



Department  
for Culture  
Media & Sport



Shareholder  
Executive

HM Government

# **Enabling UK growth - Releasing public spectrum**

Making 500 MHz of spectrum available by 2020

Public Sector Spectrum Release

Programme Update

March 2014



## INTRODUCTION

As part of the comprehensive spending review in 2010 the Government announced a target of 500MHz of public sector spectrum below 5GHz to be released by 2020. This Programme, managed by the Shareholder Executive in BIS, is now in its 4<sup>th</sup> year. This paper provides an update on the progress of the Programme, details some of the lessons learned so far in carrying out the work and sets out the next steps for the remainder of the programme.

Public sector use of spectrum plays a key role in the UK spectrum landscape, as the public sector accesses around 52% of all radio spectrum<sup>1</sup>. Public sector uses include essential functions such as defence, emergency services, transport and science. Of the spectrum accessed by the public sector, roughly half is shared in some way with private sector users.

As with all other spectrum users, the public sector's own spectrum needs are changing as technologies develop and services provided evolve.

## KEY PROGRESS TO DATE

Good progress has been made with the Programme to date:

- From a long list of public sector holdings a short list of bands to make up the 500MHz target has been identified. The process of identifying appropriate bands was discussed in our earlier publication 'Enabling UK Growth : Releasing Public Spectrum'<sup>2</sup> published in March 2011 and in the December 2011 update following conclusion of our consultation<sup>3</sup>.
- Projects are underway at Government Departments to release, or examine the feasibility of release of, the bands identified. Around 60MHz of spectrum has already been released by MOD and the Emergency Services and further substantial releases are due in the financial year 2015/16.
- HM Treasury, working with Shareholder Executive, DCMS and Ofcom, have extended the system of financial incentives for public bodies, to take effect from 2015/16, to encourage Departments to use spectrum more efficiently. These incentives are based on the principle that all public bodies should pay market rates for the spectrum they use<sup>4</sup>.
- Considerable work is ongoing to clarify the legal and regulatory consequences of selling or sharing spectrum. This work will be particularly relevant as spectrum sharing becomes more common.
- A major study was commissioned from Analysys Mason, published in November 2012<sup>5</sup> to understand the changing value of spectrum use to the UK economy, noting a real growth of 25% in economic value of spectrum since 2006.
- The Programme has worked closely with DCMS and Ofcom to contribute to spectrum policy. In particular this has involved developing a common view of future spectrum demand, developing licensing for shared use and input to international organisations to harmonise bands.

---

<sup>1</sup> Ofcom estimates with reference to all spectrum between 87.5MHz and 86GHz. Spectrum bands over 1GHz have been weighted so that 10MHz at 1GHz have the same weight as 100MHz at 10GHz.

<sup>2</sup> <https://www.gov.uk/government/publications/enabling-uk-growth-releasing-public-sector-spectrum-march-2011>

<sup>3</sup> <https://www.gov.uk/government/publications/enabling-uk-growth-releasing-public-spectrum-update-on-progress-to-december-2011>

<sup>4</sup> These rates are set to reflect a broad measure of opportunity costs.

<sup>5</sup> <https://www.gov.uk/government/publications/impact-of-radio-spectrum-on-the-uk-economy-and-factors-influencing-future-spectrum-demand>

## MEETING THE 500MHZ TARGET

The composition of the 500MHz target is set out below:

| Band                              | Lead Dept          | Expected release | Quantum (MHz)          | Status  |
|-----------------------------------|--------------------|------------------|------------------------|---|
| <b>A. Releases Completed</b>      |                    |                  |                        |   |
| <b>VHF and L-Band</b>             | Emergency Services | 2012             | 13 (released to Ofcom) | Around 9MHz within the VHF band were released back to Ofcom. Have also vacated an additional 4MHz of shared spectrum in L- band (a total of 13MHz representing about 20% of UK3 holdings).  |
| <b>870-872MHz and 915-917MHz</b>  | MoD                | H1 2013          | 4 (released to Ofcom)  | Decision reached to transfer management responsibility to Ofcom. Above to be released on the same basis alongside 872-876MHz and 917-921MHz, most likely allocating it to short-range devices (such as smart meters) on a licence-exempt basis. |
| <b>2025 – 2070MHz</b>             | MoD                | H2 2013          | 45 (shared)            | Decision reached by MoD to offer 5 year rolling notice to PMSE users (wireless cameras) in this band on a more formal basis going forward.  |
| <b>Total released to date</b>     |                    |                  | <b>62MHz</b>           |   |
| <b>B. Upcoming Releases</b>       |                    |                  |                        |   |
| <b>2.3-2.4GHz</b>                 | MoD                | 2015             | 40                     | Technical co-existence consultation published by Ofcom <sup>6</sup> .   |
| <b>3.4-3.6GHz</b>                 | MoD                | 2015             | 190 <sup>7</sup>       | Technical co-existence consultation published by Ofcom <sup>6</sup> .   |
| <b>4.8-4.9GHz</b>                 | MoD                | 2015             | 55(shared)             | MoD currently exploring opportunities for sharing within the above band.  |
| <b>1427-1452MHz</b>               | MoD                | 2015             | 20 (shared)            | MoD currently exploring opportunities for sharing within the above band.  |
| <b>Total upcoming releases</b>    |                    |                  | <b>305MHz</b>          |   |
| <b>C. Longer term releases</b>    |                    |                  |                        |   |
| <b>2.7-2.9GHz</b>                 | DfT                | 2016-2020        | 100                    | Dependent on further studies and future developments. Works currently taken forward by DfT, with CAA managing the programme.  |
| <b>Other</b>                      | Various            | 2014-2020        | Up to 35               |   |
| <b>Total longer term releases</b> |                    |                  | <b>135MHz</b>          |   |
| <b>Total</b>                      |                    |                  | <b>Up to 500MHz</b>    |   |

Below we outline the activities undertaken under each of the workstreams in further detail.

<sup>6</sup> <http://stakeholders.ofcom.org.uk/consultations/pssr-2014/>

<sup>7</sup> Includes 40MHz currently being used by UK Broadband.

## Releases to date

The Emergency Services use spectrum as either exclusive or as a shared access. Releases from exclusive bands (about 9MHz to date) leads to handover of those bands to Ofcom. Releases from the shared bands (4MHz to date) are treated similarly, but any new users will have to respect the same regulatory restrictions. Additional releases from exclusive bands have not been identified at the present time.

In January 2013, the UK Spectrum Strategy Committee (UKSSC) decided that the bands 870-872 MHz and 915-917 MHz should be released by the MOD to Ofcom. The UKSSC requested that Ofcom should take account of both existing and potential new public sector requirements. Following consultation, Ofcom decided that the bands 870-876 MHz and 915-921 MHz should be made available on a licence exempt basis subject to the CEPT's harmonised technical measures so long as those include sufficient technical constraints to permit the efficient use of the spectrum. Ofcom has now consulted on the technical proposals that would enable the authorisation of licence exempt use of certain Short Range Devices (SRDs) in the bands 870 to 876 MHz and 915 to 921 MHz. Following subsequent consultation on the necessary regulations, Ofcom anticipates that the licence exemption will be in force, and hence the band usable by new application by July 2014.

MoD have announced their intention to provide security of tenure by means of a 5 year rolling notice period for 45MHz of spectrum in the 2.0GHZ band to Programme Makers and Special Events users. These users, particularly outside broadcasters, have lost much of the spectrum available to them following recently releases, so this use of MoD spectrum will provide some certainty of spectrum access for these important purposes<sup>8</sup>.

## Upcoming MoD Releases

### MoD sales

The MoD holds around 75% of public sector spectrum below 5GHz. Much of this spectrum is already shared with other users and the MoD remains committed to maximising the efficiency of its spectrum use. A major project, the Spectrum Preparation Project, was undertaken in 2010/11 to audit MoD's spectrum holdings and this led to the development of a database of MoD's holdings to enable effective and efficient spectrum management and to identify spectrum for potential release.

### MoD sharing

The spectrum preparation project also identified a number of bands that could potentially be shared with other non-public sector users. Full details of the bands are set out on the MoD's website. A number of parties have expressed interest in the bands, for uses such as fixed wireless broadband, video systems on buses and trains and use in smart cities. MoD and Ofcom have started initial investigations into the bands below 5GHz (1427-1452MHz and 4800-4900MHz) and at 7900-7975MHz.

## Longer term Releases

### DfT releases

The Civil Aviation Authority (CAA), on behalf of the Department for Transport, has begun a major research programme to examine the feasibility of releasing around 100MHz of spectrum

---

<sup>8</sup> <http://stakeholders.ofcom.org.uk/binaries/consultations/pssr-2014/summary/pssr.pdf>

from the 2.7-2.9GHz currently used for civil and military aviation radars. The programme has three main components:

1. Analysing the feasibility of 'refarming' the band, by retuning radars to operate in the upper end of the band or in the 2.9-3.1GHz band.
2. Assessing whether there is potential to replace existing radars with new surveillance technologies that operate in other bands and which can provide long-term strategic benefits for aviation stakeholders.
3. Analysing the longer term requirements for aviation surveillance.

The current feasibility phase involves complex technical study work, testing and demonstrations with equipment manufacturers particularly on work looking at new technologies. The programme is looking at all three components in parallel workstreams and has built in a number of decision points. It is unlikely final decisions on the success of each component and their implications for spectrum release would be able to be taken much before 2018. However, the programme is seeking possibilities to release some spectrum through 'refarming' of existing systems before 2017 but it remains that maximising release might be through the deployment of new technologies.

The 2.7-2.9GHz band is adjacent to the 2.6GHz band which is now used for mobile broadband and therefore 2.7-2.9GHz might be an attractive band for future mobile broadband use. Although there are considerable technical challenges with introducing new services into this band, it has nevertheless been considered for inclusion on the agenda for the World Radiocommunications Conference (WRC) in 2015, as a candidate for more detailed study.

### Home Office releases

The Home Office primarily uses spectrum for the emergency services. A project is underway (the Emergency Services Mobile Communication Programme (ESMCP)) to identify future communications requirements and depending on the outcome may release spectrum for other purposes.

The Home Office recently carried out an audit of its other spectrum holdings and identified some spectrum for release. Some of this spectrum has already been released and work is ongoing on the other identified bands.

The law enforcement community relies to a great extent on sharing MoD spectrum. Work is already ongoing to release altogether 73MHz of spectrum by January 2015 back to MoD to support the MoD spectrum releases at 2.3GHz and 3.4GHz. This work is partially funded by MoD and has been made possible by both rationalising the spectrum use of some users and getting shared access to 42MHz of another existing, less commercially attractive, part of MoD spectrum.

### **EMERGING FINDINGS**

The PSSRP has worked closely with DCMS and Ofcom and the work has identified a number of areas which impact other aspects of spectrum policy as outlined below.

#### **Managing the sales**

The PSSRP considered how best public sector spectrum should be taken to market. Many Departments do not have the resources or expertise to conduct spectrum sales, so there is a danger that this process could become complicated or delayed if Departments undertake this work themselves.

In the case of the forthcoming MoD sales (40 MHz located in the 2.3 GHz band and another 150 MHz above 3.4 GHz) it has recently been announced that Ofcom will manage this process<sup>9</sup>. Having already completed a number of successful spectrum releases, including the recent 4G auction, Ofcom has significant experience and expertise in this area and is well positioned to manage these sales as well as other future public sector spectrum releases.

## Allocation of spectrum for public sector uses

As the amount of available spectrum becomes scarcer and as the needs of public and private sectors evolve, the basis of sharing spectrum between different users will be increasingly important. The UK Spectrum Strategy<sup>10</sup> addresses ways in which these allocation decisions should be taken, and how the public sector uses can be more closely aligned with the private sector to drive the best efficiency overall.

The Wireless Telegraphy Act (WTA) does not bind the Crown so, in theory, Crown bodies do not require authorisation from Ofcom to use spectrum. In practice, however, arrangements are in place to plan and manage the spectrum they use and the Crown respects the rights of authorised non-Crown users. These arrangements are embodied in the UK Frequency Allocation Table (UK FAT).

Allocations of spectrum to public sector bodies have involved a significant element of custom and practice, from times when the availability of spectrum was not such an issue. Public sector holdings are also driven to a large extent by international agreements which allocate bands on a global basis for uses such as defence or aviation.

Changes to public sector use, or release of spectrum to Ofcom for use in the private sector, are governed by the UK Spectrum Strategy Committee, which represents public sector users.

Reallocation of spectrum from public to private use (and vice versa) raises important policy questions around the value of respective uses and how spectrum should be allocated for different purposes.

In 2005, HM Treasury commissioned a review of public sector spectrum holdings from an independent expert, Professor Martin Cave. This review concluded that efficiencies in public sector spectrum use could be achieved and the resulting spectrum released for other purposes.

Cave recommended that policy decisions around the value of spectrum in public sector use should primarily be the responsibility of user Departments, but that Departments should follow the principle of 'user pays'. Unless there is an overriding case for Government intervention, decisions around allocations should not be taken centrally, but Departments should bear the market cost of spectrum to drive efficient usage. Similarly, where Departments require additional spectrum or services that are dependent on spectrum access, this should be acquired from the market. This remains the Government's policy.

## Driving efficiency

Spectrum charges based on the opportunity cost of spectrum were first introduced for Defence in 2005/6. In addition, other mechanisms (such as Recognised Spectrum Access) have been put in place to allow for release and sharing of public sector spectrum.

Following on from the application of market-based spectrum charges for Defence, an announcement was made as part of the 2013 Budget on the wider introduction of financial

---

<sup>9</sup> <http://stakeholders.ofcom.org.uk/spectrum/public-sector-spectrum-release/>

<sup>10</sup> <http://www.gov.uk/publications/spectrum-strategy>

incentives. As a result market-based spectrum charges were applied in the 2013 Spending Review to become effective from 2015/16 onwards across all public sector users of spectrum.

Market based pricing alone may not be sufficient to incentivise Departments to release spectrum that it values less highly than other uses. As the current technical and remediation works undertaken by the MOD to allow for the release of 2.3-2.4GHz and 3.4-3.6GHz bands have highlighted, spectrum clearance is a complex and often costly process. To some extent these costs can be met from receipts from sale: however, there needs to be a clear policy in place for funding the upfront costs of spectrum release and treatment of capital receipts, communicated to Departments, to support investment decisions.

## Managing spectrum

A significant proportion of spectrum is managed by Government departments. Individual departments each make decisions on how their spectrum holdings are used for their own purposes or shared with other users.

Around 52% of spectrum is accessed by the public sector. As there are literally thousands of assignments across frequencies, time periods and regions, efficient management of this spectrum is a major undertaking. It relies on accurate data on assignments, which are kept up to date, and suitably qualified staff.

As part of the work to establish departmental spectrum charges for 2015/16, Ofcom carried out an analysis based on available data of public sector uses, following the UK FAT allocations. This exercise revealed that beyond the broad spectrum bands which public sector bodies are responsible for, there is incomplete data on actual usage of frequencies within the bands by many Departments. This lack of clarity may hide spectrum that could otherwise be released. Although the system of spectrum charges should help address this, an accurate database of public sector usage is urgently required.

As mentioned earlier, the MOD, who have the largest spectrum holdings in the public sector, have developed a spectrum database as part of their work to improve spectrum management and thereby rationalise their spectrum usage. This database more accurately identifies the users of spectrum in the bands managed by the Department, so that MOD can manage its spectrum more efficiently and are able to identify opportunities where spectrum could be shared.

A similar database application could be extended across all public sector users, to promote better management of spectrum. Opportunities could then be assessed across Departments and arrangements will be put in place to notify commercial users of spectrum that is potentially available for use. In the longer term, this database could also support the development of geolocation databases in the public sector.

Resources and the approach to spectrum management differ across departments. Establishing a common spectrum database that is kept up to date, would also enable Ofcom to more effectively support departments particularly where resources and internal expertise is limited.

## Co-ordination with DCMS and Ofcom

The project has raised a number of important issues in the public sector which require co-ordination with other policy objectives. Policy, legislation and regulation around public sector and commercial spectrum needs to be developed in the context of the UK spectrum strategy, taking into account current and expected future spectrum demand, so that spectrum is allocated in the most efficient way, maximising its value to the UK as a whole.



Particular policy decisions include which bands should be prioritised for release by the public sector (considering what is potentially available and what is the market demand) and the timing of releases, so that they are co-ordinated with releases of commercial spectrum by Ofcom. The public sector also has an important role to play in informing policy for Ofcom and DCMS in international discussions on spectrum allocations at regional and/or global level.

Such decisions are critical in ensuring spectrum across public and private sector is allocated in a manner that delivers best long term economic benefit for the UK.

## Sharing

As the case for clearing spectrum is becoming harder to make and demand for key spectrum bands keeps growing, this will increase the role of spectrum sharing going forward and the significance of technical and regulatory innovations to enable such sharing.

Currently around 29% of spectrum is being shared between public sector and private sector users. As discussed, the creation of a central public sector spectrum database that is dynamic should permit visibility of potential sharing opportunities and allow more efficient and innovative use of spectrum going forward. New enabling technologies such as geolocation databases and white space devices will also add to this opportunity in the longer term.

As part of the 500MHz public sector spectrum release works, progress has been made on establishing the regulatory process to allow MOD to share spectrum but more work is required before the plans can be fully implemented. MOD is in the process of preparing bands for sharing by progressing its technical preparatory work on bands identified for sharing.<sup>11</sup>

## NEXT STEPS

The Programme runs to 2020 and much important work remains to be done. Key upcoming Programme activities are outlined below.

### 1. Current release projects

The good momentum of the current release projects will continue. Important milestones are expected to be:

- The MoD sales of the 2.3-2.4GHz and 3.4-3.6GHz bands are targeted to complete in 2015. Formal consultations have been launched by Ofcom and responses are due through the first half of 2014. Depending on the outcome of these, the auction of the spectrum is expected to take place in the financial year 2015/16.
- Technical work to enable sharing of MoD bands continues. Following the consultation of a 5 year rolling notice to PMSE for spectrum in the 2025-2070MHz band further sharing is planned for later in the year.
- The initial results of the feasibility work to free up spectrum in the 2.7-2.9GHz band should be known later this year or early in 2015. Depending on the outcome of the work, a more detailed field testing programme will then commence. Studies will also be required into what purposes the released spectrum might be put to and therefore how the new user and usage will co-exist with other users and usage remaining in adjacent bands.

---

<sup>11</sup> <https://www.gov.uk/sharing-defence-spectrum>

- ESMC is expected to issue OJEU, PQQ and ITT in 2014 with a target of full business case approval in early 2015.

## 2. Database of public sector holdings

The PSSRP has identified the need for a more accurate record of public sector spectrum holdings and usage. Much good work in this regard has been done by the MoD which can provide lessons for other Government departments. Other departments accept the need for better record keeping to drive efficiency, a position which has been endorsed by UKSSC.

ShEx, DCMS, MoD and Ofcom will work with other Government departments to establish data requirements, with a view to establishing over time a database or databases which can underpin more efficient spectrum management and enable sharing. Once established the database(s) can act as a means of enabling information to be provided to other spectrum users about spectrum that may potentially be available and could also link with geolocation databases to enable dynamic spectrum access in the longer term.

## 3. Incentives

The wider use of financial incentives has already been put in place to apply to public sector spectrum from 2015/16. During 2014/15 HM Treasury will continue to work with ShEx, Ofcom and departments to refine these charges, as additional data becomes available, to apply from 2016/17.

Further work will also be undertaken to understand better the costs of spectrum clearance and how these costs will be funded.

## 4. New bands and priorities

Ofcom's mobile data strategy consultation document identifies a number of bands where additional capacity for mobile broadband could come from, some of which are in the public sector. Although the PSSRP looks set to release the 500MHz target from bands already identified, the Programme will consider whether further bands identified by Ofcom should be explored, particularly extending the Programme to spectrum below 6GHz, and considering the potential for release of 5GHz bands, which may present an opportunity for licence exempt use. Ofcom's consultation on mobile data strategy has also identified other possible frequencies for more mobile data use.

ShEx will continue to work closely with DCMS and Ofcom to ensure that the PSSRP is closely aligned with developing spectrum policy and international developments.

## 5. Sharing

Sharing already forms an important part of the Programme. It offers, in some cases, a cost-effective and quicker way of providing access to spectrum that is likely to become increasingly significant.

We will continue to explore other opportunities for sharing in public sector bands, which offer the potential to generate 'quick wins'. The Shareholder Executive will work closely with Ofcom to understand how other sharing initiatives such as dynamic spectrum access or use of white spaces could work in a public sector context, as well as in identifying bands for which such an approach present the most likely opportunity to increase the value derived for the UK from the use of spectrum under public sector management.

## 6. Rights and licensing

Sharing of public sector spectrum poses some new challenges. It will, of course, be necessary for us to assess the technical issues of co-existence between new users and existing users, as with all changes to how spectrum is used. However, sharing of spectrum (on a dynamic basis or otherwise) can present new licensing and regulatory challenges depending on the exact form of sharing contemplated. The concept of RSA has been developed to facilitate trading in public sector spectrum, but further work is required on how best to reflect the public sector's rights to spectrum they share and the rights of those they share spectrum with in the regulatory and licensing approach that supports such sharing. This is of particular importance where the public sector is looking to share on a time-limited basis and so there is an expectation that the rights to use the spectrum will revert to the original public sector body at the end of the term of release, which is expected to be in the region of 15-20 years.

Over the coming year the Shareholder Executive will work closely with Ofcom to help develop the approach to sharing and the most appropriate regulatory regime to support it, including any changes that may be necessary in the use of grants of RSA and developing new licence products that may be required for these potentially new and innovative arrangements.

## 7. Governance

Finally, the Shareholder Executive will provide input to DCMS and Ofcom to ensure that the governance arrangements enable the allocation and management of spectrum to be seamless regardless of who manages the spectrum.

In case of queries on this paper, please contact one of the people listed below.

### CONTACTS:

Adam Thynne, Executive Director, Shareholder Executive  
[Adam.Thynne@bis.gsi.gov.uk](mailto:Adam.Thynne@bis.gsi.gov.uk)  
020 7215 3298

Paul Norris, Executive Director, Shareholder Executive  
[Paul.Norris@bis.gsi.gov.uk](mailto:Paul.Norris@bis.gsi.gov.uk)  
020 7215 5626