

TV White Spaces for Rural Broadband

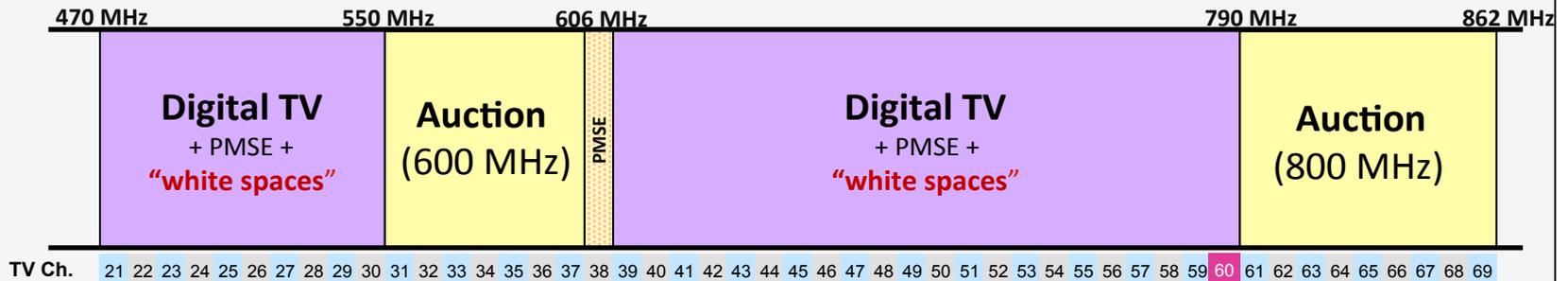
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What is the TV White Spaces Spectrum?

UK TV band plan post-switchover

6 x DTV multiplexes (Freeview platform)
550 – 606 MHz to be auctioned, use TBD (e.g. more TV)
790 – 862 MHz to be auctioned for mobile (e.g. LTE)

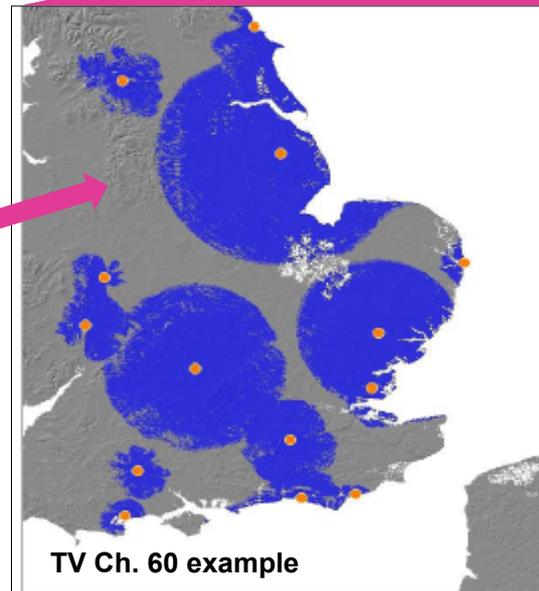


PMSE = Programme Making and Special Events
(e.g. Wireless microphones)

The TV white space is the area where a given TV channel is not used for TV reception

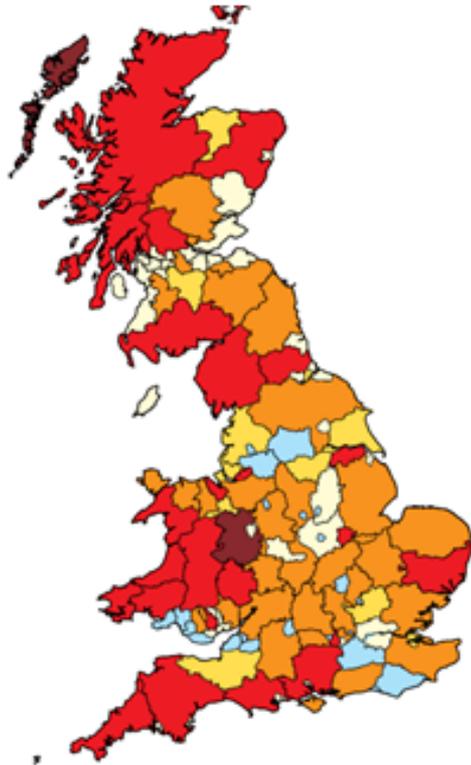
Key Points:

- Unlicensed use
- Range of throughputs, extensible through combining channels

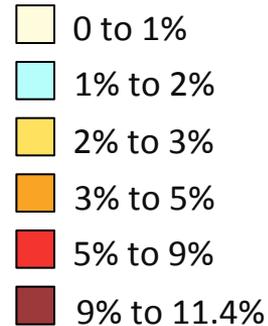


TV “white spaces” spectrum versus Not-Spot locations

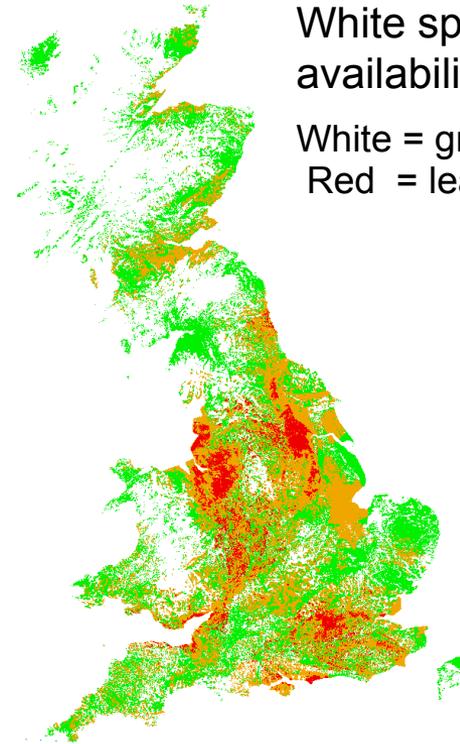
The more rural areas of Great Britain where there are the highest levels of broadband at <2Mbps due to line length....



Percentage of problem lines due to length



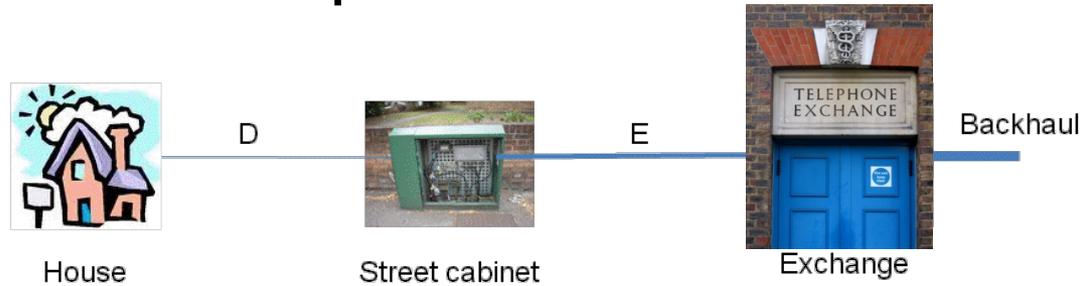
...correlate well with the areas of Great Britain where the most TV white space spectrum will be available.



White space spectrum availability

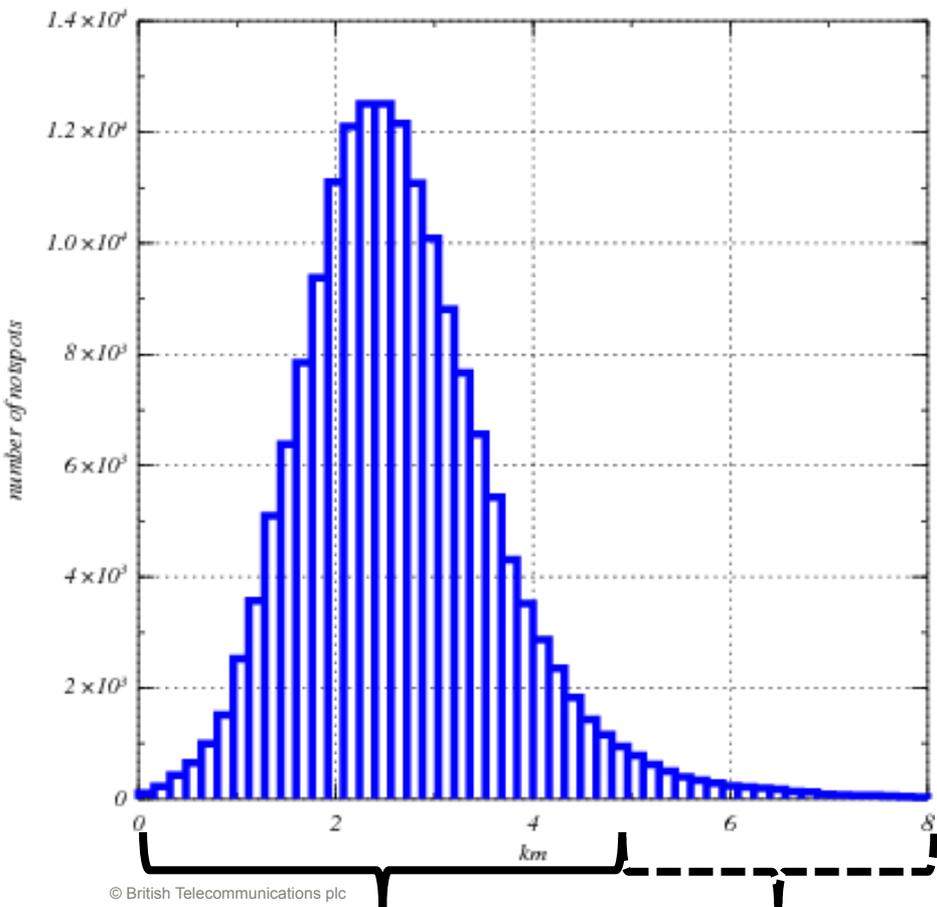
White = greatest availability
Red = least availability

The Not Spot Problem

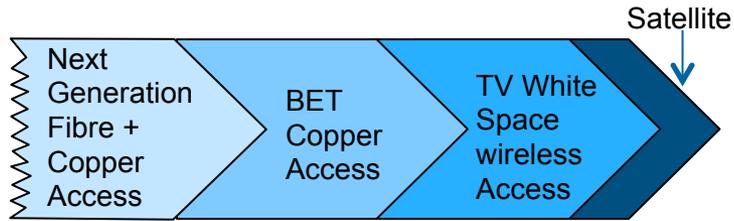


- If 'D + E' are too long then 2Mbps broadband is not possible. NGA might bring fibre to cabinet but 'D' length still might be too long

notspots: distance to nearest exchange



- Challenge is to cover 'not-spot', premises that cannot get 2Mbit/s broadband
- There are 2.75m customers whose service is <2Mbits/s in the UK [Ofcom]
- TV white space technology could cover around 25% of these.



Non-LoS TVWS LoS TVWS



The Concept

Up to 5km non line-of-sight, 8km line-of-sight



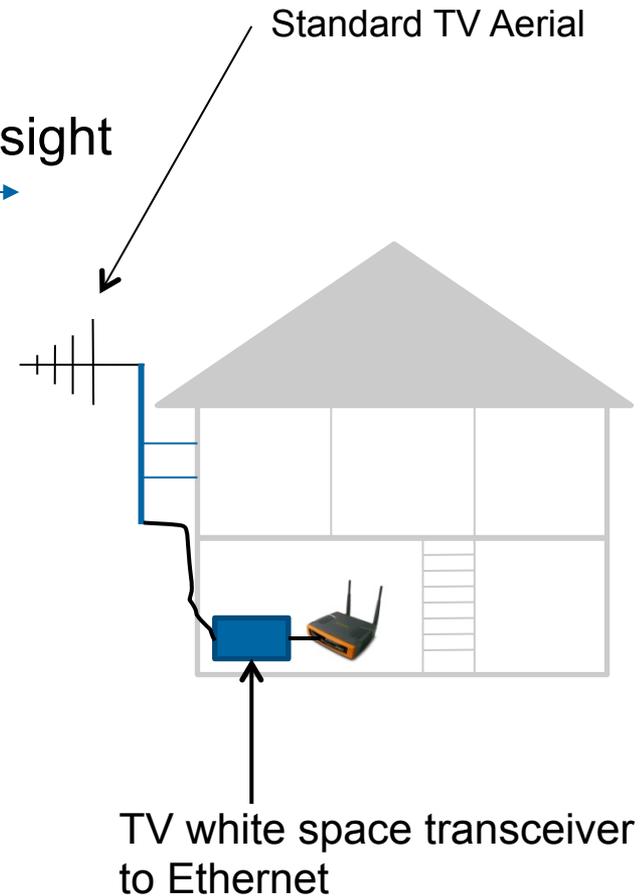
TVWS BS

Router

Ethernet

DSLAM

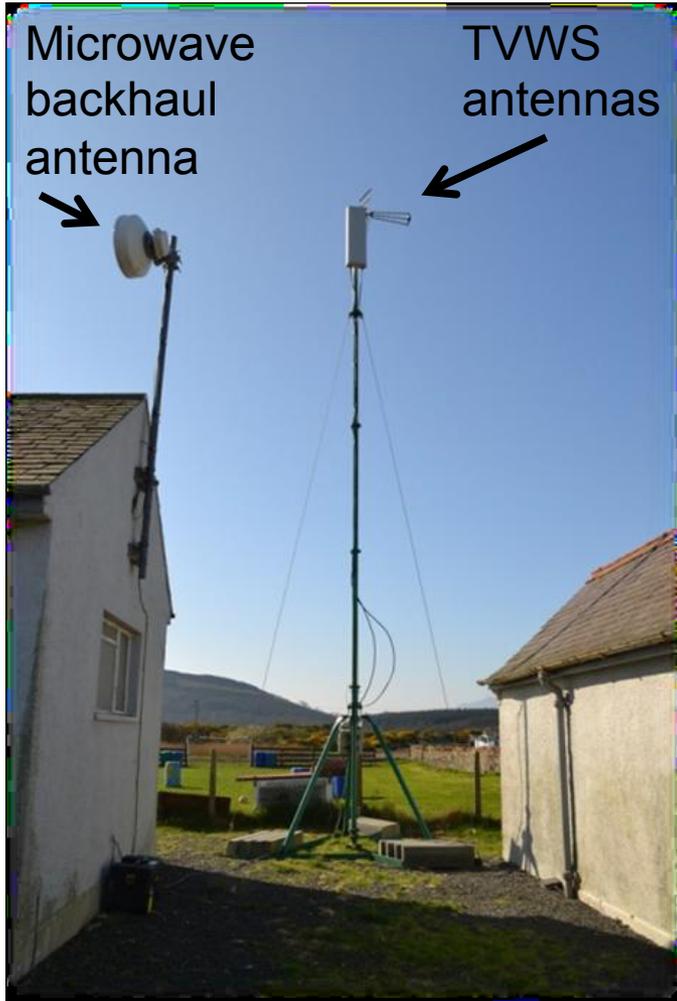
Backhaul



- ▶ Trials in Isle of Bute, Scotland (5 Users) and Sutton, Suffolk (14+ users)
- ▶ Sharing wireless spectrum with Digital TV Transmitters.
- ▶ UHF between 470 – 790MHz
- ▶ Low diffraction and building penetration loss

Example installation

Basestation



Trialist



TSB funded Rural Broadband Trial on the Isle of Bute

- Collaborative R&D project supported by the UK government's Technology Strategy Board started 1st April 2011 until mid 2012
- To build and test a trial white space broadband network on Bute, Scotland, with backhaul connection to the mainland via microwave
- Purpose: to prove the viability of the technology and establish the processes required
- Six collaborating partners:



Wider use of Cognitive (thinking) Radio



Secondary use of military spectrum coming available. (Date tbd)



Solve challenges to make system support QoS. EU Project QoS MOS (Jan 2010 for 36 months)



Home Hub 3 Introduced Cognitive Radio techniques to WiFi to improve the efficiency of 2.4GHz operation. (Available 2011).



Earliest opportunity is rural broadband in TV white space using geo-location. TSB trial (mid-2011 for 12 months)



With dedicated silicon introduce a whole new era of machine to machine control. Working with the 'Cambridge White Space Trial started' (mid-2011)