



# International Consortium for Telemetry Spectrum



## ICTS REGION I REPORT

*Update 2015*

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# Agenda



- L , S & C-Band in Europe, **AMT and Common Allocations**, **European C-band introduction**.
- „**Licensed Shared Access**“(LSA) *and* „**Licensed Assisted Access**“(LAA)-LTE, **a threat potential ?**
- WRC-15 Action Items, **CEPT positions** and its **threat potential**
- **Conclusions**



# L-Band in Europe



- AMT L-band use deleted in 1997, as a consequence of WRC-95 allocations to the S-DAB service (CEPT / ERC Rec. 62-02E)
- But **L-band still used** in the
  - Russian Federation** 1429 – 1535 MHz (et al.)
  - Switzerland** 1435 - 1445 MHz
  - UK** 1427 – 1452 MHz
- CEPT decided to review „use of the **1452 – 1492 MHz** band (PT FM50) as „prime spectrum for new services and applications, bringing social and economic benefits for Europe“. Work of PT FM50 concluded.



# Present AMT allocations in Europe



- S-band for ATM (CEPT/ERC Rec.62-02E)
  - Core band 2300 – 2330 MHz
  - Extension band 2330 – 2400 MHz

*Countries implemented: 6; planned: 2; study: 2; no:12.*  
*Some countries still use 2295-2300 MHz (dedicated to deep space TM !)*

- WRC-07 C-band global 5091 – 5150 MHz
  - Region 1 5250 – 5250 MHz

*That is the only **real harmonized AMT band in Europe !***



# S - Band ATM allocations in EU-countries



- Czech R. 2300 – 2328 MHz aeronautical
- France 2200 – 2300 MHz Eurocopter, Dassault
- Germany 2300 – 2350 MHz civil and military
- Greece 2025 - 2105 MHz military
- Italy 2200 – 2290 MHz civil
- Sweden 2290 – 2485 MHz military and civil
- Switzerl. 2310 – 2320 MHz military
- UK 2310 – 2350 MHz military and civil

**Ref: European Frequency Information System (EFIS) 2014 and national sources.**



# 2300-2400 MHz

## European Common Allocations



- Amateur Radio Service 2320 – 2450 MHz
- Aeronautical Mobile Telemetry 2300 – 2400 MHz
- **BWS – Usage (BWA, LTE / WiMAX) 2300 – 2400 MHz**
- Medical Implants (LP-AMI) 2360 – 2400 MHz
- Medical Telemetry (MBANS) 2360 – 2400 MHz
- Short Range Dev. (SRD, Ind.+ UWB) 2360 – 2400 MHz
- **Video Links (PMSE SAP / SAB) 2320 – 2400 MHz**

[Results of a questionnaire to CEPT Admins](#) „Current & Future Usage 2300 – 2400 MHz“ ECC FM(12)017:

**Current use: PMSE applications (27 countries)**

**Future use: IMT (incl. LTE or WiMAX), BWA (16 countries)**



# 5091-5250 MHz

## European Common Allocations



- Aer. Mobile (Route) Service 5091 – 5250 MHz
- **Aer. Mobile Telemetry  
MHz** **5091 – 5250**
- Fixed Sat. Service (uplink) 5091 – 5250 MHz
- Aero Radio Nav. Service (ext.) 5091 – 5150 MHz
- **WLAN (indoor)** **5150 – 5250 MHz**
- Public Mobile Service 5150 – 5250 MHz



# European C-band introduction



- **Austria:** Payload tests for border surveillance
- **France:** Airbus to test AB 350 et al.  
*Spain* may be later part of the Airbus network.
- **Germany:** DLR and Fraunhofer doing operational tests, Airbus Mil. & Space C-band vs. S-band evaluation. Airbus-Eurocopter in planning status, ops. expected from 2017 on.
- **The Netherlands:** NRL, systems procured.
- **Sweden & Norway:** VIDSEL Range: procurement C-band tracking station in process, test flights in 2014. Andoya Range pondering to introduce C-band.
- **Switzerland:** Armasuisse in planning status for 2017-2020.
- **UK:** BAES and Qinetiq in planning status.





## C- Band test activities



- **Airbus Toulouse** regular FT with 10 Mbps 10W onboard with C-band gnd network, now with OFDM Transmitter.
- **Airbus Defense and Space** prepared FT C-band vs. S-band, with small aircraft and Tornado.
- **Airbus Helicopters** did successful evaluation flights, using a Zodiac test system (5W, COFDM).
- **Vidsele Range** in Sweden did flight tests S-band vs. C-band (with Helicopter), inclusive interference studies from their C-band Radar.



# Licensed Shared Access (LSA)

## Philosophy



- **LSA** is seen as enabler to release additional spectrum for mobile broadband services, sharing with incumbents, on a secondary basis ***assessing protection of existing services.***
- Aimed for implementation of full country covering BWS networks !
- **ECC Report 172: *Sharing with incumbent services as a secondary service feasible***, by proper mitigation techniques (adjacent channel ops, geographical separation, time sharing)
- Concept put forward by the „Radio Spectrum Policy Group“ (RSPG), supported by **DIGTALEUROPE.**



# AMT S-band threat by LSA:

## *Preparing the final report*



- **Modifications** to the final report from **CEPT to the European Commission** were accepted, as recommended by the ICTS :
- **PFD by interferers** must be in accordance with ITU(R) M1459, not more than **-180dB/m<sup>2</sup>** (in any 4KHz part of the AMT signal).
- **Availability** of transmitted **AMT data** (with high integrity) must be better than **0,995** of the test period.
- The German Spectrum Agency was **key** for doing that.



# LSA final report and proposed studies by ITU(R)



- Draft final report of FM52 on *„technological and regulatory options for sharing between WBB and the relevant incumbent services/applications in the 2,3 GHz band“* accepted as CEPT Report Nr. 52 !
- New proposal for further work in ITU(R) Study Groups:  
WP1B: *“to develop the regulatory frame conditions for LSA implementation“*  
WP5A: *“to study the necessary mitigation techniques“*
- With LSA issues on ITU-level one might expect to expand the LSA-idea from a regional to a global level !!



# Brand-new attack: LAA-LTE in AMT C -Band



- Licensed Assisted Access (LAA) idea is, that LTE cells operating in other bands synchronise secondary cells in C-band, 5150-5250 MHz (that band presently allocated to indoor WLAN on a power level +23 dBm, only !)
- But **indoor ops is not mentioned** (would make no sense!)  
Outdoor cells can affect AMT Ops..ICTS has to monitor further intentions & studies in band 5150 -5250 MHz, that is allocated to Telemetry in Region 1 and Region 2 (Brasil).



# On the way to WRC-15



- The **Conference Preparatory Meeting** (CPM-2) defining the „roadmap“ of the WRC-15 (on basis of SGs) was concluded.
- **Action items critical to AMT** are in the Report to the WRC-15 in **chapter 1 „mobile and amateur issues“** (AI 1.1) **chapter 3 „aeronautical, maritime and radiolocation issues“** (AI.1.5, 1.17) and **chapter 4 „satellite services“** (AI.1.7).
- The **CEPT Conference Preparatory Group** (CPG) and their Project Teams try to show a **European Common Position** (ECP) to the WRC- Action Items.
- **RR Article 5 footnotes** are foreseen or modified, **to protect AMT ops** as part of the AMS, in L-band and C-band.



# WRC-15 Action Item 1.1

## CEPT ECP



### 1.1 "to seek additional spectrum for IMT\* "

\*(International Mobile Telecommunications)

- CEPT supports 1427 – 1518 MHz

AMT 1427- 1452 MHz protected by RR Article 5 footnote, in countries of further use (RR 5.342); use of AMT in 1452 – 1492 MHz requires prior agreement from neighboring countries !

Bands **not** supported for mobile broadband services:

1518 – 1525 MHz, 1695 – 1710 MHz

2025 – 2110 MHz, 2200 – 2290 MHz, 4400 – 4950 MHz

- ATU supports 1350 -1400 MHz; 1427 – 1518 MHz

NOC 1518 -1525 MHz; 1695 – 1710 MHz

- ASMG supports 1452 – 1518 MHz



# Resolution 223 (Rev. WRC-12)

## Additional Frequency bands identified for IMT



- Band **2300 – 2400 MHz** coming also in view for further studies due to Resolution 223 (Rev. WRC-12), independent of the FM 52 LSA initiative.
- 1710-1885 MHz; **2300-2400 MHz**; 2500-2690 MHz  
are **identified for use or already used by administrations**“.
- „...invites ITU-R to study **implications of sharing IMT to develop harmonized frequency arrangements for the band 2300-2400 MHz**“.
- **Comment:**  
„**Not getting full ECP support from all member countries, e.g. no-go from Germany to protect primary services**“





# WRC-15 Action Item 1.5 CEPT ECP



- **1.5 “use of bands allocated to the FSS for C<sup>2</sup> of UAS”**

Band 5150 – 5250 MHz not more discussed as a candidate.

**Currently from CEPT side no threat to AMT.**

**But FCC WRC-15 Advisory Committee approved a proposal with “revisions for spurring UAS with FSS, on use of band 5091 – 5150 MHz” !**

*(Ref. World Radiocommunication Report, 31 Aug. 2014)*



# WRC-15 Action Item 1.7

## CEPT ECP



- 1.7 “review the use of band 5091-5150 MHz by the FSS”
  - CEPT supports Res. 114 (WRC-12) ,” **..but AMT must be protected” (RR 5.444B)**
  - „The allocation reviews of other services may create an impact on the status of Aeronautical Mobile Telemetry (AMT)! „
  - **New Action by WP4A:** Draft CPM-text to revise Res.748, to **delete** the noted aggregate interference level between AM(R)S and AMT!



# Resolution 114 (Rev.WRC-12)

## Compatibility studies of new systems, ARNS and FSS at 5091-5150 MHz



- „...that the **allocation to the ARNS and the FSS** in the frequency band 5 091-5 150 MHz to be **reviewed** at a future competent conference **prior to 2018**“.
- „...that **studies** be undertaken on **compatibility between new systems** of the ARNS and systems of the FSS providing feeder links of the non-GSO systems in the MSS (Earth-to-space)“.
- The **Aeronautical Mobile Service (AMS)** was not mentioned as part of that proposed studies !



# Coming Issue of ITU(R) *WP5B „Aeronautical Group“*



- The report of the 14th meeting of WP5B did address the **“development of a new report on protection criteria for aeronautical (and maritime) applications”**
- **AMT in the 5 GHz- band**, as part of the Aeronautical Mobile Services (AMS) **will be concerned**, too.
- Some ITU-member countries proposed this new study and **AMT experts** are **invited to participate** in the coming discussions.
- Actual **work** on the coming **new study** will be initiated in a meeting **after WRC-15**, **in early 2016**, likely.



# WRC-15 Action Items 1.17

## CEPT ECP



- **1.17 “spectrum requirements including aeronautical allocations to support wireless avionics intra-communications”**

5091 – 5150 MHz not more discussed as a target band.

**Currently no AMT threat in Region 1, due to protect the incumbent AMS, AM(R)S and ANRS allocations !**



## **WRC-15 Action Item 10: New AI proposed for WRC-19**



- „to consider sharing technologies or mitigation techniques applicable to Wireless Access Systems (WAS) incl. Broadband Wireless Access (BWA) in the 5 GHz Range***

***Supported by 3 CEPT countries, but also by the ATU !***

***(That proposal was on priority position 2 of the AI list, in Sept. 2015)***



## New AI being tried to propose, (but too late for WRC-15 AI 10)



- Industry 4.0, „**Smart Manufacturing**“, is on the roadmap to standardisation, supported by **ETSI, IEC, ISA, IEEE, OneM2M et.al.**
- Industrial radio links presently in the 2,4 GHz band, investigating possible allocations from 1,5 – 6 GHz, spectrum requirements 80 MHz of bandwidth.
- **Candidate for studies 2340 - 2400 MHz**  
**5150 – 5250 MHz**

**Too late for WRC-19**, but will be **discussed** in the **ITU(R) Radio Assembly**, to **define a study group!**



# Conclusions (1)



- **EU harmonisation level for S-Band still poor** (implemented in 6 countries, only); C-band use in progress (Austria, France, Germany, the Netherlands, Spain, Sweden, UK)
- **The LSA intentions continue, for 2300-2400 MHz..** But the report of CEPT/ECC to the European Commission contains now at least the protection criteria, as proposed by European ICTS members.
- **. 2300-2400 MHz** is already ***under severe threat*** by Res. 223 (WRC-12), further with **AI 1.1** (WRC-15) and the **LSA** lobby intentions.





## Conclusions (2)



- 5091-5150 MHz may come under threat by AI 1.7 and follow-up studies towards the WRC-19.
- 5150-5250 MHz considered by the LSA lobby as one candidate band for RLAN, WiFi and WiMax !
- 5150-5250 MHz considered by the LAA lobby as one candidate band for secondary LTE-cells.
- New AI WRC-19: „to study sharing technologies and mitigation techniques for WAS and BWA in the 5 GHz range“, 5150-5250 MHz is target band, too.



# References



- CEPT-Brief, CPG-18-08, Bergen, September 2015
- Report of the CPM on operational and regulatory / procedural matters to the WRC-15, ITU(R), April 2015
- Technological and Regulatory Options for Sharing between WBB and the relevant incumbent Services/Applications in the 2,3 GHz Band, CEPT Report Nr. 52, May, 2015.
- CEPT Report to the EC in Response for the Mandate on Harmonised Technical Conditions for 2300-2400 MHz in the EU, „for provision of wireless broadband communication systems“, FM 53, Sept. 2014
- Pos.Paper on Licensed Shared Access, DIGTALEUROPE, 2013
- Protection for Aeronautical Telemetry Systems in the Frequency Band 1429 – 1535 MHz, Russian Federation, Doc. 5B /221-E, May 2013
- Broadband Wireless Systems Usage in 2300 – 2400 MHz, ECC Rep. 172, March 2012



# For more information



- European Communication Office (ECO)

[www.ero.dk](http://www.ero.dk)

- European Frequency Information System (EFIS)

[www.efis.dk](http://www.efis.dk)

- CEPT / ECC Study Groups

[www.cept.org/ecc](http://www.cept.org/ecc)

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# Questions / Discussion