ICTS REGION I REPORT

Update 2017

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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 independent 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 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
- **Aero Mobile Telemetry** 5091 – 5250 MHz
- **Fixed Sat. Service (uplink)** 5091 – 5250 MHz
- **Aero Radio Navigation Service** 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-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 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).

- **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 incumbents, 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 European Commission, 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!!
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

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 extension requirements of AMT (time horizon 2020 & beyond)!
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 access 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!

- Candidate 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
European Test and Telemetry Conference

June 26-28, 2018
Nuremberg, Germany

www.ettc2018.org