

ETSI TS 103 235 V1.1.1 (2015-10)



**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**

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Foreword

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

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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1 Scope

The present document specifies the system architecture for operation of mobile broadband service in the 2 300 MHz - 2 400 MHz band under Licensed Shared Access (LSA) [i.2] and [i.3], aimed at enabling access for mobile/fixed communication networks (MFCNs) in those CEPT countries where access to the band is foreseen but cannot be provided without restrictions due to Incumbent usage, as documented in ETSI TR 103 113 [i.1]. Application to other bands is not precluded and depends on future regulatory decisions.

The documented system architecture includes definition of the logical elements, reference points and functions supported by the architecture, and the definition of the procedures and procedure flows. The present document has been developed following, and in accordance with, the System Requirements for LSA as documented in ETSI TS 103 154 [1].

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 reference document (including any amendments) applies.

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

- [1] ETSI TS 103 154: "Reconfigurable Radio Systems (RRS); System requirements for operation of Mobile Broadband Systems in the 2 300 MHz - 2 400 MHz band under Licensed Shared Access (LSA)".

2.2 Informative 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 reference document (including any amendments) applies.

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 103 113 (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".
- [i.2] ECC Report 205: "Licensed Shared Access (LSA)", February 2014.
- [i.3] RSPG Opinion on Licensed Shared Access, RSPG13-538, November 2013.
- [i.4] IETF RFC 791: "Internet Protocol (IP)", September 1981.
- [i.5] ECC Recommendation (15)04: "Guidance for the implementation of a sharing framework between MFCN and PMSE within 2300-2400 MHz", July 2015.
- [i.6] CEPT Report 58: "Technical sharing solutions for the shared use of the 2300-2400 MHz band for WBB and PMSE", July 2015.

3 Definitions and abbreviations

3.1 Definitions

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

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

LSA spectrum resource: spectrum resource which is to be shared between an Incumbent and a LSA Licensee on a static or dynamic basis according to the Sharing Framework defined by the Administration/NRA

LSA spectrum resource availability information: information provided to a Licensee, which conveys the LSA spectrum resource that may be used by the Licensee, and the respective operational conditions

sharing arrangement: set of practical details for sharing an 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 LSA

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

3.2 Abbreviations

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

3GPP	3 rd Generation Partnership Project
DTLS	Datagram Transport Layer Security
ECC	Electronic Communications Committee of the CEPT
IP	Internet Protocol
IPsec	Internet Protocol security
ITU	International Telecommunications Union
LC	LSA Controller
LR	LSA Repository
LSA	Licensed Shared Access
LSRAI	LSA Spectrum Resource Availability Information
LTE	Long Term Evolution
MFCN	Mobile/Fixed Communications Network
NRA	National Regulatory Authority
OAM	Operation, Administration and Maintenance
RSPG	Radio Spectrum Policy Group
TCP	Transmission Control Protocol
TLS	Transport Layer Security
UDP	User Datagram Protocol

4 Architecture Model

4.1 Architecture Reference Model

The LSA Architecture reference model is shown in figure 4.1. Reference points shown in dashed format indicate that the respective interfaces and corresponding interface functions will not be defined in the present document, although some guidance is provided (see annex B).

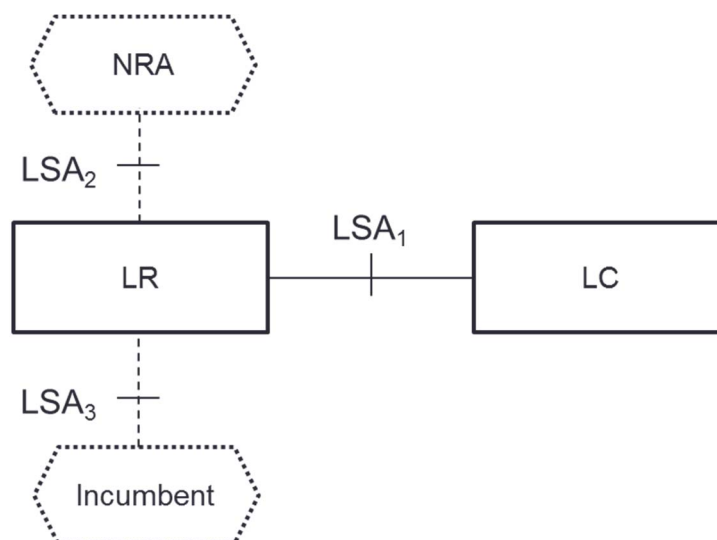


Figure 4.1: LSA Architecture Reference Model

4.2 Logical Elements

LSA Repository (LR): The LR supports the entry and storage of information describing Incumbent's usage and protection requirements [1]. It is able to convey the related availability information to authorized LSA Controllers, and is also able to receive and store acknowledgement information received from the LSA Controllers. The LR also provides means for the NRA to monitor the operation of the LSA System [1], and to provide the LSA System with information on the Sharing Framework and the LSA Licensees. The LR ensures that the LSA system operates in conformance with the Sharing Framework [i.2] and the licensing regime, and may in addition realize any non-regulatory details of the Sharing Arrangement [1].

LSA Controller (LC): The LC is located within the LSA Licensee's domain, and enables the LSA Licensee [1] to obtain LSA spectrum resource availability information from the LR, and to provide acknowledgment information to the LR. The LC interacts with the Licensee's MFCN in order to support the mapping of availability information into appropriate radio transmitter configurations, and receive the respective confirmations from the MFCN.

4.3 Reference Points

- LSA₁:** Reference point between LR and LC.
- LSA₂:** Reference point for Administration/NRA interaction with the LR. Some of the functionality associated with this reference point is described in annex B.
- LSA₃:** Reference point for Incumbent interaction with the LR. Some of the functionality associated with this reference point is described in annex B.

4.4 High Level Functions

4.4.0 Introduction

This clause lists and describes the high level functions performed by the LSA System. The high level functions cover the aspects of LSA System operation in line with requirements of ETSI TS 103 154 [1].

4.4.1 Information Entry Function

Allows the entry and storage of information that is needed for the operation of the LSA System, including the following:

- Sharing Framework information (set of sharing rules or sharing conditions for the band, information on spectrum that can be made available for shared use and the corresponding technical and operational conditions for its use, identification of incumbents).

- LSA License information (Licensee identity and related information).
- Sharing Arrangement information for each Incumbent and Licensee (set of practical details for sharing an LSA spectrum resource, whereby LSA spectrum resource may be used by Incumbent or LSA Licensee).
- Incumbent's LSA spectrum resource usage and protection requirements.

The function also supports the verification of inputs (consistency with Sharing Framework/Arrangement).

4.4.2 Information Processing Function

This function supports the derivation of LSA spectrum resource availability information for each Licensee, to be provided to the Information Exchange function for forwarding to the respective Information Mapping function of the LSA Licensee. The LSA spectrum resource availability information is derived based on the data collected by the Information Entry Function. The function further supports the processing of Licensee acknowledgment information.

The above functionality also includes support for multiple Incumbents and multiple LSA Licensees, scheduled and on-demand modes of operation, and logging of processing information.

4.4.3 Information Mapping Function

The information mapping function receives LSA spectrum resource availability information, confirms reception and initiates respective operations in the MFCN. It also sends acknowledgements to the information exchange function (for forwarding to the information processing function) when changes in the MFCN are processed.

NOTE: The respective interaction with the MFCN is out of scope of the present document.

4.4.4 Reporting Function

The reporting function is responsible to create and provide reports regarding the LSA System operation to Administration/NRA, Incumbent(s), and/or LSA Licensee(s) on an on-demand or scheduled basis.

4.4.5 LSA Information Exchange Function

The information exchange function supports communication mechanisms, internal to the LSA System, to exchange LSA spectrum resource availability information, and related acknowledgement information.

4.4.6 System Support Functions Group

The system support functions comprise:

Security Support Function: support of authentication and authorization as well as services to support integrity and confidentiality of data.

Robustness and Reliability Function: support of mechanisms to maintain robustness and reliability against failures and malicious attacks.

Fault Management Function: support of:

- failure detection in the LSA System;
- subsequent generation and delivery of respective failure notification(s) to LSA Licensee(s) and Incumbent(s);
- initiation of respective operations in the LSA System.

4.4.7 System Management Functions Group

This includes:

- Operation, administration and maintenance tasks in the LSA System.
- Identity management (comprising user identity and authentication management, and user authorization profiles).

System management is separate for LR and LC since these logical entities belong to different operation domains. The supported functionality may also be different in the two entities. Identity management applies to the LR only.

4.5 Mapping of High Level Functions to Logical Elements

Figure 4.2 shows how the high level functions and function groups are mapped to the logical entities LR and LC.

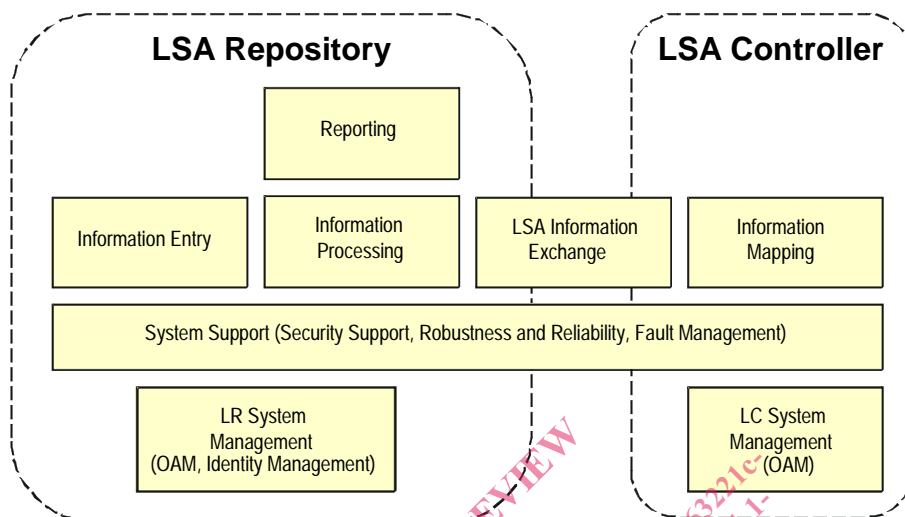


Figure 4.2: Mapping of high level functions and function groups to logical elements

The System Support functions group may be considered to map across all elements and reference points of the LSA System.

The corresponding functionality at the LSA₁ reference point is covered by the LSA Information Exchange function and the System Support functions group.

5 LSA₁ Functional Description and Information Flows

5.1 Introduction

This clause describes procedures, procedural flows and additional functional aspects related to the interface between LR and LC (LSA₁ interface).

The LSA₁ interface provides support for the exchange of LSA Spectrum Resource Availability Information (LSRAI, clause 5.4.2) and respective acknowledgement information between LR and LC, and for maintaining and recovering synchronization of such information between LR and LC.

5.2 Protocol Stacks

The LSA₁ application layer protocol shall ensure the application part, in LR and LC, conforms to the regulatory requirements, thereby the requirements on underlying transport protocols are kept to minimum. Supported network layer protocol is IP [i.4]. No LSA specific requirement is set on the transport layer protocol.

NOTE: Supported Transport layer mechanisms include TCP and UDP. Depending on the security requirements, use of IPsec, TLS or DTLS may be applicable.

5.3 LSA₁ Interface Management Functions

The LSA₁ Interface shall provide Management functions and corresponding procedures to ensure means for a defined start of interface operation and means to identify application or protocol failure.