International Consortium for Telemetry Spectrum

ICTS REGION I REPORT

Update 2019

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Agenda

- **L , S & C-Band in Europe**

- **WRC-19 Action Items,** issues ***impacting AMT***, AI 1.16 and 9.1.8, from an European View.

- **Further Threats** to the ***AMT- Bands***

  „Licenced Shared Access“(LSA) & **„Licenced Assisted Access“**(LAA)-LTE, ***a threat potential*** ***on a proposed*** ***secondary use of S-and C-bands.***

- ***Conclusions***

AMT-Frequency Spectrum Stewardship in Region 1, ***Sources of Information***

- Provide an independant assessment of ITU-Region 1 issues & positions (mainly from Europe) 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 **S**atellite – ***D**igital **A**udio **B**roadcast* **S**ervice 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 !**

New: AMT European L- Band Cross- Boarder Coordination

ECC Report 295 (Mar.2019)

„Guidance on Cross-boarder coordinaton between Mobile / Fixed Com. Networks (MFCN) and AMT in the 1429-1518MHz band“

- Based on practical interference cases in some East-European countries of AMT stations with UMTS networks the methology for aggregated interference calculations is presented. The calculations show that the interference level to AMT stations could be increased up to 4 dB. Possible technical measures to eliminate the harmful interference from MFCN to AMT stations were discussed.

AMT S - Band in Europe

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

  Some countries still use parts of 2025 - 2300 MHz !

- **for Terrestrial Telemetry** ***2200 – 2400 MHz***
  allocable in some countries.

- ***Increasing Interference & Noise Levels „motivate“ AMT users to change to C-Band !***

Interference Potential in S-Band

***2300-2400 MHz,* by other Services on a Co-Primary Basis**

- Band has already to be shared with **Low Power Services**

Medical Implants (LP-AMI)	2360 – 2400 MHz
Medical Telemetry (MBANS)	2360 – 2400 MHz
Short Range Devices (Indust.+ UWB)	2360 – 2400 MHz

- Band also to be shared with **High Power Services***

Video Links (PMSE SAP / SAB)	*2320 – 2400 MHz*
IMT & BWA (as a secondary service)	*2300 – 2400 MHz*

- ***Recent Spectrum Auction in the UK :***

  2350 – 2390 MHz now allocated for use with 5G,

  to Telefonica UK Ltd.

* Allocation decisions pending from national administrations.

AMT C-Band in Europe

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

  That is the only real harmonized AMT band in Europe !

- **Band operationally used by**

  Austria, France, Germany, The Netherlands, Norway, Sweden, Switzerland.

  Introduction in process by *Italy, Spain and the UK .*

- **Interference level** from other allocated ***co-primary*** **services still low**, compared to S-Band !

Interference & Noise Scenario S- vs. C-band

S-band: Billions of „Part 15“ and „3 & 4g-mobile“ devices can create **significant out-of-band spurious emissions**

Spectral occupancy & interference studies in various regions show frequently noise levels of

-90..-100 dBm **in the band 2300 - 2380 MHz**

-80..- 70 dBm **in the band 2380 - 2400 MHz**

C-band: WRC´07 bands 5091 – 5150 MHz (global) and 5150 – 5250 MHz (Region 1 extension) show

-103…- 87 dBm

Ref. FCC TAC, Noise Environment Subcommittee

NTIA Reports on Spectrum Survey Measurements

Wellens et al.; RWTH Aachen University, Germany

On the way to WRC-19

Threats to AMT (European View)

- Most important issue for Region 1:

Action item 1.16 Res. 239 (WRC-15)

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

Other Action Items concern **AMT allocations in Region 2 and 3**

AI 1.14 , 9.1.1 – 9.1.3

but h*ave no impact in Region 1**, as they study L, - S, and C-band segments for their use that are ***not allocable to AMT ops in Region 1.

CEPT–Position on AI 1.16

*(CEPT Brief, 28/09/18 & **NEW: ECP, 29/06/19**)*

- " In **the 5150 - 5250 MHz band**, CEPT notes that an outdoor relaxation to WAS/RLAN *would affect the operation of* the MSS feeder links, aeronautical radio navigation and *aeronautical telemetry* "
- " However, CEPT is *still studying **usage restrictions*** (e.g. in vehicle use) *combined with appropriate **mitigation techniques*** **to achieve co-existence** with incumbent services, to enable outdoor **WAS/RLAN** use in this band."
- **Draft European Common Position (ECP)** on the 5150 – 5250 MHz band, **last pending studies:**

  Option 1*: Clarifying technical conditions for **indoor use in vehicles.***

  Option 2 : Also limited ***outdoor use by WAS / RLAN ?***

NEW: **AI 1.16:** *Final* **ECP *29/06/19* to the CPM**

- **WAS/RLANs** to be restricted to **indoor** use, including inside trains and aircraft, with max. *mean EIRP of 200mW and a 0,25mW / 25KHz in any 25KHz band*.
- Operation inside automobiles *max. EIRP of 40mW*.
- National Administrations may exercise *some flexibility* by adopting appropriate regulatory measures, incl. mitigation techniques, that would allow *limited outdoor usage* (up to EIRP of 200mW) maintaining protection of incumbent services.

Other **Region 1 Positions** towards **AI 1.16**

ASMG : The Arab Administrations supports the no-change method in bands of study for WAS/RLAN use.

ATU: Study showed that low ERIP (up to 40 mW)associated with in-vehicle usage restriction is an effective measure to mitigate the level of interference .

RCC: Oppose reduction of restrictions for WAS/RLAN use in 5150-5250 MHz band. Possibility of inside vehicle use considered, provided a compatibility with primary services, achieved through limiting power of WAS/RLAN systems transmission and additional absorption by vehicle body.

Last Minute WRC-19 **AI 9.1.8**

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 unlicensed 2,4 GHz band* investigate licensed allocations from 1,5 – 6 GHz, spectrum requirements ***80 MHz (2x40MHz)*** !
- **Candiates 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 **M**achine-**T**ype **C**ommunication infrastructures* (to be studied by WP5D)

AI 9.1.8, MTC

Preliminary Position of ITU-WP5D

Working Doc towards Draft CPM-Text for WRC-19:

"Analysis of the current and future spectrum use for narrowband and broadband machine type communications (MTC), as expressed in AI 9.1.8 Resolution 958 (WRC-15), concluded that there *is no need to identify specific spectrum* for those applications in the Radio Regulations.

MTC / IoT applications and devices can be used effectively with all the benefits of *the existing bands and the new frequency bands under study for IMT*, as well as those for SRD and ISM applications". That position was also supported by ECC PT1.

But: Spectrum needs for future (narrowband) communications of the *"Internet of Things"* (IoT / M2M) may come-up as an agenda item, to be studied for the WRC- 23 , for a band in frequency range 1 – 6 GHz !

Threats to AMT-Bands

by secondary IMT Allocations

- **Licenced Shared Access (LSA)** as a secondary service at **2200-2300 MHz**, is concluded. LSA specs released by the CEPT. *National implementation now possible*.

- **Licenced Assisted Access (LAA)** on secondary basis at **5150 -5250 MHz** to synchronize secondary LTE – Cells is under national introduction. On the desired transmitting level *(+36 dBm)*, there may be an impact from a final decision of WRC-19, AI 1.16, where a max. power level of *+ 23 dBm* is under decision for ***outdoor WAS / RLAN*** ops.

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 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) !

- *Monitor 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, in ***9 EU - countries*** presently.
- **Action Items WRC-19:**

AI 1.16: ***"WAS and BWA in the 5 GHz range",*** with 5150-5250 MHz as one target band". **Feasibility of *WLAN outdoor ops is still under discussion.***

AI 9.1.8 ***„to study Machine-Type Comm. infrastructures for wireless industrial applications" ;*** candidates were AMT S- and C-bands,too !

Prelim. Position of WP5D: **„No need to identify specific spectrum:**

„Use the existing & future IMT-bands !"

- Shared **Use of AMT bands on a secondary basis (LSA&LAA-LTE)**

LSA specs released, national licensing possible. Some adminitrations are still hesitating to grant licences, to protect the incumbent services. The **LAA** introduction is in a similar process.

For more information

- European Communication Office (ECO)

  www.cept.org/eco

- European Frequency Information System (EFIS) www.efis.dk

- CEPT / ECC Study Groups

  www.cept.org/ecc

Questions / Discussion

ANNEX:
European C-band Introduction

- ***Austria:*** Payload tests for border surveillance
- ***France:*** Airbus Operations to test AB 350 et al.

  Spain *may* be later part of the Airbus network.
- ***Germany:*** *DLR and* Fraunhofer doing operational tests, Airbus Helicopters in opl.- status from end of 2018 onward.
- ***The Netherlands:*** NRL, systems procurred & operational.
- ***Sweden & Norway:*** VIDSEL Range: procurement C-band tracking station in process, flight tests concluded. Andoya Range in introduction process.
- **Switzerland:** Armasuisse and Swiss Copter Group in introduction process.
- **UK:** BAES and Qinetiq in planning status for 2018 onward.

C- Band Test Activities

- **Airbus Operations Toulouse** regular FT with10 Mbps 10W onboard with C-band gnd network, with OFDM Transmitter.
- **Airbus Defense and Space Manching** concluded FT C-band vs. S-band, with small aircraft and Tornado.
- **Airbus Helicopters** rolls out regular flight tests in C-band.
- **Vidsel Range** in Sweden did flight tests S-band vs. C-band (with Helicoper), inclusive interference studies from their C-band Radar.

Threat to a **Canditate Band** for a possible ***future AMT Use***

- 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), as demonstrated in ***studies****.

- It seems **IMT (5G) Services** will **get access** to **that band. Then** it will be **extremely difficult** to apply for AMT allocations ! (Lessons learned from WRC-07 and AMT-C bands; ***be never too late***…)

* ***„15G&up“,*** US DOD TRMC 2008 and ***„AMT over 15GHz“,*** BYU 2014; Ref. ITC-15, **ICTS Session „15 GHz & up“.**

Threats to AMT S-Band

by further IMT – Allocations

Licenced Shared Access (LSA)

- **LSA** was seen as enabler to release additional spectrum for Mobile Broadband Services, sharing with incumbants, on **secondary basis** ***assessing protection of existing services*** (Concept: Radio Spectrum Policy Group, DIGITALEUROPE).
- ***CEPT Report Nr. 52:*** describes the ***„technological and regulatory options for sharing between WBB and the relevant incumbent services/applications in the 2,3 GHz band“.***
- **LSA Demo & Testing:** by **Italy,** Finland, **France**, The Netherlands and Spain successfully concluded by 2017 end.
- **Further work *delegated to ITU(R)*** ***:“to develop the regulatory frame conditions for LSA implementation“ (WP1B) & “to study the necessary mitigation techniques“ (WP5A).***
- **LSA Specs released: National implementation possible !**

Threads to C-Band 5150–5250 MHz by *LAA-LTE Cells on Secondary Basis*

- **Band has already to be shared** with the

  ***A**eronautical **M**ob.(**R**oute) **S**ervice, **F**ixed **S**atellite **S**ervice (uplink), **A**ero. **R**adio **N**avigation **S**ervice* 5091 - 5250 MHz
  P**ublic **M**obile **S**ervice & **WLAN indoor 5150 - 5250 MHz

- **Licensed Assisted Access (LAA)** idea is, that LTE cells operating in other bands synchronise **secondary cells** in C-band, **5150 – 5250 - (5350) MHz** (that band is presently allocated to indoor **WLAN** on a power level +**23 dBm**, only !)

- **But Outdoor LAA - cells can affect AMT Ops, especially with the proposed power level of +36 dBm !**
- **ICTS to monitor further intentions & studies !**

LTE- Advanced
Standard „Advanced-Pro“

Europe: ***(introduction tried since 2017, but still 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

Proposed extention of the transmitting levels:

- **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

Acronyms

AMT	Aeronatical Mobile Telemetry
BWA	Broadband Wireless Access
CEPT	Conferénce Européenne des Administrations de Poste
ECP	European Common Position (of the CEPT)
EEES	Earth Exploration Satellite Service
ERC	European Radio Communications
NTIA	Nat. Telecommunications & Informations Administration
FCC TAC	Fed. Communications Commission, Technical Advisory Council
RR	Radio Rules
PMSE	Programme Making Special Events
SAB	Services Ancillary to Broadcast
SAP	Services Ancillary to Program Making
WAS	Wireless Access Systems
WBB	Wireless Broad Band