Spectrum Sharing – making it more normal!

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Almost everything uses Spectrum

Mobile

Radio

TV – terrestrial and satellite

Scientific – space & earth exploration

Aeronautical and maritime comms

Short range devices

Defence & security

Wi-Fi

Drones

Astronomy

Health / Medical

Fixed links (telecoms backhaul)

Positioning systems (sat nav)

Business radio

Wireless Headsets (Bluetooth)
Wireless connectivity is an enabler

Different sectors are starting to use wireless to meet their business objectives

- Precision agriculture
- Manufacturing
- Smart retail - logistics

Small Robot Company

MTC – factory in a box

Ocado
But our approach to spectrum management today is still designed for yesterday

- **Tight harmonisation**
- **Large ‘coordinated’ clearance programmes**
- **Co-existence**
- **Some applications use cost economics of ‘licence exempt eco-systems’ - but claim to need protection**
It’s an approach of “no you can’t” instead of “let's see how to make it work”
...so we need to change

We are technology natural – but is all our work?

- We talk about IMT – and mobile. But:
- Industrial applications - may not involve an MNO
- IoT - both applications and industrial solutions
- Transport (connected cars) – command and control, information, entertainment: is this all provided by MNOs?

Speed of change is increasing, is spectrum management keeping up?
TVWS – a long journey

2006 – First thought of ‘TVWS’ in 2006 to allow cognitive/sensing devices to use TV spectrum

2009 – Decided to focus on using Geolocation and Database Managed access as sensing is difficult

2011 – set out our approach to implementing geolocation

2012 to 2014 – various studies, trials, pilot networks, coexistence testing

2015 – TVWS introduced, Exemption Regulations in force, Manually Configurable WSD licences available. Used mainly to provide rural broadband connectivity

TVWS Review – Looking at options to revise and simplify the rules to make TVWS more attractive to users
But do we need to wait to use databases – to build in flexibility?

- Most applications are not dynamic?
- It's not always a complex sharing environments.
- Requires equipment to be able to communicate with the database.
- But they are a great tool for the right problem!
Our spectrum sharing framework to enable a range of different uses cases and players

**Shared access licence** for access to mobile spectrum, 1800 MHz, 2300 MHz, 3.8-4.2 GHz and 26 GHz → deployment within 6 months of obtaining licence

1. User applies for band, location, bandwidth, and power required
2. Ofcom assesses interference to/from other users
3. User pays licence fee (per channel and per area/base station)
4. Ofcom grants licence per area/per base station licence

**Local access licence** for access to licensed mobile spectrum

1. User applies for band, location, bandwidth, and power required
2. Ofcom engages with relevant MNO(s)
3. £950 per licence (maximum 3 years unless longer duration agreed with MNOs)
4. ✓
Our spectrum toolbox allows us flexibility to meet current demand and prepare for future innovation

- We have been engaging with different businesses and organisations, through a series of workshops, to better understand their evolving needs and to highlight the options available and their characteristics.

**Auctioned**
- Spectrum mostly authorised on a nationwide basis.

**Sharing**
- Low cost licences enabling localised access to spectrum.

**Exempt & Light Licence**
- Access to spectrum with low barriers is an important enabler of innovation.
Let’s look at an example 3.4 – 4.2 GHz

Localised Licences – including 4G/5G

Each PAL is a 10 MHz channel in the 3550-3650 MHz band. No more than seven PALS will be issued in any county. A licensee can aggregate up to four PALS channels in one county.
And another example - 37 – 43.5 GHz - A single band, but with ‘mixed bathing’

We will need a very different approach to harmonisation and how we allocate/authorise spectrum
Better use of spectrum means also thinking about receivers!

"Big ears loud voices"

- When designing receivers we need to change our philosophy
- You need to think you will get a loud neighbour – they will have filters, but you need to design your receivers for your band!
- We shouldn't think if the receiver is wide – I should get more protection!
- Is this the right incentive?
Opening up more spectrum for Wi-Fi at 6 GHz – enabling it to work with other services!

Increasing number of connected devices

- Demand for greater bandwidth, lower latency and improved coverage
- Key to enable innovation
- Improved wireless experience

We opened up 5925-6425 MHz for unlicensed use:

- 250mW indoor
- 25mW outdoor
Sharing – is an important tool in our spectrum management tool kit

While we need to consider what services need – sharing should increasingly become normal.

We need to use the right tool for the right problem – the right level of complexity

Change our approach on co-existence to one of how do I make it work!