



**IMT cellular networks;
Harmonized EN covering the essential requirements
of article 3.2 of the R&TTE Directive;
Part 14: Evolved Universal Terrestrial Radio Access (E-UTRA)
Base Stations (BS)**

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Foreword

This draft Harmonized European Standard (EN) has been produced by ETSI Technical Committee Mobile Standards Group (MSG), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

The present document has been produced by ETSI in response to mandate M/284 issued from the European Commission under Directive 98/34/EC [i.1] as amended by Directive 98/48/EC [i.6].

The title and reference to the present document are intended to be included in the publication in the Official Journal of the European Union of titles and references of Harmonized Standard under the Directive 1999/5/EC [i.2].

The requirements relevant to Directive 1999/5/EC [i.2] are summarized in annex A.

The present document is part 14 of a multi-part deliverable. Full details of the entire series can be found in part 1 [i.7].

Proposed national transposition dates	
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Modal verbs terminology

In the present document **"shall"**, **"shall not"**, **"should"**, **"should not"**, **"may"**, **"may not"**, **"need"**, **"need not"**, **"will"**, **"will not"**, **"can"** and **"cannot"** are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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Introduction

The present document is part of a set of standards developed by ETSI and is designed to fit in a modular structure to cover all radio and telecommunications terminal equipment within the scope of the R&TTE Directive [i.2]. The modular structure is shown in ETSI EG 201 399 [i.3].

1 Scope

The present document applies to the following radio equipment types:

- 1) Base Station for Evolved Universal Terrestrial Radio Access (E-UTRA).

This radio equipment type is capable of operating in all or any part of the operating bands given in table 1-1.

Table 1-1: E-UTRA Base Station operating bands

E-UTRA band	Direction of transmission	E-UTRA Base Station operating bands
1	Transmit	2 110 MHz to 2 170 MHz
	Receive	1 920 MHz to 1 980 MHz
3	Transmit	1 805 MHz to 1 880 MHz
	Receive	1 710 MHz to 1 785 MHz
7	Transmit	2 620 MHz to 2 690 MHz
	Receive	2 500 MHz to 2 570 MHz
8	Transmit	925 MHz to 960 MHz
	Receive	880 MHz to 915 MHz
20	Transmit	791 MHz to 821 MHz
	Receive	832 MHz to 862 MHz
22	Transmit	3 510 MHz to 3 590 MHz
	Receive	3 410 MHz to 3 490 MHz
33	Transmit and Receive	1 900 MHz to 1 920 MHz
34	Transmit and Receive	2 010 MHz to 2 025 MHz
38	Transmit and Receive	2 570 MHz to 2 620 MHz
40	Transmit and Receive	2 300 MHz to 2 400 MHz
42	Transmit and Receive	3 400 MHz to 3 600 MHz
43	Transmit and Receive	3 600 MHz to 3 800 MHz

The present document covers requirements for E-UTRA Base Stations for 3GPP Release 8, 9, 10 and 11.

The present document is intended to cover the provisions of Directive 1999/5/EC [i.2] (R&TTE Directive), Article 3.2, which states that "... radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as to avoid harmful interference".

In addition to the present document, other ENs that specify technical requirements in respect of essential requirements under other parts of article 3 of the R&TTE Directive may apply to equipment within the scope of the present document.

NOTE: A list of such ENs is included on the web site <http://www.newapproach.org>.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are necessary for the application of the present document.

- [1] Void.

- [2] ETSI TS 136 141 (V11.10.0) (09-2014): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing (3GPP TS 36.141 version 11.10.0 Release 11)".
- [3] Void.
- [4] Recommendation ITU-R SM.329-12 (09-2012): "Unwanted emissions in the spurious domain".
- [5] ETSI TS 125 104 (V11.9.0) (07-2014): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) radio transmission and reception (FDD) (3GPP TS 25.104 version 11.9.0 Release 11)".
- [6] ETSI TS 125 105 (V11.6.0) (01-2014): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) radio transmission and reception (TDD) (3GPP TS 25.105 version 11.6.0 Release 11)".
- [7] ETSI TS 136 104 (V11.9.0) (07-2014): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception (3GPP TS 36.104 version 11.9.0 Release 11)".
- [8] ETSI TS 125 141 (V11.8.0) (03-2014): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD) (3GPP TS 25.141 version 11.8.0 Release 11)".
- [9] Void.
- [10] ETSI TS 136 211 (V11.5.0) (01-2014): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical channels and modulation (3GPP TS 36.211 version 11.5.0 Release 11)".
- [11] Void.

2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.
- [i.2] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).
- [i.3] ETSI EG 201 399: "Electromagnetic compatibility and Radio spectrum Matters (ERM); A guide to the production of Harmonized Standards for application under the R&TTE Directive".
- [i.4] Void.
- [i.5] ETSI TR 100 028 (all parts) (V1.4.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [i.6] Directive 98/48/EC of the European Parliament and of the Council of 20 July 1998 amending Directive 98/34/EC laying down a procedure for the provision of information in the field of technical standards and regulations.
- [i.7] ETSI EN 301 908-1 (V6.2.1) (2013-04): "IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 1: Introduction and common requirements".
- [i.8] ETSI EN 301 908-18 (V7.1.2) (07-2014): "IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 18: E-UTRA, UTRA and GSM/EDGE Multi-Standard Radio (MSR) Base Station (BS)".
- [i.9] ETSI TS 136 214 (V11.1.0) (02-2013): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer; Measurements (3GPP TS 36.214 version 11.1.0 Release 11)".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

aggregated channel bandwidth: RF bandwidth, measured in MHz, in which a Base Station transmits and receives multiple contiguously aggregated carriers

base station class: wide area Base Station, medium range base Station, local Area Base Station or home Base Station, as declared by the manufacturer

base station RF bandwidth: bandwidth in which a Base Station transmits and receives multiple carriers within a supported operating band

base station RF bandwidth edge: frequency of one of the edges of the Base Station RF bandwidth

carrier: modulated waveform conveying the E-UTRA or UTRA (WCDMA) physical channels

carrier aggregation: aggregation of two or more component carriers in order to support wider transmission bandwidths

carrier aggregation band: set of one or more operating bands across which multiple carriers are aggregated with a specific set of technical requirements

NOTE: Carrier aggregation band(s) for an E-UTRA BS is declared by the manufacturer according to the designations in tables 4.2.1-3 to 4.2.1-4.

channel bandwidth: RF bandwidth supporting a single E-UTRA RF carrier with the transmission bandwidth configured in the uplink or downlink of a cell

NOTE: The channel bandwidth is measured in MHz and is used as a reference for transmitter and receiver RF requirements.

channel edge: lowest and highest frequency of the E-UTRA carrier, separated by the channel bandwidth

contiguous carriers: two or more carriers configured in a spectrum block where there are no RF requirements based on co-existence for un-coordinated operation within the spectrum block

contiguous spectrum: spectrum consisting of a contiguous block of spectrum with no sub-block gaps

downlink operating band: part of the operating band designated for downlink (BS transmit)

Downlink Reference Symbol (DL RS) power: resource element power of Downlink Reference Symbol

highest carrier: carrier with the highest carrier centre frequency transmitted/received in a specified operating band

home Base Station: Base Stations characterized by requirements derived from femtocell scenarios with a BS to UE minimum coupling loss equal to 45 dB

inter-RF bandwidth gap: frequency gap between two consecutive RF bandwidths that are placed within two supported operating bands

inter-band carrier aggregation: carrier aggregation of component carriers in different operating bands

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

intra-band contiguous carrier aggregation: contiguous carriers aggregated in the same operating band

intra-band non-contiguous carrier aggregation: non-contiguous carriers aggregated in the same operating band

local area Base Station: Base Stations characterized by requirements derived from picocell scenarios with a BS to UE minimum coupling loss equal to 45 dB

lower edge: lowest frequency in the Base station RF bandwidth, or the lowest frequency in the channel bandwidth of a single E-UTRA carrier; used as a frequency reference point for transmitter and receiver requirements

lower sub-block edge: frequency at the lower edge of one sub-block, used as a frequency reference point for both transmitter and receiver requirements

lowest carrier: carrier with the lowest carrier centre frequency transmitted/received in a specified operating band

maximum Base Station RF bandwidth: maximum RF bandwidth supported by a BS within each supported operating band

maximum output power: mean power level per carrier of the Base Station measured at the antenna connector in a specified reference condition

maximum radio bandwidth: maximum frequency difference between the upper edge of the highest used carrier and the lower edge of the lowest used carrier

maximum throughput: maximum achievable throughput for a reference measurement channel

mean power: when applied to E-UTRA transmission this is the power measured in the channel bandwidth of the carrier where the period of measurement is at least one subframe (1 ms), unless otherwise stated

medium range Base Station: Base Stations characterized by requirements derived from micro cell scenarios with a BS to UE minimum coupling loss equal to 53 dB

multi-band Base Station: Base Station characterized by the ability of its transmitter and/or receiver to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different non-overlapping operating band than the other carrier(s)

multi-band transmitter: transmitter characterized by the ability to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different non-overlapping operating band than the other carrier(s)

multi-band receiver: receiver characterized by the ability to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different non-overlapping operating band than the other carrier(s)

multi-carrier transmission configuration: set of one or more contiguous carriers that a BS is able to transmit simultaneously according to the manufacturer's specification

non-contiguous spectrum: spectrum consisting of two or more sub-blocks separated by sub-block gap(s)

operating band: frequency range (paired or unpaired) that is defined with a specific set of technical requirements, in which E-UTRA operates

NOTE: The operating band(s) for an E-UTRA BS is declared by the manufacturer according to the designations in table 1-1. Operating bands for E-UTRA are designated with Arabic numerals, while the corresponding operating bands for UTRA are designated with Roman numerals.

output power: mean power of one carrier of the Base Station, delivered to a load with resistance equal to the nominal load impedance of the transmitter

rated output power: rated output power of the Base Station is the mean power level per carrier that the manufacturer has declared to be available at the antenna connector

resource block: physical resource consisting of a number of symbols in the time domain and a number of consecutive subcarriers spanning 180 kHz in the frequency domain

sub-block: is one contiguous allocated block of spectrum for transmission and reception by the same Base Station.

NOTE: There may be multiple instances of sub-blocks within an RF bandwidth.

sub-block bandwidth: bandwidth of one sub-block

sub-block gap: frequency gap between two consecutive sub-blocks within an RF bandwidth, where the RF requirements in the gap are based on co-existence for un-coordinated operation

synchronized operation: operation of TDD in two different systems, where no simultaneous uplink and downlink occur

throughput: number of payload bits successfully received per second for a reference measurement channel in a specified reference condition

total RF bandwidth: maximum sum of RF bandwidths in all supported operating bands

transmission bandwidth: bandwidth of an instantaneous transmission from a UE or BS, measured in Resource Block units

transmission bandwidth configuration: highest transmission bandwidth allowed for uplink or downlink in a given channel bandwidth, measured in Resource Block units

transmitter OFF period: time period during which the BS transmitter is not allowed to transmit

transmitter ON period: time period during which the BS transmitter is transmitting data and/or reference symbols, i.e. data subframes or DwPTS

transmitter transient period: time period during which the transmitter is changing from the OFF period to the ON period or vice versa

unsynchronized operation: operation of TDD in two different systems, where the conditions for synchronized operation are not met

uplink operating band: part of the operating band designated for uplink (BS receive)

upper edge: highest frequency in the Base Station RF Bandwidth or the highest frequency in the channel bandwidth of a single E-UTRA carrier; used as a frequency reference point for transmitter and receiver requirements

upper sub-block edge: frequency at the upper edge of one sub-block, used as a frequency reference point for both transmitter and receiver requirements

wide area Base Station: Base Stations characterized by requirements derived from Macro Cell scenarios with a BS to UE minimum coupling loss equal to 70 dB

NOTE: This Base Station class has the same requirements as the general purpose Base Station in 3GPP Release 8.

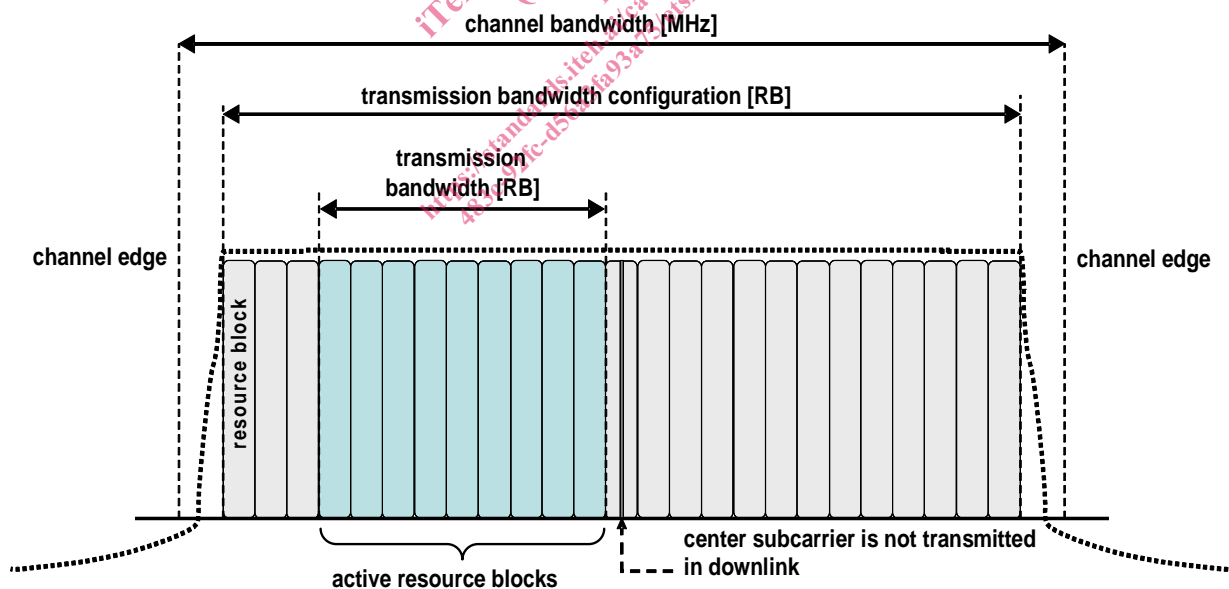


Figure 3.1-1: Channel bandwidth and transmission bandwidth configuration for one E-UTRA carrier

Figure 3.1-2 illustrates the aggregated channel bandwidth for intra-band contiguous carrier aggregation.

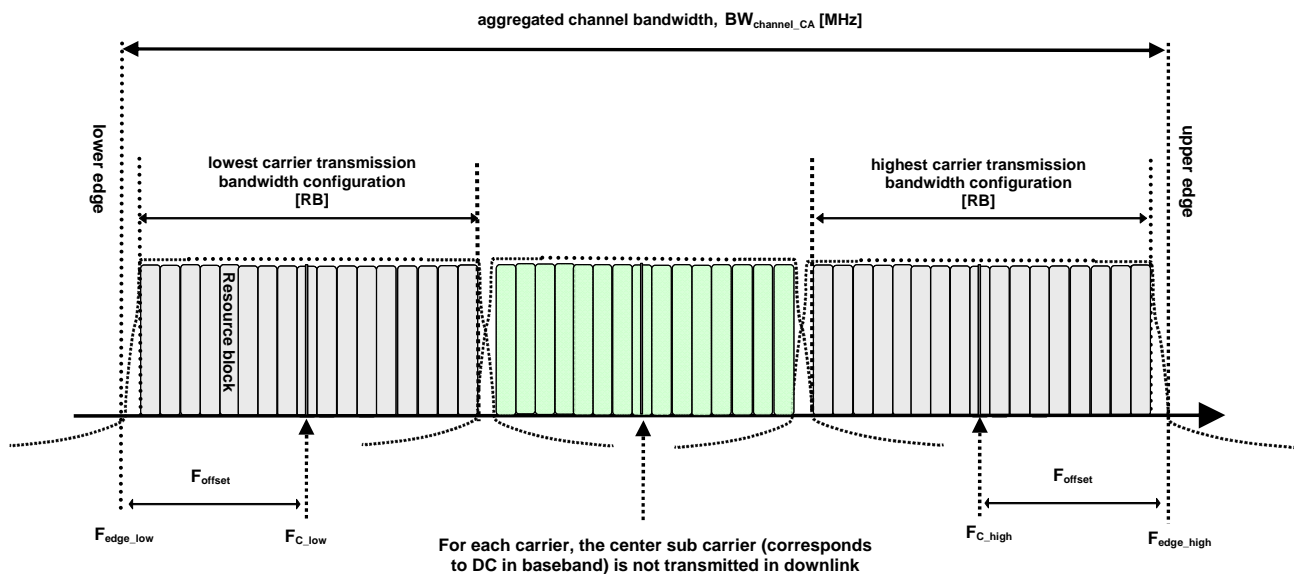


Figure 3.1-2: Aggregated channel bandwidth for intra-band carrier aggregation

The lower edge of the aggregated channel bandwidth ($BW_{Channel_CA}$) is defined as $F_{edge_low} = F_{C_low} - F_{offset}$. The upper edge of the aggregated channel bandwidth is defined as $F_{edge_high} = F_{C_high} + F_{offset}$. The aggregated channel bandwidth, $BW_{Channel_CA}$, is defined as follows:

$$BW_{Channel_CA} = F_{edge_high} - F_{edge_low} \text{ [MHz]}$$

Figure 3.1-3 illustrates the sub-block bandwidth for a BS operating in non-contiguous spectrum.

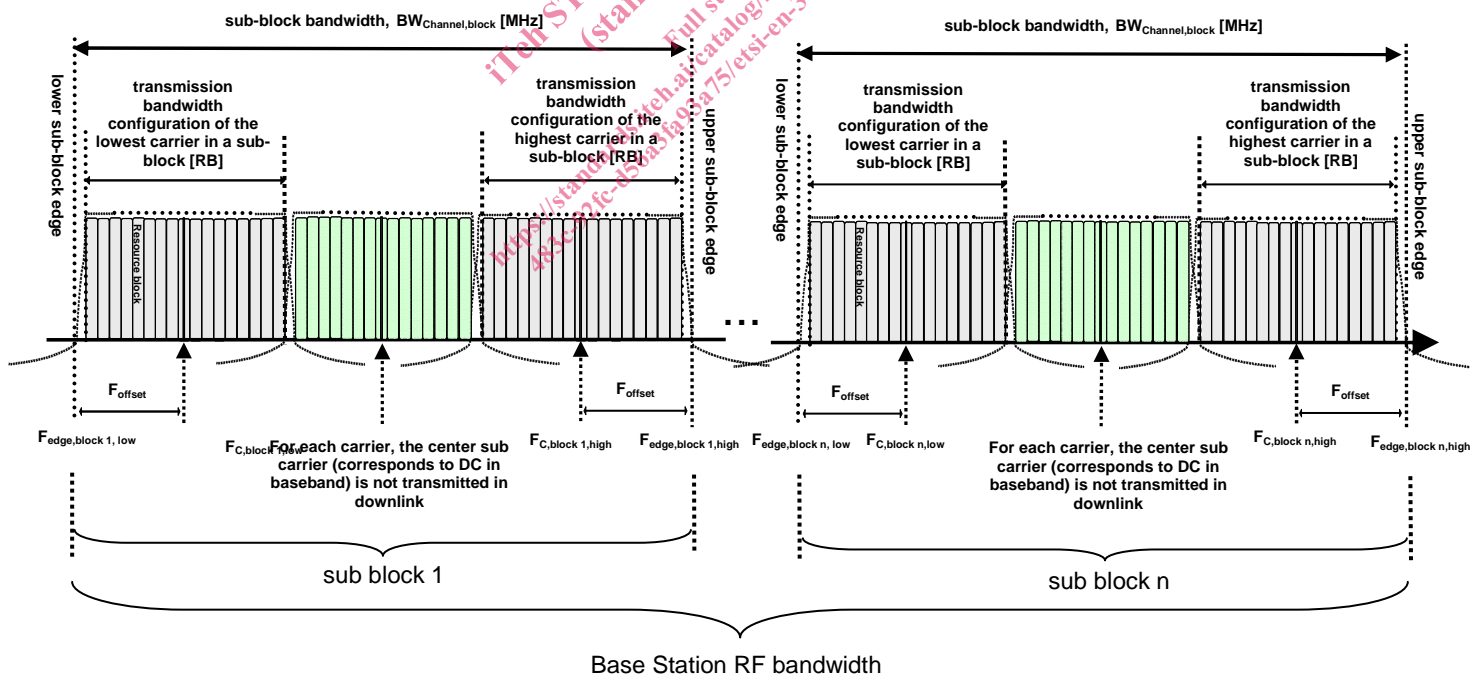


Figure 3.1-3: Sub-block bandwidth for intra-band non-contiguous spectrum

The lower sub-block edge of the sub-block bandwidth ($BW_{Channel_block}$) is defined as $F_{edge_block,low} = F_{C_block,low} - F_{offset}$. The upper sub-block edge of the sub-block bandwidth is defined as $F_{edge_block,high} = F_{C_block,high} + F_{offset}$. The sub-block bandwidth, $BW_{Channel_block}$, is defined as follows:

$$BW_{Channel_block} = F_{edge_block,high} - F_{edge_block,low} \text{ [MHz]}$$

F_{offset} is defined in table 3.1-1 below where BW_{Channel} is defined in table 5.6-1 of ETSI TS 136 141 [2].

Table 3.1-1: Definition of F_{offset}

Channel Bandwidth of the Lowest or Highest Carrier: BW_{Channel} [MHz]	F_{offset} [MHz]
5, 10, 15, 20	$BW_{\text{Channel}}/2$
NOTE 1: F_{offset} is calculated separately for the lower edge/lower sub-block edge and the upper edge /upper sub-block edge of the aggregated channel bandwidth/sub-block bandwidth.	
NOTE 2: The values of $BW_{\text{Channel_CA}}/BW_{\text{Channel_block}}$, for UE and BS are the same if the channel bandwidths of lowest and the highest component carriers are identical.	

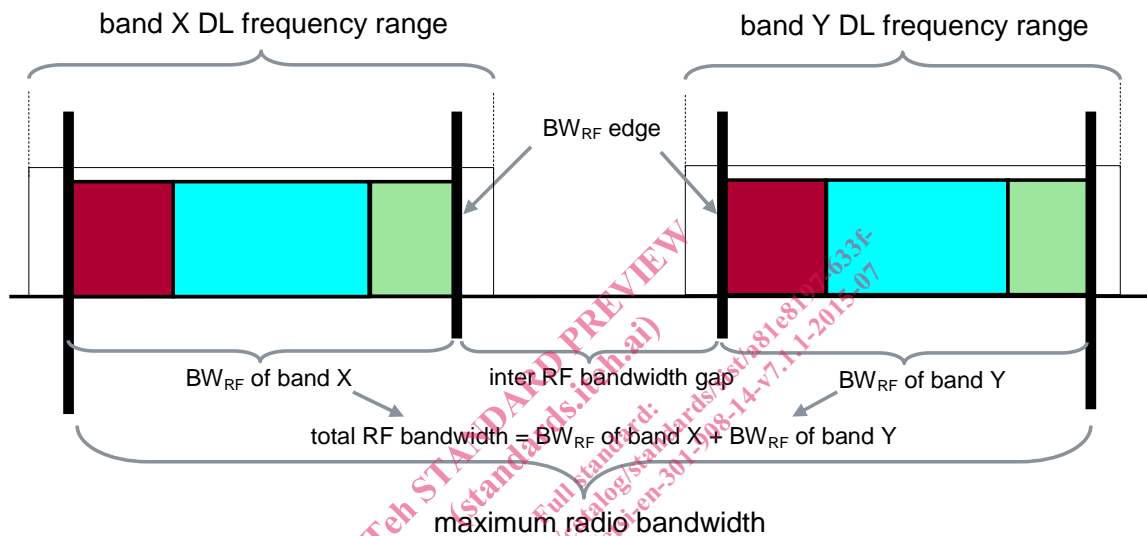


Figure 3.1-4: Maximum radio bandwidth and total RF bandwidth for multi-band Base Station

3.2 Symbols

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

B_{RFBW}	Maximum RF bandwidth located at the bottom of the supported frequency range in the operating band
BW_{Channel}	Channel bandwidth
$BW_{\text{Channel_block}}$	Sub-block bandwidth, expressed in MHz. $BW_{\text{Channel_block}} = F_{\text{edge_block_high}} - F_{\text{edge_block_low}}$
BW_{Config}	Transmission bandwidth configuration, expressed in MHz, where $BW_{\text{Config}} = N_{\text{RB}} \times 180$ kHz in the uplink and $BW_{\text{Config}} = 15$ kHz + $N_{\text{RB}} \times 180$ kHz in the downlink
CA_X	Contiguous intra-band CA for band X where X is the applicable E-UTRA operating band
CA_X_X	Non-contiguous intra band CA for band X where X is the applicable E-UTRA operating band
$CPICH \hat{E}_c$	Common Pilot Channel code power (on the adjacent channel)
$CRS \hat{E}_c$	Reference Signal received power per resource element
f	Frequency
Δf	Separation between the channel edge frequency and the nominal -3 dB point of the measuring filter closest to the carrier frequency
Δf_{max}	The largest value of Δf used for defining the requirement
F_C	Carrier centre frequency
$F_{C_block_high}$	Center frequency of the highest transmitted/received carrier in a sub-block
$F_{C_block_low}$	Center frequency of the lowest transmitted/received carrier in a sub-block
F_{C_high}	The carrier centre frequency of the highest carrier, expressed in MHz