International Consortium for Telemetry Spectrum

ICTS REGION I REPORT

Update 2017

Region I Coordinator: Gerhard Mayer

Former Chair ICTS

Presented by Mr. Renaud Urli

Chair European Society of Telemetry (EST)

gmayer@gvm-consultants.com

Agenda

- **L , S & C-Band in Europe, AMT and Common Allocations**
- **„Licenced Shared Access“(LSA)** *and* **„Licensed Assisted Access“(LAA)-**LTE, **a threat potential ?**
- **Industry 4.0 „**Smart Manufacturing“ and **M2M**, **a future threat ?**
- **WRC-19 Action Items,** issues impacting AMT

- **Conclusions**

Frequency Spectrum Stewardship

for Aeronautical Mobile Telemetry (AMT)

- Provide an independant assessment of ITU-Region 1 issues & positions that could impact AMT capabilities, in preparation of the WRC-19.
- Sources of information (meetings & reports) from:

  CEPT, *European Conference of Postal & Telecommunications*

  RCC, *Regional Commonwealth in Communications*

  ASMG, *Arab Spectrum Management Group*

  ATU, *African Telecommunication Union*
- **ITU(R)** Preparation Process for WRC-19, conferences & meetings: Reports from Study Groups, Joint Task Groups, Working Parties

AMT: L-Band in Europe

- AMT L-band ***still used*** despite of CEPT / ERC Rec. 62-02E (1997) ,as a consequence of the WRC-95 allocations to the Satellite - DAB service in that band:

Russian Federation & Allies	**1429 – 1535 MHz**
France	**1427 – 1429 MHz**
Switzerland	**1429 - 1445 MHz**
Spain &UK	**1427 – 1452 MHz**

- ***Res.223*** *(Rev.WRC-15):* **1427-1452 MHz**, 1492-1518 MHz identified for IMT worldwide;

  1452-1492 MHz in Region 2+3; in Region 1 in some African and Middle-East countries, only : **not supported by CEPT.**

- ***RR Article 5 footnotes*** **included to protect AMT ops !**

AMT: S- & C Band in Europe

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

  Some countries still use parts of 2025 - 2300 MHz !!

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

  That is the only real harmonized AMT band in Europe !

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 questionaire 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

- **A**er. **M**obile (**R**oute) **S**ervice 5091 – 5250 MHz
- **A**ero **M**obile **T**elemetry **5091 – 5250 MHz**
- **F**ixed **S**at. **S**ervice (uplink) 5091 – 5250 MHz
- **A**ero **R**adio **N**avation **S**ervice 5091 – 5150 MHz
- **WLAN (indoor) 5150 – 5250 MHz**
- **P**ublic **M**obile **S**ervice 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-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 concluded. Andoya Range in introduction process.
- **Switzerland:** Armasuisse in planning status for 2017-2020.
- **UK:** BAES and Qinetiq in planning status for 2017 onward.

C- Band test activities

- **Airbus Toulouse** regular FT with10 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).
- **Vidsel Range** in Sweden did flight tests S-band vs. C-band (with Helicoper), inclusive interference studies from their C-band Radar.

Licenced Shared Access(LSA)

Threat for the AMT S-Band ?

- **LSA** is seen as enabler to release additional spectrum for **Mobile Broadband Services**, sharing with incumbants, on a secondary basis ***assessing protection of existing services.***
- Concept put forward by the **„Radio Spectrum Policy Group“** (RSPG), supported by **DIGTALEUROPE.**
- ***ECC Report 172:*** *„**Sharing with incumbent services** as secondary service **feasible***, by proper *mitigation techniques*“ (adjacent channel ops, geographical separation,time sharing)
- **Modifications** to the final report were accepted, **as recommended by the ICTS :**

  - **PFD by interferers** must be not more than **-180dBm**

  (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.*

LSA final report and proposed studies by ITU(R)

- ***CEPT Report Nr. 52:*** describing the ***„technological and regulatory options for sharing between WBB and the relevant incumbent services/applications in the 2,3 GHz band“*** *was released.*
- **LSA Demo & Testing** supported by **Italy,** Finland, **France**, The Netherlands and Spain (and their industrial partners) further by the **Joint Research Centre** of the **E**uropean **C**ommission, started from Oct. 2015 up to Jan. 2017.
- **Further work** was proposed to delegate to the **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 an ITU-level the **LSA-idea** is on way 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, **5150-5350 MHz** (that band is presently allocated to indoor WLAN on a power level +**23 dBm**, only !)

- **Outdoor cells can affect AMT Ops**..ICTS has to monitor further intentions & studies in band **5150 -5250 MHz**, with ***Res. 418 (Rev.WRC-15)*** allowing now a **global allocation** for AMT in future !!

LTE- Advanced
Standard „Advanced-Pro“

Europe: (introduction from ***2017 onward***, in planning status!)

LAA-LTE bands 5150 – 5350 MHz; 5470 – 5725 MHz

in band 5150 – 5250 MHz: 5 channels x 20 MHz

The Americas:

LTE-U bands 5150 – 5250 MHz; 5250 – 5750 MHz

in band 5150 – 5250 MHz: 4 channels x 20 MHz

- **Power levels:** Elevation 0 < 30 deg. **+ 36 dBm**
  > 30 deg. +21 dBm
- **Power flux density** + 17 dBm / MHz

Ref: LTE-U Technical Report (2015-02) et al

On the way to WRC-19

Threats to AMT

- Res. COM 6/16 (WRC-15):

Action item 1.16 **supports the LAA-initiative:**

„..inviting to perform sharing and compatibility studies WAS/RLAN applications and incumbent services in frequ.band 5150-(5250)-5350 MHz with possibility of enabling ***outdoor WAS/RLAN ops*** including ***possible associated conditions***“.

- Res. COM 6/20 (WRC-15):

Action item 1.13 **supports identification** of additional bands for **future IMT-development**: *„…inviting to conduct sharing & compatibility studies for band* **24,25 – 27,5 GHz“.**

That band would be a favourite candidate for extention requirements of AMT (time horizon 2020 & beyond) !

Draft CEPT Brief on WRC-19
for **AI 1.16**

CEPT supports studies to be performed under AI 1.16 in accordance with Res. 239 (WRC-15).

„In the **5150 – 5350 MHz** band, CEPT would support relaxing the acess conditions applicable to WAS / RLANs***, if results show sharing and compatibility cannot be achieved*** with EESS, radars, Sat-feederlinks, aeronautical navigation and **aeronautical telemetry**“.

„However CEPT noted that the ***current studies*** have shown **difficulties** in **achieving co-existence** with incumbent services“ (3rd meeting, May 2017).

CEPT **revised that position further** in its 4th meeting, Sept. 2017, especially with reference to the band **5150 – 5250 MHz !**

Last Minute Action Item WRC-19 for *Wireless Industrial Applications*

- **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 investigate licensed allocations from 1,5 – 6 GHz, spectrum requirements ***80 MHz (2x40MHz)*** of bandwidth needed !
- **Candiate for studies: *2340 - 2400 MHz & 5150 – 5250 MHz***
- The ***„one M2M Partnership Project“*** (>200 members worldwide) succeeded to bring that issue on the ITU (R) list **of *„urgent studies required in preparation of the WRC-19“,*** as ***AI 9.1.8*** Res.958 (WRC-15): *Narrow & broadband machine-type communication infrastructures* (to be studied by WP5D)

What Can the ICTS Do

- The ***Agenda Items for the WRC-19*** and **regional BWS- initiatives (LSA, LAA-LTE)** have to be carefully studied and assessed.

  Provide **early warning** with respect to spectrum threats emerging in other areas of the world.

- **Support of relevant study groups in AMT-critical issues**, e.g. the technical & operational characteristics in band 5150 – 5250 MHz, in the

  ITU (R) Working Party 5B and Joint Task Group meetings (Geneva).

- *Monitoring CEPT & ATU, RCC and ASMG meetings and workshops,.*

- Possible tasking to investigate the feasibility of **augmenting the current AMT bands by new allocations in *Ku, K, and Ka bands (15 - 30 GHz).***

Conclusions

- **EU harmonisation** level for **S-Band** still **poor** ; **C-band use in progress** (Austria, France, Germany, Netherlands, Norway, Spain, Sweden, UK).
- **The LSA intentions continue, for 2300-2400 MHz. But the protection criteria as proposed by European ICTS members, where accepted.**
- **2300-2400** MHz was already *under* ***severe threat*** by Res. 223 (WRC-12) allocated to IMT in some Region 1 countries.

Some countries (Germany, France & UK) try to delay an allocation to protect incumbent primary services (esp. AMT and PMSE) !

- **5150-5250 MHz** in occupation process by the LAA lobby as band for secondary LTE-cells. **Introduction planned from 2017 onward.**

New AI´s WRC-19:

- AI 1.16:"WAS and BWA in the **5 GHz** range", with **5150-5250 MHz as one target band** , proposing to *study* ***outdoor ops*** *of WLAN*.

- **- „to study machine-type comm. infrastructures for wireless industrial applications, candidates are AMT S- and C-bands,too !**

For more information

- European Communication Office (ECO)

  www.ero.dk

- European Frequency Information System (EFIS)

  www.efis.dk

- CEPT / ECC Study Groups

  www.cept.org/ecc

Questions / Discussion


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