

IEEE 1900.7 White Space Radio Potential Use Cases For TVWS

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Use Cases

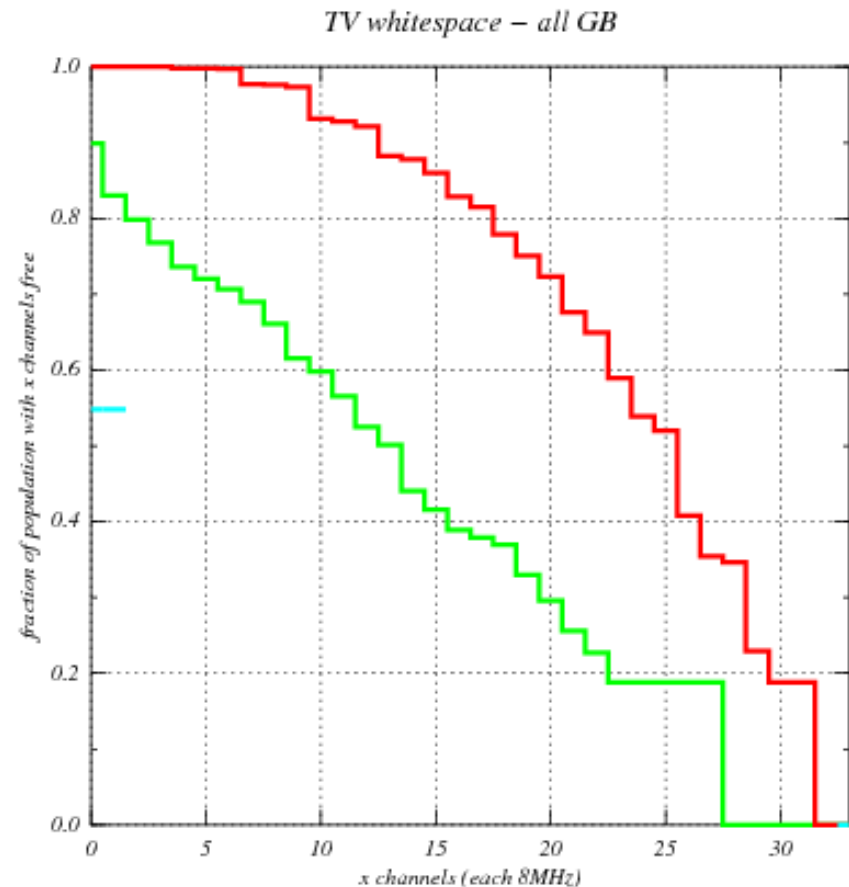
- ➔ Forseen use cases for TV white space:
 - Rural broadband
 - Dynamic backhaul
 - Indoor networking (with inside-to-outside coverage)
 - Machine-to-machine (longer term use case)

Use Cases

- ➔ Forseen use cases for TV white space:
 - **Rural broadband**
 - Dynamic backhaul
 - Indoor networking (with inside-to-outside coverage)
 - Machine-to-machine (longer term use case)

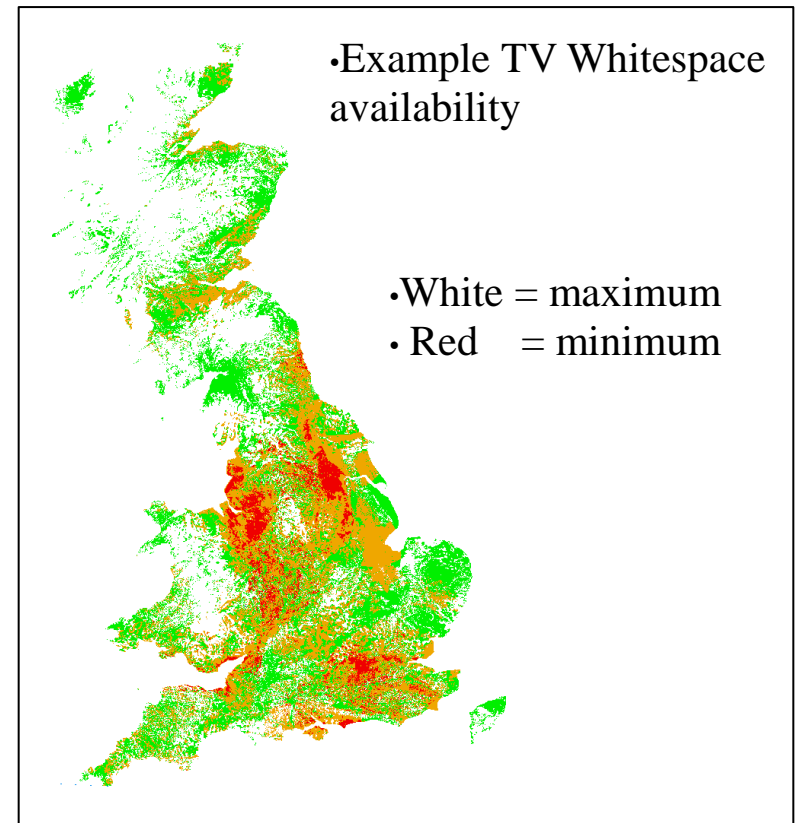
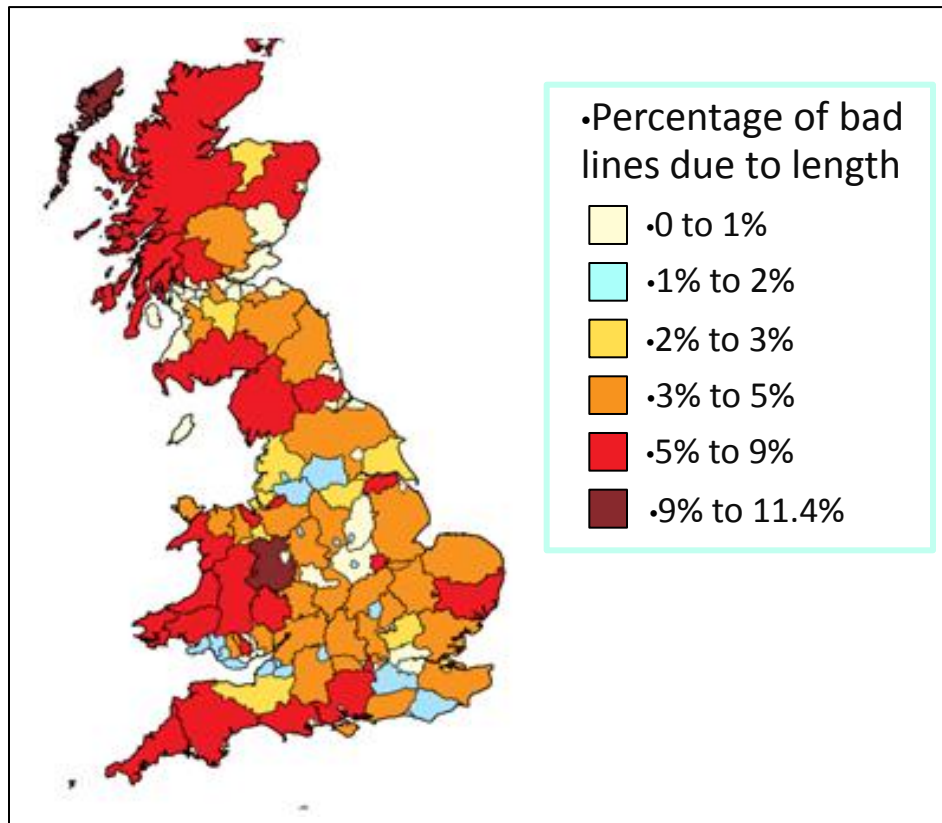
Rural Broadband

- ➔ TVWS availability in UK (weighted by population)
- ➔ If adjacent channels can be used everyone can see at least 40MHz and 50% can see at 200MHz (red line)
- ➔ If adjacent channel are not allowed then 70% can see 40MHz and 50% can see 100MHz (green line)



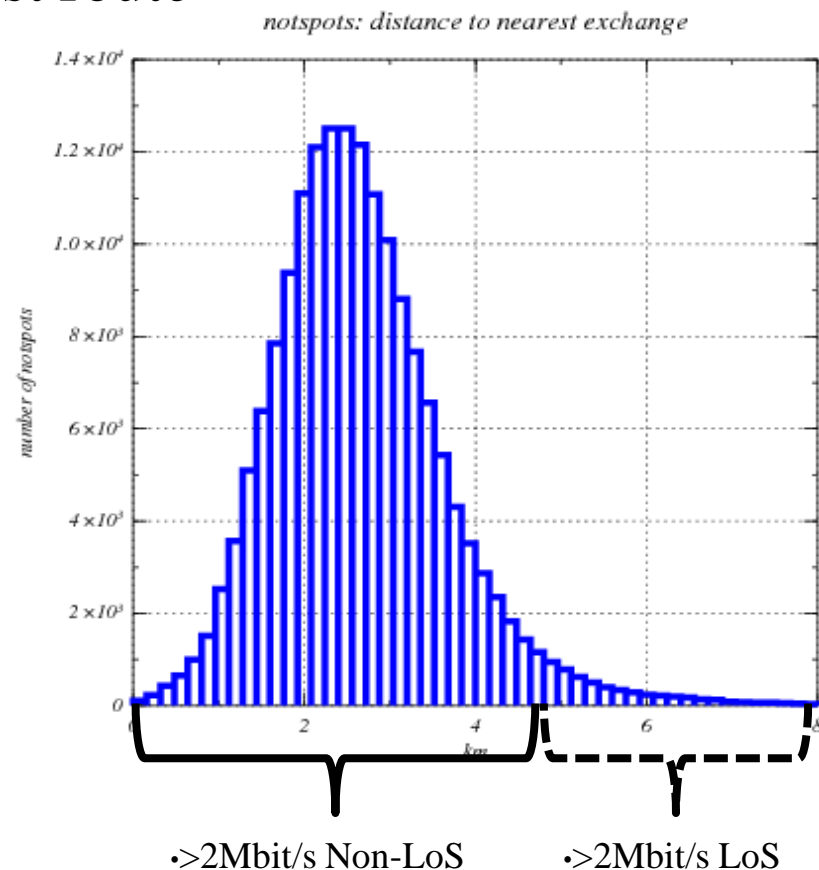
Rural Broadband

- ➔ Not-spot locations correlate well with TVWS availability



Rural Broadband

- ➔ Fixed broadband is limited by length of copper lines. Copper often does not take the shortest route
- ➔ Average not-spot 3km from nearest exchange
- ➔ UHF can provide $>2\text{Mbit/s}$ up to approx 5km NLOS and up to approx 8km LOS
- ➔ Rural broadband trial already underway

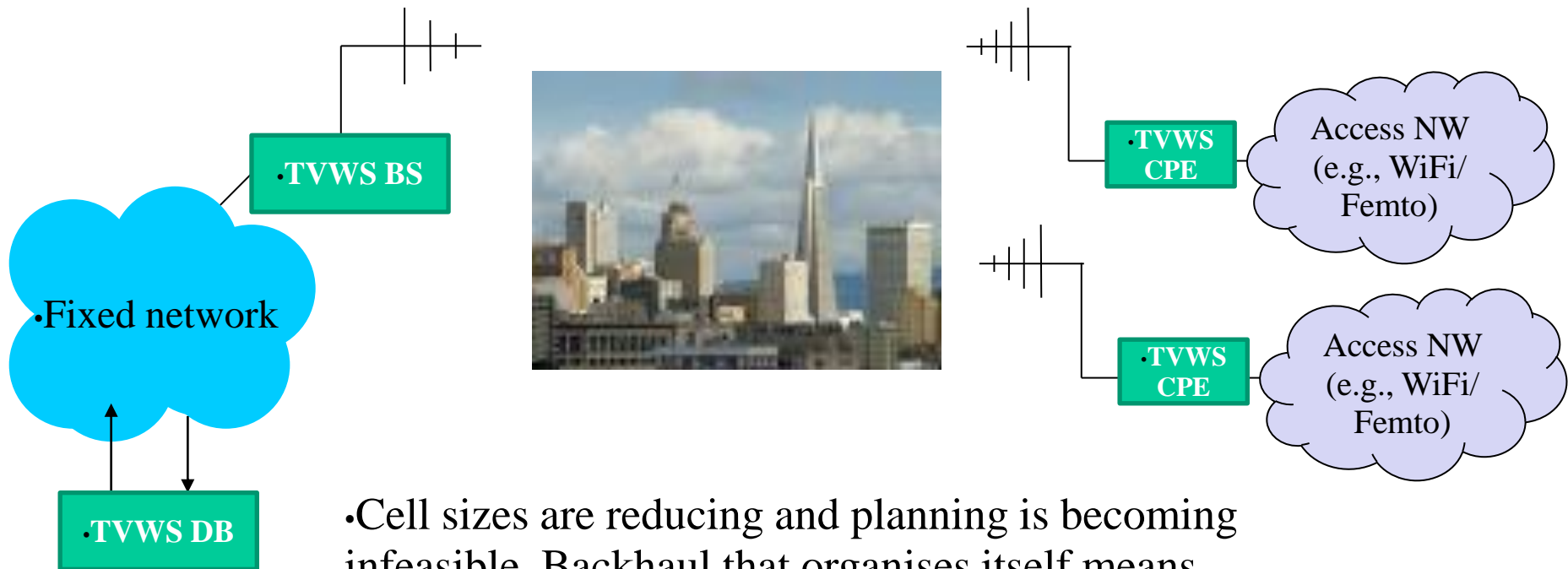


Use Cases

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Dynamic backhaul

- ➔ Fixed broadband is limited by length of copper lines. Copper often does not take the shortest route



•Cell sizes are reducing and planning is becoming infeasible. Backhaul that organises itself means easy installation of small cells for both licensed and unlicensed systems

Use Cases

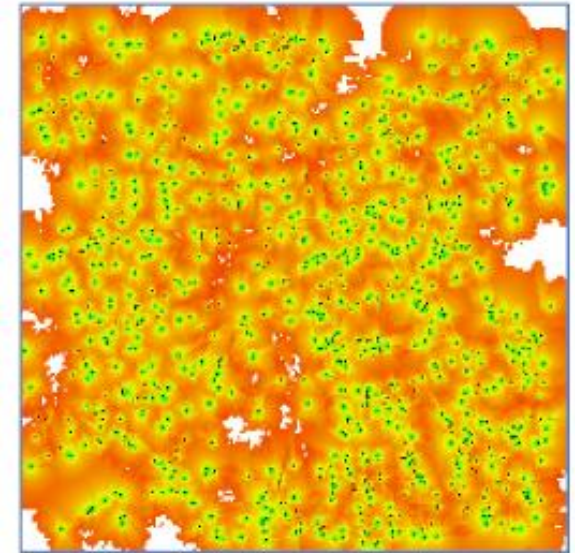
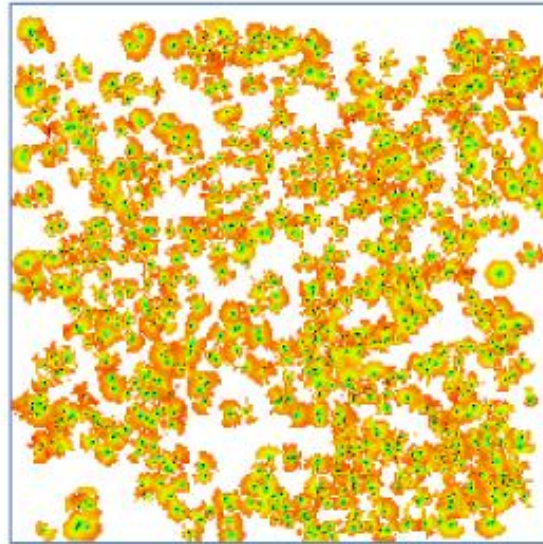
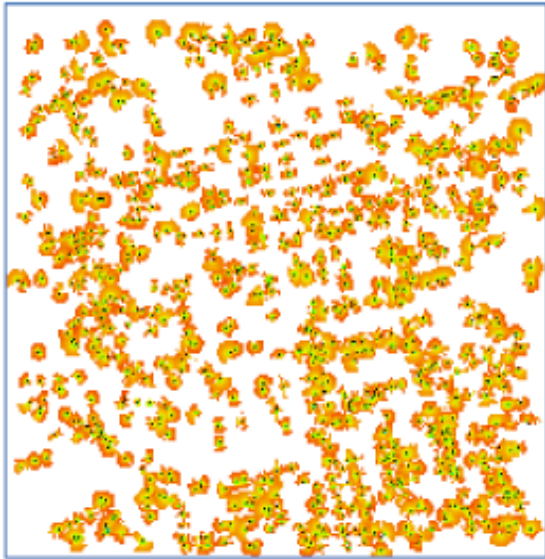
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Indoor Networking (inside-to-outside)

- ➔ Distribution of bandwidth inside premises when NGA is delivered (Indoor networking)
 - Millions of homes in urban areas with high speed broadband that can reach at least 50Mbit/s
 - WiFi at 2.4GHz is already congested and 5GHz will not reach around even a moderately sized house
 - UHF uses lower energy than 2.4 / 5GHz for the same coverage and throughput

Indoor Networking (inside-to-outside)

- Area – 1sq km in London, household density 5k



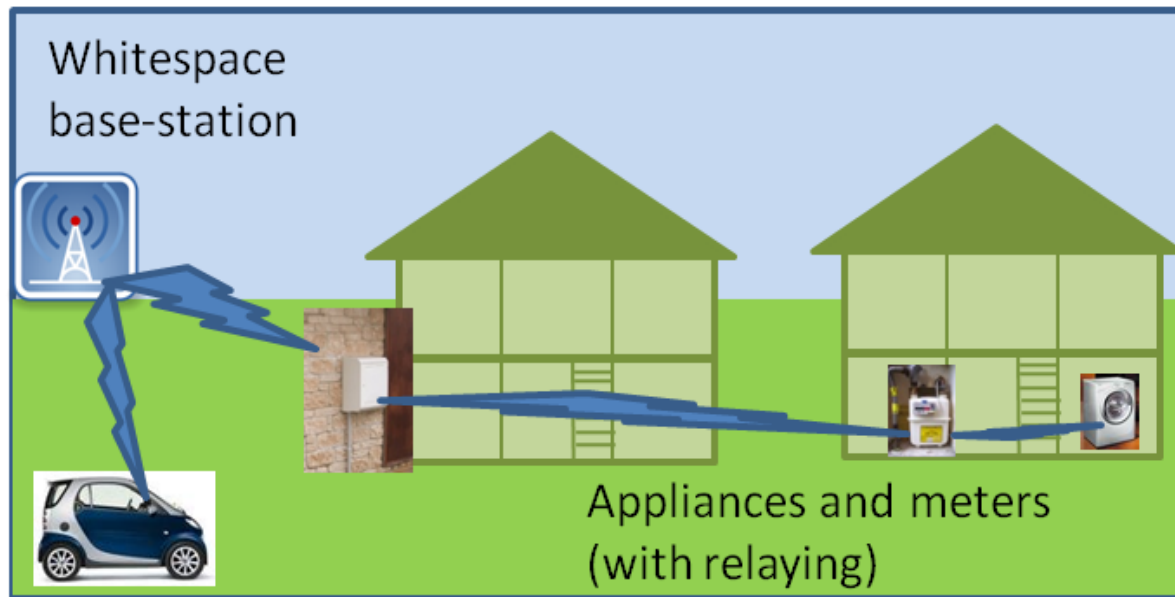
- (a) 5GHz
- (b) 2.4GHz
- (c) TVWS
- TVWS band provides coverage similar to a mobile broadband network – with a 20% deployment density

Use Cases

- ➔ Forseen use cases for TV white space:
 - Rural broadband
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 - **Machine-to-machine (longer term use case)**

Machine-to-machine

- ➔ High number of devices in a small area
- ➔ Relaying used to reach base stations
- ➔ Some device fixed, others mobile
- ➔ Typically low power



Conclusions

- ➔ Several use cases suggested for TV white space:
 - Rural broadband
 - Dynamic backhaul
 - Indoor networking (with inside-to-outside coverage)
 - Machine-to-machine (longer term use case)
- ➔ Early use cases fixed. Later use cases become increasingly mobile.