A-46C\_n66A | DC\_2A\_n66A | CA\_2A-46C | n66 |
| DC\_2A-46D\_n66A | DC\_2A\_n66A | CA\_2A-46D | n66 |

5.1.146.3 ∆TIB and ∆RIB values

For DC\_2-46\_n66, the TIB,c and RIB,c values are reused from LTE combination CA\_2-46-66, and are given in the tables below.

**Table 5.1.146.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-46\_n66 | 2 | 0.5 |
| 46 | 0 |
| n66 | 0.5 |

**Table 5.1.146.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-46\_n66 | 2 | 0 |
| 46 | 0 |
| n66 | 0 |

5.1.146.4 REFSENS requirements

Co-existence analysis from DC\_2\_n66 shows that there is IMD3 and IMD5 impact from DC\_2\_n66 UL to Band 46 DL. MSD for DC\_2-46\_n66 is proposed to be defined like in table below, where Note x is derived from Note 8 in TS36.101 Table 7.3.1A-0eA.

**Table 5.1.146.4-1:** **Reference sensitivity QPSK PREFSENS (EN-DC with n46)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| E-UTRA or NR Band / Channel bandwidth of the affected DL band / MSD | | | | | | | | | | | | |
| UL band | DL band | 5  MHz  (dB) | 10 MHz  (dB) | 15 MHz  (dB) | 20 MHz  (dB) | 25 MHz  (dB) | 40 MHz  (dB) | 50 MHz  (dB) | 60 MHz  (dB) | 80 MHz  (dB) | 90 MHz  (dB) | 100 MHz  (dB) |
| DC\_2A\_n66A | 46 |  |  |  | 0 |  | 0 |  | 0 | 0 |  | 0 |
| NOTE x: When Band 46 have self-interference problems by dual uplink CA/EN-DC, then the requirements do not apply in exclusion zone which is frequency range within (harmonics frequency region + FHD) and IMD frequency region as follow.  IMD frequency range   |  |  |  |  | | --- | --- | --- | --- | | DL\_CA configuration | UL\_CA configuration | Exclusion zone center frequency | Exclusion zone BW | | DC\_2A-46A\_n66A | DC\_2A\_n66A | 2\*fc\_2A + fc\_n66A | 2\*BW\_2A + BW\_n66A | | DC\_2A-46A\_n66A | DC\_2A\_n66A | fc\_2A + 2\*fc\_n66A | BW\_2A + 2\*BW\_n66A | | | | | | | | | | | | | |

## 5.1.147 DC\_2-66\_n48 and DC\_2-66-66\_n48

5.1.147.1 Operating bands for DC

Table 5.1.147.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-66\_n48 | CA\_2-66 | n48 | No |
| DC\_2-66-66\_n48 | CA\_2-66-66 | n48 | No |

5.1.147.2 Configurations for DC

Table 5.1.147.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_2A-66A\_n48A | DC\_2A\_n48A  DC\_66A\_n48A | CA\_2A-66A | n48A |
| DC\_2A-66A\_n48B | DC\_2A\_n48A  DC\_66A\_n48A | CA\_2A-66A | CA\_n48B |
| DC\_2A-66A-66A\_n48A | DC\_2A\_n48A  DC\_66A\_n48A | CA\_2A-66A-66A | n48A |
| DC\_2A-66A-66A\_n48B | DC\_2A\_n48A  DC\_66A\_n48A | CA\_2A-66A-66A | CA\_n48B |

5.1.147.3 Co-existence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, and the impact to own Rx of the 3rd band is shown as the followings.

- 4th order IMD generated by dual uplink of Band 2 + Band n48 may fall into own Rx of band 66, the MSD value could reuse the LTE MSD value for CA\_2A-48A-66A.

- 5th order IMD generated by dual uplink of Band 66 + Band n48 may fall into own Rx of band 2, the MSD value could reuse the LTE MSD value for CA\_2A-48A-66A.

5.1.147.4 ∆TIB and ∆RIB values

For DC\_2-66\_n48 and DC\_2-66-66\_n48, the TIB,c and RIB,c values are given in the tables below.

Table 5.1.147.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n48  DC\_2-66-66\_n48 | 2 | 0.6 |
| 66 | 0.6 |
| n48 | 0.8 |

Table 5.1.147.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n48  DC\_2-66-66\_n48 | 2 | 0.3 |
| 66 | 0.3 |
| n48 | 0.5 |

5.1.147.5 REFSENS requirements

Table 5.1.147.5-1 shows the required MSD levels for the DC configuration.

Table 5.1.147.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_2A-66A\_n48A  DC\_2A-66A\_n48B  DC\_2A-66A-66A\_n48A  DC\_2A-66A-66A\_n48B | 2 | 1905 | 5 | 25 | 1985 | N/A | FDD | N/A |
| 66 | 1755 | 5 | 25 | 2155 | 12.1 | FDD | IMD4  |3\*fB2-fBn48| |
| n48 | 3560 | 5 | 25 | 3560 | N/A | TDD | N/A |
| DC\_2A-66A\_n48A  DC\_2A-66A\_n48B  DC\_2A-66A-66A\_n48A  DC\_2A-66A-66A\_n48B | 2 | 1880 | 5 | 25 | 1960 | 28.3 | FDD | IMD5  |2\*fBn48-3\*fB66| |
| 66 | 1735 | 5 | 25 | 2135 | N/A | FDD | N/A |
| n48 | 3695 | 5 | 25 | 3695 | N/A | TDD | N/A |

## 5.1.148 DC\_5-66\_n2, DC\_5-5-66\_n2, DC\_5-66-66\_n2 and DC\_5-5-66-66\_n2

5.1.148.1 Operating bands for DC

Table 5.1.148.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_5-66\_n2 | CA\_5-66 | n2 | No |
| DC\_5-5-66\_n2 | CA\_5-5-66 | n2 | No |
| DC\_5-66-66\_n2 | CA\_5-66-66 | n2 | No |
| DC\_5-5-66-66\_n2 | CA\_5-5-66-66 | n2 | No |

5.1.148.2 Configuration for DC

Table 5.1.148.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_5A-66A\_n2A | DC\_5A\_n2A | CA\_5A-66A | n2A |
| DC\_5B-66A\_n2A | DC\_5A\_n2A | CA\_5B-66A | n2A |
| DC\_5A-5A-66A\_n2A | DC\_5A\_n2A | CA\_5A-5A-66A | n2A |
| DC\_5A-66A-66A\_n2A | DC\_5A\_n2A | CA\_5A-66A-66A | n2A |
| DC\_5B-66A-66A\_n2A | DC\_5A\_n2A | CA\_5B-66A-66A | n2A |
| DC\_5A-5A-66A-66A\_n2A | DC\_5A\_n2A | CA\_5A-5A-66A-66A | n2A |

5.1.148.3 Coexistence studies

Based on co-existence studies of DC\_5A\_n2A in TR 37.863-01-01, and the impact to own Rx of the 3rd band is shown as the followings.

- 4th order IMD generated by dual uplink of Band5 + Band n2 may fall into own Rx of band 66, the MSD value could reuse the LTE MSD value for CA\_2A-5A-66A.

5.1.148.4 ∆TIB and ∆RIB values

For DC\_5-66\_n2, DC\_5-5-66\_n2, DC\_5-66-66\_n2 and DC\_5-5-66-66\_n2, the TIB,c and RIB,c values reused the values for DC\_5\_n2 in TS 38.101-3.

Table 5.1.148.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_5-66\_n2  DC\_5-5-66\_n2  DC\_5-66-66\_n2  DC\_5-5-66-66\_n2 | 5 | 0.3 |
| 66 | 0.5 |
| n2 | 0.5 |

Table 5.1.148.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_5-66\_n2  DC\_5-5-66\_n2  DC\_5-66-66\_n2  DC\_5-5-66-66\_n2 | 5 | 0 |
| 66 | 0.3 |
| n2 | 0.3 |

5.1.148.5 REFSENS requirements

Table 5.1.148.5-1 shows the required MSD levels for the DC configuration.

Table 5.1.148.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_5A-66A\_n2A  DC\_5BA-66A\_n2A  DC\_5A-5A-66A\_n2A  DC\_5A-66A-66A\_n2A  DC\_5B-66A-66A\_n2A  DC\_5A-5A-66A-66A\_n2A | 5 | 834 | 5 | 25 | 879 | N/A | FDD | N/A |
| 66 | 1712 | 5 | 25 | 2132 | 7.2 | FDD | IMD4  |2\*fB5-2\*fBn2| |
| n2 | 1900 | 5 | 25 | 1980 | N/A | FDD | N/A |

## 5.1.149 DC\_13-46\_n5

5.1.149.1 Operating bands for DC

**Table 5.1.149.1-1: Band combination EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_13-46\_n5 | CA\_13-46 | n5 | No |

5.1.149.2 Configuration for DC

**Table 5.1.149.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_13A-46A\_n5A | DC\_13A\_n5A | CA\_13A-46A | n5A |

5.1.149.3 Co-existence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there is no harmonic or IMD issues for this band combination.

5.1.149.4 ∆TIB and ∆RIB values

For DC\_13-46\_n5, the TIB,c and RIB,c values are given in the tables below. Numbers come from LTE CA\_5A-13A-46A

Table 5.1.149.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_13-46\_n5 | 13 | 0.5 |
| n5 | 0.5 |

Table 5.1.149.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_13-46\_n5 | 13 | 0 |
| n5 | 0 |

5.1.149.5 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.150 DC\_13-66\_n2 and DC\_13-66-66\_n2

5.1.150.1 Operating bands for DC

Table 5.1.150.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_13-66\_n2 | CA\_13-66 | n2 | No |
| DC\_13-66-66\_n2 | CA\_13-66-66 | n2 | No |

5.1.150.2 Configurations for DC

Table 5.1.150.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_13A-66A\_n2A | DC\_13A\_n2A  DC\_66A\_n2A | CA\_13A-66A | n2A |
| DC\_13A-66A-66A\_n2A | DC\_13A\_n2A  DC\_66A\_n2A | CA\_13A-66A-66A | n2A |

5.1.150.3 Co-existence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, and the impact to own Rx of the 3rd band is shown as the followings.

- 4th order IMD generated by dual uplink of Band 13+ Band n2 may fall into own Rx of band 66, the MSD value could reuse the LTE MSD value for CA\_2A-13A-66A.

5.1.150.4 ∆TIB and ∆RIB values

For DC\_13-66\_n2 and DC\_13-66-66\_n2, the TIB,c and RIB,c values are given in the tables below.

Table 5.1.150.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_13-66\_n2  DC\_13-66-66\_n2 | 13 | 0.3 |
| 66 | 0.5 |
| n2 | 0.5 |

Table 5.1.150.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_13-66\_n2  DC\_13-66-66\_n2 | 13 | 0 |
| 66 | 0.3 |
| n2 | 0.3 |

5.1.150.5 REFSENS requirements

Table 5.1.150.5-1 shows the required MSD levels for the DC configuration.

Table 5.1.150.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_13A-66A\_n2A  DC\_13A-66A-66A\_n2A | 13 | 782 | 5 | 25 | 751 | N/A | FDD | N/A |
| 66 | 1736 | 5 | 25 | 2156 | 7..2 | FDD | IMD3  |2\*fB13-2\*fBn2| |
| n2 | 1860 | 5 | 25 | 1940 | N/A | FDD | N/A |

## 5.1.151 DC\_13-66\_n48 and DC\_13-66-66\_n48

5.1.151.1 Operating bands for DC

Table 5.1.151.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_13-66\_n48 | CA\_13-66 | n48 | No |
| DC\_13-66-66\_n48 | CA\_13-66-66 | n48 | No |

5.1.151.2 Configurations for DC

Table 5.1.151.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_13A-66A\_n48A | DC\_13A\_n48A  DC\_66A\_n48A | CA\_13A-66A | n48A |
| DC\_13A-66A\_n48B | DC\_13A\_n48A  DC\_66A\_n48A | CA\_13A-66A | CA\_n48B |
| DC\_13A-66A-66A\_n48A | DC\_13A\_n48A  DC\_66A\_n48A | CA\_13A-66A-66A | n48A |
| DC\_13A-66A-66A\_n48B | DC\_13A\_n48A  DC\_66A\_n48A | CA\_13A-66A-66A | CA\_n48B |

5.1.151.3 Co-existence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, and the impact to own Rx of the 3rd band is shown as the followings.

- 3rd order IMD generated by dual uplink of Band 13+ Band n48 may fall into own Rx of band 66, the MSD value could reuse the LTE MSD value for CA\_13A-48A-66A.

5.1.151.4 ∆TIB and ∆RIB values

For DC\_13-66\_n48 and DC\_13-66-66\_n48, the TIB,c and RIB,c values are given in the tables below.

Table 5.1.151.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_13-66\_n48  DC\_13-66-66\_n48 | 13 | 0.3 |
| 66 | 0.6 |
| n48 | 0.8 |

Table 5.1.151.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_13-66\_n48  DC\_13-66-66\_n48 | 13 | 0 |
| 66 | 0.2 |
| n48 | 0.5 |

5.1.151.5 REFSENS requirements

Table 5.1.151.5-1 shows the required MSD levels for the DC configuration.

Table 5.1.151.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_13A-66A\_n48A  DC\_13A-66A\_n48B  DC\_13A-66A-66A\_n48A  DC\_13A-66A-66A\_n48B | 13 | 782 | 5 | 25 | 751 | N/A | FDD | N/A |
| 66 | 1731 | 5 | 25 | 2131 | 17.1 | FDD | IMD3  |2\*fB13-fBn48| |
| n48 | 3695 | 5 | 25 | 3695 | N/A | TDD | N/A |

## 5.1.152 DC\_46-66\_n25

5.1.152.1 Operating bands for DC

Table 5.1.152.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_46-66\_n25 | CA\_46-66 | n25 | No |

5.1.152.2 Configuration for DC

Table 5.1.152.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** |
| --- | --- |
| DC\_46A-66A\_n25A  DC\_46C-66A\_n25A  DC\_46D-66A\_n25A | DC\_66A\_n25A |

5.1.152.3 Coexistence studies

Co-existence analysis for DC\_66\_n25 in TR 37.716-11-11 shows that 3rd order harmonics and 3rd and 5th IMD might fall in Band 46.

5.1.152.4 ∆TIB and ∆RIB values

For DC\_46-66\_n25, the TIB,c and RIB,c values are derived from CA\_46-66 in TS 36.101 and DC\_66A\_n25A in TR 37.716-11-11.

Table 5.1.152.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_46-66\_n25 | 46 | 0 |
| 66 | 0.5 |
| n25 | 0.5 |

Table 5.1.152.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_46-66\_n25 | 46 | 0 |
| 66 | 0.3 |
| n25 | 0.3 |

5.1.152.5 REFSENS requirements

MSD is derived from DC\_66A\_n25A captured in TR 37.716-11-11. The values have also been aligned with the values proposed in R4-2002012 which are derived from Co-existence analysis for DC\_2\_n66 which shows that there is IMD3 and IMD5 impact from DC\_2\_n66 UL to Band 46 DL.

Table 5.1.152.5-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | |
| EN-DC  Configuration | EUTRA or NR band | UL Fc  (MHz) | UL/DL BW  (MHz) | UL  LCRB | DL Fc (MHz) | MSD  (dB) | IMD order |
| DC\_46A-66A\_n25A3  DC\_46C-66A\_n25A3  DC\_46D-66A\_n25A3 | 46 | 5505 | 10 | 50 | 5505 | 16.1 | IMD3 |
| 66 | 1775 | 5 | 25 | 2175 | N/A | N/A |
| n25 | 1855 | 5 | 25 | 1935 | 20 | IMD3 |
| 46 | 5505 | 10 | 50 | 5505 | 16.1 | IMD3 |
| 66 | 1750 | 5 | 25 | 2150 | 4 | IMD5 |
| n25 | 1883.3 | 5 | 25 | 1963.3 | N/A | N/A |
| 46 | 5505 | 10 | 50 | 5505 | 16.1 | IMD3 |
| 66 | 1712.5 | 5 | 25 | 2112.5 | 23 | IMD3 |
| n25 | 1912.5 | 5 | 25 | 1992.5 | N/A | N/A |
| NOTE 3: This band is subject to IMD5 also which MSD is not specified. | | | | | | | |

## 5.1.153 DC\_1-41\_n28

5.1.153.1 Operating bands for DC

**Table 5.1.153.1-1: Band combination EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-41\_n28 | CA\_1-41 | n28 | No |

5.1.153.2 Configuration for DC

**Table 5.1.153.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-41A\_n28A | DC\_1A\_n28A  DC\_41A\_n28A | CA\_1A-41A | n28A |
| DC\_1A-41C\_n28A | DC\_1A\_n28A  DC\_41A\_n28A  DC\_41C\_n28A | CA\_1A-41C | n28A |

5.1.153.3 Co-existence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there are IMD impacting on the three band in this band combination, as below list:

- 2nd order IMD generated by dual uplink of Band 1 + Band n28 may also fall into own Rx of band 41.

The MSD due to 2nd order IMD generated by dual uplink of band1+band n28 impacting to Rx of band 41 could reuse the value of DC\_1A-7A\_n28A.

5.1.153.4 ∆TIB and ∆RIB values

For DC\_1-41\_n28, the ΔTIB,c and ΔRIB,c values are given in the tables below, based on the values of its consistent 2 Bands fallback mode

Table 5.1.153.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-41\_n28 | 1 | 0.5 |
| 41 | 0.5 |
| n28 | 0.5 |

Table 5.1.153.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-41\_n28 | 1 | 0 |
| 41 | 0 |
| n28 | 0.2 |

5.1.153.5 REFSENS requirements

Table 5.1.153.5-1 shows the required MSD levels for the DC configuration.

Table 5.1.153.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_1A-41A\_n28A | 1 | 1935 | 5 | 25 | 2125 | N/A | FDD | N/A |
| n28 | 718 | 5 | 25 | 773 | N/A | FDD | N/A |
| 41 | 2653 | 10 | 50 | 2653 | 30 | TDD | IMD2  |fB1+fBn28| |

## 5.1.154 DC\_11-18\_n77

5.1.154.1 Operating bands for DC

**Table 5.1.154.1-1: Band combinations EN-DC (three bands)**

| **EN-DC Band** | **E-UTRA Band** | **NR Band** | **Single UL allowed** |
| --- | --- | --- | --- |
| DC\_11-18\_n77 | CA\_11-18 | n77 | No |

5.1.154.2 Configurations for DC

**Table 5.1.154.2-1: Inter-band EN-DC configurations (three bands)**

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration**  **(NOTE 1)** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_11A-18A\_n77A | DC\_11A\_n77A  DC\_18A\_n77A | CA\_11A-18A | n77A |

5.1.154.3 Co-existence studies

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, based on the Operator’s spectrum, there only has:

- 3rd rder IMD generated by dual uplink of Band 11 + Band n77 may also fall into own Rx of band 18, and it may reuse the MSD of DC\_19A-21A\_n77A.

.

5.1.154.4 ∆TIB and ∆RIB values

For DC\_11-18\_n77, the ΔTIB,c and ΔRIB,c values are given in the tables below, based on the values of its consistent 2 Bands fallback mode.

**Table 5.1.154.4-1: ΔTIB,c**

| **Inter-band DC Configuration** | **E-UTRA and NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| DC\_11-18\_n77 | 11 | 0.4 |
| 18 | 0.3 |
| n77 | 0.8 |

**Table 5.1.154.4-2: ΔRIB**

| **Inter-band DC Configuration** | **E-UTRA and NR Band** | **ΔRIB [dB]** |
| --- | --- | --- |
| DC\_11-18\_n77 | 11 | 0 |
| 18 | 0 |
| n77 | 0.5 |

5.1.154.5 REFSENS requirements

Table 5.1.154.5-1 shows the required MSD levels for the DC configuration.

Table 5.1.154.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_11A-18A\_n77A | 11 | 1443 | 5 | 25 | 1491 | N/A | FDD | N/A |
| n77 | 3706 | 10 | 50 | 3706 | N/A | TDD | N/A |
| 18 | 820 | 5 | 25 | 865 | 18.7 | FDD | IMD3  |fBn77-2\*fB11| |

## 5.1.155 DC\_11-18\_n78

5.1.155.1 Operating bands for DC

**Table 5.1.155.1-1: Band combinations EN-DC (three bands)**

| **EN-DC Band** | **E-UTRA Band** | **NR Band** | **Single UL allowed** |
| --- | --- | --- | --- |
| DC\_11-18\_n78 | CA\_11-18 | n78 | No |

5.1.155.2 Configurations for DC

**Table 5.1.155.2-1: Inter-band EN-DC configurations (three bands)**

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration**  **(NOTE 1)** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_11A-18A\_n78A | DC\_11A\_n78A  DC\_18A\_n78A | CA\_11A-18A | n78A |

5.1.155.3 Co-existence studies

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, based on the Operator’s spectrum, there only has:

- 3rd order IMD generated by dual uplink of Band 11 + Band n78 may also fall into own Rx of band 18, and it may reuse the MSD of DC\_19A-21A\_n78A.

5.1.155.4 ∆TIB and ∆RIB values

For DC\_11-18\_n78, the ΔTIB,c and ΔRIB,c values are given in the tables below, based on the values of its consistent 2 Bands fallback mode.

**Table 5.1.155.4-1: ΔTIB,c**

| **Inter-band DC Configuration** | **E-UTRA and NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| DC\_11-18\_n78 | 11 | 0.4 |
| 18 | 0.3 |
| n78 | 0.8 |

**Table 5.1.155.4-2: ΔRIB**

| **Inter-band DC Configuration** | **E-UTRA and NR Band** | **ΔRIB [dB]** |
| --- | --- | --- |
| DC\_11-18\_n78 | 11 | 0 |
| 18 | 0 |
| n78 | 0.5 |

5.1.155.5 REFSENS requirements

Table 5.1.155.5-1 shows the required MSD levels for the DC configuration.

Table 5.1.155.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_11A-18A\_n78A | 11 | 1443 | 5 | 25 | 1491 | N/A | FDD | N/A |
| n78 | 3706 | 10 | 50 | 3706 | N/A | TDD | N/A |
| 18 | 820 | 5 | 25 | 865 | 18.7 | FDD | IMD3  |fBn77-2\*fB11| |

## 5.1.156 DC\_18-41\_n3

5.1.156.1 Operating bands for DC

**Table 5.1.156.1-1: Band combination EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_18-41\_n3 | CA\_18-41 | n3 | No |

5.1.156.2 Configuration for DC

**Table 5.1.156.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_18A-41A\_n3A | DC\_18A\_n3A  DC\_41A\_n3A | CA\_18A-41A | n3A |
| DC\_18A-41C\_n3A | DC\_18A\_n3A  DC\_41A\_n3A  DC\_41C\_n3A | CA\_18A-41C | n3A |

5.1.156.3 Co-existence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, the IMD issues for this band combination are as below list:

- 2nd and 3rd order IMDs generated by dual uplink of band 18 and band n3 maybe fall into the Rx of band 41. However, B18 only used in Japan. So specific band combinations can considered, then only IMD3 will be impact to the own Band 41.

- 2nd and 3rd order IMDs generated by dual uplink of band 41 and band n3 maybe fall into the Rx of band 18.

5.1.156.4 ∆TIB and ∆RIB values

For DC\_18-41\_n3, the ΔTIB,c and ΔRIB,c values are given in the tables below, based on the values of its consistent 2 Bands fallback mode.

Table 5.1.156.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_18-41\_n3 | 18 | 0.3 |
| 41 | 0.31/0.82 |
| n3 | 0.5 |
| NOTE 1**:** The requirement is specified for the frequency range of 2545-2690MHz.  NOTE 2**:** The requirement is specified for the frequency range of 2496-2545MHz. | | |

Table 5.1.156.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_18-41\_n3 | 18 | 0 |
| 41 | 01/0.52 |
| n3 | 0 |
| NOTE 1**:** The requirement is specified for the frequency range of 2545-2690MHz.  NOTE 2: The requirement is specified for the frequency range of 2496-2545MHz. | | |

5.1.156.5 REFSENS requirements

Table 5.1.156.5-1 shows the required MSD levels for the DC configuration.

Table 5.1.156.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **DL BW  (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_18A-41A\_n3A  DC\_18A-41C\_n3A | | 18 | 820 | 5 | 25 | 865 | 5 | N/A | FDD | N/A |
| n3 | 1725 | 5 | 25 | 1820 | 5 | N/A | FDD | N/A |
| 41 | 2630 | 5 | 25 | 2630 | 5 | 16.0 | TDD | IMD3  |2\*fB18-fBn3| |
| 18 | 820 | 5 | 25 | 865 | 5 | 28.9 | FDD | IMD21  |fB41-fBn3| |
| n3 | 1765 | 5 | 25 | 1860 | 5 | N/A | FDD | N/A |
| 41 | 2630 | 5 | 25 | 2630 | 5 | N/A | TDD | N/A |
| NOTE 1: This band is subject to IMD3 falling down band18 also which MSD is not specified. | | | | | | | | | | |

## 5.1.157 DC\_2-48\_n66

5.1.157.1 Operating bands for DC

Table 5.1.157.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-48\_n66 | CA\_2-66 | n48 | No |

5.1.157.2 Configurations for DC

Table 5.1.157.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_2A-48A\_n66A | DC\_2A\_n66A  DC\_48A\_n66A | CA\_2A-48A | n66A |

5.1.157.3 Co-existence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, and the impact to own Rx of the 3rd band is shown as the followings.

- 2nd order IMD generated by dual uplink of Band 2 + Band n66 may fall into own Rx of band 48, it can reuse the MSD of DC\_2A\_n66A-n78A.

- 2nd order IMD generated by dual uplink of Band 48+ Band n66 may fall into own Rx of band 2, it can reuse the MSD of DC\_2A-66A\_n48A.

5.1.157.4 ∆TIB and ∆RIB values

For DC\_2-48\_n66, the ΔTIB,c and ΔRIB,c values reused the values for DC\_2A\_n48A-n66A, as given in the tables below.

Table 5.1.157.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-48\_n66 | 2 | 0.6 |
| 48 | 0.8 |
| n66 | 0.6 |

Table 5.1.157.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-48\_n66 | 2 | 0.3 |
| 48 | 0.5 |
| n66 | 0.3 |

5.1.157.5 REFSENS requirements

Table 5.1.157.5-1 shows the required MSD levels for the DC configuration.

Table 5.1.157.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_2A-48A\_n66A | 2 | 1880 | 5 | 25 | 1960 | N/A | FDD | N/A |
| 48 | 3620 | 10 | 50 | 3620 | 29.4 | FDD | IMD2  |fB2+Bn66| |
| n66 | 1740 | 5 | 25 | 2140 | N/A | TDD | N/A |
| DC\_2A-48A\_n66A | 2 | 1880 | 5 | 25 | 1960 | 28.3 | FDD | IMD2  |fBn48-fB66| |
| 48 | 3695 | 5 | 25 | 3695 | N/A | FDD | N/A |
| n66 | 1735 | 5 | 25 | 2135 | N/A | TDD | N/A |

## 5.1.158 DC\_1-11\_n3

5.1.158.1 Operating bands for DC\_1-11\_n3

Table 5.1.158.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-11\_n3 | CA\_1-11 | n3 | DC\_1\_n3 |

5.1.158.2 Configurations for DC\_1-11\_n3

Table 5.1.158.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-11A\_n3A | DC\_1A\_n3A  DC\_11A\_n3A | CA\_1A-11A | n3A |

5.1.158.3 Co-existence studies

When Uplink EN-DC configuration is DC\_1A\_n3A, (1) IMD3 of (B1 - n3) will fall into Rx band of Band 11. When Uplink EN-DC configuration is DC\_11A\_n3A, (2) IMD3 of (B11 - n3) will fall into Rx band of Band 1.5.1.158.4 ∆TIB and ∆RIB values

The following relaxation values are proposed:

Table 5.1.158.4-1: ΔTIB,c

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_1-11\_n3 | 1 | 0.3 |
| 11 | 0.8 |
| n3 | 0.9 |

Table 5.1.158.4-2: ΔRIB

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_1-11\_n3 | 1 | 0 |
| 11 | 0.3 |
| n3 | 0.5 |

5.1.158.5 REFSENS requirements

Band 11 is the specific band used in only Japan. Considering the spectrum allocation in Japan, only IMD3 of B1 and n3 to Band11 Rx need to be addressed for REFSENS relaxation. The following values are proposed:

Table 5.1.x.5-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** | Single UL allowed |
| DC\_1A-11A\_n3A | 1 | 1960 | 5 | 25 | 2150 | N/A | FDD | N/A | Yes |
| n3 | 1720 | 5 | 25 | 1815 | N/A | TDD | N/A | Yes |
| 11 | 1432 | 5 | 25 | 1480 | 15.2 | FDD | IMD3 |  |

## 5.1.159 DC\_3-8\_n28

5.1.159.1 Operating bands for DC\_3-8\_n28

Table 5.1.159.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-8\_n28 | CA\_3-8 | n28 | - |

5.1.159.2 Configurations for DC\_3-8\_n28

Table 5.1.159.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-8A\_n28A | DC\_3A\_n28A  DC\_8A\_n28A | CA\_3A-8A | n28A |

5.1.159.3 Co-existence studies

There is no additional harmonic and intermodulation impact for the additional band receiver.5.1.159.4 ∆TIB and ∆RIB values

The following relaxation values are proposed:

Table 5.1.159.4-1: ΔTIB,c

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_3-8\_n28 | 3 | 0.3 |
| 8 | 0.6 |
| n28 | 0.5 |

Table 5.1.159.4-2: ΔRIB

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_3-8\_n28 | 3 | 0 |
| 8 | 0.2 |
| n28 | 0.1 |

5.1.159.5 REFSENS requirements

As mentioned in 5.1.159.3, REFSENS exceptions are not expected.

## 5.1.160 DC\_8-11\_n3

5.1.160.1 Operating bands for DC\_8-11\_n3

Table 5.1.160.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_8-11\_n3 | CA\_8-11 | n3 | - |

5.1.160.2 Configurations for DC\_8-11\_n3

Table 5.1.160.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_8A-11A\_n3A | DC\_8A\_n3A  DC\_11A\_n3A | CA\_8A-11A | n3A |

5.1.160.3 Co-existence studies

There is no additional harmonic and intermodulation impact for the additional band receiver.5.1.160.4 ∆TIB and ∆RIB values

The following relaxation values are proposed:

Table 5.1.160.4-1: ΔTIB,c

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_8-11\_n3 | 8 | 0.3 |
| 11 | 0.8 |
| n3 | 0.9 |

Table 5.1.160.4-2: ΔRIB

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_8-11\_n3 | 8 | 0 |
| 11 | 0.3 |
| n3 | 0.5 |

5.1.160.5 REFSENS requirements

As mentioned in 5.1.160.3, REFSENS exceptions are not expected.

## 5.1.161 DC\_1-20\_n41

5.1.161.1 Operating bands for DC

**Table 5.1.161.1-1: band combination EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1A-20A\_n41A | CA\_1-20 | n41 | DC\_20A\_n41A |

5.1.161.2 Configuration for DC

**Table 5.1.161.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  Configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-20A\_n41A | DC\_1A\_n41  DC\_20A\_n41 | CA\_1A-20A | n41A |

5.1.161.3 ∆TIB and ∆RIB values

For DC\_1A-20A\_n41A, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 5.1.161.5-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-20\_n41 | 1 | 0.5 |
| 20 | 0.3 |
| n41 | 0.51 |
| 1.22 |
| 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 5.1.161.5-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-20\_n41 | 1 | 0 |
| 20 | 0 |
| n41 | 0 |

5.1.161.4 REFSENS requirements

Based on co-existence studies of Band 1 + Band n41 and Band 20 + Band n41 captured in 38.101-3, 3rd and 5th intermodulation products of band 20 and n41 fall into receiver of band 20. Other than that there is no additional exceptions.

## 5.1.162 DC\_3-20\_n41

5.1.162.1 Operating bands for DC

**Table 5.1.162.1-1: band combination EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-20\_n41 | CA\_3-20 | n41 | DC\_20\_n41 |

5.1.162.2 Configuration for DC

**Table 5.1.162.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  Configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-20A\_n41A | DC\_3A\_n41A  DC\_20A\_n41A | CA\_3A-20A | n41A |
| DC\_3C-20A\_n41A | DC\_3C\_n41A  DC\_20A\_n41A | CA\_3C-20A | n41A |

5.1.162.3 ∆TIB and ∆RIB values

For DC\_3-20\_n41, the ΔTIB,c and ΔRIB,c values are given in the tables below.

Table 5.1.162.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-20\_n41 | 3 | 0.5 |
| 20 | 0.3 |
| n41 | 0.51 |
| 1.22 |
| 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 5.1.162.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-20\_n41 | 3 | 0 |
| 20 | 0 |
| n41 | 0 |

5.1.162.4 REFSENS requirements

Based on co-existence studies of Band 3 + Band n41 and Band 20 + Band n41 captured in 38.101-3, 3rd and 5th intermodulation products of band 20 and n41 fall into receiver of band 20 while 4th intermodulation products of band 3 and n41 fall into receiver of band 3.

Additionally, when simultaneous transmission happens between band 20 and band n41, 2nd intermodulation products fall into the receiver of band 3. When simultaneous transmission happens between band 3 and band n41, 2nd and 3rd intermodulation products also fall into the receiver of band 20. Corresponding requirements are defined in the below table.

Table 5.1.162.4-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC\_3A-20A\_n41A  DC\_3C-20A\_n41A | 3 | 1744 | 5 | 25 | 1839 | 26.0 | FDD | IMD 2 |
| n41 | 2680 | 10 | 52 | 2680 | N/A | TDD | N/A |
| 20 | 841 | 10 | 50 | 800 | N/A | FDD | N/A |
| DC\_3A-20A\_n41A  DC\_3C-20A\_n41A | 3 | 1779 | 5 | 25 | 1874 | N/A | FDD | N/A |
| n41 | 2590 | 10 | 52 | 2590 | N/A | TDD | N/A |
| 20 | 852 | 10 | 50 | 811 | 26.0 | FDD | IMD 2 |
| DC\_3A-20A\_n41A  DC\_3C-20A\_n41A | 3 | 1730 | 5 | 25 | 1825 | N/A | FDD | N/A |
| n41 | 2660 | 10 | 52 | 2660 | N/A | TDD | N/A |
| 20 | 841 | 5 | 25 | 800 | 12.5 | FDD | IMD 3 |

## 5.1.163 DC\_7-8\_n3

5.1.163.1 Operating bands for DC

Table 5.1.163.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_7-8\_n3 | CA\_7-8 | n3 | no |

5.1.163.2 Configuration for DC

Table 5.1.163.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_7A-8A\_n3A | DC\_7A\_n3A  DC\_8A\_n3A | CA\_7-8 | n3 |

5.1.163.3 Co-existence studies

For UE coexistence study of Band 7 + Band n3, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.163.3-1.

Table 5.1.163.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 2500 | 2570 | 1710 | 1785 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 5000 | 5140 | 3420 | 3570 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 7500 | 7710 | 5130 | 5355 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 10000 | 10280 | 6840 | 7140 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 12500 | 12850 | 8550 | 8925 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 860 | 715 | 4210 | 4355 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 3215 | 3430 | 850 | 1070 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 6710 | 6925 | 5920 | 6140 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 5715 | 6000 | 2560 | 2855 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 9210 | 9495 | 7630 | 7925 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 1430 | 1720 | 8420 | 8710 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 4640 | 4270 | 8570 | 8215 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 355 | 10 | 4290 | 3930 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 9340 | 9710 | 11710 | 12065 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 10130 | 10495 | 10920 | 11280 |

For UE coexistence study of Band 8 + Band n3, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.163.3-1.

Table 5.1.163.3-2: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1710 | 1785 | 880 | 915 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3420 | 3570 | 1760 | 1830 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5130 | 5355 | 2640 | 2745 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 6840 | 7140 | 3520 | 3660 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 8550 | 8925 | 4400 | 4575 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 905 | 795 | 2590 | 2700 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 2505 | 2690 | 25 | 120 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 4300 | 4485 | 3470 | 3615 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 4215 | 4475 | 855 | 1035 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 6010 | 6270 | 4350 | 4530 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 1590 | 1810 | 5180 | 5400 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 1950 | 1735 | 6260 | 5925 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 675 | 930 | 3595 | 3300 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 5230 | 5445 | 7720 | 8055 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 6060 | 6315 | 6890 | 7185 |

IMD3 may fall into Rx of band 8 with UL DC\_7\_n3.

IMD2 and IMD3 may fall into Rx of band 7 with UL DC\_8\_n3.

5.1.163.4 ∆TIB and ∆RIB values

Table 5.1.163.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_7-8\_n3 | 7 | 0.5 |
| 8 | 0.6 |
| n3 | 0.5 |

**Table 5.1.163.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_7-8\_n3 | 7 | 0 |
| 8 | 0.2 |
| n3 | 0 |

5.1.163.5 REFSENS requirements

The reference sensitivity exception (MSD) due to IMD3 for DC\_7-8\_n3 with UL DC\_7\_n3 is specified as below referring to the MSD for CA\_3A-7A-8A from 36.101.

The reference sensitivity exception (MSD) due to IMD2 and IMD3 for DC\_7-8\_n3 with UL DC\_8\_n3 is specified as below referring to the MSD for CA\_3A-7A-8A from 36.101.

Table 5.1.163.5-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_7A-8A\_n3A | n3 | 1735 | 5 | 25 | 1830 | N/A | N/A |
| 7 | 2530 | 10 | 50 | 2650 | N/A | N/A |
| 8 | 895 | 5 | 25 | 940 | 18.0 | IMD3 |
| DC\_7A-8A\_n3A | n3 | 1780 | 5 | 25 | 1875 | N/A | N/A |
| 8 | 890 | 5 | 25 | 935 | N/A | N/A |
| 7 | 2550 | 10 | 50 | 2670 | 29.0 | IMD2+IMD3y |
| NOTE y: This MSD requirement apply with both IMD2 and IMD3 products should be generated. | | | | | | | |

## 5.1.164 DC\_1-(n)38

5.1.164.1 Operating bands for DC

Table 5.1.164.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-(n)38 | CA\_1-38 | n38 | no |

5.1.164.2 Configuration for DC

Table 5.1.164.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-(n)38AA | DC\_1A\_n38A | CA\_1-38 | n38 |

5.1.164.3 Co-existence studies

For UE coexistence study of Band 1 + Band n38, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.164.3-1.

Table 5.1.164.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1920 | 1980 | 2570 | 2620 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3840 | 3960 | 5140 | 5240 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5760 | 5940 | 7710 | 7860 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 7680 | 7920 | 10280 | 10480 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 9600 | 9900 | 12850 | 13100 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 590 | 700 | 4490 | 4600 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 1220 | 1390 | 3160 | 3320 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 6410 | 6580 | 7060 | 7220 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 3140 | 3370 | 5730 | 5940 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 8330 | 8560 | 9630 | 9840 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 1400 | 1180 | 8980 | 9200 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 8560 | 8300 | 5350 | 5060 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 4020 | 3750 | 800 | 520 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 12200 | 12460 | 10250 | 10540 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 11550 | 11820 | 10900 | 11180 |

Based on the table, there is no harmonic and IMD issue.

5.1.164.4 ∆TIB and ∆RIB values

Table 5.1.164.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-(n)38 | 1 | 0.5 |
| 38 | 0.5 |
| n38 | 0.5 |

**Table 5.1.164.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-(n)38 | 1 | 0 |
| 38 | 0 |
| n38 | 0 |

5.1.164.5 REFSENS requirements

There is no the MSD requirements.

## 5.1.165 DC\_20-(n)38

5.1.165.1 Operating bands for DC

Table 5.1.165.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_20-(n)38 | CA\_20-38 | n38 | no |

5.1.165.2 Configuration for DC

Table 5.1.165.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_20A-(n)38AA | DC\_20A\_n38A | CA\_20-38 | n38 |

5.1.165.3 Co-existence studies

For UE coexistence study of Band 20 + Band n38, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.165.3-1.

Table 5.1.165.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 832 | 862 | 2570 | 2620 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 1664 | 1724 | 5140 | 5240 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 2496 | 2586 | 7710 | 7860 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 3328 | 3448 | 10280 | 10480 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 4160 | 4310 | 12850 | 13100 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 1708 | 1788 | 3402 | 3482 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 956 | 846 | 4278 | 4408 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 4234 | 4344 | 5972 | 6102 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 124 | 16 | 6848 | 7028 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 5066 | 5206 | 8542 | 8722 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 3576 | 3416 | 6804 | 6964 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 9648 | 9418 | 878 | 708 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 6196 | 5986 | 2554 | 2744 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 11112 | 11342 | 5898 | 6068 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 9374 | 9584 | 7636 | 7826 |

Based on the table, there is no harmonic and IMD issue.

5.1.165.4 ∆TIB and ∆RIB values

Table 5.1.165.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_20-(n)38 | 20 | 0.3 |
| 38 | 0.3 |
| n38 | 0.3 |

**Table 5.1.165.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_20-(n)38 | 20 | 0 |
| 38 | 0 |
| n38 | 0 |

5.1.165.5 REFSENS requirements

There is no the MSD requirements.

## 5.1.166 DC\_20-(n)41

5.1.166.1 Operating bands for DC

Table 5.1.166.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_20-(n)41 | CA\_20-41 | n41 | no |

5.1.166.2 Configuration for DC

Table 5.1.166.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_20A-(n)41AA  DC\_20A-(n)41CA  DC\_20A-(n)41DA | DC\_20A\_n41A | CA\_20-41 | n41 |

5.1.166.3 Co-existence studies

For UE coexistence study of Band 20 + Band n41, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.166.3-1.

Table 5.1.166.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 832 | 862 | 2496 | 2690 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 1664 | 1724 | 4992 | 5380 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 2496 | 2586 | 7488 | 8070 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 3328 | 3448 | 9984 | 10760 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 4160 | 4310 | 12480 | 13450 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 1634 | 1858 | 3328 | 3552 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 1026 | 772 | 4130 | 4548 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 4160 | 4414 | 5824 | 6242 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 194 | 90 | 6626 | 7238 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 4992 | 5276 | 8320 | 8932 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 3716 | 3268 | 6656 | 7104 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 9928 | 9122 | 952 | 638 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 6406 | 5764 | 2406 | 2884 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 10816 | 11622 | 5824 | 6138 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 9152 | 9794 | 7488 | 7966 |

Based on the table, there is no harmonic and IMD issue.

5.1.166.4 ∆TIB and ∆RIB values

Table 5.1.166.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_20-(n)41 | 20 | 0.3 |
| 41 | 0.3 |
| n41 | 0.3 |

**Table 5.1.166.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_20-(n)41 | 20 | 0 |
| 41 | 0 |
| n41 | 0 |

5.1.166.5 REFSENS requirements

There is no the MSD requirements.

## 5.1.167 DC\_1-32\_n78

5.1.167.1 Operating bands for DC

Table 5.1.167.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-32\_n78 | CA\_1-32 | n78 | no |

5.1.167.2 Configuration for DC

Table 5.1.167.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-32A\_n78A  DC\_1A-32A\_n78(2A) | DC\_1A\_n78A | CA\_1-32 | n78 |

5.1.167.3 Co-existence studies

For UE coexistence study of Band 1 + Band n78, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.167.3-1.

Table 5.1.167.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1920 | 1980 | 3300 | 3800 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3840 | 3960 | 6600 | 7600 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5760 | 5940 | 9900 | 11400 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 7680 | 7920 | 13200 | 15200 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 9600 | 9900 | 16500 | 19000 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 1320 | 1880 | 5220 | 5780 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 40 | 660 | 4620 | 5680 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 7140 | 7760 | 8520 | 9580 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 1960 | 2640 | 7920 | 9480 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 9060 | 9740 | 11820 | 13380 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 3760 | 2640 | 10440 | 11560 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 13280 | 11220 | 4620 | 3880 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 7560 | 5940 | 660 | 1840 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 15120 | 17180 | 10980 | 11720 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 13740 | 15360 | 12360 | 13540 |

Based on the table, IMD2 and IMD5 may fall into Rx of band 32 with UL DC\_1A\_n78A.

5.1.167.4 ∆TIB and ∆RIB values

Table 5.1.167.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-32\_n78 | 1 | 0.5 |
| 32 | N/A |
| n78 | 0.8 |

**Table 5.1.167.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-32\_n78 | 1 | 0 |
| 32 | 0 |
| n78 | 0.5 |

5.1.167.5 REFSENS requirements

The reference sensitivity exception (MSD) due to IMD issues for DC\_1-32\_n78 with UL DC\_1\_n78 is specified as below.

Table 5.1.167.5-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_1A-32A\_n78A  DC\_1A-32A\_n78(2A) | 1 | 1930 | 5 | 25 | 2120 | N/A | N/A |
| 32 | N/A | 5 | 25 | 1470 | 31.8 | IMD2 |
| n78 | 3400 | 10 | 50 | 3400 | N/A | N/A |
| 1 | 1930 | 5 | 25 | 2120 | N/A | N/A |
| 32 | N/A | 5 | 25 | 1470 | 0 | IMD5 |
| n78 | 3630 | 10 | 50 | 3630 | N/A | N/A |

## 5.1.168 DC\_3-32\_n78

5.1.168.1 Operating bands for DC

Table 5.1.168.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-32\_n78 | CA\_3-32 | n78 | no |

5.1.168.2 Configuration for DC

Table 5.1.168.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_3A-32A\_n78A  DC\_3A-32A\_n78(2A) | DC\_3A\_n78A | CA\_3-32 | n78 |

5.1.168.3 Co-existence studies

For UE coexistence study of Band 3 + Band n78, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.168.3-1.

Table 5.1.168.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1710 | 1785 | 3300 | 3800 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3420 | 3570 | 6600 | 7600 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5130 | 5355 | 9900 | 11400 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 6840 | 7140 | 13200 | 15200 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 8550 | 8925 | 16500 | 19000 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 1515 | 2090 | 5010 | 5585 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 380 | 270 | 4815 | 5890 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 6720 | 7370 | 8310 | 9385 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 1330 | 2055 | 8115 | 9690 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 8430 | 9155 | 11610 | 13185 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 4180 | 3030 | 10020 | 11170 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 13490 | 11415 | 3840 | 3040 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 7980 | 6330 | 1245 | 2470 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 14910 | 16985 | 10140 | 10940 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 13320 | 14970 | 11730 | 12955 |

Based on the table, IMD4 and IMD5 may fall into Rx of band 32 with UL DC\_3A\_n78A.

5.1.168.4 ∆TIB and ∆RIB values

Table 5.1.168.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-32\_n78 | 3 | 0.6 |
| 32 | N/A |
| n78 | 0.8 |

**Table 5.1.168.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-32\_n78 | 3 | 0.2 |
| 32 | 0 |
| n78 | 0.5 |

5.1.168.5 REFSENS requirements

The reference sensitivity exception (MSD) due to IMD issues for DC\_3-32\_n78 with UL DC\_3\_n78 is specified as below.

Table 5.1.168.5-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_3A-32A\_n78A  DC\_3A-32A\_n78(2A) | 3 | 1730 | 5 | 25 | 1825 | N/A | N/A |
| 32 | N/A | 5 | 25 | 1470 | 4.9 | IMD4 |
| n78 | 3720 | 10 | 50 | 3720 | N/A | N/A |
| 3 | 1775 | 5 | 25 | 1870 | N/A | N/A |
| 32 | N/A | 5 | 25 | 1475 | 0 | IMD5 |
| n78 | 3400 | 10 | 50 | 3400 | N/A | N/A |

## 5.1.169 DC\_20-32\_n78

5.1.169.1 Operating bands for DC

Table 5.1.169.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_20-32\_n78 | CA\_20-32 | n78 | no |

5.1.169.2 Configuration for DC

Table 5.1.169.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_20A-32A\_n78A  DC\_20A-32A\_n78(2A) | DC\_20A\_n78A | CA\_20-32 | n78 |

5.1.169.3 Co-existence studies

For UE coexistence study of Band 20 + Band n78, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.169.3-1.

Table 5.1.169.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 832 | 862 | 3300 | 3800 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 1664 | 1724 | 6600 | 7600 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 2496 | 2586 | 9900 | 11400 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 3328 | 3448 | 13200 | 15200 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 4160 | 4310 | 16500 | 19000 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 2438 | 2968 | 4132 | 4662 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 2136 | 1576 | 5738 | 6768 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 4964 | 5524 | 7432 | 8462 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 1304 | 714 | 9038 | 10568 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 5796 | 6386 | 10732 | 12262 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 5936 | 4876 | 8264 | 9324 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 14368 | 12338 | 148 | 472 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 9736 | 8176 | 4014 | 5104 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 14032 | 16062 | 6628 | 7248 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 11564 | 13124 | 9096 | 10186 |

Based on the table, There is no harmonic and IMD issue.

5.1.169.4 ∆TIB and ∆RIB values

Table 5.1.169.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_20-32\_n78 | 20 | 0.5 |
| 32 | N/A |
| n78 | 0.8 |

**Table 5.1.169.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_20-32\_n78 | 20 | 0 |
| 32 | 0 |
| n78 | 0.5 |

5.1.169.5 REFSENS requirements

There is no MSD requirements.

## 5.1.170 DC\_1-3\_n40

5.1.170.1 Operating bands for EN-DC

Table 5.1.170.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 1-3\_n40 | CA\_1-3 | n40 | No |

5.1.170.2 Configuration for DC

Table 5.1.170.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-3A\_n40A | DC\_1A\_n40A DC\_3A\_n40A | CA\_1A-3A | n40 |

5.1.170.3 ∆TIB and ∆RIB values

For DC\_1-3\_n40, the ΔTIB,c and ΔRIB,c values are reused from LTE combination CA\_1-3-40, and are given in the tables below.

**Table 5.1.170.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-3\_n40 | 1 | 0.5 |
| 3 | 0.5 |
| n40 | 0.5 |

**Table 5.1.170.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-3\_n40 | 1 | 0 |
| 3 | 0 |
| n40 | 0 |

5.1.170.4 REFSENS requirements

There is no impact to consider.

## 5.1.171 DC\_1-28\_n40

5.1.171.1 Operating bands for EN-DC

Table 5.1.171.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 1-28\_n40 | CA\_1-28 | n40 | No |

5.1.171.2 Configuration for DC

Table 5.1.171.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-28A\_n40A | DC\_1A\_n40A DC\_28A\_n40A | CA\_1A-28A | n40 |

5.1.171.3 ∆TIB and ∆RIB values

For DC\_1-28\_n40, the ΔTIB,c and ΔRIB,c values are reused from LTE combination CA\_1-28-40, and are given in the tables below.

**Table 5.1.171.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-28\_n40 | 1 | 0.6 |
| 28 | 0.3 |
| n40 | 0.5 |

**Table 5.1.171.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-28\_n40 | 1 | 0 |
| 28 | 0.2 |
| n40 | 0 |

5.1.171.4 REFSENS requirements

There is IMD4 impact from DC\_1\_n40 UL affecting band 28 DL. MSD value is derived from DC\_1-5\_n79 and DC\_1-18\_n79.

Table 7.3B.2.3.5.2-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_1A-28A\_n40A | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
| 28 | 725 | 5 | 25 | 780 | 8.9 | IMD4 |
| n40 | 2340 | 5 | 25 | 2340 | N/A | N/A |

## 5.1.172 DC\_3-28\_n40

5.1.172.1 Operating bands for EN-DC

Table 5.1.172.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 3-28\_n40 | CA\_3-28 | n40 | No |

5.1.172.2 Configuration for DC

Table 5.1.172.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_3A-28A\_n40A | DC\_3A\_n40A DC\_28A\_n40A | CA\_3A-28A | n40 |

5.1.172.3 ∆TIB and ∆RIB values

For DC\_3-28\_n40, the ΔTIB,c and ΔRIB,c values are reused from LTE combination CA\_3-28-40, and are given in the tables below.

**Table 5.1.172.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-28\_n40 | 3 | 0.5 |
| 28 | 0.3 |
| n40 | 0.5 |

**Table 5.1.172.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-28\_n40 | 3 | 0 |
| 28 | 0 |
| n40 | 0 |

5.1.172.4 REFSENS requirements

There is no impact to consider.

## 5.1.173 DC\_1-41\_n3

5.1.173.1 Operating bands for DC

**Table 5.1.173.1-1: Band combination EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-41\_n3 | CA\_1-41 | n3 | No |

5.1.173.2 Configuration for DC

**Table 5.1.173.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-41A\_n3A | DC\_41A\_n3A | CA\_1A-41A | n3A |
| DC\_1A-41C\_n3A | DC\_41A\_n3A  DC\_41C\_n3A | CA\_1A-41C | n3A |

5.1.173.3 Co-existence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes. There is IMD5 of band 1 UL and band n3 UL falling to band 41 DL, and the MSD could reuse the value for CA\_1A-3A-41A.

5.1.173.4 ∆TIB and ∆RIB values

For DC\_1-41\_n3, the ΔTIB,c and ΔRIB,c values are given in the tables below. Numbers come from LTE CA\_1A-3A-41A

Table 5.1.173.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-41\_n3 | 1 | 0.5 |
| 41 | 0.31/0.82 |
| n3 | 0.5 |
| NOTE 1**:** The requirement is specified for the frequency range of 2545-2690MHz.  NOTE 2**:** The requirement is specified for the frequency range of 2496-2545MHz. | | |

Table 5.1.173.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-41\_n3 | 1 | 0 |
| 41 | 01/0.52 |
| n3 | 0 |
| NOTE 1**:** The requirement is specified for the frequency range of 2545-2690MHz.  NOTE 2: The requirement is specified for the frequency range of 2496-2545MHz. | | |

5.1.173.5 REFSENS requirements

Table 5.1.173.5-1 shows the required MSD levels for the DC configuration.

Table 5.1.173.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_1A-41A\_n3A  DC\_1A-41C\_n3A | 1 | 1977.5 | 5 | 25 | 2167.5 | N/A | FDD | N/A |
| n3 | 1712.5 | 5 | 25 | 1807.5 | N/A | FDD | N/A |
| 41 | 2507.5 | 5 | 25 | 2507.5 | 5.0 | TDD | IMD5  |3\*fB1-2\*fn3| |

## 5.1.174 DC\_3-41\_n28

5.1.174.1 Operating bands for DC

**Table 5.1.174.1-1: Band combination EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-41\_n28 | CA\_3-41 | n28 | No |

5.1.174.2 Configuration for DC

**Table 5.1.174.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-41A\_n28A | DC\_3A\_n28A  DC\_41A\_n28A | CA\_3A-41A | n28A |
| DC\_3A-41C\_n28A | DC\_3A\_n28A  DC\_41A\_n28A  DC\_41C\_n28A | CA\_3A-41C | n28A |

5.1.174.3 Co-existence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there are IMD impacting on the three band in this band combination, as below list:

- 2nd order IMD generated by dual uplink of Band 41 + Band n28 may also fall into own Rx of band 3, it could reuse the MSD value of DC\_3A-7A\_n28A.

- 2nd and 3rd order IMD generated by dual uplink of Band 3 + Band n28 may also fall into own Rx of band 41.

There is no IMD impact to B41 considering the KDDI’s spectrum.

5.1.174.4 ∆TIB and ∆RIB values

For DC\_3-41\_n28, the ΔTIB,c and ΔRIB,c values are given in the tables below. Numbers come from LTE CA\_3A-28A-41A

Table 5.1.174.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-41\_n28 | 3 | 0.5 |
| 41 | 0.31/0.82 |
| n28 | 0.3 |
| NOTE 1: Applicable for the frequency range of 2515-2690 MHz.  NOTE 2: Applicable for the frequency range of 2496-2515 MHz. | | |

Table 5.1.174.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-41\_n28 | 3 | 0 |
| 41 | 01/0.52 |
| n28 | 0 |
| NOTE 1: Applicable for the frequency range of 2515-2690 MHz.  NOTE 2: Applicable for the frequency range of 2496-2515 MHz. | | |

5.1.174.5 REFSENS requirements

Table 5.1.174.5-1 shows the required MSD levels for the DC configuration.

Table 5.1.174.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |
| --- |
| **Source of IMD** |
| **DC**  **Configuration** | | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** |  |
| DC\_3A-41A\_n28A  DC\_3A-41C\_n28A | | 41 | 2543 | 10 | 50 | 2543 | N/A | N/A |
| n28 | 710.5 | 5 | 25 | 765.5 | N/A | N/A |
| 3 | 1737.5 | 5 | 25 | 1832.5 | 26 | IMD2  |fB41-fn28| |
| 3 | 1780 | 5 | 25 | 1875 | N/A | N/A |
| n28 | 738 | 5 | 25 | 793 | N/A | N/A |
| 41 | 2518 | 5 | 25 | 2518 | 27.4 | IMD2  |fB3+fn28| |
| 3 | 1715 | 5 | 25 | 1810 | N/A | N/A |
| n28 | 743 | 5 | 25 | 798 | N/A | N/A |
| 41 | 2687 | 5 | 25 | 2687 | 15.9 | IMD3  |2\*fB3-fn28| |

## 5.1.175 DC\_18-41\_n77

5.1.175.1 Operating bands for DC

**Table 5.1.175.1-1: Band combination EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_18-41\_n77 | CA\_18-41 | n77 | No |

5.1.175.2 Configuration for DC

**Table 5.1.175.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_18A-41A\_n77A | DC\_18A\_n77A  DC\_41A\_n77A | CA\_18A-41A | n77A |
| DC\_18A-41C\_n77A | DC\_18A\_n77A  DC\_41A\_n77A  DC\_41C\_n77A | CA\_18A-41C | n77A |

5.1.175.3 Co-existence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, the IMD issues for this band combination are as below list

- 2nd and 3rd order IMDs generated by dual uplink of band 18 and band n77 maybe fall into the Rx of band 41.

- 2nd and 3rd order IMDs generated by dual uplink of band 41 and band n77 maybe fall into the Rx of band 18.

There is only IMD5 impact to Band 18 considering KDDI’s spectrum, since B18 only was used in Japan.

5.1.175.4 ∆TIB and ∆RIB values

For DC\_18-41\_n77, the ΔTIB,c and ΔRIB,c values are given in the tables below, based on the values of its consistent 2 Bands fallback mode.

Table 5.1.175.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_18-41\_n77 | 18 | 0.3 |
| 41 | 0.3 |
| n77 | 0.8 |

Table 5.1.175.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_18-41\_n77 | 18 | 0 |
| 41 | 0 |
| n77 | 0.5 |

5.1.175.5 REFSENS requirements

Table 5.1.175.5-1 shows the required MSD levels for the DC configuration.

Table 5.1.175.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_18A-41A\_n77A  DC\_18A-41C\_n77A | 18 | 820 | 5 | 25 | 865 | 3.4 | FDD | IMD5  |2\*fn77-3\*fB41| |
| n77 | 3527.5 | 10 | 50 | 3527.5 | N/A | FDD | N/A |
| 41 | 2640 | 5 | 25 | 2640 | N/A | TDD | N/A |

## 5.1.176 DC\_18-41\_n78

5.1.176.1 Operating bands for DC

**Table 5.1.176.1-1: Band combination EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_18-41\_n78 | CA\_18-41 | n78 | No |

5.1.176.2 Configuration for DC

**Table 5.1.176.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_18A-41A\_n78A | DC\_18A\_n78A  DC\_41A\_n78A | CA\_18A-41A | n78A |
| DC\_18A-41C\_n78A | DC\_18A\_n78A  DC\_41A\_n78A  DC\_41C\_n78A | CA\_18A-41C | n78A |

5.1.176.3 Co-existence study

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, the IMD issues for this band combination are as below list:

- 2nd order IMDs generated by dual uplink of band 18 and band n78 maybe fall into the Rx of band 41.

- 2nd and 5th order IMDs generated by dual uplink of band 41 and band n78 maybe fall into the Rx of band 18.

There is only IMD5 impact to Band 18 considering KDDI’s spectrum, since B18 only was used in Japan.

5.1.176.4 ∆TIB and ∆RIB values

For DC\_18-41\_n78, the ΔTIB,c and ΔRIB,c values are given in the tables below, based on the values of its consistent 2 Bands fallback mode.

Table 5.1.176.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_18-41\_n78 | 18 | 0.3 |
| 41 | 0.3 |
| n78 | 0.8 |

Table 5.1.176.4-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_18-41\_n78 | 18 | 0 |
| 41 | 0 |
| n78 | 0.5 |

5.1.176.5 REFSENS requirements

Table 5.1.176.5-1 shows the required MSD levels for the DC configuration.

Table 5.1.176.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **c** | | | | | | | | **Source of IMD** |
| **DC**  **Configuration** | **EUTRA and NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |
| DC\_18A-41A\_n78A  DC\_18A-41C\_n78A | 18 | 820 | 5 | 25 | 865 | 3.4 | FDD | IMD5  |2\*fn78-3\*fB41| |
| n78 | 3527.5 | 10 | 50 | 3527.5 | N/A | FDD | N/A |
| 41 | 2640 | 5 | 25 | 2640 | N/A | TDD | N/A |

## 5.1.177 DC\_1-3\_n71

5.1.177.1 Operating bands for DC

Table 5.1.177.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-3\_n71 | CA\_1-3 | n71 | no |

5.1.177.2 Configuration for DC

Table 5.1.177.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-3A\_n71A  DC\_1A-3A\_n71B | DC\_1A\_n71A  DC\_3A\_n71A | CA\_1-3 | n71 |

5.1.177.3 Co-existence studies

For UE coexistence study of Band 1 + Band n71, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.177.3-1.

Table 5.1.177.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1920 | 1980 | 663 | 698 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3840 | 3960 | 1326 | 1396 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5760 | 5940 | 1989 | 2094 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 7680 | 7920 | 2652 | 2792 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 9600 | 9900 | 3315 | 3490 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 1317 | 1222 | 2583 | 2678 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 3142 | 3297 | 654 | 524 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 4503 | 4658 | 3246 | 3376 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 5062 | 5277 | 9 | 174 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 6423 | 6638 | 3909 | 4074 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 2444 | 2634 | 5166 | 5356 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 872 | 672 | 7257 | 6982 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 1746 | 1971 | 4614 | 4364 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 4572 | 4772 | 8343 | 8618 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 5829 | 6054 | 7086 | 7336 |

For UE coexistence study of Band 3 + Band n71, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.177.3-1.

Table 5.1.177.3-2: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1710 | 1785 | 663 | 698 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3420 | 3570 | 1326 | 1396 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5130 | 5355 | 1989 | 2094 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 6840 | 7140 | 2652 | 2792 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 8550 | 8925 | 3315 | 3490 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 1122 | 1012 | 2373 | 2483 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 2722 | 2907 | 459 | 314 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 4083 | 4268 | 3036 | 3181 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 4432 | 4692 | 204 | 384 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 5793 | 6053 | 3699 | 3879 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 2024 | 2244 | 4746 | 4966 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 1082 | 867 | 6477 | 6142 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 1326 | 1581 | 4029 | 3734 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 4362 | 4577 | 7503 | 7838 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 5409 | 5664 | 6456 | 6751 |

IMD5 may fall into Rx of band 3 with UL DC\_1\_n71.

IMD4 may fall into Rx of band 1 with UL DC\_3\_n71.

5.1.177.4 ∆TIB and ∆RIB values

Table 5.1.177.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-3\_n71 | 1 | 0.3 |
| 3 | 0.3 |
| n71 | 0.3 |

**Table 5.1.177.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-3\_n71 | 1 | 0 |
| 3 | 0 |
| n71 | 0 |

5.1.177.5 REFSENS requirements

The reference sensitivity exception (MSD) due to IMD4 for DC\_1-3\_n71 with UL DC\_3\_n71 is specified as below referring to the MSD for DC\_66A\_n71A from 38.101-3.

The reference sensitivity exception (MSD) due to IMD5 for DC\_1-3\_n71 with UL DC\_1\_n71 is shown as below, based on the discussion.

Table 5.1.177.5-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_1A-3A\_n71A  DC\_1A-3A\_n71B | 1 | 1960 | 5 | 25 | 2150 | 5 | IMD4 |
| 3 | 1750 | 5 | 25 | 1845 | N/A | N/A |
| n71 | 675 | 5 | 25 | 629 | N/A | N/A |
|  | | | | | | | |

## 5.1.178 DC\_1-7\_n40

5.1.178.1 Operating bands for DC

Table 5.1.178.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-7\_n40 | CA\_1-7 | n40 | No |

5.1.178.2 Configuration for DC

Table 5.1.178.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** |
| --- | --- |
| DC\_1A-7A\_n40A | DC\_1A\_n40A  DC\_7A\_n40A |

5.1.178.3 Coexistence studies

Co-existence studies for DC\_1A\_n40A are captured in 38.101-3 and for DC\_7A\_n40A in TR 37.716-11-11. IMD3 will fall in Rx band of 1 and 7.

5.1.178.4 ∆TIB and ∆RIB values

For DC\_1-7\_n40, the ΔTIB,c and ΔRIB,c values are reused from CA\_1-7-40 in TS 36.101.

Table 5.1.178.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-7\_n40 | 1 | 0.6 |
| 7 | 0.8 |
| n40 | 0.9 |

Table 5.1.178.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_1-7\_n40 | 1 | 0 |
| 7 | 0.3 |
| n40 | 0.8 |

5.1.178.5 REFSENS requirements

MSD is derived from similar combinations already captured for CA in 36.101 and EN-DC in 38.101-3. In this case CA\_1A-7A-40A, DC\_7\_n40 and DC\_7A-40A\_n1A.

Table 5.1.178.5-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | |
| EN-DC  Configuration | EUTRA or NR band | UL Fc  (MHz) | UL/DL BW  (MHz) | UL  LCRB | DL Fc (MHz) | MSD  (dB) | IMD order |
| DC\_1A-7A\_n40A | 1 | 1970 | 5 | 25 | 2160 | N/A | N/A |
| 7 | 2510 | 5 | 25 | 2630 | 23 | IMD3 |
| n40 | 2390 | 5 | 25 | 2390 | N/A | N/A |
| 1 | 1930 | 5 | 25 | 2120 | 16.4 | IMD3 |
| 7 | 2530 | 5 | 25 | 2650 | N/A | N/A |
| n40 | 2310 | 5 | 25 | 2310 | N/A | N/A |

## 5.1.179 DC\_3-7\_n40

5.1.179.1 Operating bands for DC

Table 5.1.179.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-7\_n40 | CA\_3-7 | n40 | No |

5.1.179.2 Configuration for DC

Table 5.1.179.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** |
| --- | --- |
| DC\_3A-7A\_n40A | DC\_3A\_n40A  DC\_7A\_n40A |

5.1.179.3 Coexistence studies

Co-existence studies for DC\_3A\_n40A are captured in 38.101-3 and for DC\_7A\_n40A in TR 37.716-11-. IMD5 might fall in Rx band of band 3.

5.1.179.4 ∆TIB and ∆RIB values

For DC\_3-7\_n40, the ΔTIB,c and ΔRIB,c values are reused from CA\_3-7-40 in TS 36.101.

Table 5.1.179.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-7\_n40 | 3 | 0.6 |
| 7 | 0.8 |
| n40 | 0.9 |

Table 5.1.179.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_3-7\_n40 | 3 | 0 |
| 7 | 0.3 |
| n40 | 0.8 |

5.1.179.5 REFSENS requirements

MSD is derived from similar combinations already captured for CA in 36.101 and EN-DC in 38.101-3. In this case CA\_3A-7A-40A, DC\_3A\_n40A and DC\_7A\_n40A.

Table 5.1.179.5-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | |
| EN-DC  Configuration | EUTRA or NR band | UL Fc  (MHz) | UL/DL BW  (MHz) | UL  LCRB | DL Fc (MHz) | MSD  (dB) | IMD order |
| DC\_3A-7A\_n40A | 3 | 1771.6 | 5 | 25 | 1866.6 | 3.4 | IMD5 |
| 7 | 2530 | 5 | 25 | 2650 | N/A | N/A |
| n40 | 2310 | 5 | 25 | 2310 | N/A | N/A |

## 5.1.180 DC\_7-28\_n40

5.1.180.1 Operating bands for DC

Table 5.1.180.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_7-28\_n40 | CA\_7-28 | n40 | No |

5.1.180.2 Configuration for DC

Table 5.1.180.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** |
| --- | --- |
| DC\_7A-28A\_n40A | DC\_7A\_n40A  DC\_28A\_n40A |

5.1.180.3 Coexistence studies

Co-existence studies are captured for DC\_7A\_n40A and DC\_28A\_n40A in TR 37.716-11-11. IMD5 might fall in Rx band of band 7.

5.1.180.4 ∆TIB and ∆RIB values

For DC\_7-28\_n40, the ΔTIB,c and ΔRIB,c values are reused from CA\_7-28-40 in TS 36.101.

Table 5.1.180.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_7-28\_n40 | 7 | 0.5 |
| 28 | 0.3 |
| n40 | 0.6 |

Table 5.1.180.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_7-28\_n40 | 7 | 0 |
| 28 | 0 |
| n40 | 0.5 |

5.1.180.5 REFSENS requirements

MSD is derived from similar combinations already captured for CA in 36.101 and EN-DC in 38.101-3. In this case CA\_7A-28A-40A, DC\_28A\_n40A and DC\_7A\_n40A.

Table 5.1.180.5-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | |
| EN-DC  Configuration | EUTRA or NR band | UL Fc  (MHz) | UL/DL BW  (MHz) | UL  LCRB | DL Fc (MHz) | MSD  (dB) | IMD order |
| DC\_7A-28A\_n40A | 7 | 2510 | 5 | 25 | 2630 | 5.9 | IMD5 |
| 28 | 743 | 5 | 25 | 798 | N/A | N/A |
| n40 | 2310 | 5 | 25 | 2310 | N/A | N/A |

## 5.1.181 DC\_2\_(n)12

5.1.181.1 Operating bands for DC

Table 5.1.181.1-1: Band combinations EN-DC (two bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2\_(n)12 | CA\_2-12 | n12 |  |

5.1.181.2 Configuration for DC

Table 5.1.181.2-1: Inter-band EN-DC configurations (two bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_2A\_(n)12AA | DC\_2A\_n12A  DC\_(n)12AA1 | CA\_2A-12A | n12A |
| NOTE1: Only single switched UL is supported | | | |

5.1.181.3 Coexistence studies

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there is no own Rx impact on the third band.

5.1.181.4 ∆TIB and ∆RIB values

ΔTIB,c and ΔRIB,c values are derived from DC\_2\_n12.

Table 5..1.62.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2\_(n)12 | 2 | 0.3 |
| 12 | 0.3 |
| n12 | 0.3 |

Table 5.1.181.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2\_(n)12 | 2 | 0 |
| 12 | 0 |
| n12 | 0 |

5.1.181.5 REFSENS requirements

No additional REFSENS requirement is needed.

## 5.1.182 DC\_5\_(n)12

5.1.182.1 Operating bands for DC

Table 5.1.182.1-1: Band combinations EN-DC (two bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_5\_(n)12 | CA\_5-12 | n12 |  |

5.1.182.2 Configuration for DC

Table 5.1.182.2-1: Inter-band EN-DC configurations (two bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_5A\_(n)12AA | DC\_5A\_n12A  DC\_(n)12AA1 | CA\_5A-12A | n12A |
| NOTE1: Only single switched UL is supported | | | |

5.1.182.3 Coexistence studies

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there is no own Rx impact on the third band.

5.1.182.4 ∆TIB and ∆RIB values

ΔTIB,c and ΔRIB,c values are derived from DC\_5\_n12.

Table 5..1.62.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_5\_(n)12 | 5 | 0.8 |
| 12 | 0.4 |
| n12 | 0.4 |

Table 5.1.182.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_5\_(n)12 | 5 | 0.5 |
| 12 | 0.3 |
| n12 | 0.3 |

5.1.182.5 REFSENS requirements

No additional REFSENS requirement is needed.

## 5.1.183 12\_(n)5

5.1.183.1 Operating bands for DC

Table 5.1.183.1-1: Band combinations EN-DC (two bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| 12\_(n)5 | CA\_5-12 | n5 |  |

5.1.183.2 Configuration for DC

Table 5.1.183.2-1: Inter-band EN-DC configurations (two bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_12A\_(n)5AA | DC\_12A\_n5A  DC\_(n)5AA1 | CA\_5A-12A | n5A |
| NOTE1: Only single switched UL is supported | | | |

5.1.183.3 Coexistence studies

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there is no own Rx impact on the third band.

5.1.183.4 ∆TIB and ∆RIB values

ΔTIB,c and ΔRIB,c values are derived from DC\_12\_n5

Table 5.1.183.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| 12\_(n)5 | 5 | 0.8 |
| 12 | 0.4 |
| n5 | 0.8 |

Table 5.1.183.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| 12\_(n)5 | 5 | 0.5 |
| 12 | 0.3 |
| n5 | 0.5 |

5.1.183.5 REFSENS requirements

## 5.1.184 48\_(n)5

No additional REFSENS requirement is needed.

5.1.184.1 Operating bands for DC

Table 5.1.184.1-1: Band combinations EN-DC (two bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| 48\_(n)5 | CA\_5-48 | n5 |  |

5.1.184.2 Configuration for DC

Table 5.1.184.2-1: Inter-band EN-DC configurations (two bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_48A\_(n)5AA | DC\_48A\_n5A  DC\_(n)5AA1 | CA\_5A-48A | n5A |
| NOTE1: Only single switched UL is supported | | | |

5.1.184.3 Coexistence studies

Co-existence studies of this 3DL/2UL DC configuration are already covered in the constituent fall-back modes, there is no own Rx impact on the third band.

5.1.184.4 ∆TIB and ∆RIB values

ΔTIB,c and ΔRIB,c values are derived from DC\_48\_n5

Table 5.1.184.4-1: ΔTIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| 48\_(n)5 | 5 | 0.3 |
| 48 | 0.3 |
| n5 | 0.3 |

Table 5.1.184.4-2: ΔRIB,c

| E-UTRA and NR DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| 48\_(n)5 | 5 | 0 |
| 48 | 0 |
| n5 | 0 |

5.1.184.5 REFSENS requirements

## 5.1.185 DC\_48-66\_n71

No additional REFSENS requirement is needed.

5.1.185.1 Operating bands for EN-DC

Table 5.1.185.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 48-66\_n71 | CA\_48-66 | n71 | No |

5.1.185.2 Configuration for DC

Table 5.1.185.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_48A-66A\_n71A | DC\_48A\_n71A  DC\_66A\_n71A | CA\_48A-66A | n71 |

5.1.185.3 ∆TIB and ∆RIB values

For DC\_48-66\_n71, the TIB,c and RIB,c values for the 48\_n71 part are reused from CA\_13-48-66 and CA\_5-48-66 and are given in the tables below.

**Table 5.1.185.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_48-66\_n71 | 48 | 0.8 |
| 66 | 0.6 |
| n71 | 0.3 |

**Table 5.1.185.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_48-66\_n71 | 48 | 0.5 |
| 66 | 0.2 |
| n71 | 0 |

5.1.185.4 REFSENS requirements

Co-existence analysis from DC\_48\_n71 shows that there is IMD3 impact from DC\_48\_n71 UL to Band 66 DL. MSD value for band 66 DL affected by DC\_48\_n71 UL are derived from 28\_n77 UL affecting band 1 DL in DC\_1-28\_n77 and need to be defined in TS 38.101-3 like in table below.

Co-existence analysis from DC\_66\_n71 shows that there is IMD4 impact from DC\_66\_n71 UL to Band 48 DL. MSD value for band 48 DL affected by DC\_66\_n71 UL are derived from 19-21 UL affecting band 42 DL in CA\_19-21-42 and need to be defined in TS 38.101-3 like in table below.

Table 7.3B.2.3.5.2-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_48A-66A\_n71A | 48 | 3560 | 5 | 25 | 3560 | N/A | N/A |
| 66 | 1774 | 5 | 25 | 2174 | 15.8 | IMD3 |
| n71 | 693 | 5 | 25 | 647 | N/A | N/A |
| 48 | 3697.5 | 5 | 25 | 3697.5 | 13.0 | IMD4 |
| 66 | 1712.5 | 5 | 25 | 2112.5 | N/A | N/A |
| n71 | 665.5 | 5 | 25 | 619.5 | N/A | N/A |

## 5.1.186 DC\_2-29\_n66 and DC\_2-2-29\_n66

5.1.186.1 Operating bands for EN-DC

Table 5.1.186.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-29\_n66 | CA\_2-29 | n66 |  |
| DC\_2-2-29\_n66 | CA\_2-2-29 | n66 |  |

5.1.186.2 Configuration for DC

Table 5.1.186.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_2A-29A\_n66A | DC\_2A\_n66A | CA\_2A-29A | n66 |
| DC\_2A-2A-29A\_n66A | DC\_2A\_n66A | CA\_2A-2A-29A | n66 |

5.1.186.3 Co-existence studies

There is no impact from UL configuration DC\_2\_n66 into DL band of 29.

5.1.186.4 ∆TIB and ∆RIB values

For DC\_2-29\_n66 and DC\_2-2-29\_n66, the ΔTIB,c and ΔRIB,c values are reused from EN-DC combination DC\_2\_n66, and are given in the tables below.

**Table 5.1.186.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-29\_n66  DC\_2-2-29\_n66 | 2 | 0.5 |
| n66 | 0.5 |

**Table 5.1.186.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-29\_n66  DC\_2-2-29\_n66 | 2 | 0.3 |
| n66 | 0.3 |

5.1.186.5 REFSENS requirements

There is no additional REFSENS requirement for this band combination.

## 5.1.187 DC\_29-66\_n2 and DC\_29-66-66\_n2

5.1.187.1 Operating bands for EN-DC

Table 5.1.187.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_29-66\_n2 | CA\_29-66 | n2 |  |
| DC\_29-66-66\_n2 | CA\_29-66-66 | n2 |  |

5.1.187.2 Configuration for DC

Table 5.1.187.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_29A-66A\_n2A | DC\_66A\_n2A | CA\_29A-66A | n2 |
| DC\_29A-66A-66A\_n2A | DC\_66A\_n2A | CA\_29A-66A-66A | n2 |
|  | | | |

5.1.187.3 Co-existence studies

There is no impact from UL configuration DC\_66\_n2 into DL band of 29.

5.1.187.5 ∆TIB and ∆RIB values

For DC\_29-66\_n2 and DC\_29-66-66\_n2, the ΔTIB,c and ΔRIB,c values are reused from EN-DC combination DC\_66\_n2, and are given in the tables below.

**Table 5.1.187.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_29-66\_n2  DC\_29-66-66\_n2 | 66 | 0.5 |
| n2 | 0.5 |

**Table 5.1.187.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_29-66\_n2  DC\_29-66-66\_n2 | 66 | 0.3 |
| n2 | 0.3 |

5.1.187.5 REFSENS requirements

There is no additional REFSENS requirement for this band combination.

## 5.1.188 DC\_1-42\_n28

5.1.188.1 Operating bands for DC\_1-42\_n28

Table 5.1.188.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-42\_n28 | CA\_1-42 | n28 | No |

5.1.188.2 Configurations for DC\_1-42\_n28

Table 5.1.188.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-42A\_n28A | DC\_1A\_n28A  DC\_42A\_n28A | CA\_1A-42A | n28A |
| DC\_1A-42C\_n28A | DC\_1A\_n28A  DC\_42A\_n28A  DC\_42C\_n28A | CA\_1A-42C | n28A |

5.1.188.3 Co-existence studies

When Uplink EN-DC configuration is DC\_1A\_n28A, (1) IMD3 of (B1 - n28) will fall into Rx band of Band 42. When Uplink EN-DC configuration is DC\_42A\_n28A, (2) IMD3 of (B42 - n28) will fall into Rx band of Band 1.

5.1.188.4 ∆TIB and ∆RIB values

The following relaxation values are proposed:

Table 5.1.188.4-1: ΔTIB,c

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_1-42\_n28 | 1 | 0.3 |
| 42 | 0.8 |
| n28 | 0.8 |

Table 5.1.188.4-2: ΔRIB

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_1-42\_n28 | 1 | 0 |
| 42 | 0.5 |
| n28 | 0.5 |

5.1.188.5 REFSENS requirements

As mentioned above, IMD3 of B1 and n28 to Band42 Rx and IMD3 of B42 and n28 to Band1 Rx need to be addressed for REFSENS relaxation. The following values are proposed:

Table 5.1.188.5-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| DC\_1A-42A\_n28A | 1 | 1950 | 5 | 25 | 2140 | N/A | FDD | N/A |
| n28 | 733 | 5 | 25 | 788 | N/A | FDD | N/A |
| 42 | 3416 | 5 | 25 | 3416 | 15.7 | TDD | IMD3 |
| DC\_1A-42A\_n28A | 42 | 3580 | 5 | 25 | 3580 | N/A | TDD | N/A |
| n28 | 723 | 5 | 25 | 778 | N/A | FDD | N/A |
| 1 | 1944 | 5 | 25 | 2134 | 15.7 | FDD | IMD3 |

## 5.1.189 DC\_3-42\_n28

5.1.189.1 Operating bands for DC\_3-42\_n28

Table 5.1.189.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-42\_n28 | CA\_3-42 | n28 | No |

5.1.189.2 Configurations for DC\_3-42\_n28

Table 5.1.189.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-42A\_n28A | DC\_3A\_n28A  DC\_42A\_n28A | CA\_3A-42A | n28A |
| DC\_3A-42C\_n28A | DC\_3A\_n28A  DC\_42A\_n28A  DC\_42C\_n28A | CA\_3A-42C | n28A |

5.1.189.3 Co-existence studies

There is no additional harmonic and intermodulation impact for the additional band receiver.

5.1.189.4 ∆TIB and ∆RIB values

The following relaxation values are proposed:

Table 5.1.189.4-1: ΔTIB,c

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_3-42\_n28 | 3 | 0.6 |
| 42 | 0.8 |
| n28 | 0.8 |

Table 5.1.189.4-2: ΔRIB

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_3-42\_n28 | 3 | 0.2 |
| 42 | 0.5 |
| n28 | 0.5 |

5.1.189.5 REFSENS requirements

As mentioned in 5.1.189.3, REFSENS exceptions are not expected.

## 5.1.190 DC\_8-42\_n28

5.1.190.1 Operating bands for DC\_8-42\_n28

Table 5.1.190.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_8-42\_n28 | CA\_8-42 | n28 | No |

5.1.190.2 Configurations for DC\_8-42\_n28

Table 5.1.190.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_8A-42A\_n28A | DC\_8A\_n28A  DC\_42A\_n28A | CA\_8A-42A | n28A |
| DC\_8A-42C\_n28A | DC\_8A\_n28A  DC\_42A\_n28A  DC\_42C\_n28A | CA\_8A-42C | n28A |

5.1.190.3 Co-existence studies

When Uplink EN-DC configuration is DC\_8A\_n28A, IMD4 will fall into Rx band of Band 42.

5.1.190.4 ∆TIB and ∆RIB values

The following relaxation values are proposed:

Table 5.1.190.4-1: ΔTIB,c

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_8-42\_n28 | 8 | 0.6 |
| 42 | 0.8 |
| n28 | 0.8 |

Table 5.1.190.4-2: ΔRIB

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_8-42\_n28 | 8 | 0.2 |
| 42 | 0.5 |
| n28 | 0.5 |

5.1.190.5 REFSENS requirements

As mentioned in section 3, REFSENS exceptions due to IMD4 are expected. The following values are proposed.

Table 5.1.190.5-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA/NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** | **IMD order** |
| DC\_8A-42A\_n28A | 8 | 900 | 5 | 25 | 945 | N/A | FDD | N/A |
| n28 | 743 | 5 | 25 | 798 | N/A | FDD | N/A |
| 42 | 3443 | 5 | 25 | 3443 | 8.7 | TDD | IMD4 |

## 5.1.191 DC\_2-14\_n66

5.1.191.1 Operating bands for EN-DC

Table 5.1.191.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 2-14\_n66 | CA\_2-14 | n66 |  |

5.1.191.2 Configuration for DC

Table 5.1.191.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_2A-14A\_n66A | DC\_2A\_n66A DC\_14A\_n66A | CA\_2A-14A | n66A |
| DC\_2A-2A-14A\_n66A | DC\_2A\_n66A DC\_14A\_n66A | CA\_2A-2A-14A | n66A |

5.1.191.3 ∆TIB and ∆RIB values

For DC\_2-14\_n66, the ΔTIB,c and ΔRIB,c values are reused from LTE combination CA\_2-14-66, and are given in the tables below.

**Table 5.1.191.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-14\_n66 DC\_2-2-14\_n66 | 2 | 0.5 |
| 14 | 0.3 |
| n66 | 0.5 |

**Table 5.1.191.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-14\_n66  DC\_2-2-14\_n66 | 2 | 0.3 |
| 14 | 0 |
| n66 | 0.3 |

5.1.191.4 REFSENS requirements

There is IMD4 impact from DC\_14\_n66 UL affecting band 2 DL. MSD value is derived from CA\_2-13-66 which have IMD4 impact to band 2 from UL\_2\_13.

Table 7.3B.2.3.5.2-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_2A-14A\_n66A | 2 | 1874 | 5 | 25 | 1954 | 7.2 | IMD4 |
| 14 | 793 | 5 | 25 | 763 | N/A | N/A |
| 66 | 1770 | 5 | 25 | 2170 | N/A | N/A |

## 5.1.192 DC\_2-14\_n2

5.1.192.1 Operating bands for EN-DC

Table 5.1.192.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 2-14\_n2 | CA\_2-14 | n2 |  |

5.1.192.2 Configuration for DC

Table 5.1.192.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_2A-14A\_n2A | DC\_2A\_n2A1 DC\_14A\_n2A | CA\_2A-14A | n2 |
| NOTE 1: Only single switched UL is supported | | | |

5.1.192.3 ∆TIB and ∆RIB values

For DC\_2-14\_n2, the ΔTIB,c and ΔRIB,c values are reused from LTE combination CA\_2-14, and are given in the tables below.

**Table 5.1.192.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-14\_n2 | 2 | 0.3 |
| 14 | 0.3 |
| n2 | 0.3 |

**Table 5.1.192.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-14\_n2 | 2 | 0 |
| 14 | 0 |
| n2 | 0 |

5.1.192.4 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.193 DC\_14-66\_n2

5.1.193.1 Operating bands for EN-DC

Table 5.1.193.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 14-66\_n2 | CA\_14-66 | n2 |  |

5.1.193.2 Configuration for DC

Table 5.1.193.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_14A-66A\_n2A | DC\_14A\_n2A DC\_66A\_n2A | CA\_14A-66A | n2A |
| DC\_14A-66A-66A\_n2A | DC\_14A\_n2A DC\_66A\_n2A | CA\_14A-66A-66A | n2A |

5.1.193.3 ∆TIB and ∆RIB values

For DC\_14-66\_n2, the ΔTIB,c and ΔRIB,c values are reused from LTE combination CA\_2-14-66, and are given in the tables below.

**Table 5.1.193.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_14-66\_n2 DC\_14-66-66\_n2 | 14 | 0.3 |
| 66 | 0.5 |
| n2 | 0.5 |

**Table 5.1.193.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_14-66\_n2 DC\_14-66-66\_n2 | 14 | 0 |
| 66 | 0.3 |
| n2 | 0.3 |

5.1.193.4 REFSENS requirements

There is IMD4 impact from DC\_14\_n2 UL affecting band 66 DL. MSD value is derived from CA\_2-4-13 which have IMD4 impact to band 4 from UL\_2\_13.

Table 7.3B.2.3.5.2-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_14A-66A\_n2A DC\_14A-66A-66A\_n2A | 14 | 793 | 5 | 25 | 763 | N/A | N/A |
| 66 | 1762 | 5 | 25 | 2162 | 7.6 | IMD4 |
| n2 | 1874 | 5 | 25 | 1954 | N/A | N/A |

## 5.1.194 DC\_46-66\_n5

5.1.194.1 Operating bands for EN-DC

Table 5.1.194.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 46-66\_n5 | CA\_46-66 | n5 |  |

5.1.194.2 Configuration for DC

Table 5.1.194.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_46A-66A\_n5A  DC\_46C-66A\_n5A  DC\_46D-66A\_n5A  DC\_46E-66A\_n5A | DC\_66A\_n5A | CA\_46A-66A  CA\_46C-66A  CA\_46D-66A  CA\_46E-66A | n5A |

5.1.194.3 ∆TIB and ∆RIB values

For DC\_46-66\_n5, the ΔTIB,c and ΔRIB,c values are reused from LTE combination CA\_5-46-66 and are given in the tables below.

**Table 5.1.194.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_46-66\_n5 | 66 | 0.3 |
| n5 | 0.3 |

**Table 5.1.194.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_46-66\_n5 | 66 | 0 |
| n5 | 0 |

5.1.194.4 REFSENS requirements

There is IMD4 impact from DC\_66\_n5 UL affecting band 46 DL. MSD value is derived from CA\_1-5-40 which have IMD4 impact to band 40 from UL\_1-5, and from DC\_12\_n7-n78 which have IMD4 impact to band n78 from UL\_12\_n7.

Table 7.3B.2.3.5.2-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| **NR or E-UTRA Band / Channel bandwidth / NRB / MSD** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EN-DC Configuration** | **EUTRA / NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL**  **LCRB** | **DL Fc (MHz)** | **MSD  (dB)** | **IMD order** |
| DC\_46A-66A\_n5A | 46 | 5163 | 10 | 50 | 5163 | 9.0 | IMD4 |
| 66 | 1775 | 5 | 25 | 2175 | N/A | N/A |
| n5 | 847 | 5 | 25 | 892 | N/A | N/A |

## 5.1.195 DC\_14-66\_n66

5.1.195.1 Operating bands for EN-DC

Table 5.1.195.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 14-66\_n66 | CA\_14-66 | n66 |  |

5.1.195.2 Configuration for DC

Table 5.1.195.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_14A-66A\_n66A | DC\_14A\_n66A  DC\_66A\_n66A1 | CA\_14A-66A | n66 |
| NOTE 1: Only single switched UL is supported | | | |

5.1.195.3 ∆TIB and ∆RIB values

For DC\_14-66\_n66, the ΔTIB,c and ΔRIB,c values are reused from LTE combination CA\_14-66, and are given in the tables below.

**Table 5.1.195.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_14-66\_n66 | 14 | 0.3 |
| 66 | 0.3 |
| n66 | 0.3 |

**Table 5.1.195.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_14-66\_n66 | 14 | 0 |
| 66 | 0 |
| n66 | 0 |

5.1.195.4 REFSENS requirements

There is no additional requirement for this band combination.

## 5.1.196 DC\_3-(n)41

5.1.196.1 Operating bands for DC

Table 5.1.196.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-(n)41 | CA\_3-41 | n41 | no |

5.1.196.2 Configuration for DC

Table 5.1.196.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_3A-(n)41AA  DC\_3A-(n)41CA  DC\_3A-(n)41DA | DC\_3A\_n41A | CA\_3-41 | n41 |

5.1.196.3 Co-existence studies

For UE coexistence study of Band 3 + Band n41, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.196.3-1.

Table 5.1.196.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1710 | 1785 | 2496 | 2690 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3420 | 3570 | 4992 | 5380 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5130 | 5355 | 7488 | 8070 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 6840 | 7140 | 9984 | 10760 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 8550 | 8925 | 12480 | 13450 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 711 | 980 | 4206 | 4475 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 730 | 1074 | 3207 | 3670 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 5916 | 6260 | 6702 | 7165 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 2440 | 2859 | 5703 | 6360 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 7626 | 8045 | 9198 | 9855 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 1960 | 1422 | 8412 | 8950 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 9050 | 8199 | 4644 | 4150 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 4650 | 3918 | 363 | 250 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 11694 | 12545 | 9336 | 9830 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 10908 | 11640 | 10122 | 10735 |

Based on the table, there is no IMD issue for Scell band 41.

IMD4 may fall into band 3 Rx when DC\_3\_n41 is configured as UL.

5.1.196.4 ∆TIB and ∆RIB values

Table 5.1.196.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-(n)41 | 3 | 0.5 |
| 41 | 0.33 |
| 0.84 |
| n41 | 0.33 |
| 0.84 |
| NOTE 3: The requirement is applied for UE transmitting on the frequency range of 2515 – 2690 MHz.  NOTE 4: The requirement is applied for UE transmitting on the frequency range of 2496 – 2515 MHz. | | |

**Table 5.1.196.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-(n)41 | 3 | 0 |
| 41 | 03 |
| 0.54 |
| n41 | 03 |
| 0.54 |
| NOTE 3: The requirement is applied for UE transmitting on the frequency range of 2515 – 2690 MHz.  NOTE 4: The requirement is applied for UE transmitting on the frequency range of 2496 – 2515 MHz. | | |

5.1.196.5 REFSENS requirements

B3 Rx with UL DC\_3A\_n41A suffers from IMD4 for which MSD is already specified in 38.101-3. There is no need to further specify the MSD requirements.

## 5.1.197 DC\_3-41\_n41

5.1.197.1 Operating bands for DC

Table 5.1.197.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-41\_n41 | CA\_3-41 | n41 | no |

5.1.197.2 Configuration for DC

Table 5.1.197.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_3A-41A\_n41A  DC\_3A-41C\_n41A  DC\_3A-41D\_n41A | DC\_3A\_n41A | CA\_3-41 | n41 |

5.1.197.3 Co-existence studies

For UE coexistence study of Band 3 + Band n41, the 2nd, 3rd, 4th and 5th order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.1.197.3-1.

Table 5.1.197.3-1: Harmonic and IMD analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 1710 | 1785 | 2496 | 2690 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3420 | 3570 | 4992 | 5380 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 5130 | 5355 | 7488 | 8070 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\* fy\_low | 4\* fy\_high |
| 4th harmonics frequency limits (MHz) | 6840 | 7140 | 9984 | 10760 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 8550 | 8925 | 12480 | 13450 |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 711 | 980 | 4206 | 4475 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 730 | 1074 | 3207 | 3670 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 5916 | 6260 | 6702 | 7165 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 2440 | 2859 | 5703 | 6360 |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 7626 | 8045 | 9198 | 9855 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | 1960 | 1422 | 8412 | 8950 |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 9050 | 8199 | 4644 | 4150 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 4650 | 3918 | 363 | 250 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 11694 | 12545 | 9336 | 9830 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 10908 | 11640 | 10122 | 10735 |

Based on the table, there is no IMD issue for Scell band 41.

IMD4 may fall into band 3 Rx when DC\_3\_n41 is configured as UL.

5.1.197.4 ∆TIB and ∆RIB values

Table 5.1.197.4-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-41\_n41 | 3 | 0.5 |
| 41 | 0.33 |
| 0.84 |
| n41 | 0.33 |
| 0.84 |
| NOTE 3: The requirement is applied for UE transmitting on the frequency range of 2515 – 2690 MHz.  NOTE 4: The requirement is applied for UE transmitting on the frequency range of 2496 – 2515 MHz. | | |

**Table 5.1.197.4-2: ΔRIB,c due to EN-DC (three bands)**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-41\_n41 | 3 | 0 |
| 41 | 03 |
| 0.54 |
| n41 | 03 |
| 0.54 |
| NOTE 3: The requirement is applied for UE transmitting on the frequency range of 2515 – 2690 MHz.  NOTE 4: The requirement is applied for UE transmitting on the frequency range of 2496 – 2515 MHz. | | |

5.1.197.5 REFSENS requirements

B3 Rx with UL DC\_3A\_n41A suffers from IMD4 for which MSD is already specified in 38.101-3. There is no need to further specify the MSD requirements.

## 5.1.198 DC\_2-66\_n2

### 5.1.198.1 Configurations for DC

Table 5.1.198.1-1: Inter-band DC configurations (three bands)

| DC  configuration | Uplink configuration |
| --- | --- |
| DC\_2A-66A\_n2A | DC\_2A\_n2A1  DC\_66A\_n2A |
| NOTE 1: Only single switched UL is supported | |

### 5.1.198.2 Co-existence studies

When uplink is DC\_66A\_n2A there is interfering IMD3 and IMD5 to E-UTRA band 2 downlink.

### 5.1.198.3 ∆TIB and ∆RIB values

It is proposed to take the maximum relaxation values from E-UTRA CA\_2-66

Table 5.1.198.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n2 | 2 | 0.5 |
| 66 | 0.5 |
| n2 | 0.5 |

**Table 5.1.198.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-66\_n2 | 2 | 0.3 |
| 66 | 0.3 |
| n2 | 0.3 |

### 5.1.198.4 Reference sensitivity exceptions

It is prosed to re-use the IMD3 and IMD5 MSD from already specified configuration DC\_2A-66A\_n25A which is similar to DC\_2A-66A\_n2A.

Table 5.1.198.4-1: Reference sensitivity exceptions

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| EN-DC Configuration | EUTRA / NR band | UL Fc  (MHz) | UL/DL BW  (MHz) | UL  LCRB | DL Fc (MHz) | MSD  (dB) | IMD order |
| DC\_2A-66A\_n2A | 2 | 1900 | 5 | 25 | 1980 | 20 | IMD3 |
| 66 | 1730 | 5 | 25 | 2130 | N/A | N/A |
| n2 | 1855 | 5 | 25 | 1935 | N/A | N/A |

## 5.1.199 DC\_29-30\_n66

### 5.1.199.1 Configurations for DC

Table 5.1.199.1-1: Inter-band DC configurations (three bands)

| DC  configuration | Uplink configuration |
| --- | --- |
| DC\_29A-30A\_n66A | DC\_30A\_n66A |

### 5.1.199.2 Co-existence studies

When uplink is DC\_30A\_n66A there is IMD5 interfering band 29 downlink.

### 5.1.199.3 ∆TIB and ∆RIB values

It is proposed to take the maximum relaxation values from E-UTRA CA\_29-30-66

Table 5.1.199.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_29-30-n66 | 30 | 0.3 |
| n66 | 0.5 |

**Table 5.1.199.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_29-30-n66 | 30 | 0.5 |
| n66 | 0.4 |

### 5.1.199.4 Reference sensitivity exceptions

It is prosed to re-use the IMD5 MSD from already specified configuration DC\_1A-28A\_n7A which is similar to DC\_29A-30A\_n66A.

Table 5.1.199.4-1: Reference senstivity exceptions

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| EN-DC Configuration | EUTRA / NR band | UL Fc  (MHz) | UL/DL BW  (MHz) | UL  LCRB | DL Fc (MHz) | MSD  (dB) | IMD order |
| DC\_29A-30A\_n66A | 29 | N/A | 5 | 25 | 719.5 | 4.5 | IMD5 |
| 30 | 2307.5 | 5 | 25 | 2352.5 | N/A | N/A |
| n66 | 1777.5 | 5 | 25 | 2177.5 | N/A | N/A |

## 5.1.200 DC\_2-30\_n2

### 5.1.200.1 Configurations for DC

Table 5.1.200.1-1: Inter-band DC configurations (three bands)

| DC  configuration | Uplink configuration |
| --- | --- |
| DC\_2A-30A\_n2A | DC\_2A\_n2A1  DC\_30A\_n2A |
| NOTE 1: Only single switched UL is supported | |

### 5.1.200.2 Co-existence studies

When uplink is DC\_30A\_n2A there is no interfering IMD to E-UTRA band 2 downlink.

### 5.1.200.3 ∆TIB and ∆RIB values

It is proposed to take the maximum relaxation values from E-UTRA CA\_2-30

Table 5.1.200.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-30\_n2 | 2 | 0.5 |
| 30 | 0.3 |
| n2 | 0.5 |

**Table 5.1.200.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-30\_n2 | 2 | 0.5 |
| 30 | 0.3 |
| n2 | 0.5 |

### 5.1.200.4 Reference sensitivity exceptions

No reference sensitivity exceptions needed.

## 5.1.201 DC\_29-30\_n2

### 5.1.201.1 Configurations for DC

Table 5.1.201.1-1: Inter-band DC configurations (three bands)

| DC  configuration | Uplink configuration |
| --- | --- |
| DC\_29A-30A\_n2A | DC\_30A\_n2A |

### 5.1.201.2 Co-existence studies

When uplink is DC\_30A\_n2A there is no interfering IMD to E-UTRA band 29 downlink.

### 5.1.201.3 ∆TIB and ∆RIB values

It is proposed to take the maximum relaxation values from E-UTRA CA\_30-66

Table 5.1.201.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_29-30\_n2 | 30 | 0.3 |
| n2 | 0.5 |

**Table 5.1.201.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_29-30\_n2 | 30 | 0.3 |
| n2 | 0.5 |

### 5.1.201.4 Reference sensitivity exceptions

No reference sensitivity exceptions needed.

## 5.1.202 DC\_30-66-n66

### 5.1.202.1 Configurations for DC

Table 5.1.202.1-1: Inter-band DC configurations (three bands)

| DC  configuration | Uplink configuration |
| --- | --- |
| DC\_30A-66A\_n66A | DC\_30A\_n66A  DC\_66A\_n66A1 |
| NOTE 1: Only single switched UL is supported | |

### 5.1.202.2 Co-existence studies

When uplink is DC\_30A\_n66A there is no interfering IMD to E-UTRA band 66 downlink.

### 5.1.202.3 ∆TIB and ∆RIB values

It is proposed to take the maximum relaxation values from E-UTRA CA\_30-66

Table 5.1.202.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_30-66-n66 | 30 | 0.3 |
| 66 | 0.5 |
| n66 | 0.5 |

**Table 5.1.202.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_30-66-n66 | 30 | 0.5 |
| 66 | 0.5 |
| n66 | 0.4 |

### 5.1.202.4 Reference sensitivity exceptions

No reference sensitivity exceptions needed.

## 5.2 Inter-band EN-DC including FR2

## 5.2.1 DC\_3-18\_n257

5.2.1.1 Operating bands for DC

Table 5.2.1.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-18\_n257 | CA\_3-18 | n257 |  |

5.2.1.2 Configurations for DC

Table 5.2.1.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-18A\_n257A | DC\_3A\_n257A  DC\_18A\_n257A | CA\_3A-18A | n257 |

5.2.1.3 ∆TIB and ∆RIB values

Table 5.2.1.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-18-n257 | 3 | 0.3 |
| 18 | 0.3 |
| n257 | 0 |

**Table 5.2.1.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-18-n257 | 3 | 0 |
| 18 | 0 |
| n257 | 0 |

## 5.2.2 DC\_3-8\_n257

5.2.2.1 Operating bands for DC\_3-8\_n257

Table 5.2.2.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-8\_n2571 | CA\_3-8 | n257 | No |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | |

5.2.2.2 Configurations for DC\_3-8\_n257

Table 5.2.2.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-8A\_n257A | DC\_3A\_n257A  DC\_8A\_n257A | CA\_3A-8A | n257A |
| DC\_3A-8A\_n257D  DC\_3A-8A\_n257E  DC\_3A-8A\_n257F | DC\_3A\_n257A  DC\_8A\_n257A | CA\_3A-8A | n257A  CA\_n257D  CA\_n257E  CA\_n257F |
| DC\_3A-8A\_n257G  DC\_3A-8A\_n257H  DC\_3A-8A\_n257I  DC\_3A-8A\_n257J  DC\_3A-8A\_n257K  DC\_3A-8A\_n257L  DC\_3A-8A\_n257M | DC\_3A\_n257A  DC\_8A\_n257A | CA\_3A-8A | n257A  CA\_n257G  CA\_n257H  CA\_n257I  CA\_n257J  CA\_n257K  CA\_n257L  CA\_n257M |
| DC\_3C-8A\_n257A | DC\_3A\_n257A  DC\_8A\_n257A | CA\_3C-8A | n257A |
| DC\_3C-8A\_n257D  DC\_3C-8A\_n257E  DC\_3C-8A\_n257F | DC\_3A\_n257A  DC\_8A\_n257A | CA\_3C-8A | n257A  CA\_n257D  CA\_n257E  CA\_n257F |
| DC\_3C-8A\_n257G  DC\_3C-8A\_n257H  DC\_3C-8A\_n257I  DC\_3C-8A\_n257J  DC\_3C-8A\_n257K  DC\_3C-8A\_n257L  DC\_3C-8A\_n257M | DC\_3A\_n257A  DC\_8A\_n257A | CA\_3C-8A | n257A  CA\_n257G  CA\_n257H  CA\_n257I  CA\_n257J  CA\_n257K  CA\_n257L  CA\_n257M |

5.2.2.3 ∆TIB and ∆RIB values

The delta Tib/Rib of *this* EN-D*C* are as follows*:*

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_3-8\_n257 | 3 | 0.3 |
| 8 | 0.3 |

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_3-8\_n257 | 3 | 0 |
| 8 | 0 |

## 5.2.3 DC\_28-41\_n257

5.2.3.1 Operating bands for DC\_28-41\_n257

Table 5.2.3.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_28-41\_n2571 | CA\_28-41 | n257 | No |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | |

5.2.3.2 Configurations for DC\_28-41\_n257

Table 5.2.3.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  Configuration | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_28A-41A\_n257A | DC\_28A\_n257A  DC\_41A\_n257A | CA\_28A-41A | n257A |

5.2.3.3 ∆TIB and ∆RIB values

The delta Tib/Rib of *this* EN-D*C* are as follows*:*

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_28-41\_n257 | 28 | 0.3 |
| 41 | 0.3 |

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_28-41\_n257 | 28 | 0 |
| 41 | 0 |

## 5.2.4 DC\_2-66\_n257

5.2.4.1 Operating bands for DC

Table 5.2.4.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-66\_n257 | CA\_2-66 | n257 | No |

5.2.4.2 Configurations for DC

Table 5.2.4.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_2A-66A\_n257A  DC\_2A-66A\_n257(2A) | DC\_2A\_n257A  DC\_66A\_n257A | CA\_2A-66A | n257A  CA\_n257(2A) |

**Table 5.2.4.2-2: Supported bandwidths per DC band combination of 2 LTE bands and 1 NR band**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DC operating band / channel bandwidth** | | | | | | | | | | | | | | | | |
| **E-UTRA and NR DC Configuration** | **E-UTRA and NR Band** | **Subcarrier spacing**  **[kHz]** | **5**  **MHz** | **10**  **MHz** | **15**  **MHz** | **20**  **MHz** | **40**  **MHz** | **50**  **MHz** | **60**  **MHz** | **80**  **MHz** | **100 MHz** | **200 MHz** | **400 MHz** | **Maximum aggregated bandwidth**  **[MHz]** | | |
| DC\_2A-66A\_n257A | 2 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  | | |
| 66 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  | | |
| n257 | 60 |  |  |  |  |  | Yes |  |  | Yes | Yes |  | 240 |  | |
| 120 |  |  |  |  |  | Yes |  |  | Yes | Yes | Yes | 440 |  | |
| DC\_2A-66A\_n257(2A) | 2 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  | | |
| 66 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  | | |
| n257 | 60 | See CA\_n257(2A) CA bandwidth combinations in TS 38.101-2. | | | | | | | | | | | 440 | |  |
| 120 | 840 | |  |

5.2.4.3 Spurious emission band UE co-existence for DC

The co-existence analysis of harmonics and 2UL intermodulations for DC bands 2 and n257 has has been already made in clause 6.86.3 of TS 37.863-01-01.

The co-existence analysis of harmonics and 2UL intermodulations for DC bands 66 and n257 has has been already made in clause 6.62.3 of TS 37.863-01-01.

Therefore, we skip these analysis in this TR.

Table 6.X.3-3 lists the protected bands required for the dual connectivity configuration.

Table 5.2.4.3-3: Protected bands for the dual connectivity configuration

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR DC Configuration** | **Spurious emission** | | | | | | |
| **Protected band** | **Frequency range (MHz)** | | | **Maximum Level (dBm)** | **MBW (MHz)** | **NOTE** |
| DC\_2-66\_n257 | Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 38, 41, 43, 50, 51, 66, 70, 71, 74 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Band 42, 48 | FDL\_low | - | FDL\_high | -50 | 1 | 1 (Note) |
| Note: Table 6.5.3.2-1 of TS38.101 | | | | | | | |

5.2.4.4 MSD analysis for DC

No IMD issues are expected for DC configuration between the LTE bands below 6GHz and FR2 NR band. Furthermore, up to 7th order harmonics have no impact to Rx frequency of both LTE and NR bands.

5.2.4.5 ∆TIB and ∆RIB values

For DC\_2-66-n257, the ΔTIB,c and ΔRIB values are given in the tables below, reusing LTE CA configuration CA\_2-66 for band 2 and 66 while no relaxation is introduced to band n257.

**Table 5.2.4.5-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n257 | 2 | 0.5 |
| 66 | 0.5 |
| n257 | 0 |

**Table 5.2.4.5-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-66\_n257 | 2 | 0.3 |
| 66 | 0.3 |
| n257 | 0 |

## 5.2.5 DC\_2-66\_n261

5.2.5.1 Operating bands for DC

Table 5.2.5.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-66\_ n261 | CA\_2-66 | n261 | No |

5.2.5.2 Configuration for DC

Table 5.2.5.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_2A-66A\_n261A  DC\_2A-66A\_n261(2A) | DC\_2A\_n261A  DC\_66A\_n261A | CA\_2A-66A | n261A  CA\_n261(2A) |

**Table 5.2.5.2-2: Supported bandwidths per DC band combination of 2 LTE bands and 1 NR band**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DC operating band / channel bandwidth** | | | | | | | | | | | | | | | | | | | |
| **E-UTRA and NR DC Configuration** | **E-UTRA and NR Band** | **Subcarrier spacing**  **[kHz]** | **5**  **MHz** | **10**  **MHz** | | **15**  **MHz** | **20**  **MHz** | **40**  **MHz** | **50**  **MHz** | **60**  **MHz** | **80**  **MHz** | **100 MHz** | **200 MHz** | | | **400 MHz** | **Maximum aggregated bandwidth**  **[MHz]** | | |
| DC\_2A-66A\_n261A | 2 | 15 | Yes | Yes | | Yes | Yes |  |  |  |  |  |  |  | | |  | | |
| 66 | 15 | Yes | Yes | | Yes | Yes |  |  |  |  |  |  |  | | |  | | |
| n261 | 60 |  |  | |  |  |  | Yes |  |  | Yes | Yes |  | | | 240 |  | |
| 120 |  |  | |  |  |  | Yes |  |  | Yes | Yes | Yes | | | 440 |  | |
| DC\_2A-66A\_n261(2A) | 2 | 15 | Yes | Yes | Yes | | Yes |  |  |  |  |  |  | |  | |  | | |
| 66 | 15 | Yes | Yes | Yes | | Yes |  |  |  |  |  |  | |  | |  | | |
| n261 | 60 | See CA\_n261(2A) CA bandwidth combinations in TS 38.101-2. | | | | | | | | | | | | | | 440 | |  |
| 120 | 840 | |  |

5.2.5.3 Spurious emission band UE co-existence for DC

The co-existence analysis of harmonics and 2UL intermodulations for DC bands 2 and n261 has has been already made in TR 37.716-01-01.

The co-existence analysis of harmonics and 2UL intermodulations for DC bands 66 and n261 has has been already made in clause 6.93.3 of TS 37.863-01-01.

Therefore, we skip these analysis in this TR.

Table 5.2.5.3-3 lists the protected bands required for the dual connectivity configuration.

**Table 5.2.5.3-3: Protected bands for the dual connectivity configuration**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR DC Configuration** | **Spurious emission** | | | | | | |
| **Protected band** | **Frequency range (MHz)** | | | **Maximum Level (dBm)** | **MBW (MHz)** | **NOTE** |
| DC\_2A-66A\_n261A  DC\_2A-66A\_n261(2A) | Bands 4, 5, 12, 13, 14, 17, 24, 26, 29, 30, 41, 48, 66, 70, 71, n260 | FDL\_low | - | FDL\_high | -50 | 1 |  |

5.2.5.4 MSD analysis for DC

No IMD issues are expected for DC configuration between the LTE bands below 6GHz and FR2 NR band. Furthermore, up to 7th order harmonics have no impact to Rx frequency of both LTE and NR bands.

5.2.5.5 ∆TIB and ∆RIB values

For DC\_2-66-n261, the ΔTIB,c and ΔRIB values are given in the tables below, reusing LTE CA configuration CA\_2-66 for band 2 and 66 while no relaxation is introduced to band n261.

**Table 5.2.5.5-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n261 | 2 | 0.5 |
| 66 | 0.5 |
| n261 | 0 |

**Table 6.Y.5-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-66\_n261 | 2 | 0.3 |
| 66 | 0.3 |
| n261 | 0 |

## 5.2.6 DC\_2-66\_n260

5.2.6.1 Operating bands and Configurations for DC

**Table 5.2.6.1-1: Band combinations EN-DC (three bands)**

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-66\_n260 | CA\_2-66 | n260 | No |

**Table 5.2.6.1-2: Inter-band EN-DC configurations (three bands)**

| **EN-DC**  **configuration** | **Uplink EN-DC**  **Configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_2A-66A\_n260(2A) DC\_2A-66A\_n260(3A) DC\_2A-66A\_n260(4A) | DC\_2A\_n260A  DC\_66A\_n260A | CA\_2A-66A | n260(2A)  n260(3A)  n260(4A) |

5.2.6.2 Channel bandwidths per operating band for DC

**Table 5.2.6.2-1 Supported bandwidths per DC band combination of LTE 1DL/1UL + one NR band**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DC operating / channel bandwidth** | | | | | | | | | | | | | | |
| **E-UTRA and NR DC Configuration** | **E-UTRA and NR Band** | **Subcarrier spacing**  **[kHz]** | **5**  **MHz** | **10**  **MHz** | **15**  **MHz** | **20**  **MHz** | **[40**  **MHz]** | **50**  **MHz** | **[60**  **MHz]** | **80**  **MHz** | **100 MHz** | **[200 MHz]** | **400 MHz** | **Maximum aggregated bandwidth**  **[MHz]** |
| DC\_2A-66A\_n260(2A) | 2 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  | 840  (440 for Band n260 with 60 kHz SCS) |
| 66 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |
| n260 | 60 | See CA\_n260(2A) Bandwidth Combination in Table 5.5A.2-1 of 38.101-2 | | | | | | | | | | |
| 120 |
| DC\_2A-66A\_n260(3A) | 2 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  | 1240  (640 for Band n260 with 60 kHz SCS) |
| 66 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |
| n260 | 60 | See CA\_n260(3A) Bandwidth Combination in Table 5.5A.2-1 of 38.101-2 | | | | | | | | | | |
| 120 |
| DC\_2A-66A\_n260(4A) | 2 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  | 1640  (840 for Band n260 with 60 kHz SCS) |
| 66 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |
| n260 | 60 | See CA\_n260(4A) Bandwidth Combination in Table 5.5A.2-1 of 38.101-2 | | | | | | | | | | |
| 120 |

5.2.6.3 Co-existence studies

Co-existence was studied for the lower order combination DC\_2A-66A\_n260A in Rel-15. These results are captured in 37.863-02-01. Bases on these results it is shown that neither DC\_2A\_n260A in UL or DC\_66A\_n260A in the UL cause any co-existence issues. Up to 7th order harmonics have no impact to any own Rx frequencies in LTE or NR bands. Therefor it is concluded that no further studies are needed for these new combinations.

5.2.6.4 ∆TIB and ∆RIB values

For DC\_2A-66A\_n260(2A), DC\_2A-66A\_n260(3A) and DC\_2A-66A\_n260(4A) the ΔTIB,c and ΔRIB values are same as for the lower order combination DC\_2A-66A\_n260A given in the tables below.

**Table 5.2.6.4-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2A-66A\_n260A | 2 | 0.5 |
| 66 | 0.5 |
| n260 | 0 |

**Table 5.2.6.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2A-66A\_n260A | 2 | 0 |
| 66 | 0 |
| n260 | 0 |

5.2.6.5 REFSENS

There is no specific REFSENS requirements.

## 5.2.7 DC\_46-66\_n261

5.2.7.1 Operating bands for DC

Table 5.2.7.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_46-66\_n261 | CA\_46-66 | n261 | No |

5.2.7.2 Configurations for DC

Table 5.2.7.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_46A-66A\_n261A  DC\_46C-66A\_n261A  DC\_46D-66A\_n261A  DC\_46A-66A\_n261(2A)  DC\_46C-66A\_n261(2A)  DC\_46D-66A\_n261(2A) | DC\_66A\_n261A | DC\_46A-66A  DC\_46C-66A  DC\_46D-66A  DC\_46A-66A  DC\_46C-66A  DC\_46D-66A | n261A  CA\_n261(2A) |

**Table 5.2.7.2-2: Supported bandwidths per DC band combination of 2 E-UTRA bands and 1 NR band**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DC operating band / channel bandwidth** | | | | | | | | | | | | | | | | | |
| **E-UTRA and NR DC Configuration** | **E-UTRA and NR Band** | **Subcarrier spacing**  **[kHz]** | **5**  **MHz** | **10**  **MHz** | **15**  **MHz** | **20**  **MHz** | **40**  **MHz** | **50**  **MHz** | **60**  **MHz** | **80**  **MHz** | **100 MHz** | **200 MHz** | **400 MHz** | **Maximum aggregated bandwidth**  **[MHz]** | | | |
| DC\_46A-66A\_n261A | 46 | 15 |  |  |  | Yes |  |  |  |  |  |  |  |  | | | |
| 66 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  | | | |
| n261 | 60 |  |  |  |  |  | Yes |  |  | Yes | Yes |  | 240 | |  | |
| 120 |  |  |  |  |  | Yes |  |  | Yes | Yes | Yes | 440 | |  | |
| DC\_46C-66A\_n261A | 46 | 15 | See CA\_46C bandwidth combination set 0 in TS 36.101 | | | | | | | | | | |  | |  | |
| 66 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  | |  | |
| n261 | 60 |  |  |  |  |  | Yes |  |  | Yes | Yes |  | 260 | |  | |
| 120 |  |  |  |  |  | Yes |  |  | Yes | Yes | Yes | 460 | |  | |
| DC\_46D-66A\_n261A | 46 | 15 | See CA\_46D bandwidth combination set 0 in TS 36.101 | | | | | | | | | | |  | |  | |
| 66 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  | |  | |
| n261 | 60 |  |  |  |  |  | Yes |  |  | Yes | Yes |  | 280 | |  | |
| 120 |  |  |  |  |  | Yes |  |  | Yes | Yes | Yes | 480 | |  | |
| DC\_46A-66A\_n261(2A) | 46 | 15 |  |  |  | Yes |  |  |  |  |  |  |  |  |  | | |
| 66 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  | | |
| n261 | 60 | See CA\_n261(2A) CA bandwidth combinations in TS 38.101-2. | | | | | | | | | | | 440 |  | | |
| 120 | 840 |  | | |
| DC\_46C-66A\_n261(2A) | 46 | 15 | See CA\_46C bandwidth combination set 0 in TS 36.101 | | | | | | | | | | |  |  | | |
| 66 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  | | |
| n261 | 60 | See CA\_n261(2A) CA bandwidth combinations in TS 38.101-2. | | | | | | | | | | | 460 |  | | |
| 120 | 860 |  | | |
| DC\_46D-66A\_n261(2A) | 46 | 15 | See CA\_46D bandwidth combination set 0in TS 36.101 | | | | | | | | | | |  |  | | |
| 66 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  | | | |
| n261 | 60 | See CA\_n261(2A) CA bandwidth combinations in TS 38.101-2. | | | | | | | | | | | 480 | | |  |
| 120 | 880 | | |  |

5.2.7.3 Spurious emission band UE co-existence for DC

The co-existence analysis of harmonics and 2UL intermodulations for DC bands 66 and n261 has been already made in clause 6.62.3 of TS 37.863-01-01.

Table 5.2.7.3-3 lists the protected bands required for the dual connectivity configuration.

Table 5.2.7.3-3: Protected bands for the dual connectivity configuration

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA and NR DC Configuration** | **Spurious emission** | | | | | | |
| **Protected band** | **Frequency range (MHz)** | | | **Maximum Level (dBm)** | **MBW (MHz)** | **NOTE** |
| DC\_46-66\_n261 | Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 38, 41, 43, 50, 51, 66, 70, 71, 74 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Band 42, 48 | FDL\_low | - | FDL\_high | -50 | 1 | 1 (Note) |
| Note: Table 6.5.3.2-1 of TS38.101 | | | | | | | |

5.2.7.4 MSD analysis for DC

No IMD issues are expected for DC configuration between the E-UTRA bands below 6GHz and FR2 NR band due to large frequency separation.

The third order harmonic of band 66 may fall into band 46 as already specified in E-UTRA CA\_46A-66A. The exclusion zone specified in TS36.101 Table 7.3.1A-0eC is applicable to have no MSD also for this EN-DC. The MSD analysis available in clause 6.23 of TR36.714-02-01 is also applicable to this EN-DC.

5.2.7.5 ∆TIB and ∆RIB values

For DC\_46-66-n261, the ΔTIB,c and ΔRIB values are given in the tables below, reusing E-UTRA CA configuration CA\_46-66 for band 46 and 66 while no relaxation is introduced to band n261.

Note that ΔRIB for band 46 is defined relative to the REFSENS of E-UTRA CA\_46A-66A in TS36.101 as the single carrier REFSENS is not defined for band 46.

**Table 5.2.7.5-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_46-66\_n261 | 66 | 0 |
| n261 | 0 |

**Table 5.2.7.5-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_46-66\_n261 | 46 | 0 |
| 66 | 0 |
| n261 | 0 |

## 5.2.8 DC\_18-42\_n257

5.2.8.1 Operating bands for DC

Table 5.2.8.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_18-42\_n257 | CA\_18-42 | n257 | No |

5.2.8.2 Configurations for DC

Table 5.2.8.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_18A-42A\_n257A | DC\_18A\_n257A  DC\_42A\_n257A | CA\_18A-42A | n257 |
| DC\_18A-42A\_n257F | DC\_18A\_n257A  DC\_42A\_n257A | CA\_18A-42A | n257 |
| DC\_18A-42A\_n257M | DC\_18A\_n257A  DC\_42A\_n257A | CA\_18A-42A | n257 |
| DC\_18A-42C\_n257A | DC\_18A\_n257A  DC\_42A\_n257A | CA\_18A-42C | n257 |
| DC\_18A-42C\_n257F | DC\_18A\_n257A  DC\_42A\_n257A | CA\_18A-42C | n257 |
| DC\_18A-42C\_n257M | DC\_18A\_n257A  DC\_42A\_n257A | CA\_18A-42C | n257 |

5.2.8.3 Co-existence studies

The co-existence studies for the lower order DC configurations are already captured in TR 37.863-01-01. For the additional 3rd receiver band, there is no MSD issue for this DC configuration.

5.2.8.4 ∆TIB and ∆RIB values

The same ∆TIB and ∆RIB values of DC\_19-42\_n257 can be applied.

Table 5.2.8.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_18-42\_n257 | 18 | 0.3 |
| 42 | 0.8 |
| n257 | 0 |

**Table 5.2.8.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_18-42\_n257 | 18 | 0 |
| 42 | 0.5 |
| n257 | 0 |

5.2.8.5 REFSENS requirements

No REFSENS requirements are expected for this DC configuration.

## 5.2.9 DC\_1-18\_n257

5.2.9.1 Operating bands for DC

Table 5.2.9.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-18\_n257 | CA\_1-18 | n257 | No |

5.2.9.2 Configurations for DC

Table 5.2.9.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-18A\_n257F | DC\_18A\_n257A  DC\_1A\_n257A | CA\_1A-18A | n257 |
| DC\_1A-18A\_n257M | DC\_18A\_n257A  DC\_1A\_n257A | CA\_1A-18A | n257 |

5.2.9.3 Co-existence studies

The co-existence studies for the lower order DC configurations are already captured in TR 37.863-01-01. For the additional 3rd receiver band, there is no MSD issue for this DC configuration.

5.2.9.4 ∆TIB and ∆RIB values

The same ∆TIB and ∆RIB values of DC\_1-19\_n257 can be applied.

Table 5.2.9.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-18\_n257 | 1 | 0.3 |
| 18 | 0.3 |
| n257 | 0 |

**Table 5.2.9.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-18\_n257 | 1 | 0 |
| 18 | 0 |
| n257 | 0 |

5.2.9.5 REFSENS requirements

No REFSENS requirements are expected for this DC configuration.

## 5.2.10 DC\_3-18\_n257

5.2.10.1 Operating bands for DC

Table 5.2.10.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-18\_n257 | CA\_3-18 | n257 | No |

5.2.10.2 Configurations for DC

Table 5.2.10.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-18A\_n257F | DC\_18A\_n257A  DC\_3A\_n257A | CA\_3A-18A | n257 |
| DC\_3A-18A\_n257M | DC\_18A\_n257A  DC\_3A\_n257A | CA\_3A-18A | n257 |

5.2.10.3 Co-existence studies

The co-existence studies for the lower order DC configurations are already captured in TR 37.863-01-01. For the additional 3rd receiver band, there is no MSD issue for this DC configuration.

5.2.10.4 ∆TIB and ∆RIB values

The same ∆TIB and ∆RIB values of DC\_3-19\_n257 can be applied.

Table 5.2.10.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-18\_n257 | 3 | 0.3 |
| 18 | 0.3 |
| n257 | 0 |

**Table 5.2.10.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-18\_n257 | 3 | 0 |
| 18 | 0 |
| n257 | 0 |

5.2.10.5 REFSENS requirements

No REFSENS requirements are expected for this DC configuration.

## 5.2.11 DC\_1-41\_n257

5.2.11.1 Operating bands for DC

Table 5.2.11.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-41\_n257 | CA\_1-41 | n257 | No |

5.2.11.2 Configurations for DC

Table 5.2.11.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-41A\_n257F | DC\_1A\_n257A  DC\_41A\_n257A | CA\_1A-41A | n257 |
| DC\_1A-41A\_n257M | DC\_1A\_n257A  DC\_41A\_n257A | CA\_1A-41A | n257 |
| DC\_1A-41C\_n257F | DC\_1A\_n257A  DC\_41A\_n257A | CA\_1A-41C | n257 |
| DC\_1A-41C\_n257M | DC\_1A\_n257A  DC\_41A\_n257A | CA\_1A-41C | n257 |

5.2.11.3 Co-existence studies

The co-existence studies for the lower order DC configurations are already captured in TR 37.863-01-01. For the additional 3rd receiver band, there is no MSD issue for this DC configuration.

5.2.11.4 ∆TIB and ∆RIB values

Table 5.2.11.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1-41\_n257 | 1 | 0.5 |
| 41 | 0.5 |
| n257 | 0 |

**Table 5.2.11.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_1-41\_n257 | 1 | 0.5 |
| 41 | 0.5 |
| n257 | 0 |

5.2.11.5 REFSENS requirements

No REFSENS requirements are expected for this DC configuration.

## 5.2.12 DC\_3-41\_n257

5.2.12.1 Operating bands for DC

Table 5.2.12.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-41\_n257 | CA\_3-41 | n257 | No |

5.2.12.2 Configurations for DC

Table 5.2.12.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-41A\_n257F | DC\_3A\_n257A  DC\_41A\_n257A | CA\_3A-41A | n257 |
| DC\_3A-41A\_n257M | DC\_3A\_n257A  DC\_41A\_n257A | CA\_3A-41A | n257 |
| DC\_3A-41C\_n257F | DC\_3A\_n257A  DC\_41A\_n257A | CA\_3A-41C | n257 |
| DC\_3A-41C\_n257M | DC\_3A\_n257A  DC\_41A\_n257A | CA\_3A-41C | n257 |

5.2.12.3 Co-existence studies

The co-existence studies for the lower order DC configurations are already captured in TR 37.863-01-01. For the additional 3rd receiver band, there is no MSD issue for this DC configuration.

5.2.12.4 ∆TIB and ∆RIB values

Table 5.2.12.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-41\_n257 | 3 | 0.5 |
| 41 | 0.31/0.82 |
| n257 | 0 |
| 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 5.2.12.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_3-41\_n257 | 3 | 0 |
| 41 | 01/0.52 |
| n257 | 0 |
| 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. | | |

5.2.12.5 REFSENS requirements

No REFSENS requirements are expected for this DC configuration.

## 5.2.13 DC\_41-42\_n257

5.2.13.1 Operating bands for DC

Table 5.2.13.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_41-42\_n257 | CA\_41-42 | n257 | No |

5.2.13.2 Configurations for DC

Table 5.2.13.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_41A-42A\_n257F | DC\_41A\_n257A  DC\_42A\_n257A | CA\_41A-42A | n257 |
| DC\_41A-42A\_n257M | DC\_41A\_n257A  DC\_42A\_n257A | CA\_41A-42A | n257 |
| DC\_41A-42C\_n257F | DC\_41A\_n257A  DC\_42A\_n257A | CA\_41A-42C | n257 |
| DC\_41A-42C\_n257M | DC\_41A\_n257A  DC\_42A\_n257A | CA\_41A-42C | n257 |
| DC\_41C-42A\_n257F | DC\_41A\_n257A  DC\_42A\_n257A | CA\_41C-42A | n257 |
| DC\_41C-42A\_n257M | DC\_41A\_n257A  DC\_42A\_n257A | CA\_41C-42A | n257 |
| DC\_41C-42C\_n257F | DC\_41A\_n257A  DC\_42A\_n257A | CA\_41C-42C | n257 |
| DC\_41C-42C\_n257M | DC\_41A\_n257A  DC\_42A\_n257A | CA\_41C-42C | n257 |

5.2.13.3 Co-existence studies

The co-existence studies for the lower order DC configurations are already captured in TR 37.863-01-01. For the additional 3rd receiver band, there is no MSD issue for this DC configuration.

5.2.13.4 ∆TIB and ∆RIB values

Table 5.1.13.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_41-42\_n257 | 41 | 0.3 |
| 42 | 0.8 |
| n257 | 0 |

**Table 5.1.13.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_41-42\_n257 | 41 | 0 |
| 42 | 0.5 |
| n257 | 0 |

5.2.13.5 REFSENS requirements

No REFSENS requirements are expected for this DC configuration.

## 5.2.14 DC\_46-66\_n260

5.2.14.1 Operating bands for EN-DC

Table 5.2.14.1-1: Band combinations EN-DC (four bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_46-66\_n260 | CA\_46-66 | n260 |  |

5.2.14.2 Configuration for DC

Table 5.2.14.2-1: Inter-band EN-DC configurations (four bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_46A-66A\_n260A  DC\_46C-66A\_n260A  DC\_46D-66A\_n260A  DC\_46E-66A\_n260A  DC\_46A-66A\_n260G  DC\_46C-66A\_n260G  DC\_46D-66A\_n260G  DC\_46E-66A\_n260G  DC\_46A-66A\_n260H  DC\_46C-66A\_n260H  DC\_46D-66A\_n260H  DC\_46E-66A\_n260H  DC\_46A-66A\_n260I  DC\_46C-66A\_n260I  DC\_46D-66A\_n260I  DC\_46E-66A\_n260I  DC\_46A-66A\_n260J  DC\_46C-66A\_n260J  DC\_46D-66A\_n260J  DC\_46E-66A\_n260J  DC\_46A-66A\_n260K  DC\_46C-66A\_n260K  DC\_46D-66A\_n260K  DC\_46E-66A\_n260K  DC\_46A-66A\_n260L  DC\_46C-66A\_n260L  DC\_46D-66A\_n260L  DC\_46E-66A\_n260L  DC\_46A-66A\_n260M  DC\_46C-66A\_n260M  DC\_46D-66A\_n260M  DC\_46E-66A\_n260M | DC\_66A\_n260A  DC\_66A\_n260G  DC\_66A\_n260H DC\_66A\_n260I DC\_66A\_n260J DC\_66A\_n260K DC\_66A\_n260L DC\_66A\_n260M | CA\_46A-66A  CA\_46C-66A  CA\_46D-66A  CA\_46E-66A | n260  CA\_n260G  CA\_n260H  CA\_n260I  CA\_n260J  CA\_n260K  CA\_n260L  CA\_n260M |
| DC\_46A-66A\_n260(2A)  DC\_46C-66A\_n260(2A)  DC\_46D-66A\_n260(2A) | DC\_66A\_n260A | CA\_46A-66A  CA\_46C-66A  CA\_46D-66A | CA\_n260(2A) |

5.2.14.3 ∆TIB and ∆RIB values

**Table 5.2.14.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_46-66\_n260 | 66 | 0 |
| n260 | 0 |

**Table 5.2.14.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_46-66\_n260 | 66 | 0 |

## 5.2.15 DC\_2-29\_n260, DC\_29-30\_n260

5.2.15.1 Operating bands for EN-DC

Table 5.2.15.1-1: Band combinations EN-DC (four bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 2-29\_n260 | CA\_2-29 | n260 |  |
| 29-30\_n260 | CA\_29-30 | n260 |  |

5.2.15.2 Configuration for DC

Table 5.2.15.2-1: Inter-band EN-DC configurations (four bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_2A-29A\_n260A  DC\_2A-29A\_n260G  DC\_2A-29A\_n260H  DC\_2A-29A\_n260I  DC\_2A-29A\_n260J  DC\_2A-29A\_n260K  DC\_2A-29A\_n260L  DC\_2A-29A\_n260M | DC\_2A\_n260A | CA\_2A-29A | n260  CA\_n260G  CA\_n260H  CA\_n260I  CA\_n260J  CA\_n260K  CA\_n260L  CA\_n260M |
| DC\_29A-30A\_n260A  DC\_29A-30A\_n260G  DC\_29A-30A\_n260H  DC\_29A-30A\_n260I  DC\_29A-30A\_n260J  DC\_29A-30A\_n260K  DC\_29A-30A\_n260L  DC\_29A-30A\_n260M | DC\_30A\_n260A | CA\_29A-30A | n260  CA\_n260G  CA\_n260H  CA\_n260I  CA\_n260J  CA\_n260K  CA\_n260L  CA\_n260M |

5.2.15.3 ∆TIB and ∆RIB values

**Table 5.2.15.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-29\_n260 | 2 | 0.3 |
| n260 | 0 |
| DC\_29-30\_n260 | 30 | 0.3 |
| n260 | 0 |

**Table 5.2.15.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-29\_n260 | 2 | 0 |
| n260 | 0 |
| DC\_29-30\_n260 | 30 | 0 |
| n260 | 0 |

## 5.2.16 DC\_1-3\_n257

5.2.16.1 Operating bands for DC

Table 5.2.16.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-3\_n257 | CA\_1-3 | n257 | No |

5.2.16.2 Configuration for DC

Table 5.2.16.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-3A\_n257D  DC\_1A-3A\_n257E  DC\_1A-3A\_n257F  DC\_1A-3A\_n257G  DC\_1A-3A\_n257H  DC\_1A-3A\_n257I  DC\_1A-3A\_n257J  DC\_1A-3A\_n257K  DC\_1A-3A\_n257L  DC\_1A-3A\_n257M | DC\_1A\_n257A  DC\_3A\_n257A | CA\_1A-3A | CA\_n257D  CA\_n257E  CA\_n257F  CA\_n257G  CA\_n257H  CA\_n257I  CA\_n257J  CA\_n257K  CA\_n257L  CA\_n257M |

5.2.16.3 ∆TIB and ∆RIB values

Table 5.2.16.3-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1A-3A\_n257 | 1 | 0.3 |
| 3 | 0.3 |
| n257 | 0 |

Table 5.2.16.3-2: ΔRIB,c due to EN-DC (three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_1A-3A\_n257 | 1 | 0 |
| 3 | 0 |
| n257 | 0 |

## 5.2.17 DC\_1-5\_n257

5.2.17.1 Operating bands for DC

Table 5.2.17.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-5\_n257 | CA\_1-5 | n257 | No |

5.2.17.2 Configuration for DC

Table 5.2.17.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-5A\_n257D  DC\_1A-5A\_n257E  DC\_1A-5A\_n257F  DC\_1A-5A\_n257G  DC\_1A-5A\_n257H  DC\_1A-5A\_n257I  DC\_1A-5A\_n257J  DC\_1A-5A\_n257K  DC\_1A-5A\_n257L  DC\_1A-5A\_n257M | DC\_1A\_n257A  DC\_5A\_n257A | CA\_1A-5A | CA\_n257D  CA\_n257E  CA\_n257F  CA\_n257G  CA\_n257H  CA\_n257I  CA\_n257J  CA\_n257K  CA\_n257L  CA\_n257M |

5.2.17.3 ∆TIB and ∆RIB values

Table 5.2.17.3-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1A-5A\_n257 | 1 | 0.3 |
| 5 | 0.3 |
| n257 | 0 |

Table 5.2.17.3-2: ΔRIB,c due to EN-DC (three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_1A-5A\_n257 | 1 | 0 |
| 5 | 0 |
| n257 | 0 |

## 5.2.18 DC\_1-7\_n257

5.2.18.1 Operating bands for DC

Table 5.2.18.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-7\_n257 | CA\_1-7 | n257 | No |

5.2.18.2 Configuration for DC

Table 5.2.18.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-7A\_n257D  DC\_1A-7A\_n257E  DC\_1A-7A\_n257F  DC\_1A-7A\_n257G  DC\_1A-7A\_n257H  DC\_1A-7A\_n257I  DC\_1A-7A\_n257J  DC\_1A-7A\_n257K  DC\_1A-7A\_n257L  DC\_1A-7A\_n257M | DC\_1A\_n257A  DC\_7A\_n257A | CA\_1A-7A | CA\_n257D  CA\_n257E  CA\_n257F  CA\_n257G  CA\_n257H  CA\_n257I  CA\_n257J  CA\_n257K  CA\_n257L  CA\_n257M |

5.2.18.3 ∆TIB and ∆RIB values

Table 5.2.18.3-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1A-7A\_n257 | 1 | 0.5 |
| 7 | 0.6 |
| n257 | 0 |

Table 5.2.18.3-2: ΔRIB,c due to EN-DC (three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_1A-7A\_n257 | 1 | 0 |
| 7 | 0 |
| n257 | 0 |

## 5.2.19 DC\_1-7-7\_n257

5.2.19.1 Operating bands for DC

Table 5.2.19.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-7-7\_n257 | CA\_1-7-7 | n257 | No |

5.2.19.2 Configuration for DC

Table 5.2.19.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_1A-7A-7A\_n257D  DC\_1A-7A-7A\_n257E  DC\_1A-7A-7A\_n257F  DC\_1A-7A-7A\_n257G  DC\_1A-7A-7A\_n257H  DC\_1A-7A-7A\_n257I  DC\_1A-7A-7A\_n257J  DC\_1A-7A-7A\_n257K  DC\_1A-7A-7A\_n257L  DC\_1A-7A-7A\_n257M | DC\_1A\_n257A  DC\_7A\_n257A | CA\_1A-7A-7A | CA\_n257D  CA\_n257E  CA\_n257F  CA\_n257G  CA\_n257H  CA\_n257I  CA\_n257J  CA\_n257K  CA\_n257L  CA\_n257M |

5.2.19.3 ∆TIB and ∆RIB values

Table 5.2.19.3-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_1A-7A-7A\_n257 | 1 | 0.5 |
| 7 | 0.6 |
| n257 | 0 |

Table 5.2.19.3-2: ΔRIB,c due to EN-DC (three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_1A-7A-7A\_n257 | 1 | 0 |
| 7 | 0 |
| n257 | 0 |

## 5.2.20 DC\_3-5\_n257

5.2.20.1 Operating bands for DC

Table 5.2.20.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-5\_n257 | CA\_3-5 | n257 | No |

5.2.20.2 Configuration for DC

Table 5.2.20.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_3A-5A\_n257D  DC\_3A-5A\_n257E  DC\_3A-5A\_n257F  DC\_3A-5A\_n257G  DC\_3A-5A\_n257H  DC\_3A-5A\_n257I  DC\_3A-5A\_n257J  DC\_3A-5A\_n257K  DC\_3A-5A\_n257L  DC\_3A-5A\_n257M | DC\_3A\_n257A  DC\_5A\_n257A | CA\_3A-5A | CA\_n257D  CA\_n257E  CA\_n257F  CA\_n257G  CA\_n257H  CA\_n257I  CA\_n257J  CA\_n257K  CA\_n257L  CA\_n257M |

5.2.20.3 ∆TIB and ∆RIB values

Table 5.2.20.3-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3A-5A\_n257 | 3 | 0.3 |
| 5 | 0.3 |
| n257 | 0 |

Table 5.2.20.3-2: ΔRIB,c due to EN-DC (three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_3A-5A\_n257 | 3 | 0 |
| 5 | 0 |
| n257 | 0 |

## 5.2.21 DC\_3-7\_n257

5.2.21.1 Operating bands for DC

Table 5.2.21.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-7\_n257 | CA\_3-7 | n257 | No |

5.2.21.2 Configuration for DC

Table 5.2.21.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_3A-7A\_n257D  DC\_3A-7A\_n257E  DC\_3A-7A\_n257F  DC\_3A-7A\_n257G  DC\_3A-7A\_n257H  DC\_3A-7A\_n257I  DC\_3A-7A\_n257J  DC\_3A-7A\_n257K  DC\_3A-7A\_n257L  DC\_3A-7A\_n257M | DC\_3A\_n257A  DC\_7A\_n257A | CA\_3A-7A | CA\_n257D  CA\_n257E  CA\_n257F  CA\_n257G  CA\_n257H  CA\_n257I  CA\_n257J  CA\_n257K  CA\_n257L  CA\_n257M |

5.2.21.3 ∆TIB and ∆RIB values

Table 5.2.21.3-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3A-7A\_n257 | 3 | 0.5 |
| 7 | 0.5 |
| n257 | 0 |

Table 5.2.21.3-2: ΔRIB,c due to EN-DC (three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_3A-7A\_n257 | 3 | 0 |
| 7 | 0 |
| n257 | 0 |

## 5.2.22 DC\_3-7-7\_n257

5.2.22.1 Operating bands for DC

Table 5.2.22.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-7-7\_n257 | CA\_3-7-7 | n257 | No |

5.2.22.2 Configuration for DC

Table 5.2.22.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_3A-7A-7A\_n257D  DC\_3A-7A-7A\_n257E  DC\_3A-7A-7A\_n257F  DC\_3A-7A-7A\_n257G  DC\_3A-7A-7A\_n257H  DC\_3A-7A-7A\_n257I  DC\_3A-7A-7A\_n257J  DC\_3A-7A-7A\_n257K  DC\_3A-7A-7A\_n257L  DC\_3A-7A-7A\_n257M | DC\_3A\_n257A  DC\_7A\_n257A | CA\_3A-7A-7A | CA\_n257D  CA\_n257E  CA\_n257F  CA\_n257G  CA\_n257H  CA\_n257I  CA\_n257J  CA\_n257K  CA\_n257L  CA\_n257M |

5.2.22.3 ∆TIB and ∆RIB values

Table 5.2.22.3-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3A-7A-7A\_n257 | 3 | 0.5 |
| 7 | 0.5 |
| n257 | 0 |

Table 5.2.22.3-2: ΔRIB,c due to EN-DC (three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_3A-7A-7A\_n257 | 3 | 0 |
| 7 | 0 |
| n257 | 0 |

## 5.2.23 DC\_5-7\_n257

5.2.23.1 Operating bands for DC

Table 5.2.23.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_5-7\_n257 | CA\_5-7 | n257 | No |

5.2.23.2 Configuration for DC

Table 5.2.23.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_5A-7A\_n257D  DC\_5A-7A\_n257E  DC\_5A-7A\_n257F  DC\_5A-7A\_n257G  DC\_5A-7A\_n257H  DC\_5A-7A\_n257I  DC\_5A-7A\_n257J  DC\_5A-7A\_n257K  DC\_5A-7A\_n257L  DC\_5A-7A\_n257M | DC\_5A\_n257A  DC\_7A\_n257A | CA\_5A-7A | CA\_n257D  CA\_n257E  CA\_n257F  CA\_n257G  CA\_n257H  CA\_n257I  CA\_n257J  CA\_n257K  CA\_n257L  CA\_n257M |

5.2.23.3 ∆TIB and ∆RIB values

Table 5.2.23.3-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_5A-7A\_n257 | 5 | 0.3 |
| 7 | 0.3 |
| n257 | 0 |

Table 5.2.23.3-2: ΔRIB,c due to EN-DC (three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_5A-7A\_n257 | 5 | 0 |
| 7 | 0 |
| n257 | 0 |

## 5.2.24 DC\_5-7-7\_n257

5.2.24.1 Operating bands for DC

Table 5.2.24.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_5-7-7\_n257 | CA\_5-7-7 | n257 | No |

5.2.24.2 Configuration for DC

Table 5.2.24.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_5A-7A-7A\_n257D  DC\_5A-7A-7A\_n257E  DC\_5A-7A-7A\_n257F  DC\_5A-7A-7A\_n257G  DC\_5A-7A-7A\_n257H  DC\_5A-7A-7A\_n257I  DC\_5A-7A-7A\_n257J  DC\_5A-7A-7A\_n257K  DC\_5A-7A-7A\_n257L  DC\_5A-7A-7A\_n257M | DC\_5A\_n257A  DC\_7A\_n257A | CA\_5A-7A-7A | CA\_n257D  CA\_n257E  CA\_n257F  CA\_n257G  CA\_n257H  CA\_n257I  CA\_n257J  CA\_n257K  CA\_n257L  CA\_n257M |

5.2.24.3 ∆TIB and ∆RIB values

Table 5.2.24.3-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_5A-7A-7A\_n257 | 5 | 0.3 |
| 7 | 0.3 |
| n257 | 0 |

Table 5.2.24.3-2: ΔRIB,c due to EN-DC (three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_5A-7A-7A\_n257 | 5 | 0 |
| 7 | 0 |
| n257 | 0 |

## 5.2.25 DC\_1-11\_n257

5.2.25.1 Operating bands for DC\_1-11\_n257

Table 5.2.25.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_1-11\_n257 | CA\_1-11 | n257 | No |

5.2.25.2 Configurations for DC\_1-11\_n257

Table 5.2.25.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_1A-11A\_n257A | DC\_1A\_n257A  DC\_11A\_n257A | CA\_1A-11A | n257A |
| DC\_1A-11A\_n257D | DC\_1A\_n257A  DC\_11A\_n257A | CA\_1A-11A | n257D |

5.2.25.3 ∆TIB and ∆RIB values

The following relaxation values are proposed:

Table 5.2.25.3-1: ΔTIB,c

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_1-11\_n257 | 1 | 0.3 |
| 11 | 0.3 |
| n257 | 0 |

Table 5.2.25.3-2: ΔRIB

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_1-11\_n257 | 1 | 0 |
| 11 | 0 |
| n257 | 0 |

## 5.2.26 DC\_8-11\_n257

5.2.26.1 Operating bands for DC\_8-11\_n257

Table 5.2.26.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_8-11\_n257 | CA\_8-11 | n257 | No |

5.2.26.2 Configurations for DC\_8-11\_n257

Table 5.2.26.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_8A-11A\_n257A | DC\_8A\_n257A  DC\_11A\_n257A | CA\_8A-11A | n257A |
| DC\_8A-11A\_n257D | DC\_8A\_n257A  DC\_11A\_n257A | CA\_8A-11A | n257D |

5.2.26.3 ∆TIB and ∆RIB values

The following relaxation values are proposed:

Table 5.2.26.3-1: ΔTIB,c

| Inter-band EN-DC configuration | E-UTRA or NR Band | ΔTIB,c (dB) |
| --- | --- | --- |
| DC\_8-11\_n257 | 8 | 0.3 |
| 11 | 0.4 |
| n257 | 0 |

Table 5.2.26.3-2: ΔRIB

|  |  |  |
| --- | --- | --- |
| Inter-band EN-DC configuration | NR Band | ΔRIB,c (dB) |
| DC\_8-11\_n257 | 8 | 0 |
| 11 | 0 |
| n257 | 0 |

## 5.2.27 DC\_3-3-7\_n257, DC\_3-3-7-7\_n257

5.2.27.1 Operating bands for DC

**Table 5.2.27.1-1: Band combinations EN-DC (three bands)**

| EN-DC band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_3-3-7\_n2571 | CA\_3-3-7 | n257 | No |
| DC\_3-3-7-7\_n2571 | CA\_3-3-7-7 | n257 | No |
| NOTE 1: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability | | | |

5.2.27.2 Configuration for DC

**Table 5.2.27.2-1: Inter-band EN-DC configurations (three bands)**

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_3A-3A-7A\_n257A  DC\_3A-3A-7A\_n257D  DC\_3A-3A-7A\_n257E  DC\_3A-3A-7A\_n257F  DC\_3A-3A-7A\_n257G  DC\_3A-3A-7A\_n257H  DC\_3A-3A-7A\_n257I  DC\_3A-3A-7A\_n257J  DC\_3A-3A-7A\_n257K  DC\_3A-3A-7A\_n257L  DC\_3A-3A-7A\_n257M | DC\_3A\_n257A  DC\_7A\_n257A | CA\_3A-3A-7A | n257A |
| DC\_3A-3A-7A-7A\_n257A  DC\_3A-3A-7A-7A\_n257D  DC\_3A-3A-7A-7A\_n257E  DC\_3A-3A-7A-7A\_n257F  DC\_3A-3A-7A-7A\_n257G  DC\_3A-3A-7A-7A\_n257H  DC\_3A-3A-7A-7A\_n257I  DC\_3A-3A-7A-7A\_n257J  DC\_3A-3A-7A-7A\_n257K  DC\_3A-3A-7A-7A\_n257L  DC\_3A-3A-7A-7A\_n257M | DC\_3A\_n257A  DC\_7A\_n257A | CA\_3A-3A-7A-7A | n257A |

5.2.27.3 ∆TIB and ∆RIB values

Table 5.2.27.3-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-3-7\_n257;  DC\_3-3-7-7\_n257 | 3 | 0.5 |
| 7 | 0.5 |
| n257 | 0 |

Table 5.2.27.3-2: ΔRIB,c due to EN-DC (three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_3-3-7\_n257;  DC\_3-3-7-7\_n257 | 3 | 0 |
| 7 | 0 |
| n257 | 0 |

## 5.2.28 DC\_2-46\_n261

5.2.28.1 Operating bands for DC

Table 5.2.28.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-46\_n261 | CA\_2-46 | n261 | No |

5.2.28.2 Configurations for DC

Table 5.2.28.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration |
| --- | --- |
| DC\_2A-46A\_n261A  DC\_2A-46C\_n261A  DC\_2A-46D\_n261A | DC\_2A\_n261A |

Table 5.2.28.2-2: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration |
| --- | --- |
| DC\_2A-46A\_n261(2A)  DC\_2A-46C\_n261(2A)  DC\_2A-46D\_n261(2A) | DC\_2A\_n261A |

5.2.28.3 ∆TIB and ∆RIB values

Table 5.2.28.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-46\_n261 | 2 | 0 |
| 46 | 0 |
| n261 | 0 |

**Table 5.2.28.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-46\_n261 | 2 | 0 |
| 46 | 0 |
| n261 | 0 |

## 5.2.29 DC\_46-48\_n261

5.2.29.1 Operating bands for DC

Table 5.2.29.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_46-48\_n261 | CA\_46-48 | n261 | No |

5.2.29.2 Configurations for DC

Table 5.2.29.2-1: Inter-band EN-DC configurations (three bands)

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration** | **E-UTRA configuration** | **NR configuration** |
| --- | --- | --- | --- |
| DC\_46A-48A\_n261A | DC\_48A\_n261A | CA\_46A-48A | n261A |
| DC\_46C-48A\_n261A | DC\_48A\_n261A | CA \_46C-48A | n261A |
| DC\_46D-48A\_n261A | DC\_48A\_n261A | CA \_46D-48A | n261A |
| DC\_46A-48C\_n261A | DC\_48C\_n261A | CA \_46A-48C | n261A |
| DC\_46A-48D\_n261A | DC\_48C\_n261A | CA \_46A-48D | n261A |
| DC\_46C-48C\_n261A | DC\_48C\_n261A | CA \_46C-48C | n261A |
| DC\_46C-48D\_n261A | DC\_48C\_n261A | CA \_46C-48D | n261A |
| DC\_46D-48C\_n261A | DC\_48C\_n261A | CA \_46D-48C | n261A |
| DC\_46D-48D\_n261A | DC\_48C\_n261A | CA \_46D-48D | n261A |
| DC\_46A-48A\_n261(2A) | DC\_48A\_n261A | CA \_46A-48A | n261(2A) |
| DC\_46C-48A\_n261(2A) | DC\_48A\_n261A | CA \_46C-48A | n261(2A) |
| DC\_46D-48A\_n261(2A) | DC\_48A\_n261A | CA \_46D-48A | n261(2A) |
| DC\_46A-48C\_n261(2A) | DC\_48C\_n261A | CA \_46A-48C | n261(2A) |
| DC\_46A-48D\_n261(2A) | DC\_48C\_n261A | CA \_46A-48D | n261(2A) |
| DC\_46C-48C\_n261(2A) | DC\_48C\_n261A | CA \_46C-48C | n261(2A) |
| DC\_46C-48D\_n261(2A) | DC\_48C\_n261A | CA \_46C-48D | n261(2A) |
| DC\_46D-48C\_n261(2A) | DC\_48C\_n261A | CA \_46D-48C | n261(2A) |
| DC\_46D-48D\_n261(2A) | DC\_48C\_n261A | CA \_46D-48D | n261(2A) |

5.2.29.3 ∆TIB and ∆RIB values

Table 5.2.29.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_46-48\_n261 | 46 | 0 |
| 48 | 0.8 |
| n261 | 0 |

**Table 5.2.29.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_46-48\_n261 | 46 | 0 |
| 48 | 0.5 |
| n261 | 0 |

Delta values chosen based on similar values for CA\_46A-48A and CA\_46A-48C.

## 5.2.30 DC\_46-48\_n260

5.2.30.1 Operating bands for EN-DC

Table 5.2.30.1-1 Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_46-48\_n260 | CA\_46-48 | n260 | No |

5.2.30.2 Configuration for DC

Table 5.2.30.2-1: Inter-band EN-DC configurations including FR2 (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_46A-48A\_n260A  DC\_46C-48A\_n260A  DC\_46D-48A\_n260A  DC\_46A-48C\_n260A  DC\_46A-48D\_n260A  DC\_46C-48C\_n260A  DC\_46C-48D\_n260A  DC\_46D-48C\_n260A  DC\_46D-48D\_n260A | DC\_48A\_n260A  DC\_48C\_n260A | CA\_46A-48A  CA\_46C-48A  CA\_46D-48A  CA\_46A-48C  CA\_46A-48D  CA\_46C-48C  CA\_46C-48D  CA\_46D-48C  CA\_46D-48D | n260A |
| DC\_46A-48A\_n260(2A)  DC\_46C-48A\_n260(2A)  DC\_46D-48A\_n260(2A)  DC\_46A-48C\_n260(2A)  DC\_46A-48D\_n260(2A)  DC\_46C-48C\_n260(2A)  DC\_46C-48D\_n260(2A)  DC\_46D-48C\_n260(2A)  DC\_46D-48D\_n260(2A) | DC\_48A\_n260A  DC\_48C\_n260A | CA\_46A-48A  CA\_46C-48A  CA\_46D-48A  CA\_46A-48C  CA\_46A-48D  CA\_46C-48C  CA\_46C-48D  CA\_46D-48C  CA\_46D-48D | n260(2A) |
| DC\_46A-48A\_n260(3A)  DC\_46C-48A\_n260(3A)  DC\_46D-48A\_n260(3A)  DC\_46A-48C\_n260(3A)  DC\_46A-48D\_n260(3A)  DC\_46C-48C\_n260(3A)  DC\_46C-48D\_n260(3A)  DC\_46D-48C\_n260(3A)  DC\_46D-48D\_n260(3A) | DC\_48A\_n260A  DC\_48C\_n260A | CA\_46A-48A  CA\_46C-48A  CA\_46D-48A  CA\_46A-48C  CA\_46A-48D  CA\_46C-48C  CA\_46C-48D  CA\_46D-48C  CA\_46D-48D | n260(3A) |
| DC\_46A-48A\_n260(4A)  DC\_46C-48A\_n260(4A)  DC\_46D-48A\_n260(4A)  DC\_46A-48C\_n260(4A)  DC\_46A-48D\_n260(4A)  DC\_46C-48C\_n260(4A)  DC\_46C-48D\_n260(4A)  DC\_46D-48C\_n260(4A)  DC\_46D-48D\_n260(4A) | DC\_48A\_n260A  DC\_48C\_n260A | CA\_46A-48A  CA\_46C-48A  CA\_46D-48A  CA\_46A-48C  CA\_46A-48D  CA\_46C-48C  CA\_46C-48D  CA\_46D-48C  CA\_46D-48D | n260(4A) |

5.2.30.3 ∆TIB and ∆RIB values

Table 5.2.30.3-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_46-48\_n260 | 46 | 0 |
| 48 | 0.8 |
| n260 | 0 |

Table 5.2.30.3-2: ΔRIB,c due to EN-DC (three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_46-48\_n260 | 46 | 0 |
| 48 | 0.5 |
| n260 | 0 |

## 5.2.31 DC\_14-30\_n260

5.2.31.1 Operating bands for EN-DC

Table 5.2.31.1-1 Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_14-30\_n260 | CA\_14-30 | n260 | No |

5.2.31.2 Configuration for DC

Table 5.2.31.2-1: Inter-band EN-DC configurations including FR2 (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_14A-30A\_n260A  DC\_14A-30A\_n260G  DC\_14A-30A\_n260H  DC\_14A-30A\_n260I  DC\_14A-30A\_n260J  DC\_14A-30A\_n260K  DC\_14A-30A\_n260L  DC\_14A-30A\_n260M | DC\_14A\_n260A  DC\_14A\_n260G  DC\_14A\_n260H  DC\_14A\_n260I  DC\_14A\_n260J  DC\_14A\_n260K  DC\_14A\_n260L  DC\_14A\_n260M  DC\_30A\_n260A  DC\_30A\_n260G  DC\_30A\_n260H  DC\_30A\_n260I  DC\_30A\_n260J  DC\_30A\_n260K  DC\_30A\_n260L  DC\_30A\_n260M | CA\_14A-30A  CA\_14A-30A | n260A  CA\_n260G  CA\_n260H  CA\_n260I  CA\_n260J  CA\_n260K  CA\_n260L  CA\_n260M |

5.2.31.3 ∆TIB and ∆RIB values

Table 5.2.31.3-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_14-30\_n260 | 14 | 0.3 |
| 30 | 0.3 |
| n260 | 0 |

Table 5.2.31.3-2: ΔRIB,c due to EN-DC (three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_14-30\_n260 | 14 | 0 |
| 30 | 0 |
| n260 | 0 |

## 5.2.32 DC\_14-66\_n260, DC\_14-66-66\_n260

5.2.32.1 Operating bands for EN-DC

Table 5.2.32.1-1 Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_14-66\_n260 | CA\_14-66 | n260 | No |
| DC\_14-66-66\_n260 | CA\_14-66-66 | n260 | No |

5.2.32.2 Configuration for DC

Table 5.2.32.2-1: Inter-band EN-DC configurations including FR2 (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_14A-66A\_n260A  DC\_14A-66A\_n260G  DC\_14A-66A\_n260H  DC\_14A-66A\_n260I  DC\_14A-66A\_n260J  DC\_14A-66A\_n260K  DC\_14A-66A\_n260L  DC\_14A-66A\_n260M | DC\_14A\_n260A  DC\_14A\_n260G  DC\_14A\_n260H  DC\_14A\_n260I  DC\_14A\_n260J  DC\_14A\_n260K  DC\_14A\_n260L  DC\_14A\_n260M  DC\_66A\_n260A  DC\_66A\_n260G  DC\_66A\_n260H  DC\_66A\_n260I  DC\_66A\_n260J  DC\_66A\_n260K  DC\_66A\_n260L  DC\_66A\_n260M | CA\_14A-66A | n260A  CA\_n260G  CA\_n260H  CA\_n260I  CA\_n260J  CA\_n260K  CA\_n260L  CA\_n260M |
| DC\_14A-66A-66A\_n260A  DC\_14A-66A-66A\_n260G  DC\_14A-66A-66A\_n260H  DC\_14A-66A-66A\_n260I  DC\_14A-66A-66A\_n260J  DC\_14A-66A-66A\_n260K  DC\_14A-66A-66A\_n260L  DC\_14A-66A-66A\_n260M | DC\_14A\_n260A  DC\_14A\_n260G  DC\_14A\_n260H  DC\_14A\_n260I  DC\_14A\_n260J  DC\_14A\_n260K  DC\_14A\_n260L  DC\_14A\_n260M  DC\_66A\_n260A  DC\_66A\_n260G  DC\_66A\_n260H  DC\_66A\_n260I  DC\_66A\_n260J  DC\_66A\_n260K  DC\_66A\_n260L  DC\_66A\_n260M | CA\_14A-66A-66A | n260A  CA\_n260G  CA\_n260H  CA\_n260I  CA\_n260J  CA\_n260K  CA\_n260L  CA\_n260M |

5.2.32.3 ∆TIB and ∆RIB values

Table 5.2.32.3-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_14-66\_n260, DC\_14-66-66\_n260 | 14 | 0.3 |
| 66 | 0.3 |
| n260 | 0 |

Table 5.2.32.3-2: ΔRIB,c due to EN-DC (three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_14-66\_n260, DC\_14-66-66\_n260 | 14 | 0 |
| 66 | 0 |
| n260 | 0 |

## 5.2.33 DC\_2-14\_n260, DC\_2-2-14\_n260

5.2.33.1 Operating bands for EN-DC

Table 5.2.33.1-1 Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-14\_n260 | CA\_2-14 | n260 | No |
| DC\_2-2-14\_n260 | CA\_2-2-14 | n260 | No |

5.2.33.2 Configuration for DC

Table 5.2.33.2-1: Inter-band EN-DC configurations including FR2 (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_2A-14A\_n260A  DC\_2A-14A\_n260G  DC\_2A-14A\_n260H  DC\_2A-14A\_n260I  DC\_2A-14A\_n260J  DC\_2A-14A\_n260K  DC\_2A-14A\_n260L  DC\_2A-14A\_n260M | DC\_2A\_n260A  DC\_2A\_n260G  DC\_2A\_n260H  DC\_2A\_n260I  DC\_2A\_n260J  DC\_2A\_n260K  DC\_2A\_n260L  DC\_2A\_n260M  DC\_14A\_n260A  DC\_14A\_n260G  DC\_14A\_n260H  DC\_14A\_n260I  DC\_14A\_n260J  DC\_14A\_n260K  DC\_14A\_n260L  DC\_14A\_n260M | CA\_2A-14A | n260A  CA\_n260G  CA\_n260H  CA\_n260I  CA\_n260J  CA\_n260K  CA\_n260L  CA\_n260M |
| DC\_2A-2A-14A\_n260A  DC\_2A-2A-14A\_n260G  DC\_2A-2A-14A\_n260H  DC\_2A-2A-14A\_n260I  DC\_2A-2A-14A\_n260J  DC\_2A-2A-14A\_n260K  DC\_2A-2A-14A\_n260L  DC\_2A-2A-14A\_n260M | DC\_2A\_n260A  DC\_2A\_n260G  DC\_2A\_n260H  DC\_2A\_n260I  DC\_2A\_n260J  DC\_2A\_n260K  DC\_2A\_n260L  DC\_2A\_n260M  DC\_14A\_n260A  DC\_14A\_n260G  DC\_14A\_n260H  DC\_14A\_n260I  DC\_14A\_n260J  DC\_14A\_n260K  DC\_14A\_n260L  DC\_14A\_n260M | CA\_2A-2A-14A | n260A  CA\_n260G  CA\_n260H  CA\_n260I  CA\_n260J  CA\_n260K  CA\_n260L  CA\_n260M |

5.2.33.3 ∆TIB and ∆RIB values

Table 5.2.33.3-1: ΔTIB,c due to EN-DC(three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-14\_n260, DC\_2-2-14\_n260 | 2 | 0.3 |
| 14 | 0.3 |
| n260 | 0 |

Table 5.2.33.3-2: ΔRIB,c due to EN-DC (three bands)

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-14\_n260, DC\_2-2-14\_n260 | 2 | 0 |
| 14 | 0 |
| n260 | 0 |

## 5.2.34 DC\_2-46\_n258

5.2.34.1 Operating bands for DC

Table 5.2.34.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-46\_n258 | CA\_2-46 | n258 | No |

5.2.34.2 Configurations for DC

Table 5.2.34.2-1: Inter-band EN-DC contiguous configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration |
| --- | --- |
| DC\_2A-46A\_n258A  DC\_2A-46C\_n258A  DC\_2A-46D\_n258A | DC\_2A\_n258A |

Table 5.2.34.2-2: Inter-band EN-DC non-contiguous configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration |
| --- | --- |
| DC\_2A-46A\_n258(2A)  DC\_2A-46A\_n258(3A)  DC\_2A-46A\_n258(4A)  DC\_2A-46A\_n258(5A)  DC\_2A-46C\_n258(2A)  DC\_2A-46C\_n258(3A)  DC\_2A-46C\_n258(4A)  DC\_2A-46C\_n258(5A)  DC\_2A-46D\_n258(2A)  DC\_2A-46D\_n258(3A)  DC\_2A-46D\_n258(4A)  DC\_2A-46D\_n258(5A) | DC\_2A\_n258A |

5.2.34.3 ∆TIB and ∆RIB values

Table 5.2.34.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-46\_n258 | 2 | 0 |
| 46 | 0 |
| n258 | 0 |

**Table 5.2.34.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-46\_n258 | 2 | 0 |
| 46 | 0 |
| n258 | 0 |

## 5.2.35 DC\_46-66\_n258

5.2.35.1 Operating bands for DC

Table 5.2.35.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_46-66\_n258 | CA\_46-66 | n258 | No |

5.2.35.2 Configurations for DC

Table 5.2.35.2-1: Inter-band EN-DC contiguous configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration |
| --- | --- |
| DC\_46A-66A\_n258A  DC\_46C-66A\_n258A  DC\_46D-66A\_n258A | DC\_66A\_n258A |

Table 5.2.35.2-2: Inter-band EN-DC non-contiguous configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration |
| --- | --- |
| DC\_46A-66A\_n258(2A)  DC\_46A-66A\_n258(3A)  DC\_46A-66A\_n258(4A)  DC\_46A-66A\_n258(5A)  DC\_46C-66A\_n258(2A)  DC\_46C-66A\_n258(3A)  DC\_46C-66A\_n258(4A)  DC\_46C-66A\_n258(5A)  DC\_46D-66A\_n258(2A)  DC\_46D-66A\_n258(3A)  DC\_46D-66A\_n258(4A)  DC\_46D-66A\_n258(5A) | DC\_66A\_n258A |

5.2.35.3 ∆TIB and ∆RIB values

Table 5.2.35.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_46-66\_n258 | 46 | 0 |
| 66 | 0 |
| n258 | 0 |

**Table 5.2.35.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_46-66\_n258 | 46 | 0 |
| 66 | 0 |
| n258 | 0 |

## 5.2.36 DC\_13-66\_n260, DC\_13-66-66\_n260

5.2.36.1 Operating bands for DC

Table 5.2.36.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_13-66\_n2601 | CA\_13-66 | n260 | No |
| DC\_13-66-66\_n2601 | CA\_13-66-66 | n260 | No |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | |

5.2.36.2 Configurations for DC

Table 5.2.36.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) |
| --- | --- |
| DC\_13A-66A\_n260A  DC\_13A-66A\_n260G  DC\_13A-66A\_n260H  DC\_13A-66A\_n260I  DC\_13A-66A\_n260J  DC\_13A-66A\_n260K  DC\_13A-66A\_n260L  DC\_13A-66A\_n260M | DC\_13A\_n260A  DC\_66A\_n260A |
| DC\_13A-66A\_n260(2A)  DC\_13A-66A\_n260(3A)  DC\_13A-66A\_n260(4A)  DC\_13A-66A\_n260(5A)  DC\_13A-66A\_n260(6A)  DC\_13A-66A\_n260(2G)  DC\_13A-66A\_n260(2H)  DC\_13A-66A\_n260(A-G)  DC\_13A-66A\_n260(A-H)  DC\_13A-66A\_n260(A-2G)  DC\_13A-66A\_n260(2A-G)  DC\_13A-66A\_n260(2A-2G)  DC\_13A-66A\_n260(3A-G)  DC\_13A-66A\_n260(G-H)  DC\_13A-66A-66A\_n260A  DC\_13A-66A-66A\_n260G  DC\_13A-66A-66A\_n260H  DC\_13A-66A-66A\_n260I  DC\_13A-66A-66A\_n260J  DC\_13A-66A-66A\_n260K  DC\_13A-66A-66A\_n260L  DC\_13A-66A-66A\_n260M  DC\_13A-66A-66A\_n260(2A)  DC\_13A-66A-66A\_n260(3A)  DC\_13A-66A-66A\_n260(4A)  DC\_13A-66A-66A\_n260(5A)  DC\_13A-66A-66A\_n260(6A)  DC\_13A-66A-66A\_n260(2G)  DC\_13A-66A-66A\_n260(2H)  DC\_13A-66A-66A\_n260(A-G)  DC\_13A-66A-66A\_n260(A-H)  DC\_13A-66A-66A\_n260(A-2G)  DC\_13A-66A-66A\_n260(2A-G)  DC\_13A-66A-66A\_n260(2A-2G)  DC\_13A-66A-66A\_n260(3A-G)  DC\_13A-66A-66A\_n260(G-H) | DC\_13A\_n260A  DC\_66A\_n260A |
| DC\_13A-66A\_n260I  DC\_13A-66A\_n260J  DC\_13A-66A\_n260K  DC\_13A-66A\_n260L  DC\_13A-66A\_n260M  DC\_13A-66A-66A\_n260I  DC\_13A-66A-66A\_n260J  DC\_13A-66A-66A\_n260K  DC\_13A-66A-66A\_n260L  DC\_13A-66A-66A\_n260M | DC\_13A\_n260I  DC\_66A\_n260I |

5.2.36.3 ∆TIB and ∆RIB values

The ΔTIB,c and ΔRIB,c values of DC\_13-66\_n260 have been given in TR37.863-02-01 as the below tables.

Table 5.2.36.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_13-66\_n260  DC\_13-66-66\_n260 | 13 | 0.3 |
| 66 | 0.3 |
| n260 | 0 |

Table 5.2.36.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_13-66\_n260  DC\_13-66-66\_n260 | 13 | 0 |
| 66 | 0 |
| n260 | 0 |

## 5.2.37 DC\_13-66\_n261 and DC\_13-66-66\_n261

5.2.37.1 Operating bands for DC

Table 5.2.37.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_13-66\_n2611 | CA\_13-66 | n261 | No |
| DC\_13-66-66\_n2611 | CA\_13-66 | n261 | No |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | |

5.2.37.2 Configurations for DC

Table 5.2.37.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) |
| --- | --- |
| DC\_13A-66A\_n261A  DC\_13A-66A\_n261G  DC\_13A-66A\_n261H  DC\_13A-66A\_n261I  DC\_13A-66A\_n261J  DC\_13A-66A\_n261K  DC\_13A-66A\_n261L  DC\_13A-66A\_n261M | DC\_13A\_n261A  DC\_66A\_n261A |
| DC\_13A-66A\_n261(2A)  DC\_13A-66A\_n261(3A)  DC\_13A-66A\_n261(4A)  DC\_13A-66A\_n261(2G)  DC\_13A-66A\_n261(2H)  DC\_13A-66A\_n261(A-G)  DC\_13A-66A\_n261(A-H)  DC\_13A-66A\_n261(A-I)  DC\_13A-66A\_n261(A-J)  DC\_13A-66A\_n261(A-K)  DC\_13A-66A\_n261(A-2G)  DC\_13A-66A\_n261(A-G-H)  DC\_13A-66A\_n261(A-G-I)  DC\_13A-66A\_n261(2A-G)  DC\_13A-66A\_n261(2A-H)  DC\_13A-66A\_n261(2A-I)  DC\_13A-66A\_n261(3A-G)  DC\_13A-66A\_n261(G-H)  DC\_13A-66A\_n261(G-I)  DC\_13A-66A\_n261(G-J)DC\_13A-66A\_n261(H-I)  DC\_13A-66A-66A\_n261A  DC\_13A-66A-66A\_n261G  DC\_13A-66A-66A\_n261H  DC\_13A-66A-66A\_n261I  DC\_13A-66A-66A\_n261J  DC\_13A-66A-66A\_n261K  DC\_13A-66A-66A\_n261L  DC\_13A-66A-66A\_n261M  DC\_13A-66A-66A\_n261(2A)  DC\_13A-66A-66A\_n261(3A)  DC\_13A-66A-66A\_n261(4A)  DC\_13A-66A-66A\_n261(2G)  DC\_13A-66A-66A\_n261(2H)  DC\_13A-66A-66A\_n261(A-G)  DC\_13A-66A-66A\_n261(A-H)  DC\_13A-66A-66A\_n261(A-I)  DC\_13A-66A-66A\_n261(A-J)  DC\_13A-66A-66A\_n261(A-K)  DC\_13A-66A-66A\_n261(A-2G)  DC\_13A-66A-66A\_n261(A-G-H)  DC\_13A-66A-66A\_n261(A-G-I)  DC\_13A-66A-66A\_n261(2A-G)  DC\_13A-66A-66A\_n261(2A-H)  DC\_13A-66A-66A\_n261(2A-I)  DC\_13A-66A-66A\_n261(3A-G)  DC\_13A-66A-66A\_n261(G-H)  DC\_13A-66A-66A\_n261(G-I)  DC\_13A-66A-66A\_n261(G-J)  DC\_13A-66A-66A\_n261(H-I) | DC\_13A\_n261A  DC\_66A\_n261A |
| DC\_13A-66A\_n261(A-G)  DC\_13A-66A\_n261(2A-G)  DC\_13A-66A\_n261(3A-G)  DC\_13A-66A\_n261(2G)  DC\_13A-66A-66A\_n261(A-G)  DC\_13A-66A-66A\_n261(2A-G)  DC\_13A-66A-66A\_n261(3A-G)  DC\_13A-66A-66A\_n261(2G) | DC\_13A\_n261G  DC\_66A\_n261G |
| DC\_13A-66A\_n261(A-H)  DC\_13A-66A\_n261(2A-H)  DC\_13A-66A\_n261(G-H)  DC\_13A-66A\_n261(2H)  DC\_13A-66A-66A\_n261(A-H)  DC\_13A-66A-66A\_n261(2A-H)  DC\_13A-66A-66A\_n261(G-H)  DC\_13A-66A-66A\_n261(2H) | DC\_13A\_n261H  DC\_66A\_n261H |
| DC\_13A-66A\_n261I  DC\_13A-66A\_n261J  DC\_13A-66A\_n261K  DC\_13A-66A\_n261L  DC\_13A-66A\_n261M  DC\_13A-66A-66A\_n261I  DC\_13A-66A-66A\_n261J  DC\_13A-66A-66A\_n261K  DC\_13A-66A-66A\_n261L  DC\_13A-66A-66A\_n261M  DC\_13A-66A\_n261(A-J)  DC\_13A-66A\_n261(A-K)  DC\_13A-66A\_n261(2A-I)  DC\_13A-66A\_n261(G-I)  DC\_13A-66A\_n261(G-J)  DC\_13A-66A\_n261(H-I)  DC\_13A-66A-66A\_n261(A-J)  DC\_13A-66A-66A\_n261(A-K)  DC\_13A-66A-66A\_n261(2A-I)  DC\_13A-66A-66A\_n261(G-I)  DC\_13A-66A-66A\_n261(G-J)  DC\_13A-66A-66A\_n261(H-I) | DC\_13A\_n261I  DC\_66A\_n261I |

5.2.37.3 ∆TIB and ∆RIB values

The ΔTIB,c and ΔRIB,c values of DC\_13-66\_n261 and DC\_13-66-66\_n261 are given as the below tables.

Table 5.2.37.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_13-66\_n261  DC\_13-66-66\_n261 | 13 | 0.3 |
| 66 | 0.3 |
| n261 | 0 |

Table 5.2.37.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_13-66\_n261  DC\_13-66-66\_n261 | 13 | 0 |
| 66 | 0 |
| n261 | 0 |

## 5.2.38 DC\_2-66\_n260 and DC\_2-66-66\_n260

5.2.38.1 Operating bands for DC

Table 5.2.38.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-66\_n2601 | CA\_2-66 | n260 | No |
| DC\_2-66-66\_n2601 | CA\_2-66-66 | n260 | No |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | |

5.2.38.2 Configurations for DC

Table 5.2.38.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) |
| --- | --- |
| DC\_2A-66A\_n260(5A)  DC\_2A-66A\_n260(6A)  DC\_2A-66A\_n260(2G)  DC\_2A-66A\_n260(2H)  DC\_2A-66A\_n260(A-G)  DC\_2A-66A\_n260(A-H)  DC\_2A-66A\_n260(A-2G)  DC\_2A-66A\_n260(2A-G)  DC\_2A-66A\_n260(2A-2G)  DC\_2A-66A\_n260(3A-G)  DC\_2A-66A\_n260(G-H) | DC\_2A\_n260A  DC\_66A\_n260A |
| DC\_2A-66A\_n260I  DC\_2A-66A\_n260J  DC\_2A-66A\_n260K  DC\_2A-66A\_n260L  DC\_2A-66A\_n260M  DC\_2A-66A-66A\_n260I  DC\_2A-66A-66A\_n260J  DC\_2A-66A-66A\_n260K  DC\_2A-66A-66A\_n260L  DC\_2A-66A-66A\_n260M | DC\_2A\_n260I  DC\_66A\_n260I |

5.2.38.3 ∆TIB and ∆RIB values

The ΔTIB,c and ΔRIB,c values of DC\_2-66\_n260 have been given in TR37.863-02-01 as the below tables.

Table 5.2.38.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n260  DC\_2-66-66\_n260 | 2 | 0.5 |
| 66 | 0.5 |
| n260 | 0 |

Table 5.2.38.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n260  DC\_2-66-66\_n260 | 2 | 0.3 |
| 66 | 0.3 |
| n260 | 0 |

## 5.2.39 DC\_2-66\_n261 and DC\_2-66-66\_n261

5.2.39.1 Operating bands for DC

Table 5.2.39.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-66\_n2611 | CA\_2-66 | n261 | No |
| DC\_2-66-66\_n2611 | CA\_2-66-66 | n261 | No |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | |

5.2.39.2 Configurations for DC

Table 5.2.39.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) |
| --- | --- |
| DC\_2A-66A\_n261G  DC\_2A-66A\_n261H  DC\_2A-66A\_n261I  DC\_2A-66A\_n261J  DC\_2A-66A\_n261K  DC\_2A-66A\_n261L  DC\_2A-66A\_n261M | DC\_2A\_n261A  DC\_66A\_n261A |
| DC\_2A-66A\_n261(3A)  DC\_2A-66A\_n261(4A)  DC\_2A-66A\_n261(2G)  DC\_2A-66A\_n261(2H)  DC\_2A-66A\_n261(A-G)  DC\_2A-66A\_n261(A-H)  DC\_2A-66A\_n261(A-I)  DC\_2A-66A\_n261(A-J)  DC\_2A-66A\_n261(A-K)  DC\_2A-66A\_n261(A-2G)  DC\_2A-66A\_n261(A-G-H)  DC\_2A-66A\_n261(A-G-I)  DC\_2A-66A\_n261(2A-G)  DC\_2A-66A\_n261(2A-H)  DC\_2A-66A\_n261(2A-I)  DC\_2A-66A\_n261(3A-G)  DC\_2A-66A\_n261(G-H)  DC\_2A-66A\_n261(G-I)  DC\_2A-66A\_n261(G-J)  DC\_2A-66A\_n261(H-I)  DC\_2A-66A-66A\_n261A  DC\_2A-66A-66A\_n261I  DC\_2A-66A-66A\_n261J  DC\_2A-66A-66A\_n261K  DC\_2A-66A-66A\_n261L  DC\_2A-66A-66A\_n261M  DC\_2A-66A-66A\_n261(A-G)  DC\_2A-66A-66A\_n261(A-H)  DC\_2A-66A-66A\_n261(A-J)  DC\_2A-66A-66A\_n261(A-K)  DC\_2A-66A-66A\_n261(2A-G)  DC\_2A-66A-66A\_n261(2A-H)  DC\_2A-66A-66A\_n261(2A-I)  DC\_2A-66A-66A\_n261(3A-G)  DC\_2A-66A-66A\_n261(2G)  DC\_2A-66A-66A\_n261(G-H)  DC\_2A-66A-66A\_n261(G-I)  DC\_2A-66A-66A\_n261(G-J)  DC\_2A-66A-66A\_n261(2H)  DC\_2A-66A-66A\_n261(H-I) | DC\_2A\_n261A  DC\_66A\_n261A |
| DC\_2A-66A\_n261(A-G)  DC\_2A-66A\_n261(2A-G)  DC\_2A-66A\_n261(3A-G)  DC\_2A-66A\_n261(2G)  DC\_2A-66A-66A\_n261(A-G)  DC\_2A-66A-66A\_n261(2A-G)  DC\_2A-66A-66A\_n261(3A-G)  DC\_2A-66A-66A\_n261(2G) | DC\_2A\_n261G  DC\_66A\_n261G |
| DC\_2A-66A\_n261(A-H)  DC\_2A-66A\_n261(2A-H)  DC\_2A-66A\_n261(G-H)  DC\_2A-66A\_n261(2H)  DC\_2A-66A-66A\_n261(A-H)  DC\_2A-66A-66A\_n261(2A-H)  DC\_2A-66A-66A\_n261(G-H)  DC\_2A-66A-66A\_n261(2H) | DC\_2A\_n261H  DC\_66A\_n261H |
| DC\_2A-66A\_n261I  DC\_2A-66A\_n261J  DC\_2A-66A\_n261K  DC\_2A-66A\_n261L  DC\_2A-66A\_n261M  DC\_2A-66A-66A\_n261I  DC\_2A-66A-66A\_n261J  DC\_2A-66A-66A\_n261K  DC\_2A-66A-66A\_n261L  DC\_2A-66A-66A\_n261M  DC\_2A-66A\_n261(A-J)  DC\_2A-66A\_n261(A-K)  DC\_2A-66A\_n261(2A-I)  DC\_2A-66A\_n261(G-I)  DC\_2A-66A\_n261(G-J)  DC\_2A-66A\_n261(H-I)  DC\_2A-66A-66A\_n261(A-J)  DC\_2A-66A-66A\_n261(A-K)  DC\_2A-66A-66A\_n261(2A-I)  DC\_2A-66A-66A\_n261(G-I)  DC\_2A-66A-66A\_n261(G-J)  DC\_2A-66A-66A\_n261(H-I) | DC\_2A\_n261I  DC\_66A\_n261I |

5.2.39.3 ∆TIB and ∆RIB values

The ΔTIB,c and ΔRIB,c values of DC\_2-66\_n261 are given as the below tables.

Table 5.2.39.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n261 | 2 | 0.5 |
| 66 | 0.5 |
| n261 | 0 |

Table 5.2.39.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-66\_n261 | 2 | 0.3 |
| 66 | 0.3 |
| n261 | 0 |

## 5.2.40 DC\_2-13\_n260

5.2.40.1 Operating bands for DC

Table 5.2.40.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-13\_n2601 | CA\_2-13 | n260 | No |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | |

5.2.40.2 Configurations for DC

Table 5.2.40.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) |
| --- | --- |
| DC\_2A-13A\_n260G  DC\_2A-13A\_n260H  DC\_2A-13A\_n260I  DC\_2A-13A\_n260J  DC\_2A-13A\_n260K  DC\_2A-13A\_n260L  DC\_2A-13A\_n260M | DC\_2A\_n260A  DC\_13A\_n260A |
| DC\_2A-13A\_n260(2A)  DC\_2A-13A\_n260(3A)  DC\_2A-13A\_n260(4A)  DC\_2A-13A\_n260(5A)  DC\_2A-13A\_n260(6A)  DC\_2A-13A\_n260(2G)  DC\_2A-13A\_n260(2H)  DC\_2A-13A\_n260(A-G)  DC\_2A-13A\_n260(A-H)  DC\_2A-13A\_n260(A-2G)  DC\_2A-13A\_n260(2A-G)  DC\_2A-13A\_n260(2A-2G)  DC\_2A-13A\_n260(3A-G)  DC\_2A-13A\_n260(G-H) | DC\_2A\_n260A  DC\_13A\_n260A |
| DC\_2A-13A\_n260I  DC\_2A-13A\_n260J  DC\_2A-13A\_n260K  DC\_2A-13A\_n260L  DC\_2A-13A\_n260M | DC\_2A\_n260I  DC\_13A\_n260I |

5.2.40.3 ∆TIB and ∆RIB values

The ΔTIB,c and ΔRIB,c values of DC\_2-13\_n260 have been given in TR37.863-02-01 as the below tables.

Table 5.2.40.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-13\_n260 | 2 | 0.3 |
| 13 | 0.3 |
| n260 | 0 |

Table 5.2.40.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-13\_n260 | 2 | 0 |
| 13 | 0 |
| n260 | 0 |

## 5.2.41 DC\_2-13\_n261

5.2.41.1 Operating bands for DC

Table 5.2.41.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-13\_n2611 | CA\_2-13 | n261 | No |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | |

5.2.41.2 Configurations for DC

Table 5.2.41.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) |
| --- | --- |
| DC\_2A-13A\_n261A  DC\_2A-13A\_n261G  DC\_2A-13A\_n261H  DC\_2A-13A\_n261I  DC\_2A-13A\_n261J  DC\_2A-13A\_n261K  DC\_2A-13A\_n261L  DC\_2A-13A\_n261M | DC\_2A\_n261A  DC\_13A\_n261A |
| DC\_2A-13A\_n261(2A)  DC\_2A-13A\_n261(3A)  DC\_2A-13A\_n261(4A)  DC\_2A-13A\_n261(2G)  DC\_2A-13A\_n261(2H)  DC\_2A-13A\_n261(A-G)  DC\_2A-13A\_n261(A-H)  DC\_2A-13A\_n261(A-I)  DC\_2A-13A\_n261(A-J)  DC\_2A-13A\_n261(A-K)  DC\_2A-13A\_n261(A-2G)  DC\_2A-13A\_n261(A-G-H)  DC\_2A-13A\_n261(A-G-I)  DC\_2A-13A\_n261(2A-G)  DC\_2A-13A\_n261(2A-H)  DC\_2A-13A\_n261(2A-I)  DC\_2A-13A\_n261(3A-G)  DC\_2A-13A\_n261(G-H)  DC\_2A-13A\_n261(G-I)  DC\_2A-13A\_n261(G-J)  DC\_2A-13A\_n261(H-I) | DC\_2A\_n261A  DC\_13A\_n261A |
| DC\_2A-13A\_n261(A-G)  DC\_2A-13A\_n261(2A-G)  DC\_2A-13A\_n261(3A-G)  DC\_2A-13A\_n261(2G) | DC\_2A\_n261G  DC\_13A\_n261G |
| DC\_2A-13A\_n261(A-H)  DC\_2A-13A\_n261(2A-H)  DC\_2A-13A\_n261(G-H)  DC\_2A-13A\_n261(2H) | DC\_2A\_n261H  DC\_13A\_n261H |
| DC\_2A-13A\_n261I  DC\_2A-13A\_n261J  DC\_2A-13A\_n261K  DC\_2A-13A\_n261L  DC\_2A-13A\_n261M  DC\_2A-13A\_n261(A-J)  DC\_2A-13A\_n261(A-K)  DC\_2A-13A\_n261(2A-I)  DC\_2A-13A\_n261(H-I)  DC\_2A-13A\_n261(G-I)  DC\_2A-13A\_n261(G-J) | DC\_2A\_n261I  DC\_13A\_n261I |

5.2.41.3 ∆TIB and ∆RIB values

The ΔTIB,c and ΔRIB,c values of DC\_2-13\_n261 are given as the below tables.

Table 5.2.41.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-13\_n261 | 2 | 0.3 |
| 13 | 0.3 |
| n261 | 0 |

Table 5.2.41.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-13\_n261 | 2 | 0 |
| 13 | 0 |
| n261 | 0 |

## 5.2.42 DC\_2-5\_n260

5.2.42.1 Operating bands for DC

Table 5.2.42.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-5\_n2601 | CA\_2-5 | n260 | No |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | |

5.2.42.2 Configurations for DC

Table 5.2.42.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) |
| --- | --- |
| DC\_2A-5A\_n260I  DC\_2A-5A\_n260J  DC\_2A-5A\_n260K  DC\_2A-5A\_n260L  DC\_2A-5A\_n260M | DC\_2A\_n260I  DC\_5A\_n260I |

5.2.42.3 ∆TIB and ∆RIB values

The TIB,c and RIB,c values of DC\_2-5\_n260 are given as the below tables.

Table 5.2.42.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-5\_n260 | 2 | 0.3 |
| 5 | 0.3 |
| n260 | 0 |

Table 5.2.42.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-5\_n260 | 2 | 0 |
| 5 | 0 |
| n260 | 0 |

## 5.2.43 DC\_2-5\_n261

5.2.43.1 Operating bands for DC

Table 5.2.43.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_2-5\_n2611 | CA\_2-5 | n261 | No |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | |

5.2.43.2 Configurations for DC

Table 5.2.43.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) |
| --- | --- |
| DC\_2A-5A\_n261A  DC\_2A-5A\_n261I  DC\_2A-5A\_n261J  DC\_2A-5A\_n261K  DC\_2A-5A\_n261L  DC\_2A-5A\_n261M | DC\_2A\_n261A  DC\_5A\_n261A |
| DC\_2A-5A\_n261(A-G)  DC\_2A-5A\_n261(A-H)  DC\_2A-5A\_n261(A-J)  DC\_2A-5A\_n261(A-K)  DC\_2A-5A\_n261(2A-G)  DC\_2A-5A\_n261(2A-H)  DC\_2A-5A\_n261(2A-I)  DC\_2A-5A\_n261(3A-G)  DC\_2A-5A\_n261(G-H)  DC\_2A-5A\_n261(G-I)  DC\_2A-5A\_n261(G-J)  DC\_2A-5A\_n261(2G)  DC\_2A-5A\_n261(2H)  DC\_2A-5A\_n261(H-I) | DC\_2A\_n261A  DC\_5A\_n261A |
| DC\_2A-5A\_n261(A-G)  DC\_2A-5A\_n261(2A-G)  DC\_2A-5A\_n261(3A-G)  DC\_2A-5A\_n261(2G) | DC\_2A\_n261G  DC\_5A\_n261G |
| DC\_2A-5A\_n261(2A-H)  DC\_2A-5A\_n261(G-H)  DC\_2A-5A\_n261(2H) | DC\_2A\_n261H  DC\_5A\_n261H |
| DC\_2A-5A\_n261I  DC\_2A-5A\_n261J  DC\_2A-5A\_n261K  DC\_2A-5A\_n261L  DC\_2A-5A\_n261M  DC\_2A-5A\_n261(A-J)  DC\_2A-5A\_n261(A-K)  DC\_2A-5A\_n261(2A-I)  DC\_2A-5A\_n261(G-I)  DC\_2A-5A\_n261(G-J)  DC\_2A-5A\_n261(H-I) | DC\_2A\_n261I  DC\_5A\_n261I |

5.2.43.3 ∆TIB and ∆RIB values

The TIB,c and RIB,c values of DC\_2-5\_n261 are given as the below tables.

Table 5.2.43.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-5\_n261 | 2 | 0.3 |
| 5 | 0.3 |
| n261 | 0 |

Table 5.2.43.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_2-5\_n261 | 2 | 0 |
| 5 | 0 |
| n261 | 0 |

## 5.2.44 DC\_5-66\_n260 and DC\_5-66-66\_n260

5.2.44.1 Operating bands for DC

Table 5.2.44.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_5-66\_n2601 | CA\_5-66 | n260 | No |
| DC\_5-66-66\_n2601 | CA\_5-66-66 | n260 | No |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | |

5.2.44.2 Configurations for DC

Table 5.2.44.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) |
| --- | --- |
| DC\_5A-66A\_n260I  DC\_5A-66A\_n260J  DC\_5A-66A\_n260K  DC\_5A-66A\_n260L  DC\_5A-66A\_n260M  DC\_5A-66A-66A\_n260I  DC\_5A-66A-66A\_n260J  DC\_5A-66A-66A\_n260K  DC\_5A-66A-66A\_n260L  DC\_5A-66A-66A\_n260M | DC\_5A\_n260I  DC\_66A\_n260I |

5.2.44.3 ∆TIB and ∆RIB values

The TIB,c and RIB,c values of DC\_5-66\_n260 and DC\_5-66-66\_n260 are given as the below tables.

Table 5.2.44.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_5-66\_n260  DC\_5-66-66\_n260 | 5 | 0.3 |
| 66 | 0.3 |
| n260 | 0 |

Table 5.2.44.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_5-66\_n260  DC\_5-66-66\_n260 | 5 | 0.3 |
| 66 | 0.3 |
| n260 | 0 |

## 5.2.45 DC\_5-66\_n261and DC\_5-66-66\_n261

5.2.45.1 Operating bands for DC

Table 5.2.45.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_5-66\_n2611 | CA\_5-66 | n261 | No |
| DC\_5-66-66\_n2611 | CA\_5-66-66 | n261 | No |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability | | | |

5.2.45.2 Configurations for DC

Table 5.2.45.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) |
| --- | --- |
| DC\_5A-66A\_n261A  DC\_5A-66A\_n261I  DC\_5A-66A\_n261J  DC\_5A-66A\_n261K  DC\_5A-66A\_n261L  DC\_5A-66A\_n261M | DC\_5A\_n261A  DC\_66A\_n261A |
| DC\_5A-66A\_n261(2G)  DC\_5A-66A\_n261(2H)  DC\_5A-66A\_n261(A-G)  DC\_5A-66A\_n261(A-H)  DC\_5A-66A\_n261(A-J)  DC\_5A-66A\_n261(A-K)  DC\_5A-66A\_n261(2A-G)  DC\_5A-66A\_n261(2A-H)  DC\_5A-66A\_n261(2A-I)  DC\_5A-66A\_n261(3A-G)  DC\_5A-66A\_n261(G-H)  DC\_5A-66A\_n261(G-I)  DC\_5A-66A\_n261(G-J)  DC\_5A-66A\_n261(H-I)  DC\_5A-66A-66A\_n261A  DC\_5A-66A-66A\_n261I  DC\_5A-66A-66A\_n261J  DC\_5A-66A-66A\_n261K  DC\_5A-66A-66A\_n261L  DC\_5A-66A-66A\_n261M  DC\_5A-66A-66A\_n261(A-G)  DC\_5A-66A-66A\_n261(A-H)  DC\_5A-66A-66A\_n261(A-J)  DC\_5A-66A-66A\_n261(A-K)  DC\_5A-66A-66A\_n261(2A-G)  DC\_5A-66A-66A\_n261(2A-H)  DC\_5A-66A-66A\_n261(2A-I)  DC\_5A-66A-66A\_n261(3A-G)  DC\_5A-66A-66A\_n261(2G)  DC\_5A-66A-66A\_n261(G-H)  DC\_5A-66A-66A\_n261(G-I)  DC\_5A-66A-66A\_n261(G-J)  DC\_5A-66A-66A\_n261(2H)  DC\_5A-66A-66A\_n261(H-I) | DC\_5A\_n261A  DC\_66A\_n261A |
| DC\_5A-66A\_n261(A-G)  DC\_5A-66A\_n261(2A-G)  DC\_5A-66A\_n261(3A-G)  DC\_5A-66A\_n261(2G)  DC\_5A-66A-66A\_n261(A-G)  DC\_5A-66A-66A\_n261(2A-G)  DC\_5A-66A-66A\_n261(3A-G)  DC\_5A-66A-66A\_n261(2G) | DC\_5A\_n261G  DC\_66A\_n261G |
| DC\_5A-66A\_n261(A-H)  DC\_5A-66A\_n261(2A-H)  DC\_5A-66A\_n261(G-H)  DC\_5A-66A\_n261(2H)  DC\_5A-66A-66A\_n261(A-H)  DC\_5A-66A-66A\_n261(2A-H)  DC\_5A-66A-66A\_n261(G-H)  DC\_5A-66A-66A\_n261(2H) | DC\_5A\_n261H  DC\_66A\_n261H |
| DC\_5A-66A\_n261I  DC\_5A-66A\_n261J  DC\_5A-66A\_n261K  DC\_5A-66A\_n261L  DC\_5A-66A\_n261M  DC\_5A-66A-66A\_n261I  DC\_5A-66A-66A\_n261J  DC\_5A-66A-66A\_n261K  DC\_5A-66A-66A\_n261L  DC\_5A-66A-66A\_n261M  DC\_5A-66A\_n261(A-J)  DC\_5A-66A\_n261(A-K)  DC\_5A-66A\_n261(2A-I)  DC\_5A-66A\_n261(G-I)  DC\_5A-66A\_n261(G-J)  DC\_5A-66A\_n261(H-I)  DC\_5A-66A-66A\_n261(A-J)  DC\_5A-66A-66A\_n261(A-K)  DC\_5A-66A-66A\_n261(2A-I)  DC\_5A-66A-66A\_n261(G-I)  DC\_5A-66A-66A\_n261(G-J)  DC\_5A-66A-66A\_n261(H-I) | DC\_5A\_n261I  DC\_66A\_n261I |

5.2.45.3 ∆TIB and ∆RIB values

The TIB,c and RIB,c values of DC\_5-66\_n261 and DC\_5-66-66\_n261 are given as the below tables.

Table 5.2.45.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_5-66\_n261  DC\_5-66-66\_n261 | 5 | 0.3 |
| 66 | 0.3 |
| n261 | 0 |

Table 5.2.45.3-2: ΔRIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_5-66\_n261  DC\_5-66-66\_n261 | 5 | 0 |
| 66 | 0 |
| n261 | 0 |

## 5.2.46 DC\_11-18\_n257

5.2.46.1 Operating bands for DC

Table 5.2.46.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_11-18\_n257 | CA\_11-18 | n257 | No |

5.2.46.2 Configurations for DC

Table 5.2.46.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_11A-18A\_n257A  DC\_11A-18A\_n257G  DC\_11A-18A\_n257H  DC\_11A-18A\_n257I | DC\_11A\_n257A  DC\_11A\_n257G  DC\_11A\_n257H  DC\_11A\_n257I  DC\_18A\_n257A  DC\_18A\_n257G  DC\_18A\_n257H  DC\_18A\_n257I | CA\_11A-18A | n257  CA\_n257G  CA\_n257H  CA\_n257I |

5.2.46.3 ∆TIB and ∆RIB values

Table 5.2.46.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_11-18\_n257 | 11 | 0.3 |
| 18 | 0.3 |
| n257 | 0 |

**Table 5.2.46.3-2: ΔRIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_11-18\_n257 | 11 | 0 |
| 18 | 0 |
| n257 | 0 |

## 5.2.47 DC\_18-41\_n257

5.2.47.1 Operating bands for DC

Table 5.2.47.1-1: Band combinations EN-DC (three bands)

| EN-DC Band | E-UTRA Band | NR Band | Single UL allowed |
| --- | --- | --- | --- |
| DC\_18-41\_n257 | CA\_18-41 | n257 | No |

5.2.47.2 Configurations for DC

Table 5.2.47.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA configuration | NR configuration |
| --- | --- | --- | --- |
| DC\_18A-41A\_n257A  DC\_18A-41A\_n257G  DC\_18A-41A\_n257H  DC\_18A-41A\_n257I  DC\_18A-41C\_n257A  DC\_18A-41C\_n257G  DC\_18A-41C\_n257H  DC\_18A-41C\_n257I | DC\_18A\_n257A  DC\_18A\_n257G  DC\_18A\_n257H  DC\_18A\_n257I  DC\_41A\_n257A  DC\_41A\_n257G  DC\_41A\_n257H  DC\_41A\_n257I  DC\_41C\_n257A  DC\_41C\_n257G  DC\_41C\_n257H  DC\_41C\_n257I | CA\_18A-41A  CA\_18A-41C | n257  CA\_n257G  CA\_n257H  CA\_n257I |

5.2.47.3 ∆TIB and ∆RIB values

Table 5.2.47.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_18-41\_n257 | 18 | 0.3 |
| 41 | 0.3 |
| n257 | 0 |

**Table 5.2.47.3-2: ΔRIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB,c [dB] |
| --- | --- | --- |
| DC\_18-41\_n257 | 18 | 0 |
| 41 | 0 |
| n257 | 0 |

## 5.2.48 DC\_2-46\_n260

5.2.48.1 Operating bands for EN-DC

Table 5.2.48.1-1: Band combinations EN-DC (three bands)

| EN-DC band | E-UTRA CA band | NR band | Single UL allowed |
| --- | --- | --- | --- |
| 2-46\_n260 | CA\_2-46 | n260 |  |

5.2.48.2 Configuration for DC

Table 5.2.48.2-1: Inter-band EN-DC configurations (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE 1) | E-UTRA CA configuration | NR band |
| --- | --- | --- | --- |
| DC\_2A-46A\_n260A DC\_2A-46C\_n260A  DC\_2A-46D\_n260A  DC\_2A-46E\_n260A  DC\_2A-46A\_n260G DC\_2A-46C\_n260G DC\_2A-46D\_n260G DC\_2A-46E\_n260G DC\_2A-46A\_n260H DC\_2A-46C\_n260H DC\_2A-46D\_n260H DC\_2A-46E\_n260H DC\_2A-46A\_n260I DC\_2A-46C\_n260I DC\_2A-46D\_n260I DC\_2A-46E\_n260I DC\_2A-46A\_n260J DC\_2A-46C\_n260J DC\_2A-46D\_n260J DC\_2A-46E\_n260J DC\_2A-46A\_n260K DC\_2A-46C\_n260K DC\_2A-46D\_n260K DC\_2A-46E\_n260K DC\_2A-46A\_n260L DC\_2A-46C\_n260L DC\_2A-46D\_n260L DC\_2A-46E\_n260L DC\_2A-46A\_n260M  DC\_2A-46C\_n260M  DC\_2A-46D\_n260M  DC\_2A-46E\_n260M | DC\_2A\_n260A DC\_2A\_n260G  DC\_2A\_n260H DC\_2A\_n260I DC\_2A\_n260J DC\_2A\_n260K DC\_2A\_n260L DC\_2A\_n260M | CA\_2A-46A  CA\_2A-46C  CA\_2A-46D  CA\_2A-46E | n260A  CA\_n260G  CA\_n260H  CA\_n260I  CA\_n260J  CA\_n260K  CA\_n260L  CA\_n260M |
| DC\_2A-2A-46A\_n260A DC\_2A-2A-46C\_n260A  DC\_2A-2A-46D\_n260A  DC\_2A-2A-46E\_n260A  DC\_2A-2A-46A\_n260G DC\_2A-2A-46C\_n260G DC\_2A-2A-46D\_n260G DC\_2A-2A-46E\_n260G DC\_2A-2A-46A\_n260H DC\_2A-2A-46C\_n260H DC\_2A-2A-46D\_n260H DC\_2A-2A-46E\_n260H DC\_2A-2A-46A\_n260I DC\_2A-2A-46C\_n260I DC\_2A-2A-46D\_n260I DC\_2A-2A-46E\_n260I DC\_2A-2A-46A\_n260J DC\_2A-2A-46C\_n260J DC\_2A-2A-46D\_n260J DC\_2A-2A-46E\_n260J DC\_2A-2A-46A\_n260K DC\_2A-2A-46C\_n260K DC\_2A-2A-46D\_n260K DC\_2A-2A-46E\_n260K DC\_2A-2A-46A\_n260L DC\_2A-2A-46C\_n260L DC\_2A-2A-46D\_n260L DC\_2A-2A-46E\_n260L DC\_2A-2A-46A\_n260M  DC\_2A-2A-46C\_n260M  DC\_2A-2A-46D\_n260M  DC\_2A-2A-46E\_n260M | DC\_2A\_n260A DC\_2A\_n260G  DC\_2A\_n260H DC\_2A\_n260I DC\_2A\_n260J DC\_2A\_n260K DC\_2A\_n260L DC\_2A\_n260M | CA\_2A-2A-46A  CA\_2A-2A-46C  CA\_2A-2A-46D  CA\_2A-2A-46E | n260A  CA\_n260G  CA\_n260H  CA\_n260I  CA\_n260J  CA\_n260K  CA\_n260L  CA\_n260M |

5.2.48.3 ∆TIB and ∆RIB values

For DC\_2-46\_n260 the ΔTIB,c and ΔRIB,c values are given in the tables below.

**Table 5.2.48.3-1: ΔTIB,c**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_2-46\_n260 DC\_2-2-46\_n260 | 2 | 0 |
| n260 | 0 |

**Table 5.2.48.3-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_2-46\_n260 DC\_2-2-46\_n260 | 2 | 0 |

5.2.48.4 REFSENS requirements

There is no need for additional REFSENS requirements.

# Annex A: Change history

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2018-8 | 3GPP RAN4#88 | R4-1810566 |  |  |  | TR skeleton | 0.0.1 |
| 2018-10 | 3GPP RAN4#88bis | R4-1812692 |  |  |  | Implemented TP´s from RAN4 #88:  R4-1810126 TP for TR 37.716-21-11: DC\_3-18\_n77  R4-1810127 TP for TR 37.716-21-11: DC\_3-18\_n78  R4-1810129 TP for TR 37.716-21-11: DC\_3-18\_n79  R4-1810130 TP for TR 37.716-21-11: DC\_3-18\_n257  R4-1810131 TP for TR 37.716-21-11: DC\_3-41\_n77  R4-1810132 TP for TR 37.716-21-11: DC\_3-41\_n79  R4-1810265 TP on MSD analysis for remaining LTE(2DL/1UL) + NR(1DL/1UL) DC UE  R4-1810332 TP for TR 37.716-21-11: DC band combination of Band 1, 5 and n79  R4-1810333 TP for TR 37.716-21-11: DC band combination of Band 3, 5 and n79  R4-1810334 TP for TR 37.716-21-11: DC band combination of Band 5, 41 and n79  R4-1810399 TP to 37.716-21-11, DC\_1A-7C\_n78A  R4-1810460 TP on TR 37.716-21-11 for EN-DC\_3-8\_n77  R4-1810462 TP on TR 37.716-21-11 for EN-DC\_3-8\_n79  R4-1810464 TP on TR 37.716-21-11 for EN-DC\_3-8\_n257  R4-1810466 TP on TR 37.716-21-11 for EN-DC\_28-41\_n77  R4-1810478 TP on TR 37.716-21-11 for EN-DC\_28-41\_n78  R4-1810480 TP on TR 37.716-21-11 for EN-DC\_28-41\_n79  R4-1810504 TP on TR 37.716-21-11 for EN-DC\_28-41\_n257  R4-1810804 TP for TR 37.716-21-11 Introduction of DC\_2A-66A\_n261A, DC\_2A-66A\_n261(2A), DC\_2A-66A\_n257A and DC\_2A-66A\_n257(2A)  R4-1811434 TP to 37.716-21-11, DC\_2A-66A\_n260(2A) (3A) (4A) | 0.1.0 |
| 2018-11 | 3GPP RAN4#89 | R4-1816167 |  |  |  | Implemented TP´s from RAN4 #88bis:  R4-1812243 TP on MSD analysis for LTE(2DL/1UL) + NR(1DL/1UL) DC UE  R4-1812422 TP for TR 37.716-21-11 : EN-DC\_1-8\_n77  R4-1812423 TP for TR 37.716-21-11 : EN-DC\_1-8\_n79  R4-1812599 TP for TR 37.716-21-11 Introduction of DC\_46-66\_n261  R4-1812628 TP for TR 37.716-21-11: UE requirements for DC\_3-3-7\_n78, DC\_3-3-7-7\_n78  R4-1812725 TP for TR 37.716-21-11: DC\_18-42\_n77  R4-1812726 TP for TR 37.716-21-11: DC\_18-42\_n78  R4-1812727 TP for TR 37.716-21-11: DC\_18-42\_n79  R4-1812729 TP for TR 37.716-21-11: DC\_18-42\_n257  R4-1812730 TP for TR 37.716-21-11: DC\_1-18\_n257  R4-1812737 TP for TR 37.716-21-11: DC\_3-18\_n257  R4-1812738 TP for TR 37.716-21-11: DC\_1-41\_n257  R4-1812739 TP for TR 37.716-21-11: DC\_3-41\_n257  R4-1812741 TP for TR 37.716-21-11: DC\_41-42\_n257  R4-1812790 TP for correction of table 5.1.9.1 & 5.1.9.2 in TR 37.716-21-11  R4-1812795 TP for TR 37.716-21-11 for DC\_46-66\_n260  R4-1812804 TP for TR 37.716-21-11 for 2A-29A\_n260A, 29A-30A\_n260A  R4-1813158 TP for TR 37.716-21-11: DC\_8-20\_n78  R4-1813159 TP for TR 37.716-21-11: DC\_20-38\_n78  R4-1813770 TP for TR 37.716-21-11 DC\_LTE 2bands\_n257  R4-1813775 TP to TR 37.716-21-11: Introduction of DC\_66A-(n)71AA and DC\_2A-(n)71AA  R4-1813793 TP for TR 37.716-21-11: RefSens requirement for DC band combination of Band 5, 41 and n79 | 0.2.0 |
| 2019-02 | 3GPP RAN4#90 | R4-1900898 |  |  |  | Implemented TP´s from RAN4 #89:  R4-1814909 TP for TR 37.716-21-11 UE requirements for DC\_7-8\_n77, DC\_7-8\_n78  R4-1814912 TP for TR 37.716-21-11: DC\_18-42\_n79  R4-1814914 TP for TR 37.716-21-11: DC\_3-41\_n79  R4-1814918 TP for TR 37.716-21-11: DC\_3-18\_n78  R4-1814919 TP for TR 37.716-21-11: DC\_3-18\_n77  R4-1815043 MSD analysis for DC band combination of Band 20, 38 and n78  R4-1815044 MSD analysis for DC band combination of Band 8, 20 and n78  R4-1815260 TP for TR 37.716-21-11: DC\_2-7\_n78  R4-1815346 TP for TR 37.716-21-11: DC\_7-66\_n78  R4-1815812 TP for 37.716-21-11 for 2A-29A\_n260, 29A-30A\_n260A  R4-1816051 TP for TR 37.716-21-11: DC\_3C-8A\_n78A  R4-1816163 TP for TR 37.716-21-11: DC\_3-41\_n77  R4-1816169 TP for 37.716-21-11 for 3C-28A\_n78  R4-1816177 TP for TR 37.716-21-11: RefSens requirement for DC band combination of Band 5, 41 and n79 | 0.3.0 |
| 2019-04 | 3GPP RAN4#90bis | R4-1903644 |  |  |  | Implemented TP´s from RAN4 #90:  R4-1900250 TP on MSD analysis for new LTE(2DL/1UL) + NR(1DL/1UL) DC UE : Softbank  R4-1900725 TP for TR 37.716-21-11 UE MSD requirements for DC\_7-8\_n77, DC\_7-8\_n78  R4-1900901 TP for TR 37.716-21-11: DC\_5A-7A\_n71A  R4-1900902 TP for TR 37.716-21-11: DC\_2A-7A\_n71A  R4-1900903 TP for TR 37.716-21-11: DC\_7A-66A-66A\_n78A  R4-1900904 TP for TR 37.716-21-11: DC\_2-66\_n78  R4-1901431 TP for TR 37.716-21-11 to include DC\_1A-3A\_n7A, DC\_1A-3C\_n7A  R4-1902127 TP for 37.716-21-11 for 3A-3A-28A\_n78  R4-1902206 TP for TR 37.716-21-11 for 3A+8A+n257(D-M)  R4-1902209 TP to TR 37.716-21-11: DC\_3A-28A\_n41A | 0.4.0 |
| 2019-05 | 3GPP RAN4#91 | R4-1905557 |  |  |  | Implemented TP´s from RAN4 #90bis:  R4-1902971 TP for TR 37.716-21-11: EN-DC\_1-11\_n257  R4-1902972 TP for TR 37.716-21-11: EN-DC\_8-11\_n257  R4-1903301 TP for TR 37.716-21-11: UE requirements for DC\_3-3-7\_n257, DC\_3-3-7-7\_n257  R4-1903652 TP for TR 37.716-21-11: DC\_3C-8A\_n257 (A, D-M)  R4-1902996 TP for TR 37.716-21-11: EN-DC\_1-11\_n78  R4-1902997 TP for TR 37.716-21-11: EN-DC\_8-11\_n77  R4-1902998 TP for TR 37.716-21-11: EN-DC\_8-11\_n78  R4-1903004 TP for TR 37.716-21-11 Introduction of DC\_2A-30A\_n5A and DC\_2A-2A-30A\_n5A  R4-1903078 TP for TR 37.716-21-11 DC\_30A-66A-66A\_n5A  R4-1903300 TP for TR 37.716-21-11: UE requirements for DC\_3-7\_n1, DC\_3-3-7\_n1, DC\_3-7-7\_n1, DC\_3-3-7-7\_n1  R4-1903647 TP for TR 37.716-21-11: MSD for DC\_2-66\_n78  R4-1903650 TP for TR 37.716-21-11: DC\_7A-7A-66A-66A\_n78A, DC\_7C-66A-66A\_n78A  R4-1904443 TP for TR 37.716-21-11 to include DC\_1A-3A\_n5A, 1A-3C\_n5A  R4-1904444 TP for TR 37.716-21-11 to include DC\_1A-7A\_n5A, 1A-7C\_n5A  R4-1904445 TP for TR 37.716-21-11 to include DC\_1A-28A\_n5A  R4-1904446 TP for TR 37.716-21-11 to include DC\_3A-7A\_n5A, 3C-7A\_n5A, 3A-7C\_n5A, 3C-7C\_n5A  R4-1904447 TP for TR 37.716-21-11 to include DC\_3A-28A\_n5A, 3C-28A\_n5A  R4-1904448 TP for TR 37.716-21-11 to include DC\_7A-28A\_n5A, 7C-28A\_n5A  R4-1904905 TP for TR 37.716-21-11: EN-DC\_1-11\_n77  R4-1904909 TP for TR 37.716-21-11 to include DC\_3A-20A\_n1A  R4-1904911 TP for TR 37.716-21-11 to include DC\_1A-20A\_n3A  R4-1903012 TP on MSD analysis results for LTE(2DL/1UL) + NR(1DL/1UL) DC UE  R4-1903077 TP for TR 37.716-21-11 DC\_2-66\_n5, DC\_2A-2A-66A\_n5A, DC\_2-66-66\_n5, DC\_2A-2A-66A-66A\_n5A and DC\_2-66-66-66\_n5 | 0.5.0 |
| 2019-08 | 3GPP RAN4#92 | R4-1909226 |  |  |  | Implemented TP´s from RAN4 #91:  R4-1906352 TP for TR 37.716-21-11: UE requirements for DC\_3-7\_n77  R4-1906425 TP for TR 37.716-21-11 MSD table for DC\_30A-66A-66A\_n5A  R4-1906426 TP for TR 37.716-21-11 MSD value for DC\_2A-66A\_n5A  R4-1906747 TP for TR 37.716-21-11 to include MSD for DC\_3A-28A\_n5A, 3C-28A\_n5A  R4-1907397 TP for TR 37.716-21-11 to include MSD for DC\_1A-28A\_n5A  R4-1907398 TP for TR 37.716-21-11 to include MSD for DC\_7A-28A\_n5A, 7C-28A\_n5A  R4-1907401 TP for TR37.716-21-11 for DC\_2A-13A\_n66A | 0.6.0 |
| 2019-10 | 3GPP RAN4#92bis | R4-1910871 |  |  |  | Implemented TP´s from RAN4 #92:  R4-1908100 TP for TR 37.716-21-11: DC\_2-7\_n66 and DC\_2-7-7\_n66  R4-1908101 TP for TR 37.716-21-11: DC\_2-66\_n66  R4-1908102 TP for TR 37.716-21-11: DC\_7-66\_n66 and DC\_7-7-66\_n66  R4-1908290 TP to TR 37.716-21-11: DC\_2-46\_n261  R4-1908298 TP for TR37.716-21-11: UE MSD requirements for DC\_3-7\_n77  R4-1908583 TP for TR 37.716-21-11: UE requirements for DC\_3-8\_n1, DC\_7-8\_n1  R4-1908601 TP for TR 37.716-21-11: EN-DC\_1-8\_n3  R4-1908602 TP for TR 37.716-21-11: EN-DC\_8-42\_n77  R4-1908938 TP for TR 37.716-21-11: DC\_3-40\_n1  R4-1908939 TP for TR 37.716-21-11: DC\_7-40\_n1  R4-1908978 TP for TR 37.716-21-11 Introduction of DC\_2A-5A\_n66A\_BCS0  R4-1908979 TP for TR 37.716-21-11 Introduction of DC\_2A-66A-n66A\_BCS0  R4-1908980 TP for TR 37.716-21-11 Introduction of DC\_5A-66A-n5A\_BCS0  R4-1908981 TP for TR 37.716-21-11 Introduction of DC\_5A-66A\_n66A\_BCS0  R4-1908982 TP for TR 37.716-21-11 Introduction of DC\_13A-66A-n66A\_BCS0  R4-1909194 TP for TR 37.716-21-11: DC\_2-7\_n66  R4-1909196 TP for TR 37.716-21-11: DC\_7-13\_n66  R4-1909258 TP for TR 37.716-21-11 DC\_46-48\_n261  R4-1909803 TP for TR 37.716-21-11 to include DC\_2A-66A\_n41A  R4-1909808 TP for TR 37.716-21-11 to include DC\_46A-48A\_n260A  R4-1909812 TP for TR 37.716-21-11 to include 12A-30A\_n2A  R4-1909813 TP for TR 37.716-21-11 to include 12A-66A\_n2A and 12A-66A-66A\_n2A  R4-1909814 TP for TR 37.716-21-11 to include 30A-66A\_n2A and 30A-66A-66A\_n2A  R4-1909818 TP for TR 37.716-21-11 to include 14A-30A\_n260M  R4-1909819 TP for TR 37.716-21-11 to include 14A-66A\_n260M and 14A-66A-66A\_n260M  R4-1909820 TP for TR 37.716-21-11 to include 2A-14A\_n260M and 2A-2A-14A\_n260M | 0.7.0 |
| 2019-11 | 3GPP RAN4#93 | R4-1914595 |  |  |  | Implemented TP´s from RAN4 #92bis:  R4-1911149 TP for TR 37.716-21-11: EN-DC\_1-8\_n28  R4-1911267 TP for TR 37.716-21-11: UE requirements for DC\_3-3-8\_n78  R4-1911269 TP for TR 37.716-21-11: Adding support of DC\_3-3-8\_n1, DC\_7-7-8\_n1, DC\_7-7-8\_n78  R4-1911272 TP for TR 37.716-21-11: adding support of DC\_3A-3A-7A\_n257D to DC\_3A-3A-7A\_n257M and DC\_3A-3A-7A-7A\_n257D to DC\_3A-3A-7A-7A\_n257M  R4-1911602 TP for 37.716-21-11 to introduce DC\_2A-46\_n41  R4-1911603 TP for 37.716-21-11 to introduce DC\_2A-46\_n71  R4-1911604 TP for 37.716-21-11 to introduce DC\_46-66A\_n41  R4-1911605 TP for 37.716-21-11 to introduce DC\_46-66A\_n71  R4-1912248 TP for TR 37.716-21-11 to include DC\_1-3\_n38  R4-1912252 TP for TR 37.716-21-11 to include DC\_7-20\_n3  R4-1912269 TP for TR 37.716-21-11 to include DC\_2-46\_n258  R4-1912270 TP for TR 37.716-21-11 to include DC\_46A-66A\_n258A  R4-1912428 TP for TR 37.716-21-11: Introduction of EN-DC combinations with Band 25, Band 41 and n41  R4-1912583 TP for TR 37.716-21-11: EN-DC\_1-8\_n3  R4-1912587 TP for TR 37.716-21-11: DC\_13-66\_n260  R4-1912588 TP for TR 37.716-21-11: DC\_13-66\_n261  R4-1912589 TP for TR 37.716-21-11: DC\_2-66\_n260  R4-1912590 TP for TR 37.716-21-11: DC\_2-66\_n261  R4-1912591 TP for TR 37.716-21-11: DC\_13-48\_n2  R4-1912592 TP for TR 37.716-21-11: DC\_13-48\_n66  R4-1912593 TP for TR 37.716-21-11: DC\_48-66\_n5  R4-1912601 TP for TR 37.716-21-11: DC\_2-13\_n260  R4-1912602 TP for TR 37.716-21-11: DC\_2-13\_n261  R4-1912604 TP for TR 37.716-21-11 to include DC\_1-7\_n3  R4-1912605 TP for TR 37.716-21-11 to include DC\_1-20\_n3  R4-1912607 TP for TR 37.716-21-11 to include DC\_3-20\_n38 | 0.8.0 |
| 2020-02 | 3GPP RAN4#94 | R4-2000840 |  |  |  | 1. Implemented TP´s from RAN4 #93:   R4-1913609 TP for TR37.716-21-11\_ DC\_1A-20A\_n38A  R4-1913610 TP for TR37.716-21-11\_ DC\_3A-20A\_n38A  R4-1914018 TP for TR 37.716-21-11 DC\_1A-3A\_n77(2A)  R4-1914310 TP for TR 37.716-21-11: DC\_2A-4A\_n38A  R4-1914311 TP for TR 37.716-21-11: DC\_2A-4A\_n41A  R4-1914312 TP for TR 37.716-21-11: DC\_1A-3A\_n41A  R4-1914313 TP for TR 37.716-21-11: DC\_7A-20A\_n1A  R4-1914314 updated TP for TR 37.716-21-11: adding configuration DC\_3C-20A\_n1A  R4-1914315 updated TP for TR 37.716-21-11: adding configuration DC\_3A-7C\_n1A, DC\_3C-7A\_n1A and DC\_3C-7C\_n1A  R4-1914328 TP for 37.716-21-11 to introduce DC\_2-12\_n2  R4-1914702 TP for TR 37 716-21-11 to include DC\_3-28\_n7  R4-1914706 TP for TR 37 716-21-11 to include DC\_1-7\_n7  R4-1914707 TP for TR 37 716-21-11 to include DC\_3-7\_n7  R4-1914708 TP for TR 37 716-21-11 to include DC\_7-28\_n7  R4-1914713 TP for TR 37 716-21-11 to include DC\_12-66\_n66  R4-1915640 TP for TR 37 716-21-11 to include DC\_1-28\_n7  R4-1915690 TP for TR 37.716-21-11: MSD for EN-DC\_1-8\_n28   1. Some editorial changes 2. Move DC\_2-5\_n66 to sub-clause 5.1.103 | 0.9.0 |
| 2020-04 | 3GPP RAN4#94bis | R4-2004501 |  |  |  | Implemented TP´s from RAN4 #94-e：R4-2000237 TP for TR 37.716-21-11: DC\_2-2-13\_n66  R4-2000238 TP for TR 37.716-21-11: DC\_2-5\_n2 and DC\_2-5-5\_n2  R4-2000239 TP for TR 37.716-21-11: DC\_2-5\_n5 and DC\_2-2-5\_n5  R4-2000240 TP for TR 37.716-21-11: DC\_2-5\_n66 and DC\_2-5-5\_n66  R4-2000241 TP for TR 37.716-21-11: DC\_2-13\_n2  R4-2000242 TP for TR 37.716-21-11: DC\_2-13\_n5 and DC\_2-2-13\_n5  R4-2000244 TP for TR 37.716-21-11: DC\_5-5-66\_n66 and DC\_5-5-66-66\_n66  R4-2000245 TP for TR 37.716-21-11: DC\_5-13\_n2  R4-2000247 TP for TR 37.716-21-11: DC\_5-66\_n66 and DC\_5-66-66\_n66  R4-2000248 TP for TR 37.716-21-11: DC\_5-66-66\_n5  R4-2000252 TP for TR 37.716-21-11: DC\_13A-66A-66A\_n66A  R4-2000253 TP for TR 37.716-21-11: DC\_2-5\_n260  R4-2000254 TP for TR 37.716-21-11: DC\_2-5\_n261  R4-2000255 TP for TR 37.716-21-11: DC\_2-13\_n260  R4-2000256 TP for TR 37.716-21-11: DC\_2-13\_n261  R4-2000257 TP for TR 37.716-21-11: DC\_2-66\_n260 and DC\_2-66-66\_n260  R4-2000258 TP for TR 37.716-21-11: DC\_2-66\_n261 and DC\_2-66-66\_n261  R4-2000259 TP for TR 37.716-21-11: DC\_5-66\_n260 and DC\_5-66-66\_n260  R4-2000260 TP for TR 37.716-21-11: DC\_5-66\_n261 and DC\_5-66-66\_n261  R4-2000261 TP for TR 37.716-21-11: DC\_13-66\_n260 and DC\_13-66-66\_n260  R4-2000262 TP for TR 37.716-21-11: DC\_13-66\_n261 and DC\_13-66-66\_n261  R4-2000479 TP for TR37.716-21-11: DC\_5A-66A\_n78  R4-2000532 TP to TR 37.716-21-11: DC\_2A-5A\_n71A  R4-2000533 TP to TR 37.716-21-11: DC\_2A-48A\_n71A  R4-2000534 TP to TR 37.716-21-11: DC\_5A-48A\_n71A  R4-2000535 TP to TR 37.716-21-11: DC\_48A\_(n)12AA  R4-2000536 TP to TR 37.716-21-11: DC\_66A\_(n)12AA  R4-2000843 TP for TR 37.716-21-11: DC\_2-66\_n38  R4-2000844 TP for TR 37.716-21-11: DC\_3C-8A\_n1A  R4-2000874 TP for TR 37.716-21-11: DC\_1A-18A\_n3A  R4-2000876 TP for TR 37.716-21-11 DC\_1A-28A\_n3A  R4-2001045 TP to TR 37.716-21-11: CA\_3-20\_n7  R4-2001049 TP for TR 37.716-21-11: DC\_1A-3A\_n8A  R4-2001050 TP for TR 37.716-21-11: DC\_1A-7A\_n8A  R4-2001051 TP for TR 37.716-21-11: DC\_1A-20A\_n8A  R4-2001052 TP for TR 37.716-21-11: DC\_3A-7A\_n8A  R4-2001053 TP for TR 37.716-21-11: DC\_3A-20A\_n8A  R4-2001054 TP for TR 37.716-21-11: DC\_7A-20A\_n8A  R4-2001055 updated TP for TR 37.716-21-11: add UL DC\_1\_n38 for DC\_1-20\_n38  R4-2001056 TP for TR 37.716-21-11: DC\_1A-41A\_n41A\DC\_1A-41C\_n41A  R4-2001057 TP for TR 37.716-21-11: DC\_1A-(n)41AA\DC\_1A-(n)41CA  R4-2001058 Updated TP for TR 37.716-21-11: DC\_7C-20A\_n1A  R4-2001299 TP for 37.716-21-11 to introduce DC\_2-66\_n25  R4-2001300 TP for 37.716-21-11 to introduce DC\_12-66\_n25  R4-2001532 TP for TR 37.716-21-11 to include DC\_2-7\_n38  R4-2001533 TP for TR 37.716-21-11 to include DC\_2-71\_n38  R4-2001534 TP for TR 37.716-21-11 to include DC\_7-66\_n38  R4-2001535 TP for TR 37.716-21-11 to include DC\_66-71\_n38  R4-2001536 TP for TR 37.716-21-11 to include DC\_2-66\_n38  R4-2001537 TP for TR 37.716-21-11 to include DC\_7-66\_n71  R4-2001538 TP for TR 37.716-21-11 to include DC\_2-71\_n66  R4-2001539 TP for TR 37.716-21-11 to include DC\_66-71\_n66  R4-2001540 TP for TR 37.716-21-11 to include DC\_2-71\_n78  R4-2001541 TP for TR 37.716-21-11 to include DC\_66-71\_n78  R4-2001974 TP for TR 37 716-21-11 to include DC\_2A-48A\_n12A  R4-2001975 TP for TR 37 716-21-11 to include DC\_2A-66A\_n12A  R4-2001976 TP for TR 37 716-21-11 to include DC\_5A-66A\_n71A  R4-2001979 TP for TR 37 716-21-11 to include DC\_48A-66A\_n12A  R4-2001980 TP for TR 37 716-21-11 to include DC\_48A-66A\_n71A  R4-2002007 TP for TR 37.716-21-11 to include DC\_7A-28A\_n3A, DC\_7C-28A\_n3A  R4-2002012 TP for TR 37 716-21-11 to include DC\_2-46\_n66  R4-2002576 TP for TR 37.716-21-11: DC\_2-66\_n48 and DC\_2-66-66\_n48  R4-2002577 TP for TR 37.716-21-11: DC\_5-66\_n2, DC\_5-5-66\_n2, DC\_5-66-66\_n2 and DC\_5-5-66-66\_n2  R4-2002578 TP for TR 37.716-21-11: DC\_13-46\_n5  R4-2002579 TP for TR 37.716-21-11: DC\_13-66\_n2 and DC\_13-66-66\_n2  R4-2002580 TP for TR 37.716-21-11: DC\_13-66\_n48 and DC\_13-66-66\_n48  R4-2002610 TP for 37.716-21-11 to introduce DC\_46-66\_n25 | 0.10.0 |
| 2020-06 | 3GPP RAN4#95-e | R4-2007337 |  |  |  | 1. Implemented TP´s from RAN4 #94-e-Bis：   R4-2003123 TP for TR 37.716-21-11: DC\_1-41\_n28  R4-2003129 TP for TR 37.716-21-11: DC\_11A-18A\_n77A  R4-2003130 TP for TR 37.716-21-11: DC\_11A-18A\_n78A  R4-2003131 TP for TR 37.716-21-11: DC\_18-41\_n3  R4-2003167 TP for TR 37.716-21-11: DC\_2-48\_n66  R4-2003451 TP for TR 37.716-21-11: EN-DC\_1-11\_n3  R4-2003454 TP for TR 37.716-21-11: EN-DC\_3-8\_n28  R4-2003457 TP for TR 37.716-21-11: EN-DC\_8-11\_n3  R4-2003488 TP for TR 37.716-21-11: support of DC\_3-3-7\_n77, DC\_3-7-7\_n77, DC\_3-3-7-7\_n77  R4-2003581 TP to TR 37.716-21-11 DC\_1A-20A\_n41A  R4-2003582 TP to TR 37.716-21-11 DC\_3A-20A\_n41A  R4-2003583 TP to TR 37.716-21-11 DC\_1A-3C\_n41A  R4-2003927 Updated TP for TR 37.716-21-11: add configuration DC\_1A-(n)41DA  R4-2003929 TP for TR 37.716-21-11: DC\_7A-8A\_n3A  R4-2003930 TP for TR 37.716-21-11: DC\_1A-(n)38AA  R4-2003931 TP for TR 37.716-21-11: DC\_20A-(n)38AA  R4-2003932 TP for TR 37.716-21-11: DC\_20A-(n)41AA\DC\_20A-(n)41CA\DC\_20A-(n)41DA  R4-2003934 TP for TR 37.716-21-11: DC\_1A-32A\_n78A\DC\_1A-32A\_n78(2A)  R4-2003935 TP for TR 37.716-21-11: DC\_3A-32A\_n78A\DC\_3A-32A\_n78(2A)  R4-2003936 TP for TR 37.716-21-11: DC\_20A-32A\_n78A\DC\_20A-32A\_n78(2A)  R4-2004496 TP for TR 37.716-21-11: Additional band combinations for DC\_2-66\_n78  R4-2004497 TP for TR 37.716-21-11: Additional band combinations for DC\_2-7\_n78  R4-2004498 TP for TR 37.716-21-11: Additional band combinations for DC\_7-66\_n78  R4-2004610 TP for TR 37.716-21-11 to include DC\_1A-3A\_n40A  R4-2004611 TP for TR 37.716-21-11 to include DC\_1A-28A\_n40A  R4-2004612 TP for TR 37.716-21-11 to include DC\_3A-28A\_n40A  R4-2004636 TP for TR 37.716-21-11: DC\_25A-41D\_n41A and DC\_25A-25A-41D\_n41A corrections  R4-2005004 TP to TR 37.716-21-11: Addition of 2A\_(n)12AA  R4-2005005 TP to TR 37.716-21-11: Addition of 5A\_(n)12AA  R4-2005006 TP to TR 37.716-21-11: Addition of 12A\_(n)5AA  R4-2005007 TP to TR 37.716-21-11: Addition of 48A\_(n)5AA  R4-2005131 TP for TR 37.716-21-11: DC\_1-41\_n3  R4-2005132 TP for TR 37.716-21-11: DC\_3-41\_n28  R4-2005133 TP for TR 37.716-21-11: DC\_18-41\_n77  R4-2005134 TP for TR 37.716-21-11: DC\_18-41\_n78  R4-2005143 TP for TR 37.716-21-11: DC\_1A-3A\_n71A\DC\_1A-3A\_n71B  R4-2005146 TP for 37.716-21-11 to introduce DC\_1-7\_n40  R4-2005147 TP for 37.716-21-11 to introduce DC\_3-7\_n40  R4-2005148 TP for 37.716-21-11 to introduce DC\_7-28\_n40   1. Implemented TP´s from RAN4 #95-e：   R4-2006498 TP for TR 37.716-21-11: DC\_2-29\_n66 and DC\_2-2-29\_n66  R4-2006499 TP for TR 37.716-21-11: DC\_29-66\_n2 and DC\_29-66-66\_n2  R4-2006679 TP for TR 37.716-21-11: EN-DC\_1-42\_n28  R4-2006681 TP for TR 37.716-21-11: EN-DC\_3-42\_n28  R4-2008340 TP for TR 37.716-21-11: EN-DC\_8-42\_n28  R4-2006689 TP update for TR 37.716-21-11: DC\_1-11\_n3  R4-2006934 TP to TR 37.716-21-11 DC\_3C-20A\_n41A  R4-2007614 TP for TR 37.716-21-11 to include 2-14\_n66  R4-2007615 TP for TR 37.716-21-11 to include 2-14\_n2  R4-2007616 TP for TR 37.716-21-11 to include 14-66\_n2  R4-2007617 TP for TR 37.716-21-11 to include 46-66\_n5  R4-2007618 TP for TR 37.716-21-11 to include 14-66\_n66  R4-2008345 TP for TR 37.716-21-11: DC\_3A-(n)41AA\DC\_3A-(n)41CA\DC\_3A-(n)41DA  R4-2008346 TP for TR 37.716-21-11: DC\_3A-41A\_n41A\DC\_3A-41C\_n41A\DC\_3A-41D\_n41A  R4-2006396 TP for TR 37.716-21-11 DC\_11-18\_n257  R4-2006397 TP for TR 37.716-21-11 DC\_18-41\_n257  R4-2007619 TP for TR 37.716-21-11 to include 2-46\_n260  R4-2007620 TP for TR 37.716-21-11 to include 46-66\_n260  R4-2008378 TP for TR 37.716-21-11 to add MSD for DC\_2A-5A\_n71A   1. Move DC\_48-66\_n71 to clause 5.1.185 2. Format changes | 0.11.0 |
| 2020-06 | 3GPP RAN#88e | RP-200881 |  |  |  | Presentation to TSG | 1.0.0 |

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| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2020-06 | RAN#88 |  |  |  |  | Approved by plenary – Rel-16 spec under change control | 16.0.0 |
| 2021-03 | RAN#91 | RP-210091 | 0001 |  | B | TR 37.716-21-11: Addition of missing lower order fallbacks | 16.1.0 |