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Foreword

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

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1 Scope

The present document establishes the minimum RF requirements for NR User Equipment (UE) operating on frequency Range 1.

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] 3GPP TS 38.101-2: "NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone".
 - [3] 3GPP TS 38.101-3: "NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios".
 - [4] 3GPP TS 38.521-1: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Range 1 Standalone".
 - [5] Recommendation ITU-R M.1545: "Measurement uncertainty as it applies to test limits for the terrestrial component of International Mobile Telecommunications-2000".
 - [6] 3GPP TS 38.211: "NR; Physical channels and modulation".
 - [7] 3GPP TS 38.331: "Radio Resource Control (RRC) protocol specification".
 - [8] 3GPP TS 38.213: "NR; Physical layer procedures for control".
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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 3GPP 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 3GPP TR 21.905 [1].

Aggregated Channel Bandwidth: The RF bandwidth in which a UE transmits and receives multiple contiguously aggregated carriers.

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

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

Carrier aggregation bandwidth class: A class defined by the aggregated transmission bandwidth configuration and maximum number of component carriers supported by a UE.

Carrier aggregation configuration: A combination of CA operating band(s) and CA bandwidth class(es) supported by a UE.

Contiguous carriers: A set of 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 resource allocation: A resource allocation of consecutive resource blocks within one carrier or across contiguously aggregated carriers. The gap between contiguously aggregated carriers due to the nominal channel spacing is allowed.

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

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.

Sub-block: This is one contiguous allocated block of spectrum for transmission and reception by the same UE. There may be multiple instances of sub-blocks within an RF bandwidth.

Sub-block bandwidth: The bandwidth of one sub-block.

Sub-block gap: A 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.

UE transmission bandwidth configuration: Set of resource blocks located within the UE channel bandwidth which may be used for transmitting or receiving by the UE.

Vehicular UE: A UE embedded in a vehicle, permanently connected to an embedded antenna system that radiates externally for NR operating bands.

NOTE: Vehicular UE does not refer to other UE form factors placed inside the vehicle.

3.2 Symbols

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

ΔF_{Global}	Granularity of the global frequency raster
ΔF_{Raster}	Band dependent channel raster granularity
Δf_{OOB}	Δ Frequency of Out Of Band emission
$\Delta F_{\text{TX-RX}}$	Δ Frequency of default TX-RX separation of the FDD <i>operating band</i>
$\Delta P_{\text{PowerClass}}$	Adjustment to maximum output power for a given power class
ΔR_{B}	The starting frequency offset between the allocated RB and the measured non-allocated RB $\Delta R_{\text{IB},c}$
	Allowed reference sensitivity relaxation due to support for inter-band CA operation, for serving cell c
$\Delta R_{\text{IB},4R}$	Reference sensitivity adjustment due to support for 4 antenna ports
Δ_{Shift}	Channel raster offset
ΔT_{C}	Allowed operating band edge transmission power relaxation
$\Delta T_{\text{C},c}$	Allowed operating band edge transmission power relaxation for serving cell c
$\Delta T_{\text{IB},c}$	Allowed maximum configured output power relaxation due to support for inter-band CA operation, for serving cell c
$\Delta T_{\text{IB},c}$	Allowed maximum configured output power relaxation due to support for inter-band CA operation, for serving cell c
BW_{Channel}	Channel bandwidth
$BW_{\text{Channel,block}}$	Sub-block bandwidth, expressed in MHz. $BW_{\text{Channel,block}} = F_{\text{edge,block,high}} - F_{\text{edge,block,low}}$
$BW_{\text{Channel_CA}}$	Aggregated channel bandwidth, expressed in MHz
$BW_{\text{Channel,max}}$	Maximum channel bandwidth supported among all bands in a release
BW_{GB}	$\max(BW_{\text{GB,Channel}(k)})$
$BW_{\text{GB,Channel}(k)}$	Minimum guard band defined in sub-clause 5.3A.1 of carrier k
BW_{DL}	Channel bandwidth for DL
BW_{UL}	Channel bandwidth for UL
$BW_{\text{interferer}}$	Bandwidth of the interferer
$\text{Ceil}(x)$	Rounding upwards; $\text{ceil}(x)$ is the smallest integer such that $\text{ceil}(x) \geq x$
$\text{Floor}(x)$	Rounding downwards; $\text{floor}(x)$ is the greatest integer such that $\text{floor}(x) \leq x$