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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Reconfigurable Radio Systems (RRS).

The present document is part 1 of a multi-part deliverable covering evolved Licensed Shared Access (eLSA), as identified below:

- Part 1: "System requirements";
- Part 2: "System architecture and high-level procedures".

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**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 concept of *local high-quality wireless networks* has been identified in ETSI TR 103 588 [i.1] as a collective term to enclose a kind of use cases targeting local area services requiring predictable levels of QoS, e.g. in vertical industrial sectors such as industrial automation, PMSE, PPDR and e-Health. Their need for predictable levels of QoS mostly preclude operation in a license-exempt spectrum, due to coexistence issues, and target exclusively licensed spectrum. However, due to the current scarcity of suitable exclusive licensed spectrum resources, which can be directly accessible by vertical local area service providers, spectrum sharing has been proposed in [i.1] as the enabling spectrum technology for introducing QoS enabled local area services in licensed bands.

NOTE: In the present document, the term "local area service provider" used in [i.1] is substituted by the term "MFCN operator". An MFCN operator refers to e.g. a vertical sector operator.

Three possible spectrum sharing schemes have been identified in [i.1] for providing local area services focusing on QoS in licensed bands:

- 1) MNOs can offer dedicated local area services in their licensed frequencies.
- 2) MNOs can lease part out of their spectrum locally to local area service providers.
- 3) Spectrum can be nationally licensed to local area services providers.

Scheme 1 addresses the hosting of *local high-quality wireless networks* as service network areas by MNOs. Schemes 2 and 3 target the deployment of *local high-quality wireless networks* as standalone private networks.

The use of scheme 2 is not limited to MNO bands, but any licensed band can be used where leasing is regulatory allowed.

All three spectrum sharing schemes aim to facilitate licensed spectrum sharing between local vertical sector operators, with specified geographical and temporal limits, and incumbents both in IMT and non-IMT bands. In this context, the focus on IMT-bands facilitates wide availability of equipment since those bands are also used by Mobile Network Operators (MNOs).

For enabling each of the three functional use cases, clauses 6.1 and 6.2 in [i.1] provide examples of functional architectures in a general sense and within the current LSA framework [i.2], [i.3] and [i.4], respectively.

The main advantage of embracing the LSA framework is that it aims to ensure a predictable level of QoS at a defined location for all spectrum resource users, i.e. LSA licensees and incumbents. The current LSA framework was designed to share spectrum resources between Incumbents and LSA Licensees acting as MNOs. However, the support of vertical local area service providers as a new type of LSA licensees, which asks for both shorter or longer time of spectrum resource deployments with a predictable QoS level, and the expected higher number of these new type of LSA licensees make it necessary to evolve the current LSA framework on both system and CEPT/NRA levels.

At the regulatory level, for instance, the role concept in LSA needs to be evolved opening the LSA method to include local vertical sector operators as licensees.

At LSA system level, Table 6 in ETSI TR 103 588 [i.1] lists an overview of identified potential functional enhancements to the current LSA system and the corresponding affected LSA entities.

The present document leverages on the findings in ETSI TR 103 588 [i.1] to technically specify the requirements for providing spectrum access for *local high-quality wireless networks* within the LSA framework [i.5].

1 Scope

The objective of evolving the LSA framework towards an eLSA (evolved LSA) system is to support spectrum access to local high-quality wireless networks operated by vertical sector operators, as introduced in ETSI TR 103 588 [i.1]. The present document specifies system requirements for that purpose.

ETSI TC RRS work on eLSA is of technical nature aiming to provide an automatic tool to facilitate spectrum sharing coordination between incumbents, NRAs and eLSA Licensees (e.g. vertical sector operators).

To meet the spectrum access demand and needs of local high-quality wireless networks, eLSA aims to offer technical means to facilitate the spectrum allocation procedure, including automatic local area licensing and leasing agreements, and to manage the conditions of spectrum use. The work is based on the generic aspects of the current ETSI specifications [i.2], [i.3] and [i.4] for Licensed Shared Access (LSA) in the 2 300 - 2 400 MHz band and on the functional enhancements proposed in ETSI TR 103 588 [i.1].

The work targets operation of local high-quality wireless networks in licensed bands to guarantee predictable QoS levels. It is agnostic to the radio frequency bands.

The work on eLSA is based on the LSA concept [i.5], i.e. same architecture, role assumptions and applicable functionality.

The requirements in the present document are intended to be used for the definition of an evolved LSA system architecture specification for providing spectrum access for local high-quality wireless networks.

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

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 103 588 (V1.1.1): "Reconfigurable Radio Systems (RRS); Feasibility study on temporary spectrum access for local high-quality wireless networks".
- [i.2] ETSI TS 103 154 (V1.1.1): "Reconfigurable Radio Systems (RRS); System requirements for operation of Mobile Broadband Systems in the 2300 MHz - 2400 MHz band under Licensed Shared Access (LSA)".

- [i.3] ETSI TS 103 235 (V1.1.1): "Reconfigurable Radio Systems (RRS); System architecture and high level procedures for operation of Licensed Shared Access (LSA) in the 2 300 MHz - 2 400 MHz band".
- [i.4] ETSI TS 103 379 (V1.1.1): "Reconfigurable Radio Systems (RRS); Information elements and protocols for the interface between LSA Controller (LC) and LSA Repository (LR) for operation of Licensed Shared Access (LSA) in the 2 300 MHz - 2 400 MHz band".
- [i.5] ECC Report 205: "Licensed Shared Access (LSA)", February 2014, CEPT WG FM PT53.
- [i.6] ETSI TR 103 113 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); System Reference document (SRdoc); Mobile broadband services in the 2 300 MHz - 2 400 MHz frequency band under Licensed Shared Access regime".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

allowance zone: geographical area within which an eLSA Licensee is allowed to operate radio transmitters on its assigned spectrum resource

NOTE 1: An allowance zone is defined using specific measurement quantities and thresholds, e.g. a maximum field strength level expressed in $\text{dB}\mu\text{ V/m/MHz}$, along the border of its geographical area.

NOTE 2: An allowance zone is normally applicable for a defined frequency range and time period.

eLSA licensee: entity operating a MFCN, which holds individual rights of use to an eLSA spectrum resource

NOTE: eLSA licensee role extends the scope of LSA licensees to include vertical sectors stakeholders (e.g. vertical local area communication service providers/operators).

eLSA spectrum resource: spectrum resource which is to be shared between an incumbent and an eLSA licensee on a static or dynamic basis according to the sharing framework defined by the administrations (NRAs)

eLSA system: system that enables and/or facilitates the realization of eLSA, and which comprises the eLSA specific technical features, architecture, protocols, and interfaces

incumbent: current holder of spectrum rights of use

lease: arrangement between the lessor and the lessee for using parts of the spectrum, a particular geographical area, or a combination of both, over a period of time

lessee: entity which holds right of use to a certain spectrum resource from a lessor under a lease

lessor: entity holding individual rights of use (license) to a certain spectrum resource, which leases out parts of his license to a lessee under a lease

protection zone: geographical area within which incumbent receivers will not be subject to harmful interference caused by eLSA/LSA licensees' transmissions

NOTE: A protection zone is defined using specific measurement quantities and thresholds (e.g. a mean field strength that does not exceed a defined value in $\text{dB}\mu\text{ V/m/MHz}$ at a defined receiver antenna height above ground level). A protection zone is normally applicable for a defined frequency range and time period.

restriction zone: geographical area within an allowance zone where an eLSA Licensee has to operate under certain additional restrictive conditions (e.g. maximum EIRP limits and/or constraints on antenna parameters)

sharing arrangement: set of practical details for sharing an eLSA and/or LSA spectrum resource

sharing framework: set of sharing rules or sharing conditions that will materialize the change, if any, in the spectrum rights of the incumbent(s) and define the spectrum, with corresponding technical and operational conditions, that can be made available for alternative usage under eLSA and/or LSA

spectrum resource: resource or set of resources defined in time, space and frequency domains

vertical sector operator: operator of a local high-quality wireless network (MFCN) addressing a vertical sector specific local connectivity needs

NOTE: The concept of "vertical sector" is used to name business sectors that have a need to use MFCNs to maintain their operations, such as the transport, the culture and creative, the industrial automation or the healthcare sectors. Different vertical sectors have different connectivity requirements: e.g. capacity, network quality, latency, communication security and reliability.

3.2 Symbols

Void.

3.3 Abbreviations

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

CEPT	Conférence Européenne des administrations des Postes et des Télécommunications
ECC	Electronic Communications Committee of the CEPT
EIRP	Effective Isotropic Radiated Power
eLSA	evolved LSA
IMT	International Mobile Telecommunications
LSA	Licensed Shared Access
MFCN	Mobile/Fixed Communication Network

NOTE: MFCN is used in the present document to refer to a local high-quality wireless network.

MNO	Mobile Network Operator
NRA	National Regulatory Administration
PMSE	Programme Making and Special Events
PPDR	Public Protection and Disaster Relief
QoS	Quality of Service

4 Requirement organization and methodology

4.1 Requirement organization

This clause contains a description of how the requirements are organized.

As shown in Figure 1, the requirements described in the present document belong to the category of functional requirements. This category, in turn, is organized into groups.

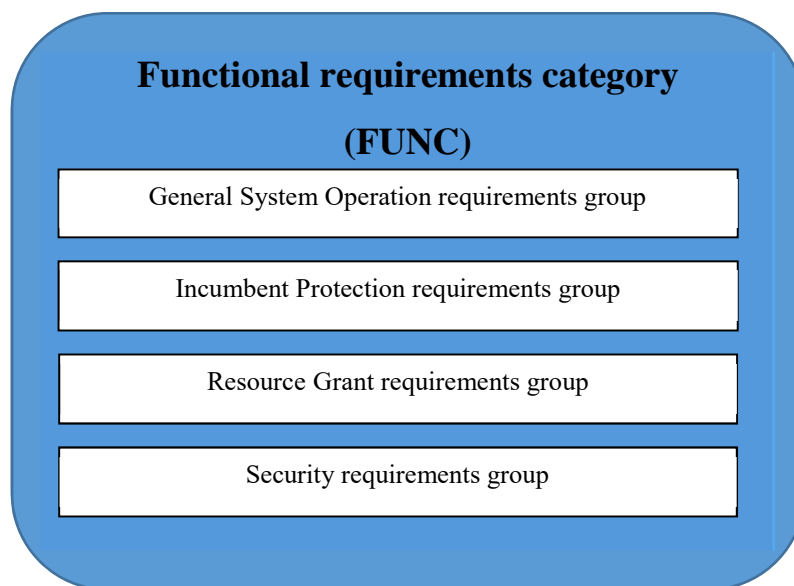


Figure 1: Organization of functional requirements

4.2 Requirement format

This clause describes the format of the requirements.

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

- R-: Standard requirement prefix
- <CAT>:

Code	Category
FUNC	Functional aspects

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

EXAMPLE: R-FUNC-GEN-01.

4.3 Requirement formulation

A requirement is formulated in such a way that it is uniquely defined. It is built as follows:

- Title: <Title Description>
- Description: the description of a requirement will be formulated using the ETSI modal verbal terminology

4.4 eLSA Roles

Requirements are formulated in regards of the "eLSA System" and make use of generic "eLSA roles". "eLSA roles" are based on "LSA roles" as introduced in ECC Report 205 [i.5]. eLSA Licensee role includes the lease/sub-lease case and extends the scope to vertical sectors stakeholders.