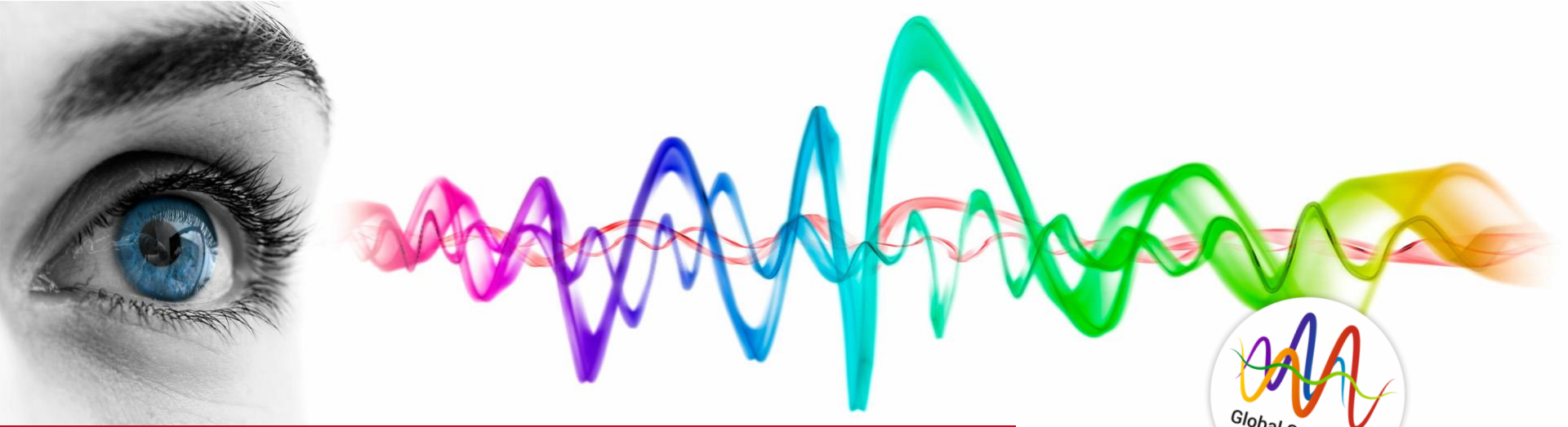


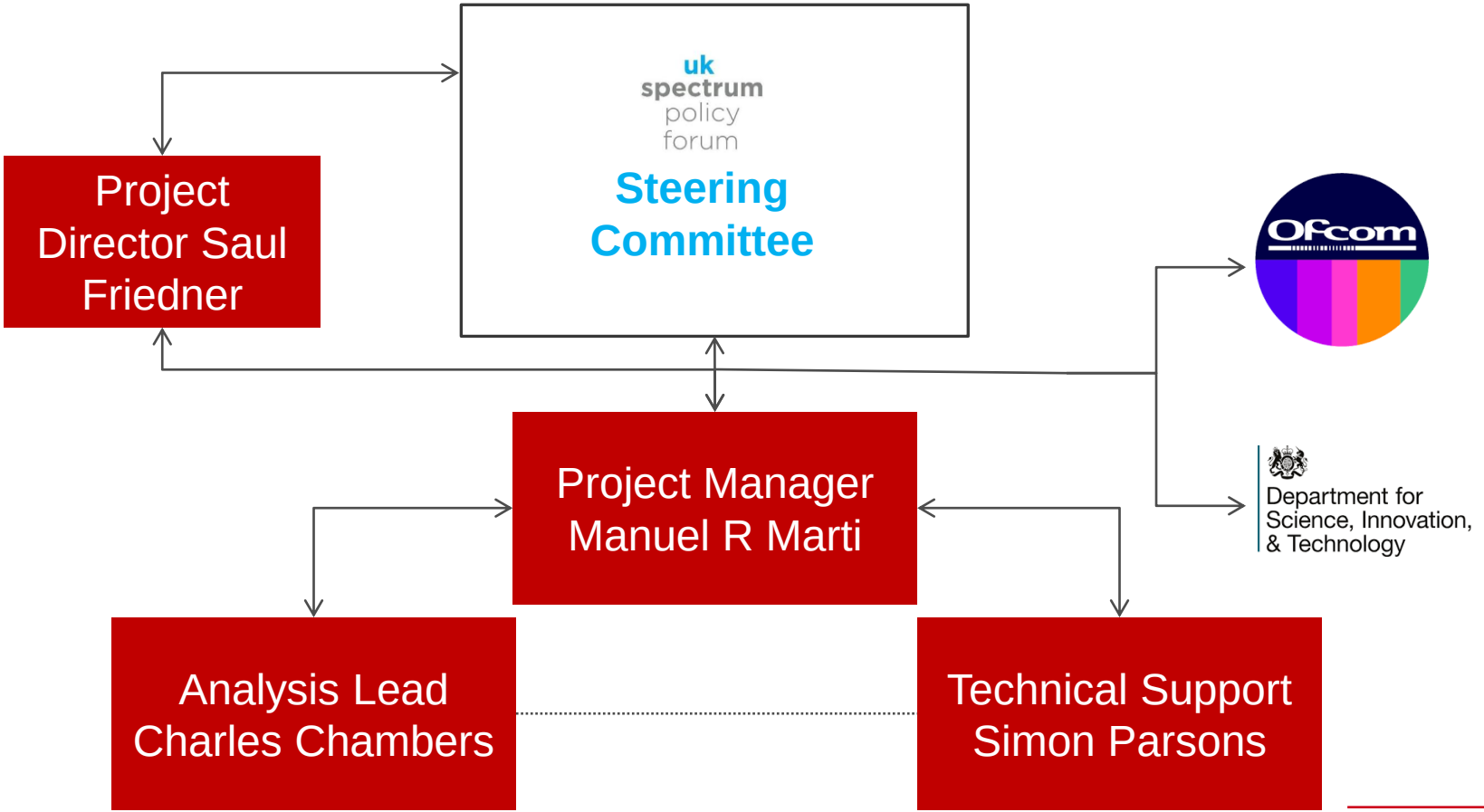
UK SPF July Plenary| 24/07/2024

Exploring a new framework for defence spectrum sharing in the UK

Agenda

1. Introduction
2. Overview of civil demand & MOD requirements for shared used
3. Barriers and considerations
4. High-level framework scenarios
5. Recommendations

Project Team and management structure



Scope

- Understand how different potential sharing frameworks could work under certain conditions set by MOD
- Focus on new sharing arrangements

Our Approach

- Target interviews with key stakeholders: MOD, DEMA, Ofcom, PMSE, MNOs, satellite IoT, vendors
- Demand driven
- High-level technical assessment
- Desk research

Domestic and International Context

- End of PSSR programme in 2022: 687 MHz out of the initial 500 MHz target have been released
- What's next? Spectrum sharing driven by demand as recognised by DSIT
- Spectrum demand continues to increase from both civilian and public users
- CBRS set the precedent for advanced agile defence-managed spectrum sharing
- WRC -27 seeking IMT identification in some NATO harmonised bands

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Evolution towards enhanced and improved defence spectrum sharing

TODAY

Sharing between MOD and civil users is possible today but constrained and suboptimal

THIS STUDY

Determined and identified key barriers and potential options for future more optimal/enhanced MOD/civil sharing

- Enhanced procedures
- Enhanced collaboration
- Enhanced data collection sharing

TOMORROW

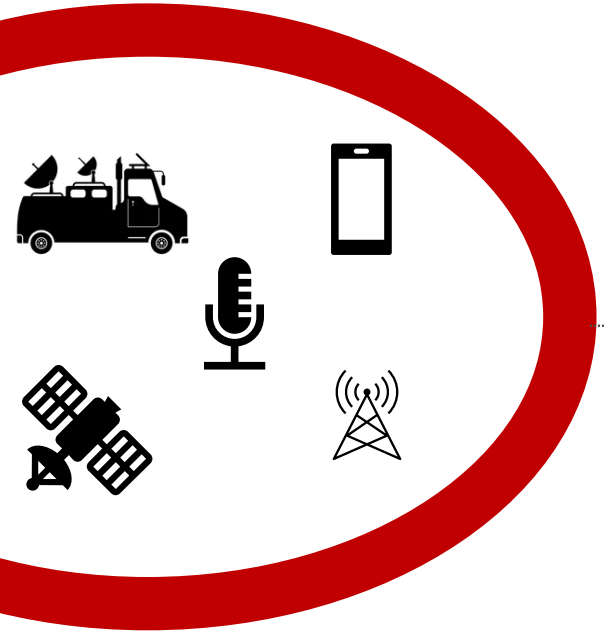
DSIT/MOD/Ofcom to develop and agree most appropriate sharing framework fit for future

A framework to facilitate increased access to MOD spectrum (harder to access)

Civil demand

Demand is niche, limited to specific user types

- Due to technical/procedural conditions
- Operationally spectrum users can access easier alternatives (both share and dedicated)



Stakeholders that hold licences in adjacent bands and seek to expand current holdings for various reasons

Stakeholders seeking access to spectrum for a limited time in a limited geographical zone, such as PMSE.

Other stakeholders that may require access to MOD bands have not been able to do so under the current arrangements

MOD requirements for shared use

- MOD does not anticipate to permanently release any new spectrum
- MOD willing to share under suitable conditions
- MOD already shares 80-85 per cent of its spectrum overall
- Increasingly congested and constrained spectrum operational environments
- MOD use of spectrum affected by int'l treaties and accepted NATO use
- New capabilities and technologies (i.e. drones) expected to drive future spectrum demand
- Interest on 5G and other standardised technologies: MOD access unused civilian frequencies

Key issue	Description
Predictability	Uncertainty and lack of predictability re availability of spectrum can be unappealing for private commercial users challenging to develop a commercial case for investment and deployment
'Train as you fight' capability	Spectrum use (often Harmonised NATO bands) subject to joint exercises with NATO allies and other international partners
Obfuscation	Obfuscation of spectrum use, and operations is essential for protecting military capabilities, maintaining operational security, and ensuring the effectiveness of military communications and electronic warfare activities
Pre-emptive capability	MoD needs the ability to gain back spectrum whenever required, and most likely at short notice without compensation, because otherwise the nation's economic and national security will be exposed to undue and significant risk

Barriers and considerations

Barriers for sharing MOD bands

- Efficacy of information
- Operational constraints
- Clarity on existing arrangements

Barriers for MOD using civil bands

- Manage the many different relationships the MOD spectrum team would/do need to have with civil users

Barriers for more long term framework or strategic implementation such as DSA

- Expertise and resources required
- Uncertainty of when and how DSA may be implemented for shared spectrum use with MOD
- Equipment capability and timescales

Barriers and challenges in identifying suitable bands for sharing/access

- Process not simple or clear
- Thorough and robust analysis required in each band
- Timescales and equipment lifecycles

Considerations

- It must align with the current legal framework or justify changes to the legal framework
- Ofcom has an existing legal responsibility to monitor, manage and provide access to spectrum to civilian users (citizen consumers). Current unmet demand is not clear.
- It must be appropriate, proportionate and consider technical and financial implications
- It must allow MOD and prospective shared users to have predetermined and agreed-upon conditions to streamline the process, which should be managed through Ofcom
- Ofcom are at the forefront of developing automatic / structured methods of providing database / automated solutions to access spectrum. This is an evolving need.
- Harmonise any spectrum access mechanism, that it is future-proof and consistent with the emerging methods and any equipment standards
- In shared bands which are internationally harmonised, there are likely to be benefits in having a sharing mechanism that can leverage any benefits of harmonised use (for both a sharing/management method and of an equipment ecosystem)

High-level framework scenarios

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Criteria	Scenario 1: No change	Scenario 2: Enhance existing model (SAL)	Scenario 3: Automated DSA solution	Scenario 4: MOD as SMO
Technical	▪ Case by case basis	▪ Existing coordination tools with MOD bands. ▪ Upgrade technical sharing criteria to meet MOD requirements	▪ Extensive development of new DSA database designed to protect MOD use and support civil kit ▪ Requires competent, security cleared solution provider	▪ Requires dedicated technical resource to carry out sharing assessments and grant Authority to Transmit to users
Procedural	▪ Slow ▪ Admin heavy	▪ Existing SAL procedures ▪ Established application process	▪ Minimal human intervention besides maintenance and management of the database ▪ Sophisticated application portal for civil users and real time access to spectrum	▪ Resource intensive with multiple skillsets needed ▪ Collection of fees ▪ Ensure/enforce correct use of frequencies
Legal/ regulatory	▪ Underpinned by current WT Act	▪ This may require some changes to the current legal status	• Potential for some changes to the current legal status	▪ Potential for extensive changes to the current legal status
Overview	▪ Preferred if little demand to warrant any further development ▪ Does not align with MODs wish to formalise sharing spectrum in UK	▪ Requires some time and financial investment from MOD and Ofcom. ▪ Familiarity among civil ▪ Cost effective for users ▪ Potentially future proof but design for MOD features challenging	▪ Costly and time consuming to implement ▪ Limited demand impacts justification for investment ▪ Future proof but consideration should be given to harmonised solution	▪ Costly and time consuming to create and train staff. ▪ Currently limited demand to justify investment. ▪ Provides full control and management of defence controlled spectrum

Recommendations (i)

Demand for MOD spectrum and existing sharing	▪ We recommend that any expansion to other uses or applications can only be merited if there is sufficient demand, and any expansion should be incremental. ▪ We recommend that the level of demand for access to MOD spectrum by any new users (ie not PMSE, Radio Amateur or Fixed Links) be verified, possibly by Ofcom. ▪ We recommend that any change to the sharing regime should not prejudice existing sharing. ▪ We recommend that information gathering begins before any implementation to assess the credibility of the demand for the restricted availability of spectrum (for a prolonged period) that would exist in MOD spectrum ▪ Ofcom should review the benefits, or otherwise, of streamlining/integrating sharing approaches into a common framework.
Licence application process	▪ We recommend that Ofcom should be clearly identified as the body that manages access to MOD spectrum for civil users, and for all users (civil and Crown) for access to civil spectrum. ▪ We recommend that Ofcom should monitor and publish any applications for spectrum that are unable to be supported in order to assess if any improved sharing in MOD spectrum is a priority. ▪ Any required coordination between MOD and Ofcom can and should be handled between them, and their decision on sharing conditions would be provided to the applicant – not the rationale. This will provide MOD a level of protection and security.

Recommendations (ii)

Sharing between civil and Crown users	▪ We recommend that MOD develop a comprehensive spectrum roadmap identifying current and future use. This will consider potentially long military equipment lifecycles, emerging technologies, operational needs, and international regulatory developments such as WRC27. ▪ We recommend the identification and formalisation of the roles within Ofcom and MOD involved in managing and maintaining any new framework. ▪ We recommend that Ofcom and MOD identify spectrum constraints and agree methodologies to allow sharing. This will include building up a set of sharing rules or coexistence approaches that Ofcom can utilise in assessing suitable sharing arrangements. ▪ UK MOD to continue to widen engagement with other government agencies, private stakeholders, and academia to advance and monitor development of sharing technologies
Harmonisation and international meetings	▪ We recommend that, MOD and Ofcom remain active in regulatory and policy fora and seek to incorporate agreed best practice in future sharing frameworks. ▪ We recommend that MOD share the outcomes of this study with friendly/NATO countries and acknowledge the parallel work within CEPT that could yield benefits to the wider defence community in the same way but considering key defence requirements. ▪ We recommend that sufficient resources (both Ofcom and MOD) should be put in place to support planning and analysis for WRC27.

Thank you for your attention

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Candidate bands

Band	Military Use	Comment
400.1 -401 MHz	Limited information on use. Legacy systems Meteorological aids & mobile satellite service. MOD's plans to operate in the 400.15-401 MHz band may change in the future	Interest from satellite IoT operator. No apparent technical band
1350-1400 MHz	NATO harmonised band. Fixed and radiolocation services.	Technical conditions for PMSE harmonised by CEPT in 2016: at least 25 MHz could be made available for audio PMSE.
2300 - 2350 GHz	Airborne telemetry and data links. Land-based telemetry and mobile comms.	High interest from one MNO with a licence in 2350. Airborne systems limited to time and some geographical zones. Potential for agile coordinated sharing.
4.4-4.8 GHz	Heavily use by MOD. Fixed and mobile Command and Control and Tactical radio Relay. Critical band for NATO. Harmonised NATO band	4.8-4.9 GHz previously studied under WRC-15. Sharing will be challenging and extremely agile.
7-8 GHz band	Heavily used for SATCOM. Harmonised NATO bands: 7.250-7.750 GHz and 7.900-8.215	Most appealing for IMT community under the WRC-27 cycle. Existing sharing arrangement EESS and fixed services on geographic basis