Reconfigurable Radio Systems: NRA’s needs

ETSI workshop on Reconfigurable Radio Systems - Status and novel Standards

Sophia Antipolis, France, 3 - 4 December 2014
• General regulatory aspects and authorisation mechanisms
• Spectrum sharing and authorisation mechanisms
• Licensed Shared Access (LSA)
• Overview of ECC activities in TV WSD (White Space Devices)
• Cognitive PMSE
• RED 2014/53/EU: New elements
3 Layers

GLOBAL
- Recommendations Reports
- ITU
- Radio Regulations

REGIONAL
- CEPT
- EU
- ETSI
- Decision, Reports, Recommendations
- Decisions Recommendations
- Standards Harmonised standards

NATIONAL
- Government
- National Frequency allocation table
- General/Individual authorizations

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Regulatory options according to ECC Report 132:

1. Individual authorisation (Individual rights of use)
2. General authorisations (No individual rights of use)

Authorisations always come from the NRA

- Individual authorisation regimes:
  - Individual licence;
  - Light-licensing;
  - License-exempt

- General authorisations: if there is no defined need for limitation of the number of users, coordination or protection, then -> general authorisations (also more efficient / less effort for the administration)

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Spectrum sharing

• Spectrum: scarce resource but more and more users.
• Full harmonisation more and more difficult to achieve
• Current usage and spectrum demand may vary from country to country

• Need to find ways to share common spectrum, both for individual authorisations and general authorisations, in a flexible way
• Examples for sharing:
  • Licensed Shared Access
  • TV White Space
  • Use of geolocation database
Scope of LSA*

LSA is a complementary spectrum management tool that fits under an “individual licensing regime”.

LSA aim to facilitate the introduction in a frequency band of new users, which require a certain level of guarantee in terms of spectrum access, while maintaining incumbent services in the band.

LSA licensees and incumbents operate different applications and are subject to different regulatory constraints. They would each have exclusive individual access to a portion of spectrum at a given location and time.

* Based on ECC Report 205, ECC decision, ECC Recommendation

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Licensed Shared Access (LSA)

Radio spectrum

National Table of Frequency Allocations (NTFA)

Governmental use
- Defence
- Civil aviation
- Maritime & waterways
- Public safety
- Meteorology
- Radio Astronomy

Commercial use / non governmental (telecom, broadcasting, amateur, SRDs...)
- Individual authorisation
- General authorisation

Frequency assignments

Individual authorisation issued by NRA

General authorisation issued by NRA

Domain of use / regulatory regime

Fine technical management of frequency bands

National legislation governing the access to frequency bands

Natural physical resource

National legislation authorising the use of spectrum

Users

Users

National legislation from the radio spectrum to users

Note: in some CEPT countries, some governmental spectrum usage (e.g. for public safety) is treated under an individual authorisation regime like PMR/PAMR for the private sector.
Licensed Shared Access (LSA)

Regulatory process required before the introduction of MFCN in a band under LSA
The first practical use case of LSA is access to additional spectrum for mobile broadband services (MFCN) in 2.3-2.4 GHz.

- The implementation of LSA relies on the concept of a "sharing framework" that is under the responsibility of Administration/NRA. Its development requires the involvement of all relevant stakeholders.
- The "sharing framework" can be understood as a set of sharing rules or sharing conditions that will materialise the change in the spectrum rights of the incumbent and define the spectrum that can be made available for alternative usage under LSA.
- The practical implementation of LSA as a complementary solution for mobile operators to access spectrum for MFCN in specific bands.
- Technical conditions for MFCN harmonised (ECC Decision)
- Details of sharing framework decided at national level, depending upon incumbent use.

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In CEPT countries, the band 2300-2400 MHz is currently used by the following systems/services:

- Programme making and special events (PMSE) applications (SAP/SAB video links);
- Telemetry (both terrestrial and aeronautical telemetry);
- Fixed links
- Other governmental use (e.g. Unmanned Aircraft Systems (UAS));
- Amateur, as a secondary service.

The CEPT has recognised the importance of the availability of common and minimal (least restrictive) technical conditions for the band 2300-2400 MHz as well as the need to ensure a long term possibility for incumbent usage (ECC Dec 14/02)
An example of LSA functional blocks and interactions

- A Flexible approach for an architecture is needed!
Examples

- LSA impacts the national allocation of a frequency band, which is a sovereign decision on the destination of this public resource.
- LSA is to be implemented by administrations on a voluntary basis.
- National administrations decide which existing applications need to be considered as incumbent uses within the sharing framework and maintained in the long term according to national policy objectives, and taking into account international obligations and community law in the case of EU Member States.
- Some administrations may not make available all frequencies in the band 2300-2400 MHz for MFCN;
- that the introduction of MFCN in the 2300-2400 MHz band in one country can have an impact on incumbent usage in neighbouring countries and thus may require the need for cross-border agreement;
- that under LSA, spectrum is used by either the incumbent(s) or the LSA licensee(s), so that the latter has individual spectrum rights of use / access where and when the spectrum is made available by the incumbent(s), in accordance with the sharing framework defined beforehand;
- From technical point: A flexible architecture with the relevant interfaces for LSA
  - The current work in ETSI TC-RRS looks quite promising to cover the needs
Available CEPT Documents on LSA

- ECC Report 205 Licensed Shared access (LSA)
- ECC Decision (14) 02
  - Harmonised technical and regulatory conditions for the use of the band 2300-2400 MHz for Mobile/Fixed Communications Networks (MFCN)
- ECC Recommendation (14) 04
  - Cross-border coordination for mobile/fixed communications networks (MFCN) and between MFCN and other systems in the frequency band 2300-2400 MHz
Licensed Shared Access (LSA)

- **ECC Report 55 (subject to public consultation)**
  - Report A from CEPT to the European Commission in response to the Mandate on ‘Harmonised technical conditions for the 2300-2400 MHz (‘2.3 GHz’) frequency band in the EU for the provision of wireless broadband electronic communications services’
  - Technical conditions for wireless broadband usage of the 2300-2400 MHz frequency band.

- **ECC Report 56 (under development)**
  - Report B1 from CEPT to the European Commission in response to the Mandate on ‘Harmonised technical conditions for the 2300-2400 MHz (‘2.3 GHz’) frequency band in the EU for the provision of wireless broadband electronic communications services’
  - Technological and regulatory options facilitating sharing between Wireless broadband applications (WBB) and the relevant incumbent service/application in the 2.3 GHz band

- **Further Report to cover PMSE is under development**
White space is a part of the spectrum, which is available for a radiocommunication application at a given time in a given geographical area on a non-interfering / non-protected basis with regard to primary services and other services with a higher priority on a national basis.

- Opportunistic Spectrum Access
- Different to LSA because no QoS
Techniques enabling introduction of TV WSD

- Sensing: conduct a measurement within a channel, to determine whether any protected service is present
- Geo-location: CR systems to define their location and consult a “geo-location” database to determine which frequencies they can use at their location
- Beacons: signals to indicate that particular channels are either in use by protected services or vacant
What we have in CEPT:

- ECC Report 159: Technical and operational requirements for the possible operation of cognitive radio systems in the ‘white spaces’ of the frequency band 470-790 MHz
- ECC Reports 185 “Further definition of technical and operational requirements for the operation of white space devices in the band 470-790 MHz”
- ECC Report 186 “Technical and operational requirements for the operation of white space devices under geo-location approach”.
- WGFM: A summary and analysis of the questionnaire on PMSE protection in case of introduction of WSD in the 470-790 MHz band.

In progress:

- WGFM PT FM53 work item for creation of a new ECC Report for TV-WSD (White Space Devices) using geo-location. The aim is to describe the overall regulatory framework for TV WSD using geo-location databases and guidance for national implementation (target date Q1 of 2015).
- ECC never received a request (SRdoc) from ETSI on TVWSD.
ECC Report 204: Spectrum Use and Future Requirements for PMSE

Initial research activities on cognitive PMSE systems have been initiated in ETSI STF 386 and in a German research project funded by BMWI (German Federal Ministry of Economics and Technology) called C-PMSE.

**Great Potential:**
- Features several in-operation audio PMSE links can be transferred to less impaired spectrum when necessary – without noticeable interruptions;
- Can lead to more robust and more efficient use of spectrum, especially in UHF bands, including duplex band operations;
- It’s cognitive because operation frequencies are “monitored” constantly / service quality checked all the time. Existing audio PMSE systems check only before the event;
- A reaction to the changes in the UHF terrestrial broadcast spectrum;
- ETSI Technical Specifications as well as first demonstrator hardware available.
RED 2014/53/EU: New elements


  - Recitals (16).... The user, the radio equipment or a third party should only be able to load software into the radio equipment where this does not compromise the subsequent compliance of that radio equipment with the applicable essential requirements

  - Recitals (19).... Verification by radio equipment of the compliance of its combination with software should not be abused in order to prevent its use with software provided by independent parties. The availability to public authorities, manufacturers and users of information on the compliance of intended combinations of radio equipment and software should contribute to facilitate competition. ....delegated Act

- ensure that software can only be used with radio equipment after the compliance of that particular combination of software and the radio equipment has been demonstrated.
- In particular, the following Articles are concerned: Article 3(3) (i) and Article 4.
Examples:

- Possibility to provide Software by independent parties. How?
- Ensure proper interworking of HW/SW combinations (even when brought to the market as separate entities) How? Is that possible? Solutions?
- Facilitate traceability of ‘declarer of conformity’
- Collect device SW history information
- Provide elements to protect against illegal programming (hacking/etc.) to ensure that Article 3 is met.
Examples:

- Ensure that the equipment can be used only for the intended purpose declared.
- The responsibility for the product (HW/SW) is a key issue.

The European Commission should provide ETSI with an appropriate Standardisation Mandate in order to cover SDR under the RED.

- Current work in TC RRS would be a good base to start such a work.
- The activities in TC RRS to develop technical documents in support of the Radio Equipment Directive is fully supported.

Need for close co-operation with:

- Administrations Co-operation group (ADCO)
- European Commission
THANKS FOR YOUR ATTENTION