WS06 – 3rd PMSE Workshop

The Suitability of Fixed Service, Aircraft and Satellite Spectrum to Share with PMSE

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Before reading this presentation we suggest that the reader considers the information contained in the presentation “How to Measure PMSE Live Spectrum Use?”.

Spectrum data in our study has been collected with a small PMSE antenna at a typical height of 1.5 m. A large antenna on a tower of course sees a very different view of spectrum use.
In late 2015 Ofcom UK consulted on the possible future use of two new frequency bands for audio PMSE. They were:

960 to 1164 MHz

and

1525 to 1559 MHz

In the end, Ofcom UK decided that of the two bands, 960 to 1164 MHz (the air band) was the most suitable.
As a result of the Ofcom UK statement the PMSE sector needed to check for itself the true viability of the band before committing to the long and costly process of designing and building of equipment suitable for working in the air-band. We would like to re-iterate that the size of the scanning antennas are typical of regular audio PMSE equipment.
In international discussions some potential bands for PMSE are under consideration

- 960 to 1164 MHz
- 1350 to 1400 MHz (CEPT study is now finalized)
- 1525 to 1559 MHz

Over the next pages I would like to briefly present the output of scans conducted in several EU countries.
Let’s start in United Kingdom

Important;
It should be emphasised that it is very positive that some administrations have recognised the challenges that the professional PMSE sector will have to contend with once 700 MHz has been cleared.
The route where scans were taken part in UK

1,481.8 km / 920.8 mi
Two core bands scanned in UK (aggregate spectrum)

960 to 1170 MHz / RMS / RBW=1MHz

1515 to 1560 MHz / RMS / RBW=100kHz
Two core bands scanned in UK (time domain)

960 to 1170 MHz / RMS / TH=-80dBm

1515 to 1560 MHz / RMS / TH=-83dBm
Additional spectrum observation in the UK

Aggregate Spectrum from 1350 to 1400 MHz / RMS

Peak spectrum data (red) and the data distribution (dark) of 7424 records / Detector = RMS / RBW = 100kHz

Time domain from 1350 to 1400 MHz / RMS / TH = -83dBm

Detected signals with time intervals of 1 min (red) and signals close below TH (orange & grey) / TH = -63dBm

Local hot spots
Denmark

On the way to the production of the 2016 Eurovision Song Contest some locations in Denmark were scanned
The route where scans were taken part in DK

190.4 km / 118.3 mi
Two bands scanned in Denmark (aggregate spectrum)

1350 to 1400 MHz / RMS

1515 to 1560 MHz / RMS
Two bands scanned in Denmark (time domain)

1350 to 1400 MHz / RMS / RBW=100kHz / TH=-86dBm

1515 to 1560 MHz / RMS / RBW=100kHz / TH=-86dBm
Before you ask...

The L-Band in Denmark is not empty, see the recording in 1490 to 1520 MHz,...

...but the antenna size of audio PMSE is quite small.
Sweden

On the way to the production of the 2016 Eurovision Song Contest some locations in Sweden were also scanned
The route where scans were taken part in SWE

1.105.7 km / 687.1 mi
Two bands scanned in Sweden (aggregate spectrum)

1350 to 1400 MHz / RMS / RBW=100kHz

1515 to 1560 MHz / RMS / RBW=100kHz
Two bands scanned in Sweden (time domain)

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**1350 to 1400 MHz / RMS / RBW=100kHz / TH=-84dBm**

- Detected signals within time intervals of 1 min (purple&red) and signals close below TH (orange&grey) / TH=-84dBm → PEAK offset

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**1515 to 1560 MHz / RMS / RBW=100kHz / TH=-84dBm**

- Detected signals within time intervals of 1 min (purple&red) and signals close below TH (orange&grey) / TH=-84dBm → PEAK offset

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Local hot spot

MSS signals
Germany

On the way back from the 2016 Eurovision Song Contest some German locations the bands 1350 to 1400 MHz and 1515 to 1560 MHz were scanned.

A few weeks later, in addition, a second scanning tour across the bands 960 to 1170 MHz and 1515 to 1560 MHz were recorded.

This is what was recorded.
The route in the northern part of Germany

1,368.0 km / 850.0 mi
Two bands scanned in north DE (aggregate spectrum)

1350 to 1400 MHz / RMS / RBW=1MHz

Peaks and spectrum data (red) and the data distribution (dark) of 13461 records / Detector = RMS / RBW = 1.000 kHz

1515 to 1560 MHz / RMS / RBW=1MHz

Peaks and spectrum data (red) and the data distribution (dark) of 13461 records / Detector = RMS / RBW = 1.000 kHz
Two bands scanned in north DE (time domain)

1350 to 1400 MHz / RMS / RBW=1MHz / TH=-83dBm

1515 to 1560 MHz / RMS / RBW=1MHz / TH=-83dBm
Can PMSE see MSS in DE?

In this presentation we have seen weak MSS signals in Denmark and Sweden. Therefore, the question is, can PMSE see MSS signals in Germany as well? The answer is yes, but only close to the Northern border of Germany.
The route in the southern part of Germany

898.9 km / 558.5 mi
L-Band scanned in south DE (aggregate spectrum)

1350 to 1400 MHz / RMS / RBW=1MHz

1515 to 1560 MHz / RMS / RBW=1MHz
L-Band scanned in south DE (time domain)

1350 to 1400 MHz / RMS / RBW=1MHz / TH=-83dBm

1515 to 1560 MHz / RMS / RBW=1MHz / TH=-83dBm
Air band in the southern part of Germany
130.9 km / 81.4 mi
Air Band scanned in south DE

Aggregate spectrum / RMS / RBW=1MHz

Time domain / RMS / RBW=1MHz / TH=-80dBm
1350 to 1400 MHz in D, A, FL and CH

560.9 km / 348.5 mi
1350 to 1400 MHz in D, A, FL and CH

Aggregate spectrum / RMS / RBW=1MHz

Time domain / RMS / RBW=1MHz / TH=-83dBm
A few local signals in 1355 to 1360 MHz

*1
Innsbruck - Austria
Low power / short distance Street Traffic Radar

*2
Dalaaser Tunnel - Swiss
Low power / short distance Street Traffic Radar
Summary

In the recorded scans it can be shown that there is a significant variance in spectrum use by frequency band and by geographical location.

Some bands are locally filled by the incumbent services and applications. Other bands are almost completely empty in the recorded time.

Therefore, it is suggested that all relevant organizations consider these findings with regards to undertaking further studies.
How to get further information?

- On APWPT’s Homepage: [www.apwpt.org](http://www.apwpt.org) especially in the section “Technical Information” further background information and documents can be found.

- E-Mail: [info@apwpt.org](mailto:info@apwpt.org)
  Feel free to submit any questions or any comments that might improve our common knowledge with regards to wireless production tools and future deployment scenarios.