TV White Space Devices
...and beyond!

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Outline

- What are TV white spaces?
- Services and applications they might be used for
- Ofcom’s decision to allow TV white space devices in the UK
- And beyond... How devices might need to access radio-spectrum in the future
TV white spaces

- “White spaces” refer to geographical areas where the radio spectrum is not used by the licensee (because to do so would cause interference to the licensee’s services elsewhere).

- White space spectrum can be potentially accessed by users other than the licensee, resulting in
  - increased overall spectrum efficiency.
  - innovative new services.

- Protection of the incumbent licensee(s) is paramount.

High power TV broadcasts using the same frequency need to leave spaces between their coverage areas to avoid interference.

These frequencies can be used in the “white spaces” in between by lower-power devices.
TV Whitespace devices – operating frequencies

- Access to the UHF TV band by white space devices (WSDs) would be subject to the protection of incumbent licensees (mostly DTT).

- TV white space devices are location aware. They check with a central database what frequencies are safe to use in their location.

- Estimates that 100MHz and more is available in many areas of the UK.
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WSD applications: Enhanced Wi-Fi

- **What is it?**

  - Wi-Fi devices operating in TV white spaces, as well as the existing allocations at 2.4 and 5 GHz.

- **Why is TV white space spectrum attractive?**

  - Popularity of Wi-Fi could lead to congestion and poor performance for devices at 2.4 GHz.
  
  - Perception that Wi-Fi operating at 5 GHz has poor range.
  
  - Potentially facilitates outdoor or “metro” coverage.
WSD applications: Rural broadband

What is it?

- Using TV white spaces to provide a wireless broadband connection to rural areas.

Why is TV white space spectrum attractive?

- A cost-effective means to provide broadband to areas that would be too expensive to serve by other means.

Photos courtesy of BT
WSD applications: Machine-to-machine communications (M2M)

- What is it?
  - Data connections between sensors and devices used for telemetry or remote monitoring.
  - Connecting everyday objects to the internet

- Why is white space spectrum attractive?
  - A more cost-effective network for M2M communications compared to using cellular networks.
  - Additional range afforded by TV white spaces is attractive to reach devices deep inside buildings
Significant interest in TV white spaces

- Industry interest in developing WSDs and deploying services is growing.

- There is also the potential for a market in related services (e.g., white space databases, WSDBs).

- Trials of prototype WSDs and WSDBs are on-going in the UK:
  - Rural broadband in Scotland.
  - A range of services in Cambridge.
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Enabling access to TV white spaces

- We have decided to proceed with enabling access to TV white spaces for the following reasons:

- Short term
  - We have a duty to secure optimum use of the spectrum. Spectrum in white spaces is (by definition) unused.
  - We have a duty to remove barriers to innovation.

- Longer term
  - Access to TV white spaces is a stepping stone for future access to white spaces in other bands. This may satisfy some of the huge demand for spectrum for wireless data applications.
  - Internet and computing technologies have advanced to the extent that dynamic and opportunistic spectrum sharing is becoming technically viable. Access to TV white spaces is a good test-case.
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Radio spectrum Supply and Demand
Much of the spectrum is allocated and licensed ...
Radio spectrum Supply and Demand
But it is not necessarily all used ...
Radio spectrum Supply and Demand
Predictions suggest huge demand forecast for wireless data applications (but much uncertainty)
Radio spectrum Supply and Demand
Predictions suggest demand will continue to outstrip supply
Better dynamic sharing of spectrum may well be a necessity in the long term

- There is huge demand forecast for wireless data applications.

- Suitable radio spectrum is in short supply, and demand is forecast to outstrip that needed:
  - However, this is significantly an artefact of the historical approach to spectrum management – there is much white space.
  - Opportunistic and dynamic spectrum sharing are technology solutions to unlock the unused spectrum.

- Various technology developments are emerging which enable the radio spectrum to be used much more efficiently in the longer term:
  - Devices are increasingly able to operate over multiple frequency bands
  - Devices are able to operate over increasingly wide frequency bands
  - Devices are increasingly sensitive and location aware
  - Internet and computing technologies now make dynamic and opportunistic spectrum sharing computationally viable.

- Enabling TV white spaces is a stepping stone potentially enabling access to white spaces in other bands.
Thank you!

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