SLOVENSKI STANDARD
SIST EN 302 969 V1.3.1:2018

01-september-2018

Radijski sistemi z možnostjo preoblikovanja (RRS) - Preoblikovanje radia glede na zahteve za mobilne naprave

Reconfigurable Radio Systems (RRS) - Radio Reconfiguration related requirements for Mobile Devices

Ta slovenski standard je istoveten z: **ETSI EN 302 969 V1.3.1 (2018-05)**

ICS:

33.060.01	Radijske komunikacije na splošno	Radiocommunications in general

SIST EN 302 969 V1.3.1:2018 **en**

ETSI EN 302 969 V1.3.1 (2018-05)

Reconfigurable Radio Systems (RRS); Radio Reconfiguration related requirements for Mobile Devices

Reference
REN/RRS-0215

Keywords
CRS, mobile, SDR

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Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

This European Standard (EN) has been produced by ETSI Technical Committee Reconfigurable Radio Systems (RRS).

National transposition dates	
Date of adoption of this EN:	17 May 2018
Date of latest announcement of this EN (doa):	31 August 2018
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	28 February 2019
Date of withdrawal of any conflicting National Standard (dow):	28 February 2019

Modal verbs terminology

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1 Scope

The scope of the present document is to define the high level system requirements for reconfigurable Mobile Devices enabling the provision of Radio Applications. The work will be based on the Use Cases defined in ETSI TR 103 062 [i.1] and ETSI TR 102 944 [i.2].

2 References

2.1 Normative 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.

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

Not applicable.

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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] ETSI TR 103 062: "Reconfigurable Radio Systems (RRS); Use Cases and Scenarios for Software Defined Radio (SDR) Reference Architecture for Mobile Device".

[i.2] ETSI TR 102 944: "Reconfigurable Radio Systems (RRS); Use Cases for Baseband Interfaces for Unified Radio Applications of Mobile Device".

3 Definitions and abbreviations

3.1 Definitions

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

Functional Block (FB): function needed for real-time implementation of Radio Application(s)

NOTE 1: A functional block includes not only the modem functions in Layer1 (L1), Layer2 (L2), and Layer 3 (L3) but also all the control functions that should be processed in real-time for implementing given Radio Application(s).

NOTE 2: Functional blocks are categorized into *standard functional blocks* and *user defined functional blocks*. In more details:

1) *Standard functional blocks* can be shared by many Radio Applications. For example, Forward Error Correction (FEC), Fast Fourier Transform (FFT)/Inverse Fast Fourier Transform (IFFT), (de)interleaver, Turbo coding, Viterbi coding, Multiple Input Multiple Output (MIMO), Beamforming, etc. are the typical category of standard functional block.

2) *User defined functional blocks* include those functional blocks that are dependent upon a specific Radio Application. They are used to support special function(s) required in a specific Radio Application or to support a special algorithm used for performance improvement. In addition, a user defined functional block can be used as a baseband controller functional block which controls the functional blocks operating in baseband processor in real-time and to control some context information processed in real-time.

NOTE 3: Each functional block has its unique name, Input, Output and properties.

network coding: technique in which transmitted data is encoded and decoded to improve network performance

Radio Application (RA): software which enforces the generation of the transmit RF signals or the decoding of the receive RF signals

NOTE 1: The software is executed on a particular radio platform or an RVM as part of the radio platform.

NOTE 2: Radio applications might have different forms of representation. They are represented as:

- source codes including radio library calls of radio library native implementation and Radio HAL calls;
- Intermediate Representations (IRs) including radio library calls of radio library native implementation and radio HAL calls;
- Executable codes for a particular radio platform.

radio library: library of Standard Functional Blocks (SFB) that is provided by a platform vendor in a form of platform-specific executable code

NOTE 1: SFBs implement reference codes of functions which are typical for radio signal processing. They are not atomic and their source codes are typed and visible for Radio Application developers.

NOTE 2: An SFB is implemented through a Radio Hardware Abstraction Layer (HAL) when the SFB is implemented on dedicated HW accelerators. Radio HAL is part of ROS.

Radio Virtual Machine (RVM): abstract machine supporting reactive and concurrent executions

NOTE: A Radio Virtual Machine may be implemented as a controlled execution environment which allows the selection of a trade-off between flexibility of base band code development and required (re-) certification efforts.

reconfigurable mobile device: mobile device with radio communication capabilities providing support for radio reconfiguration

NOTE: Reconfigurable mobile devices include but are not limited to: smartphones, feature phones, tablets, laptops.

resources: hardware resources that a Radio Application needs in active state

NOTE 1: Resources are provided by the reconfigurable Mobile Device (MD), to be used by the Radio Applications when they are active. Radio Applications provide their resource needs (e.g. using operational states) so that the multiradio computer may judge whether these resources are available, in order to ensure non-conflicting operation with other Radio Applications. Resources may or may not be shared in the reconfigurable MD.

NOTE 2: Resources may include processors, accelerators, memory, Radio Frequency circuitry, etc.

3.2 Abbreviations

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

ASIC	Application Specific Integrated Circuit
BER	Bit Error Rate
CAT	CATegory
CR	Cognitive Radio
FB	Functional Block
FEC	Forward Error Correction
FFT	Fast Fourier Transform
HAL	Hardware Abstraction Layer
IR	Intermediate Representation
LTE	Long Term Evolution
MAC	Media Access Control
MD	Mobile Device
MDRC	Mobile Device Reconfiguration Class
MIMO	Multi-Input Multi-Output
MU-MIMO	Multi User- Multi-Input Multi-Output
PER	Packet Error Rate
PMI	Precoding Matrix Indicator
RA	Radio Application
RAT	Radio Access Technology
RF	Radio Frequency
RI	Rank Indicator
ROS	Radio Operating System
RRS	Reconfigurable Radio Systems
RSSI	Received Signal Strength Indication
RVM	Radio Virtual Machine
Rx	Receive
SDR	Software Defined Radio
SFB	Standard Functional Block
SINR	Signal to Interference-plus-Noise Ratio
SU-MIMO	Single User- Multi-Input Multi-Output
Tx	Transmit
UDFB	User Defined Functional Block
WiFi	Wireless Fidelity

4 Requirement organization and methodology

4.0 General

This clause is containing the description of how the requirements are organized and the related format.

4.1 Requirement organization

As shown in Figure 1, all requirements described in the present document belong to one single category (the functional requirements category). Requirements are, in turn, organized into groups.

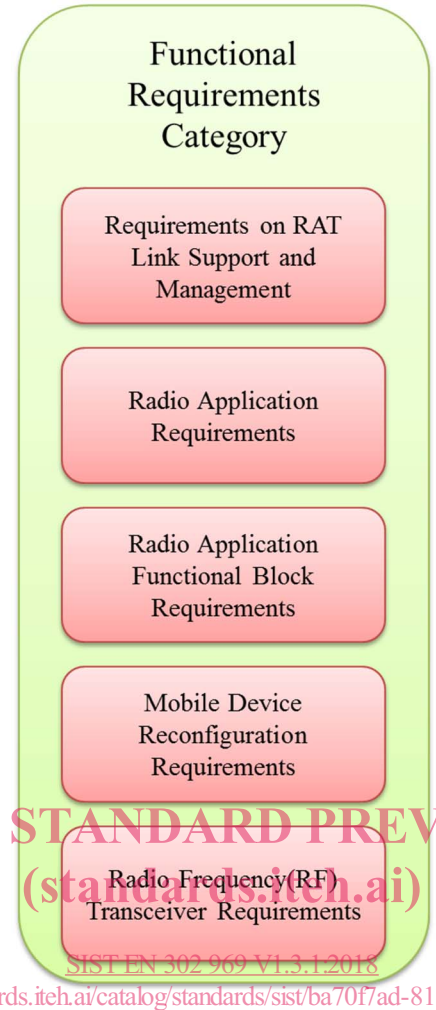

Figure 1: Overall requirements structure

4.2 Requirement format

A letter code system is defined which makes a unique identification of each requirement R-<CAT>-<GROUP>-<XX>. Each requirement is constructed as follows:

- R-: Standard requirement prefix
- <CAT>

Code	Category
FUNC	Functional aspects

- <GROUP>: Requirement group identifier. A letter code will be used for this identifier. The three first letters will give the identifier of the group
- <XX>: Requirement identifier within requirement group; range 01 => 99

EXAMPLE: R-FUNC-QOS-01.