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| 3GPP TR 38.808 V0.0.1 (2020-06) | |
| Technical Report | |
| 3rd Generation Partnership Project;  Technical Specification Group Radio Access Network;  Study on supporting NR from 52.6 GHz to 71 GHz  (Release 17) | |
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# Foreword

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

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

Version x.y.z

where:

x the first digit:

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.

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

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

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

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

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

**should** indicates a recommendation to do something

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

**may** indicates permission to do something

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

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

**can** indicates that something is possible

**cannot** indicates that something is impossible

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

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

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

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

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

In addition:

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

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

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

# Introduction

This clause is optional. If it exists, it shall be the second unnumbered clause.

# 1 Scope

In order to support wide range of services, 5G NR system aims to be flexible enough to meet the connectivity requirements of a range of existing and future (yet unknown) services to be deployable in an efficient manner. NR considers supporting potential use of frequency range up to 100 GHz (ref. TR 38.913).

NR specifications that have been developed in Rel-15 and Rel-16 define operation for frequencies up to 52.6GHz, where all physical layer channels, signals, procedures, and protocols are designed to be optimized for uses under 52.6GHz.

However, frequencies above 52.6GHz are faced with more difficult challenges, such as higher phase noise, larger propagation loss due to high atmospheric absorption, lower power amplifier efficiency, and strong power spectral density regulatory requirements in unlicensed bands, compared to lower frequency bands. Additionally, the frequency ranges above 52.6 GHz potentially contain larger spectrum allocations and larger bandwidths that are not available for bands lower than 52.6 GHz.

As an initial effort to enable and optimize 3GPP NR system for operation in above 52.6GHz, 3GPP RAN has studied requirements for NR beyond 52.6GHz up to 114.25GHz including global spectrum availability and regulatory requirements (including channelization and licensing regimes), potential use cases and deployment scenarios, and NR system design requirements and considerations on top of regulatory requirements (ref. TR 38.807). The potential use cases identified in the study include high data rate eMBB, mobile data offloading, short range high-data rate D2D communications, broadband distribution networks, integrated access backhaul (IAB), factory automation, industrial IoT (IIoT), wireless display transfer, augmented reality (AR)/virtual reality (VR) wearables, intelligent transport systems (ITS) and V2X, data center inter-rack connectivity, smart grid automation, private networks, and support of high positioning accuracy. The use cases span over several deployment scenarios identified in the study. The deployment scenarios include, but not limited to, indoor hotspot, dense urban, urban micro, urban macro, rural, factor hall, and indoor D2D scenarios. The study also identified several system design requirements around waveform, MIMO operation, device power consumption, channelization, bandwidth, range, availability, connectivity, spectrum regime considerations, and others.

Among the frequencies of interest, frequencies between 52.6 GHz and 71 GHz are especially interesting relatively in the short term because of their proximity to sub-52.6GHz for which the current NR system is optimized and the imminent commercial opportunities for high data rate communications, e.g., unlicensed spectrum but also licensed spectrum between 57GHz and 71GHz. Therefore, it would be beneficial to make a study focused on feasibility of using existing waveforms and required changes for frequencies between 52.6 GHz and 71 GHz, so as to take advantage of imminent commercial opportunities for the specific frequency regime by minimizing the specification burden and maximizing the leverage of FR2 based implementations.

# 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 TR 38.807: " Study on requirements for NR beyond 52.6 GHz".

# 3 Definitions of terms, symbols and abbreviations

## 3.1 Terms

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

## 3.2 Symbols

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

B transmission bandwidth

G antenna gain

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP 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 3GPP TR 21.905 [1].

BS Base Station

EIRP Equivalent Isotropic Radiated Power

FDD Frequency Duplex Division

IAB Integrated Access Backhaul

ISM Industrial, Scientific and Medical

ITU International Telecommunication Union

LBT Listen Before Talk

MCOT Maximum Channel Occupancy Time

NR New Radio

OCB Occupied Bandwidth

OOBE Out-Of-Band Emission

PSD Power Spectral Density

PTP Point to point

SI Study Item

SID Study Item Description

TDD Time Duplex Division

UE User Equipment

V2X Vehicle to Everything

WAN Wide Area Network

# 4 Study of Required Changes to NR

*Editor’s Note: Some descriptions on prioritized deployment scenarios (if such description is needed) could be specified here.*

## 4.1 RAN1 Aspects

*Editor’s Note: This section will be further categorized into sub-sections depending on discussions*

### 4.1.1 Candidate numerology and bandwidth

*Editor’s Note: This section can include discussion on CP length, subcarrier spacing, and channel bandwidth issues*

## 4.2 RAN4 aspects

*Editor’s Note: This section will be further categorized into sub-sections depending on discussions*

# 5 Study of channel access mechanism for 60GHz

*Editor’s Note: This section will be further categorized into sub-sections depending on discussions*

## 5.1 Identification of regulatory aspects for consideration

*Editor’s Note: This section can include list of identified regulatory aspects that is needed for consideration of channel access mechanism for 60 GHz unlicensed operation.*

## 5.1 Investigation of channel access and interference mitigation techniques

*Editor’s Note: This section can include study of channel access and interference mitigation techniques.*

# Annex <A> (informative): Evaluation Methodology

## A.1 Link level evaluation assumptions

*Editor’s Note: add parameters and assumptions for link level simulations*

## A.2 System level evaluation assumptions

*Editor’s Note: add parameters and assumptions for system level simulations.*

# Annex <B> (informative): Change history

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| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2020-06 | RAN# 88 | RP-20xxxx |  |  |  | Draft skeleton TR | V0.0.1 |