

# Background on spectrum sharing in the 960-1164MHz band

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## The issue for PMSE

- Supply of spectrum for use by PMSE is reducing
- Demand for spectrum is increasing – shows and events are getting larger and more complex
- We are addressing the requirements for low power audio PMSE applications – wireless microphones and in-ear monitors
- Less than 50 mW (typically 10 mW) used mainly indoors





# Spectrum Management Strategy

- Growing and competing demands for spectrum will require a mix of spectrum re-purposing and increased sharing (see SMS statement - [https://www.ofcom.org.uk/data/assets/pdf\\_file/0021/71436/statement.pdf](https://www.ofcom.org.uk/data/assets/pdf_file/0021/71436/statement.pdf))
- We will explore new forms of spectrum sharing and extend sharing across new bands
- We will maintain our increased focus on the coexistence challenges associated with changes in spectrum use
- We will promote improvements in RF performance standards to reduce coexistence issues in future
- We will increase the quantity and quality of information on spectrum use we make available

# Spectrum sharing options

We looked at all bands from 790 MHz to 2 GHz

- Identified **two** candidate bands as an option for PMSE:
  - 960 to 1350 MHz; and
  - 1525 to 1710 MHz
- Detailed coexistence studies narrowed these options to:
  - 960 to 1164 MHz (sharing with aeronautical services); and
  - 1525 to 1559 MHz (sharing with mobile satellite services)
- The 960 to 1164 MHz band provides the best sharing option

Band (MHz)	Main use	Sharing potential	Long term	Harmonised use
960-1164	Aero <u>RNav</u>	Yellow	Green	Green
1164-1215	ARN + GNSS	Red	Green	Green
1215-1300	ARN + GNSS	Red	Green	Green
1300-1350	RADAR	Red	Green	Green
1525-1559	MSS (s → E)	Yellow	Yellow	Green
1559-1610	RNSS	Red	Green	Green
1610-1626.5	Aero <u>RNav</u>	Red	Green	Green
1626.5-1660	MSS (E → s)	Red	Green	Green
1660-1710	Met Sat <u>etc</u>	Yellow	Yellow	Yellow



## Compatibility assessment

### We carried out theoretical and practical compatibility studies

- Desk based analysis showed sharing is possible
- Practical coexistence measurements carried out by JCSys Ltd  
(<http://stakeholders.ofcom.org.uk/binaries/consultations/new-spectrum-audio-PMSE/annexes/annex6.pdf>)
  - Studies considered both PMSE into aero and aero into PMSE (to see if spectrum was usable by PMSE)
  - Complex RF signal environment including Link 16 (JTIDS)
- Measurements provided interference thresholds into aero systems and coexistence criteria for satisfactory PMSE operation

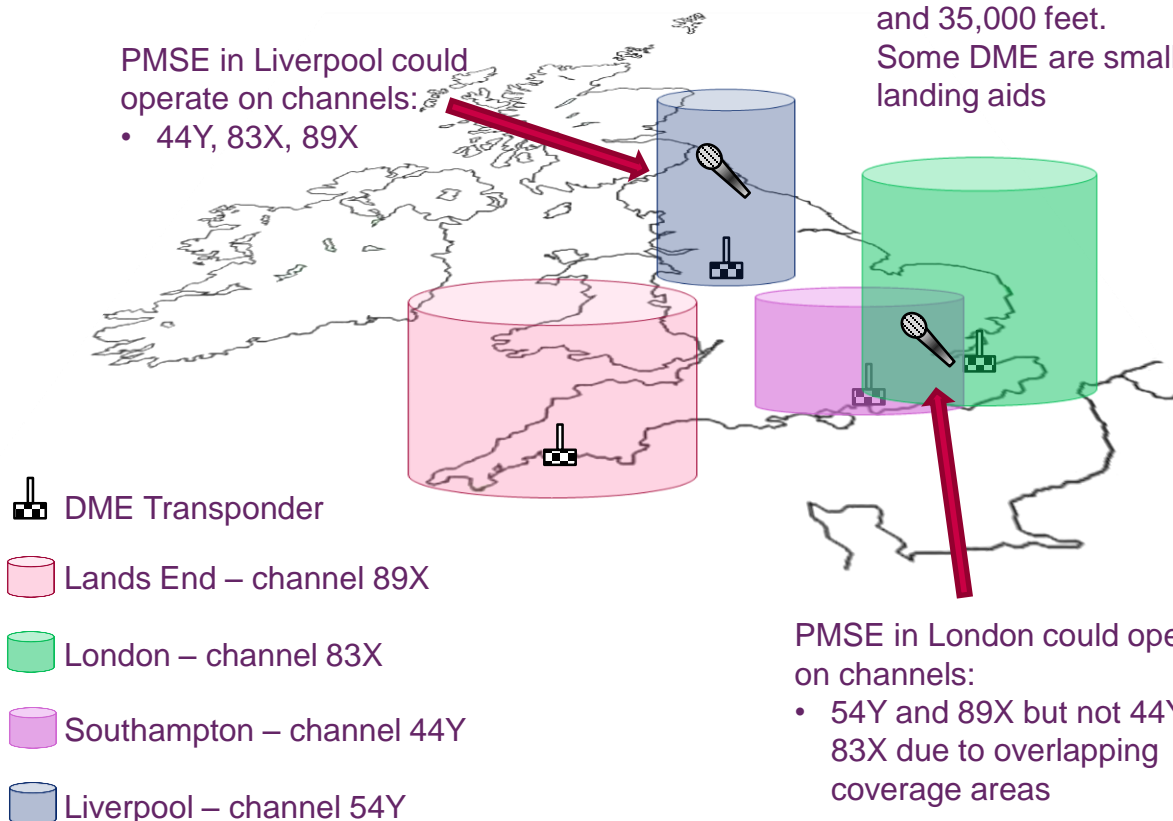
# Principle of sharing

The coverage area (DOC) of a DME ground station is defined as a cylinder of airspace with distance in nautical miles and height in hundreds of feet e.g. 100/350 would be 100 nautical miles and 35,000 feet.

Some DME are small e.g. 25 nm when used for landing aids

PMSE in Liverpool could operate on channels:

- 44Y, 83X, 89X



PMSE in London could operate on channels:

- 54Y and 89X but not 44Y or 83X due to overlapping coverage areas

## Spectrum Management Rules

- Spectrum availability is derived from the sharing criteria and modelling approach defined in the SMRs and have been agreed between Ofcom and the CAA
- Strict rules to protect aeronautical systems
- Includes DME ground facility and airborne interrogator parameters
- Measured DME interference thresholds (includes Link16 signal environment)
- Guard bands of  $\pm 15$  MHz for 1030/1090 MHz applications (SSR/ADS-B/TCAS etc.)
- Exclusion radius for 1090 MHz applications on the ground (SSR/ADS-B/WAM etc.)
- Guard bands for GNSS (10 MHz at 1164 MHz)
- Ongoing maintenance of SMRs to be jointly managed by CAA and Ofcom



# Spectrum tool example



Heathrow airport operates on:

- 32X (receive on 1056 MHz & transmit on 993 MHz)
- 40X (receive on 1064 MHz & transmit on 1001 MHz)



## Latest developments

- PMSE equipment trials ongoing (operating at 2 mW and 10 mW)
- Compatibility studies to start in CEPT (requested by Germany)
- Development of online booking tool (to incorporate recommendations from the safety case as appropriate)
- Ongoing engagement between CAA and Ofcom