

# IEEE 1900.7 White Space Radio Potential Use Cases For TVWS

Date: **2011-09-29; Berlin**

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# Use Cases

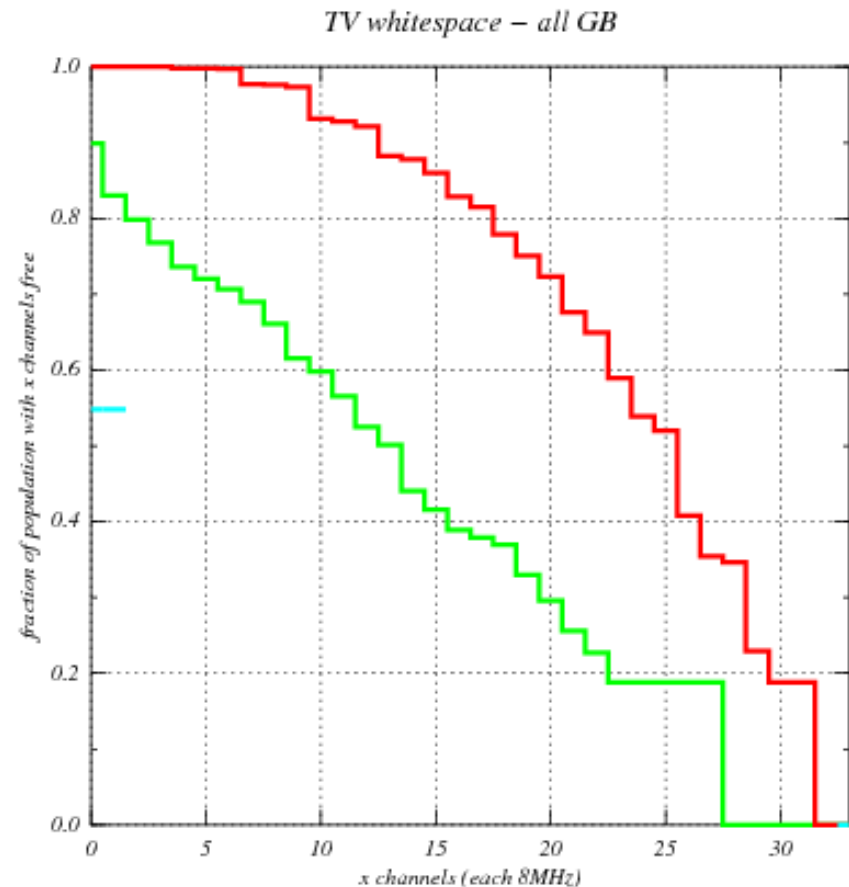
- ➔ Foreseen use cases for TV white space:
  - Rural broadband
  - Dynamic backhaul
  - Indoor networking (with inside-to-outside coverage)
  - Machine-to-machine (longer term use case)

# Use Cases

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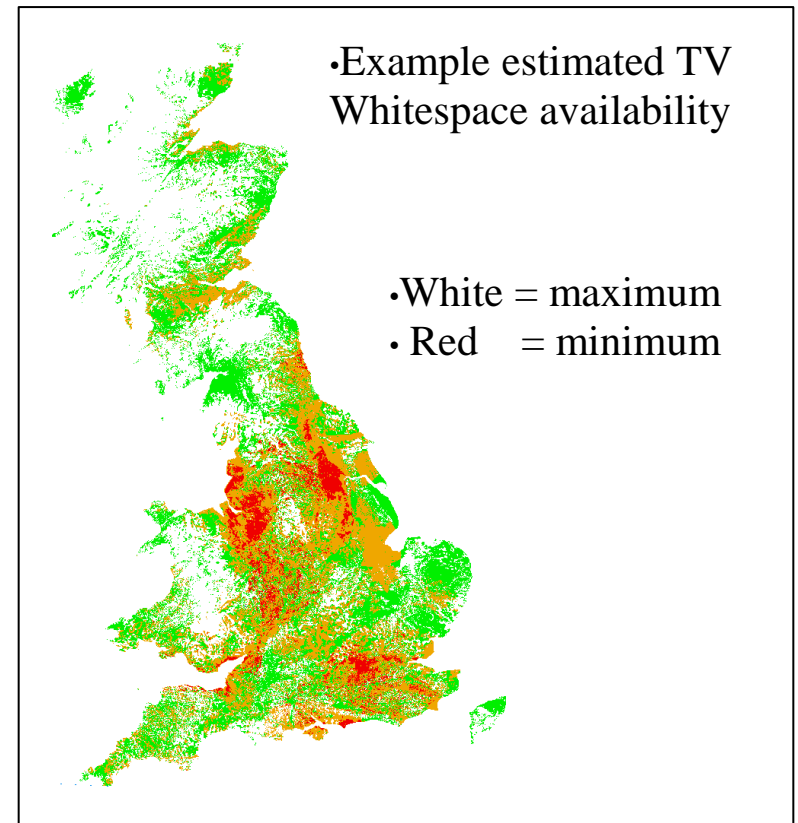
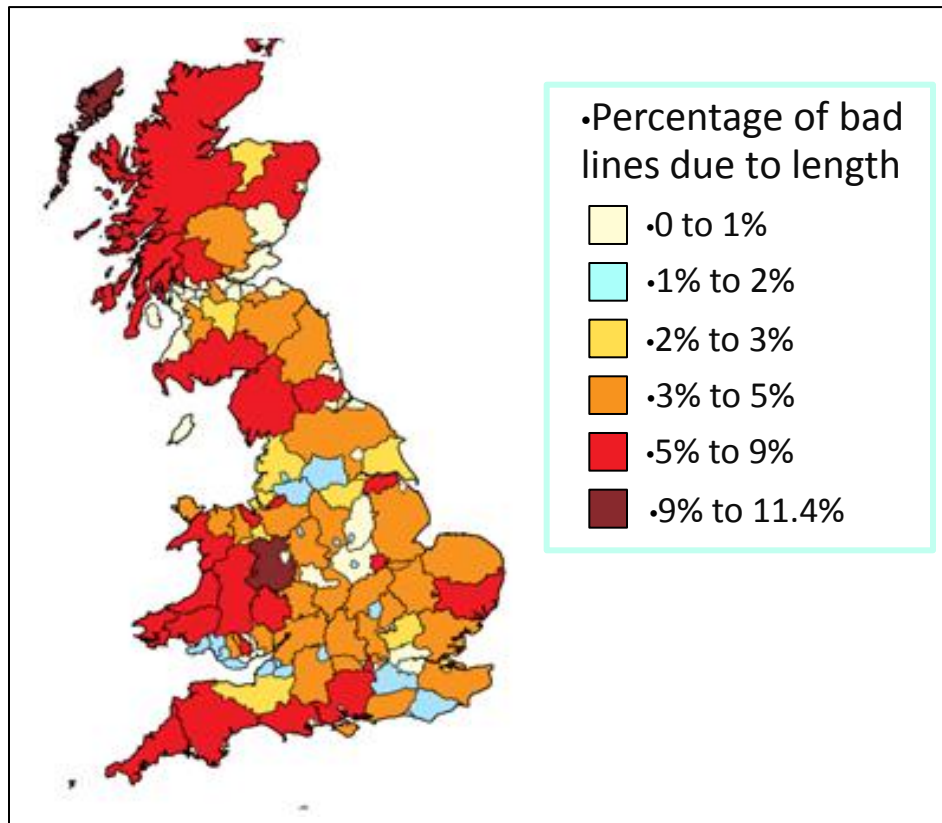
# Rural Broadband

- ➔ Estimated TVWS availability in the 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)



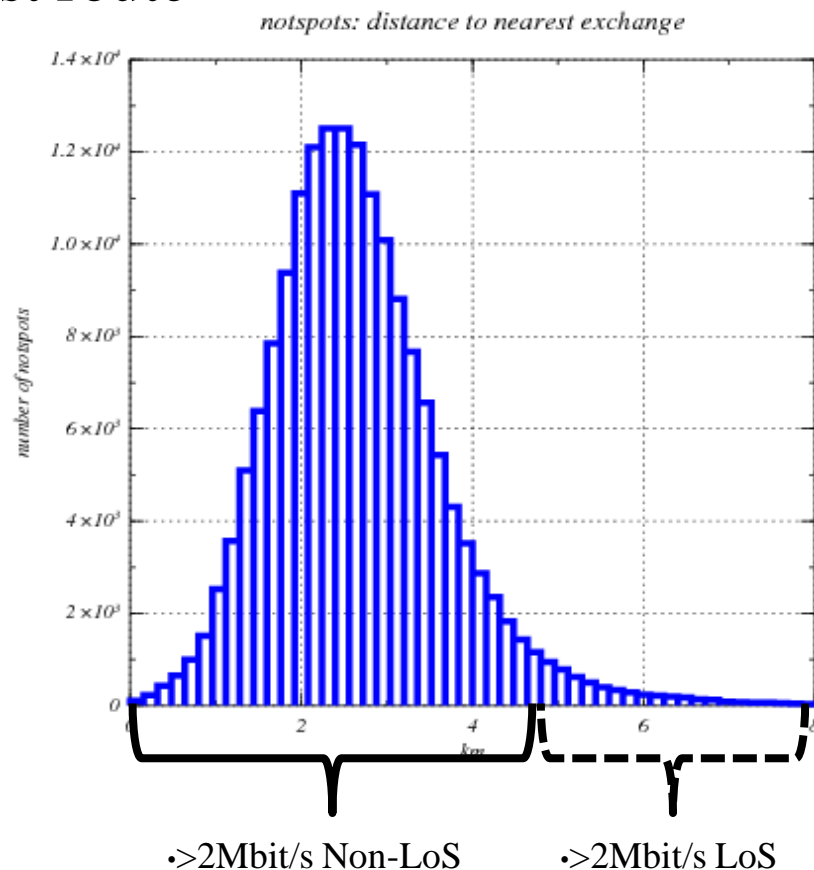
# Rural Broadband

- ➔ 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

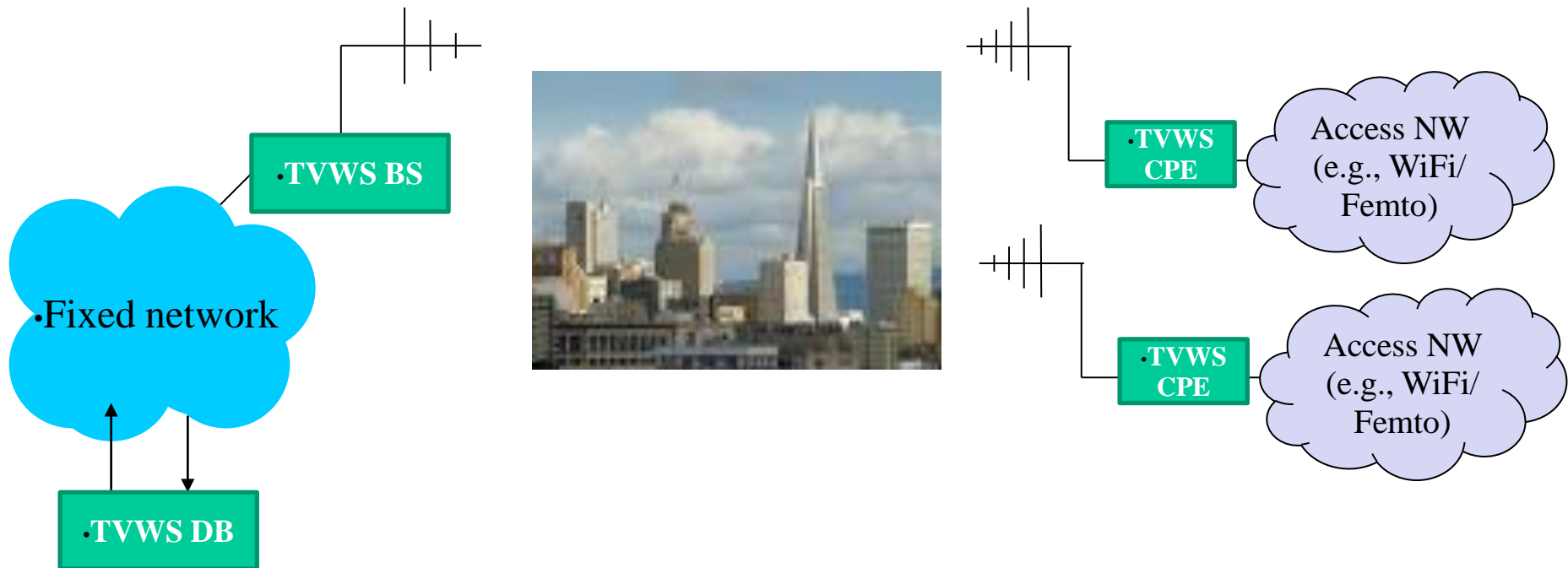


# Use Cases

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

# Dynamic backhaul

- ➔ 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

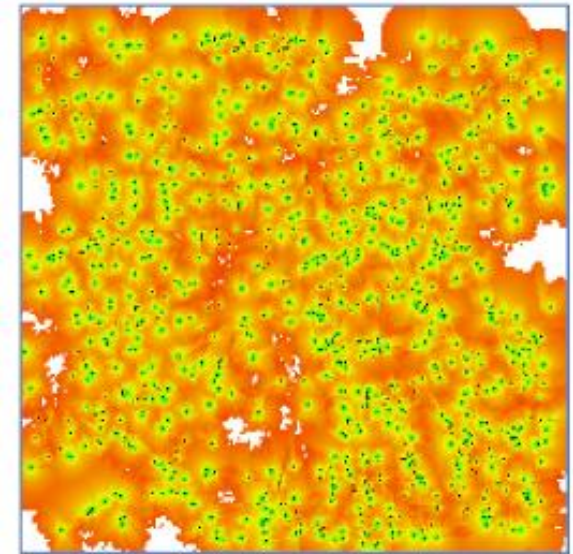
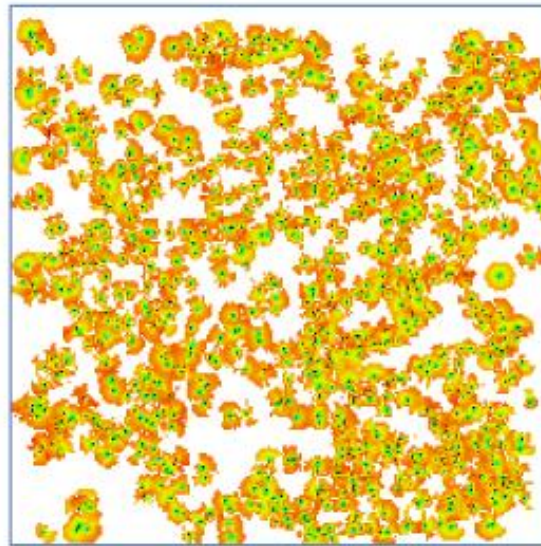
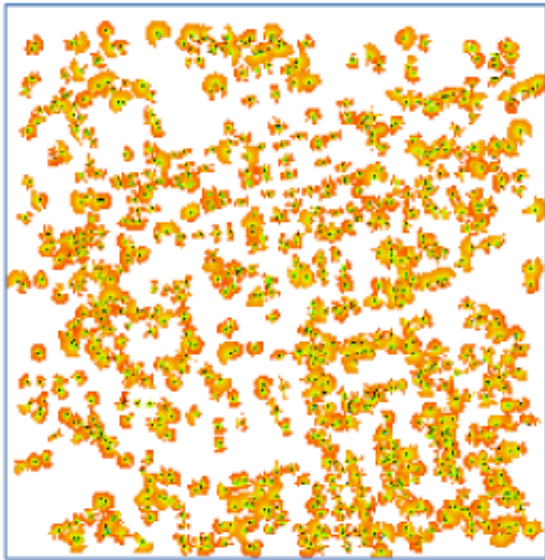
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# Indoor Networking (inside-to-outside)

- ➔ 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



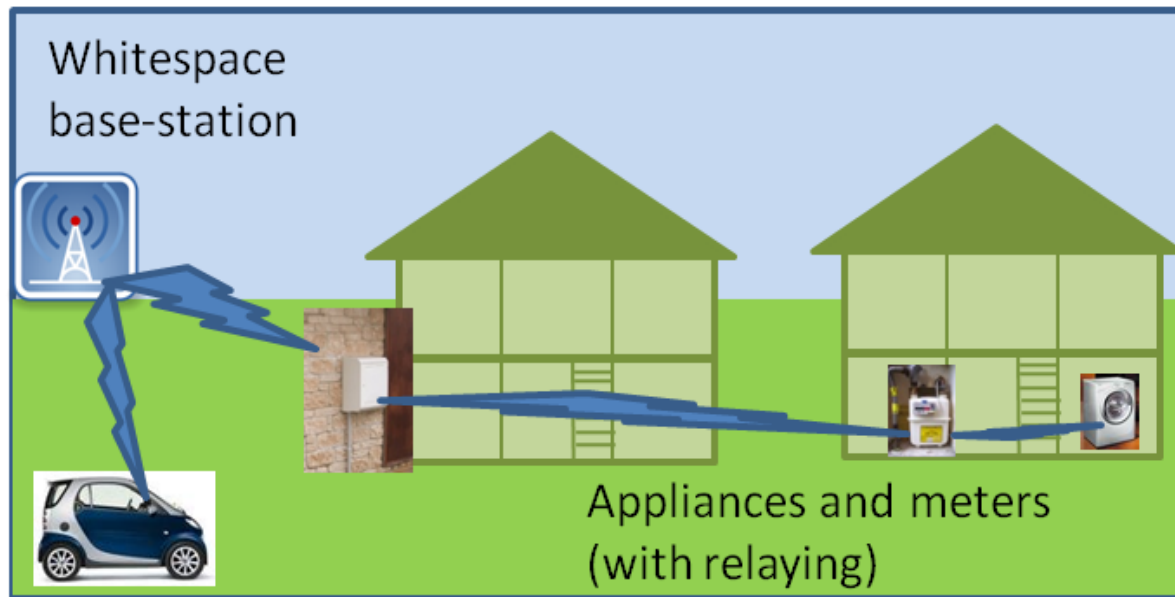
- (a) 5GHz
- (b) 2.4GHz
- (c) TVWS
- TVWS band provides coverage similar to a mobile broadband network – with a 20% deployment density

# Use Cases

- ➔ Foreseen use cases for TV white space:
  - Rural broadband
  - Dynamic backhaul
  - Indoor networking (with inside-to-outside coverage)
  - **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.