# Implementation of LSA in the 2.3 – 2.4 GHz band

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# Overview

- Overview on the European spectrum regulatory framework
- Regulatory status of the 2.3 – 2.4 GHz band for MFCN
- Compatibility studies within CEPT: BWS versus other systems in the 2.3 – 2.4 GHz band– ECC Report 172
- Why LSA in the 2.3 – 2.4 GHz band?
- Development of an ECC Decision for MFCN in the band 2.3 – 2.4 GHz including LSA
- Next steps towards harmonisation – EC
- Activities on standardisation

# Spectrum regulatory framework: CEPT, ECC and ECO

European Conference of Postal and Telecommunications Administrations

- 48 European countries cooperating to regulate posts, radio spectrum and communications networks

regulatory agencies and/ or ministries

The ECC is the part of the CEPT that deals with radio spectrum.

CEPT ECC Electronic Communications Committee

ECO european communications office

ECO: permanent office in Copenhagen.

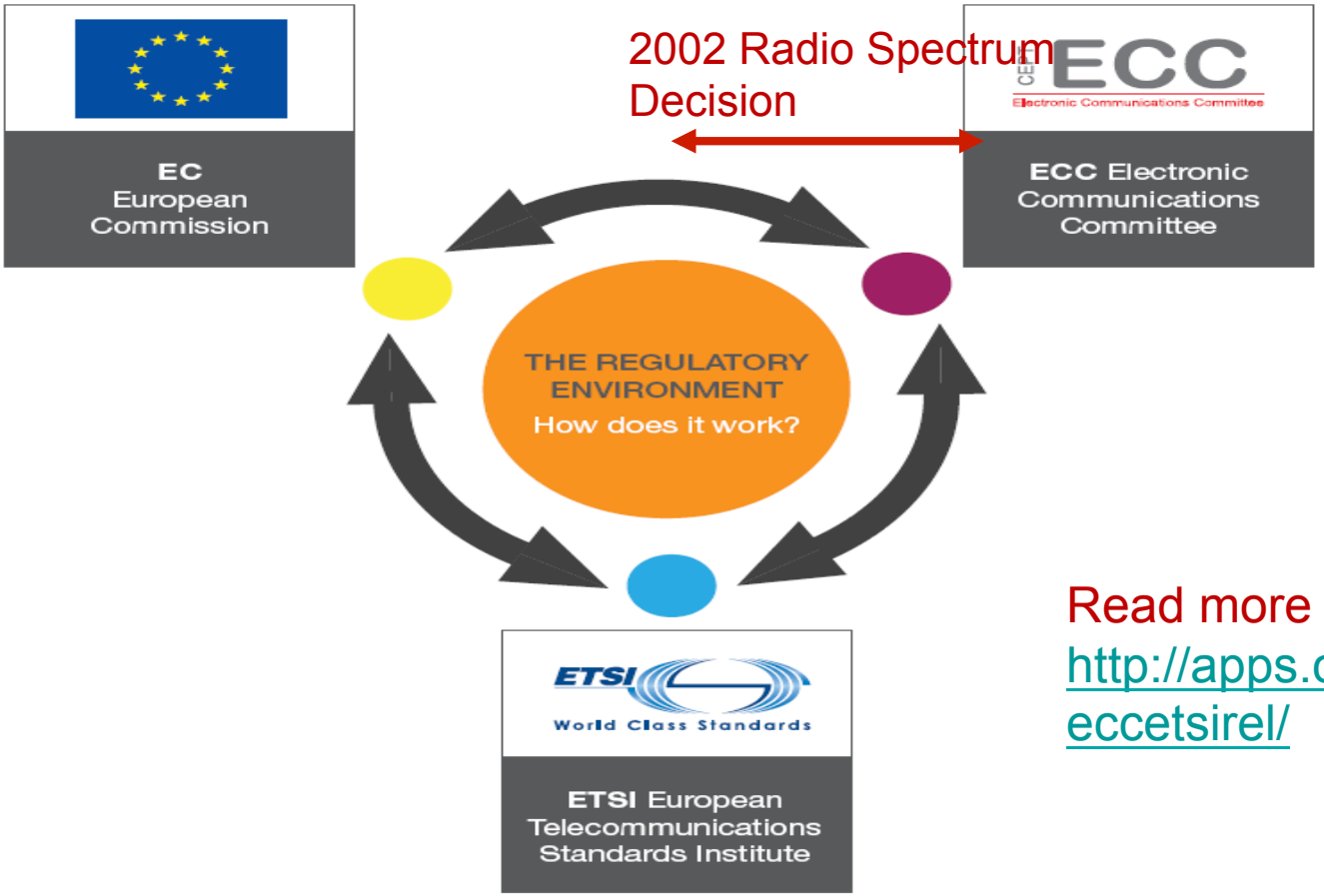
# Spectrum regulatory framework: three main players in Europe

**European Commission:**
Single market issues
Binding regulations through specific procedures with MS

**ECC:**
Spectrum allocation and technical conditions for its use
48 member countries acting together
Technical and regulatory expertise used by EC (Mandate to CEPT)

**ETSI:**
Equipment and system specifications: including 'spectrum use' characteristics
Recognised standards body for 'harmonised standards'
Makes 'System Reference Documents' which inform and trigger much of the ECC work
Largely industry-driven;

# European spectrum regulatory framework




european communications office

Read more at
http://apps.cept.org/eccetsirel/

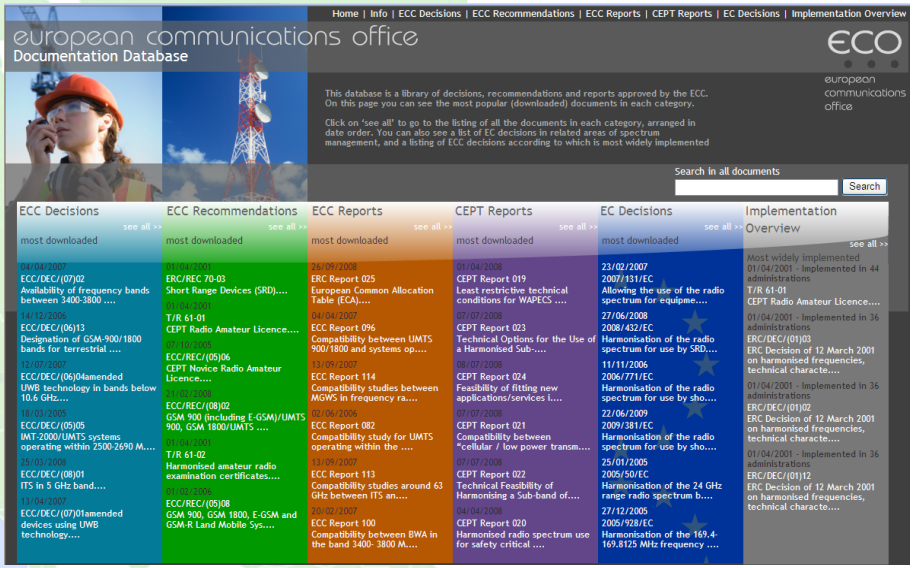
# Spectrum regulatory framework : role of the ECC in Europe

Consensus and voluntary character: flexible instrument of the national administrations

4 types of deliverable

- ECC Decisions
- ECC Recommendations
- ECC Reports
- CEPT Reports

http://www.ecodocdb.dk/




Activities triggered by the national administrations, the EC (Mandate) and ETSI (System Reference Documents)

# Spectrum regulatory framework : EFIS (ECO Frequency Information System)

Developed by the ECO  recognised by the EC as the tool on the harmonized availability of information regarding spectrum use in Europe

Tables of frequency available in EFIS  (www.efis.dk):

44 countries, including all EU member states

- ITU-R Region 1
- European Common Allocation (ECA) Table (also available as document: ERC Report 25)

Data types in EFIS:

1.Allocations (RR, ECA and all the National Tables of Frequency Allocation)
2.Applications (National Frequency Utilisation Plans)
3.Radio interfaces (mostly ECS and reference documents for unlicensed usage)
4.Documents (related to spectrum usage)
5.Right of use info (individual authorisations, mostly for ECS bands)

# Regulatory situation of the band 2.3-2.4 GHz for MFCN

- At WRC-07, 2.3-2.4 GHz allocated to the mobile service world-wide and identified to IMT. This identification does not preclude its use by other applications nor give any priority.
- Before and after WRC-07:
  - Some administrations expressed interest for IMT in this band;
  - Due to other uses, no agreement within CEPT to an harmonised implementation of this band.
- 2010: taking into account situation in other Regions and standardisation work, ETSI issued System Reference Document TR 102 837 “Broadband Wireless Systems in the band 2300-2400 MHz”, calling for compatibility studies that can be used by CEPT administrations wishing to implement BWS/IMT.
- March 2012: in response, ECC Report 172 is published.

## Compatibility studies for BWS in the band 2.3 – 2.4 GHz: ECC Report 172

- BWS systems: TDD based (LTE, WiMAX), 5-20 MHz channels;
- Studies performed for macro-cell deployment (worst case);
  - Compatibility BWS vs BWS and BWS vs other systems in 2.3-2.4 GHz
  - Compatibility BWS vs other systems in adjacent bands (<2.3; >2.4 GHz)
  - Compatibility for cross-border coordination
- Provides results as required separation distance and/or frequency separation and/or mitigation techniques.

## Compatibility studies BWS vs other systems in the band 2.3 – 2.4 GHz: ECC Report 172

- PMSE (includes SAB/SAP, ENG/OB):
  - Temporary video links, (portable, mobile with some allowance for airborne use) and cordless cameras
  - Generally confined to the limits of a defined area for an event limited in time
  - Coexistence in adjacent channel generally feasible (large separation for airborne PMSE reception)
  - Co-channel coexistence would require mitigation.
- Telemetry, including aeronautical telemetry and Unmanned Aircraft Systems
  - For aeronautical telemetry, airborne transmission and ground reception in the 2.3-2.4 GHz band
  - For UAS, both links (air-ground and ground-air) can operate in the band
  - Scheduled activities often planned well in advance
  - No co-channel, co-located compatibility. Need for separation distance and/or frequency separation and/or time sharing.
- Amateur Service: compatible with mitigation techniques.

## Why LSA for the deployment of MFCN in the 2.3 – 2.4 GHz band?

- IMT identification, standardisation, band unused in some countries
  ⟹ band attractive for MFCN.

- Band required for other applications in some countries with sharing requirements
  ⟹ traditional approach (exclusive) for an harmonised CEPT implementation of MFCN not appropriate.

- The nature of the incumbent use: governmental, planned and/or limited in time and or location, and results from ECC Report 172
  ⟹ introduction of MFCN may be possible on a shared basis with appropriate provisions.

ECC decided to study the applicability of LSA for MFCN in the 2.3-2.4 GHz band.

## Development of an ECC Decision for MFCN in the band 2.3 – 2.4 GHz including LSA

- October 2012: FM52 created with the Mandate to:
  - develop a draft ECC Decision, aimed at harmonising implementation measures for MFCN in 2300-2400 MHz including regulatory provisions based on LSA ensuring the long term incumbent use of the band in the territory of the administrations that wish maintain such use;
  - develop a draft ECC Recommendation on border coordination in the band 2300-2400 MHz
- Draft deliverables approved for public consultation in February 2014, http://www.cept.org/ecc/tools-and-services/ecc-consultation
- Publication expected in June 2014.
- Details at: http://www.cept.org/ecc/groups/ecc/wg-fm/fm-52

# Draft ECC Decision for MFCN in the band 2.3 – 2.4 GHz including LSA

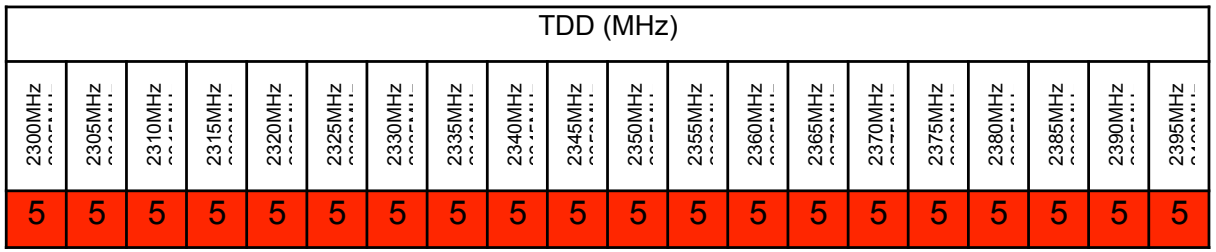
- Purpose: to provide harmonized technical and regulatory conditions for the use of the band 2300-2400 MHz for MFCN.
- **Subject to national considerations**, the frequency band 2300-2400 MHz is made available for MFCN, **while enabling administrations to maintain the use of the band by incumbent services**

⟹ “Soft” harmonisation compared to other bands for MFCN

# Draft ECC Decision for MFCN in the band 2.3 – 2.4 GHz including LSA

Harmonised implementation measures for MFCN:

- harmonised frequency arrangement – 20 blocks of 5 MHz suitable for TDD;




- Least restrictive technical conditions developed as Block-Edge Mask, containing in-block and out-of-block power limits for BS and in-block power limit for UE.
- BEM have been derived to allow coexistence between MFCN adjacent blocks in the 2300 -2400 MHz band.
- Operators of MFCN in the 2300-2400 MHz band may agree, on a bilateral or multilateral basis, on less stringent technical parameters.
- Additional conditions may be required for the protection of other services in adjacent bands on a case-by-case basis.

## Draft ECC Decision for MFCN in the band 2.3 – 2.4 GHz including LSA

administrations wishing to introduce MFCN in the band, and maintain the long term incumbent use of the band in their territory implementing Licensed Shared Access (LSA), should develop appropriate sharing framework following the guidelines described in the ECC Decision:

- Describes potential MFCN deployments
- Describes potential incumbent use

- Details for the implementation of LSA left to national administrations to increase flexibility and efficient sharing.

- For administrations without incumbent use, traditional exclusive rights for MFCN can apply.

## Draft ECC Decision for MFCN in the band 2.3 – 2.4 GHz Guidelines for LSA

Administrations

- need to determine which incumbent applications need to be considered,
- may consider results from ECC Report 172 for the determined incumbent use for preliminary assessment of sharing opportunities,
- are strongly advised to conduct national studies:
  - propagation model with terrain model,
  - technical characteristics corresponding to the national situation,
  - MFCN topologies (macro, micro, pico…)

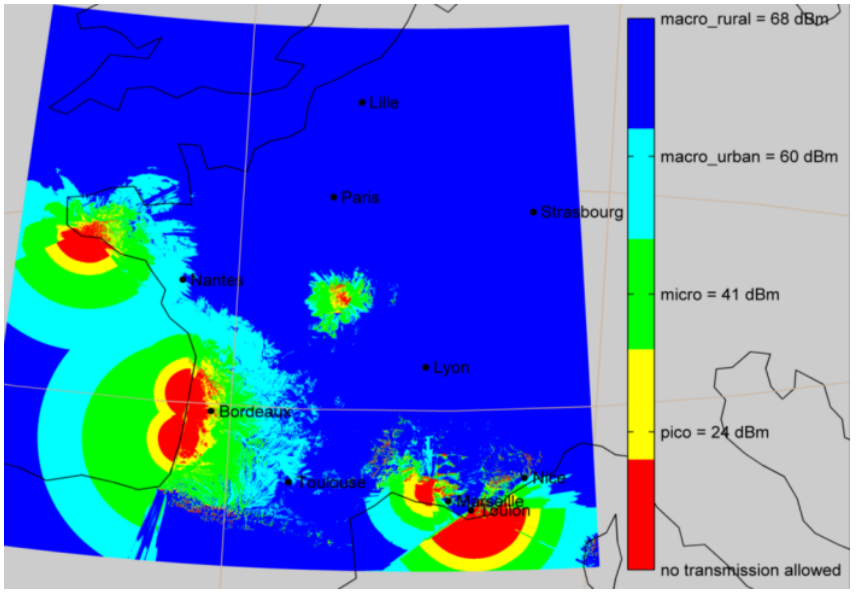
# Draft ECC Decision for MFCN in the band 2.3 – 2.4 GHz
# Example of studies for LSA

❑ Example 1: static geographical sharing in France: impact from MFCN BS into aeronautical telemetry receiver - one example of simulation to show where BS could be deployed (this is not the final deployment map)

macro-rural 45m
macro-urban 30m
micro 6m
pico 1.5m

1 BS in simulation

Protection level:
N - 6 dB
(ECC Report 172)




As a second step, study the impact of aeronautical telemetry on MFCN to assess potential QoS

❑ Example 2: dynamic sharing with temporary incumbent use (e.g. PMSE) through use of geolocation database.

## Next steps towards harmonisation within the EU ?

- Draft Mandate from EC to CEPT under consideration (RSCOM, March 2014)
- Aim: develop technical conditions for the introduction of wireless broadband (WBB) in the 2300-2400 MHz ('2.3 GHz') band including technical conditions for sharing with incumbent users.
- Challenge: providing EU-wide technical conditions whilst reflecting national circumstances.

## Standardisation activities

- Band 2.3-2.4 GHz covered in the 3GPP specifications on LTE-TDD and reflected on the ETSI TS 136-series documents.
- Activities in ETSI (TC RRS) for the specifications allowing the implementation of LSA in the 2.3-2.4 GHz band:
  - System Reference Document: ETSI TR 103 113 “Mobile Broadband Services in the 2 300 MHz – 2 400 MHz Frequency Band under Licensed Shared Access Regime” published in 2013
  - TS 103 154 “System requirements for operation of Mobile Broadband Systems in the 2300 MHz - 2400 MHz band under Licensed Shared Access (LSA) regime”;
  - New work on TS “System Architecture and High Level Procedures for operation of Licensed Shared Access (LSA) in the 2300MHz – 2400 MHz Band”.

Thanks for your attention

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