

# 3GPP TR 36.833 V0.2.0 (2013-04)

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*Technical Report*

## **3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Advanced Intra-band Non-contiguous Carrier Aggregation in Band 4 Work Item Technical Report (Release 12)**

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Keywords

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## Foreword

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

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

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

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# 1 Scope

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The present document is the technical report for the *LTE Advanced Intra-band Non-contiguous Carrier Aggregation in Band 4* work item, which was approved at TSG RAN #56 [2].

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# 2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications"
- [2] RP-120593, "WID LTE Advanced intra-band non-contiguous Carrier Aggregation for Band 4," T-Mobile USA
- [3] RP-130176, "Revised WID: LTE Advanced intra-band non-contiguous Carrier Aggregation in Band 4," T-Mobile USA

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# 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].

*Definition format (Normal)*

*<defined term>: <definition>.*

## 3.2 Symbols

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

*Symbol format (EW)*

<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].

### *Abbreviation format (EW)*

<ACRONYM> <Explanation>

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## 4 Background

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### 4.1 Task description

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## 5 Band and channel arrangement

<Text to be added>

### 5.1 CA Operating bands

<Text to be added>

### 5.2 CA channel bandwidth

<Text to be added>

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## 6 E-UTRA RF requirements for UE

<Text to be added>

### 6.1 Transmitter characteristics

<Text to be added>

#### 6.1.1 UL harmonics and IMD

CA\_4 operates at 1710~1755 MHz for UL and 2110~2155 MHz for DL. Assuming UE transmitting in the whole range of 1710~1755 MHz, the 2<sup>nd</sup> and 3<sup>rd</sup> order of harmonics, 2<sup>nd</sup>, 3<sup>rd</sup>, 5<sup>th</sup>, and 7<sup>th</sup> order IMD are calculated and shown in the following table.

**Table 2-1: CA\_4 UL harmonics and IMD**

Harmonics and IMD	Frequency range in MHz	Falling into RX band?
2 <sup>nd</sup> harmonics	3420~ 3510	No
3 <sup>rd</sup> harmonics	5130~ 5265	No
2 <sup>nd</sup> order IMD	-45 ~ 45	No
3 <sup>rd</sup> order IMD (2f1-f2)	1665 ~ 1800	No
5 <sup>th</sup> order IMD (3f1-2f2)	1620 ~ 1845	No
5 <sup>th</sup> order IMD (4f1-f2)	5085 ~ 5310	No
7 <sup>th</sup> order IMD (4f1-3f2)	1575 ~ 1890	No
7 <sup>th</sup> order IMD (5f1-2f2)	5040 ~ 5355	No

The UE RX band is 2110~2155 MHz. From the above table it can be seen that the 2<sup>nd</sup> and 3<sup>rd</sup> order harmonics and the 2<sup>nd</sup>, 3<sup>rd</sup>, 5<sup>th</sup>, and 7<sup>th</sup> order IMD do not overlap with the UE RX band. So, there is no harmonics and IMD issue for intra-band non-contiguous CA\_4 UE which supports 2UL.

There is no harmonics and IMD issue for intra-band non-contiguous CA\_4 UE which supports 2UL.

## 6.2 Receiver characteristics

<Text to be added>

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## 7 E-UTRA RRM requirements for UE

<Text to be added>

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## 8 E-UTRA RF requirements for BS

<Text to be added>

### 8.1 Co-existence studies

Table 8.1-1 shows harmonics frequency limits and Table 8.1-2 intermodulation products frequency limits for CA of Band 4, respectively.

**Table 8.1-1: DL harmonics frequency limits for CA of Band 4**

BS DL carriers	f_low	f_high
DL frequency (MHz)	2110	2155
2 <sup>nd</sup> order harmonics frequency range (MHz)	4220 to 4310	
3 <sup>rd</sup> order harmonics frequency range (MHz)	6330 to 6465	

As shown in Table 8.1-1, no second and no third harmonics will fall to any 3GPP UL frequencies.

**Table 8.1-2: DL intermodulation products frequency limits for CA of Band 4**

BS DL carriers	f_low	f_high
DL frequency (MHz)	2110	2155
2 <sup>nd</sup> order IMD products	f_low - f_high	f_high - f_low
IMD frequency range (MHz)	-45 to 45	
3 <sup>rd</sup> order IMD products	2*f_low – f_high	2* f_high – f_low
IMD frequency range (MHz)	2065 to 2200	

As shown in Table 8.1-2, no second and no third IMD products will fall to any 3GPP UL frequencies.

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## 9 Summary of required changes to E-UTRA specifications

### 9.1 Required changes to TS36.101

*<Text will be added.>*

### 9.2 Required changes to TS36.104

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### 9.3 Required changes to TS36.133

*<Text will be added.>*

### 9.4 Required changes to TS36.141

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### 9.5 Required changes to TS36.307

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### 9.6 Required changes to TS37.104

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### 9.7 Required changes to TS37.141

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## 10 Project plan

*<Text will be added.>*



## Annex A (Informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
2012-10	RAN4#64-bis	R4-125017			TR 36.833 skeleton	N/A	0.0.1
2013-02	RAN4#66	R4-130014			The following TPs have been implemented: R4-126106, "Harmonics and intermodulation products generated by the BS supporting non-contiguous CA of Band 4" Editorial updates by the rapporteur: • Changed version number	0.0.1	0.1.0
2013-04	RAN4#66-bis	R4-130990			The following TPs have been implemented: R4-130193, "TP on harmonics and intermodulation products caused by intra-band non-contiguous CA_4 UE," Editorial updates by the rapporteur: • Changed version number	0.1.0	0.2.0