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| 3GPP TR 33.877 V0.1.0 (2022-07) | |
| Technical Report | |
| 3rd Generation Partnership Project;  Technical Specification Group Services and System Aspects;  Study on the security aspects of Artificial Intelligence (AI)/Machine Learning (ML) for the NG-RAN  (Release 18) | |
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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.

# 1 Scope

Editor's Note: This clause needs more details.

# 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 37.817: "Study on enhancement for data collection for NR and ENDC"

# 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].

**example:** text used to clarify abstract rules by applying them literally.

## 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 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].

AI Artificial Intelligence

CHO Conditional Handover

ML Machine Learning

RLF Radio Link Failure

QoE Quality of Experience

# 4 Background

## 4.1 General

The NG-RAN AI/ML framework has been described in clause 4.2 of 3GPP TR 33.817 [2] and the related use cases which are captured in clause 5 of 3GPP TR 37.817 [2]. This document aims at studying the potential security handling of the NG-RAN AI/ML framework and the selected use cases.

The selected use cases in 3GPP TR 37.817 [2] are briefly described below.

## 4.2 NG-RAN use cases

Clause 5 of 3GPP TR 37.817 [2] includes the following use cases:

- Network Energy Saving: This use case is about cell activation/deactivation which is an energy saving scheme in the spatial domain that exploits traffic offloading in a layered structure to reduce the energy consumption of the whole radio access network (RAN). When the expected traffic volume is lower than a fixed threshold, the cells may be switched off, and the served UEs may be offloaded to a new target cell.

- Load Balancing: The use case is to distribute the load evenly among cells and among areas of cells, or to transfer part of the traffic from congested cells or from congested areas of cells, or to offload users from one cell, cell area, carrier or RAT to improve network performance. This can be done by means of optimization of handover parameters and handover actions.

- Mobility Optimization: The use case is to minimize performance loss due to unsuccessful or erroneous mobility management events. Mobility management is expected to guarantee the service-continuity during the mobility by minimizing the call drops, Radio Link Failures (RLFs), unnecessary handovers, and ping-pong. In the future, it is expected that handovers will be increasing in numbers as the coverage of a single node decreases and UE mobility gets higher and higher. In addition, for the applications characterized with the stringent QoS requirements such as reliability, latency etc., the Quality of Experience (QoE) is sensitive to the handover performance, so that mobility management should avoid unsuccessful handovers and reduce the latency during the handover procedures.

# 5 Key Issues

Editor's Note: This clause contains all the key issues identified during the study.

## 5.X Key Issue #X: <Key Issue Name>

### 5.X.1 Key issue details

### 5.X.2 Security threats

### 5.X.3 Potential security requirements

# 6 Solutions

Editor's Note: This clause contains the proposed solutions addressing the identified key issues.

## 6.0 Mapping between key issues and solutions

Editor's Note: This clause contains a table mapping between key issues and solutions.

## 6.Y Solution #Y: <Solution Name>

### 6.Y.1 Introduction

Editor's Note: Each solution should list the key issues being addressed.

### 6.Y.2 Solution details

### 6.Y.3 Evaluation

Editor's Note: Each solution should list the impacts to the system.

# 7 Conclusions

Editor's Note: This clause contains the agreed conclusions that will form the basis for any normative work.

Annex <X> (informative):  
Change history

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| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2022-06 | SA3#107Adhoc-e | S3-221573 |  |  |  | TR skeleton | 0.0.0 |
| 2022-07 | SA3#107Adhoc-e | S3-221650 |  |  |  | Version after incorporating changes in S3-221649. | 0.1.0 |