

DTT Clearance timetable workshop

29 November 2011

Agenda

- DTT clearance process and timetable
- Update on Draft DTT clearance timetable and planning assumptions
 - Geographical impact on service deployment (maps)
 - Co-channel limits DTT to LTE, LTE to DTT
- Update on other clearance and interference management projects (one slide per project)
 - DTT coexistence
 - PMSE
 - Emergency services
 - Short range devices
 - S Band radars
- Questions & next steps

What activity is required?

For 800 MHz in the UK:

- DTT Clearance – clear the use of 790 – 806 MHz (channels 61 & 62) by DTT
- PMSE clearance – clear the use of 854 – 862 MHz (channel 69) by PMSE equipment
- DTT coexistence – Mitigation of interference into DTT below 790 MHz (channels 60 downwards)
- Emergency services – Mitigate impact on emergency services in upper adjacent band
- Short range devices – Consider impact on short range devices in upper adjacent band

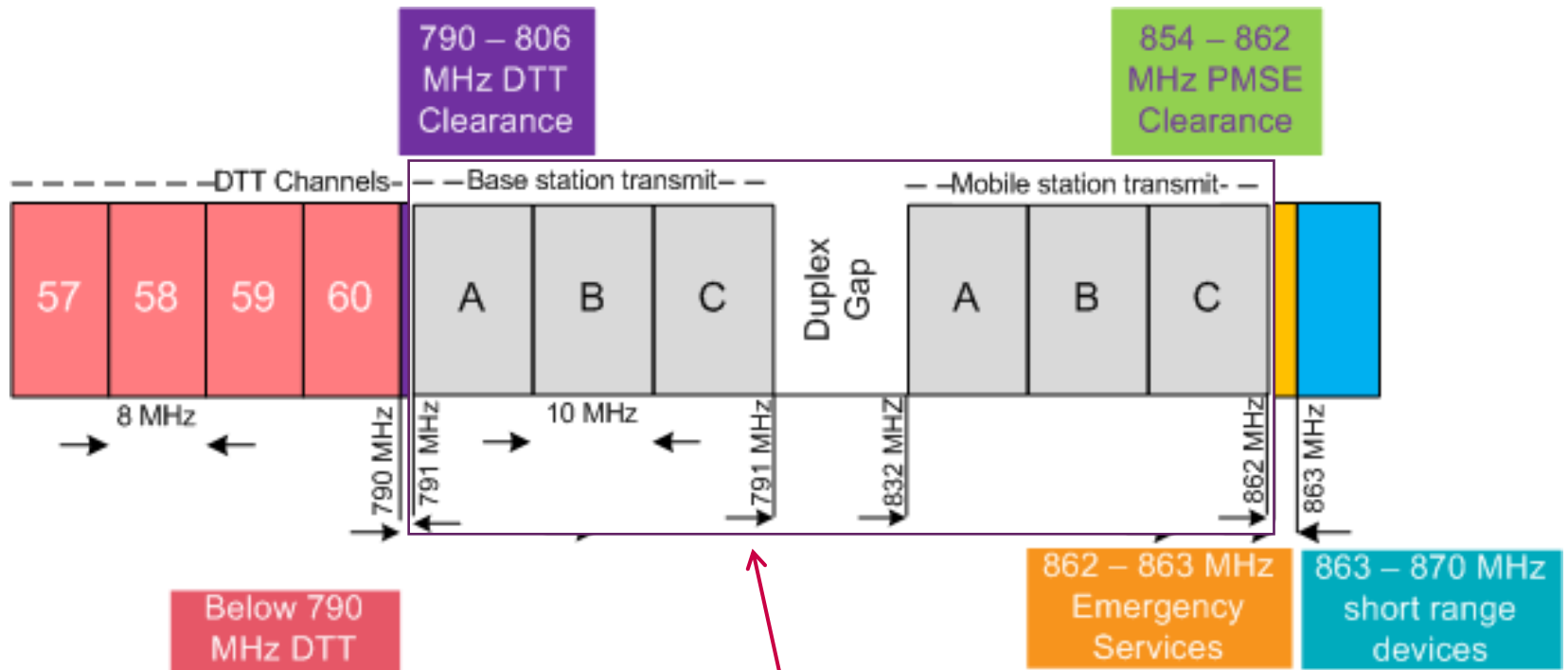
For 2.6 GHz in the UK:

- S Band radar (2.7 GHz) remediation

DTT: Digital terrestrial television

PMSE: Programme-making and special events

The 800 MHz band and adjacent spectrum



DTT: Digital terrestrial television
 PMSE: Programme-making and special events

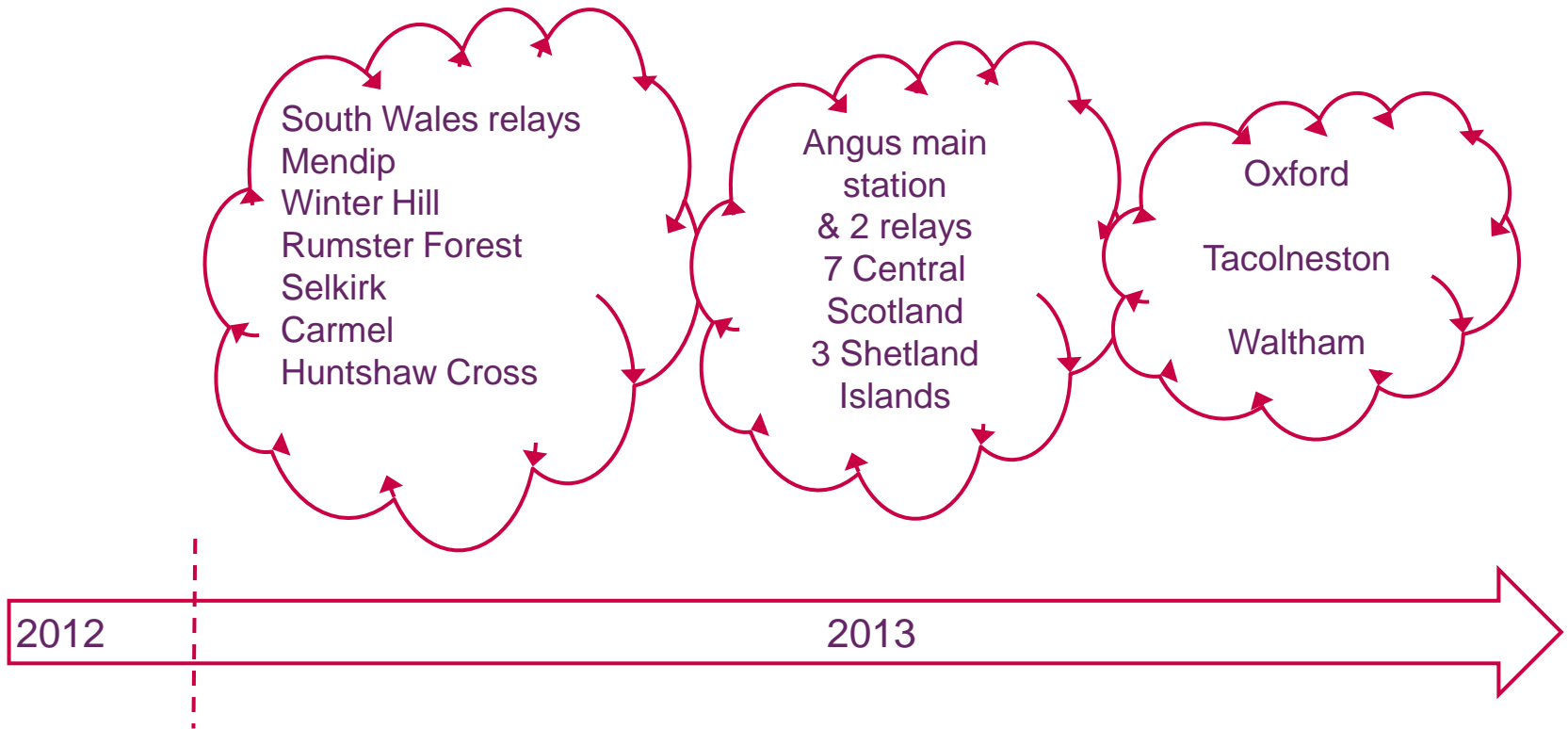
DTT Clearance Process and Timetable

DTT Clearance timetable

- Ofcom are working with Digital UK, Arqiva and the Mux operators to agree a DTT clearance plan and timetable. This work is being coordinated by the C20 group working within DUK
- Their initial work proposed a timetable (called Beta 3) which proposed that England and Wales would be mainly cleared within 2013 and that Scotland would be fully cleared by Q3 2014
- These dates have now been added to the multiplex licences setting a backstop date by which we can guarantee that the 800 MHz band will be fully available for use by the new licensees
- Subsequent to this we wrote to the multiplex operators earlier this year asking them consider speeding up the retrofit timetable
- The C20 group is now reviewing the timetable to assess whether it would be possible to accelerate the DTT clearance work such that it would be completed by end of 2013
- This new plan is expected to be finalised by April 2012 and its emergent findings are outlined later

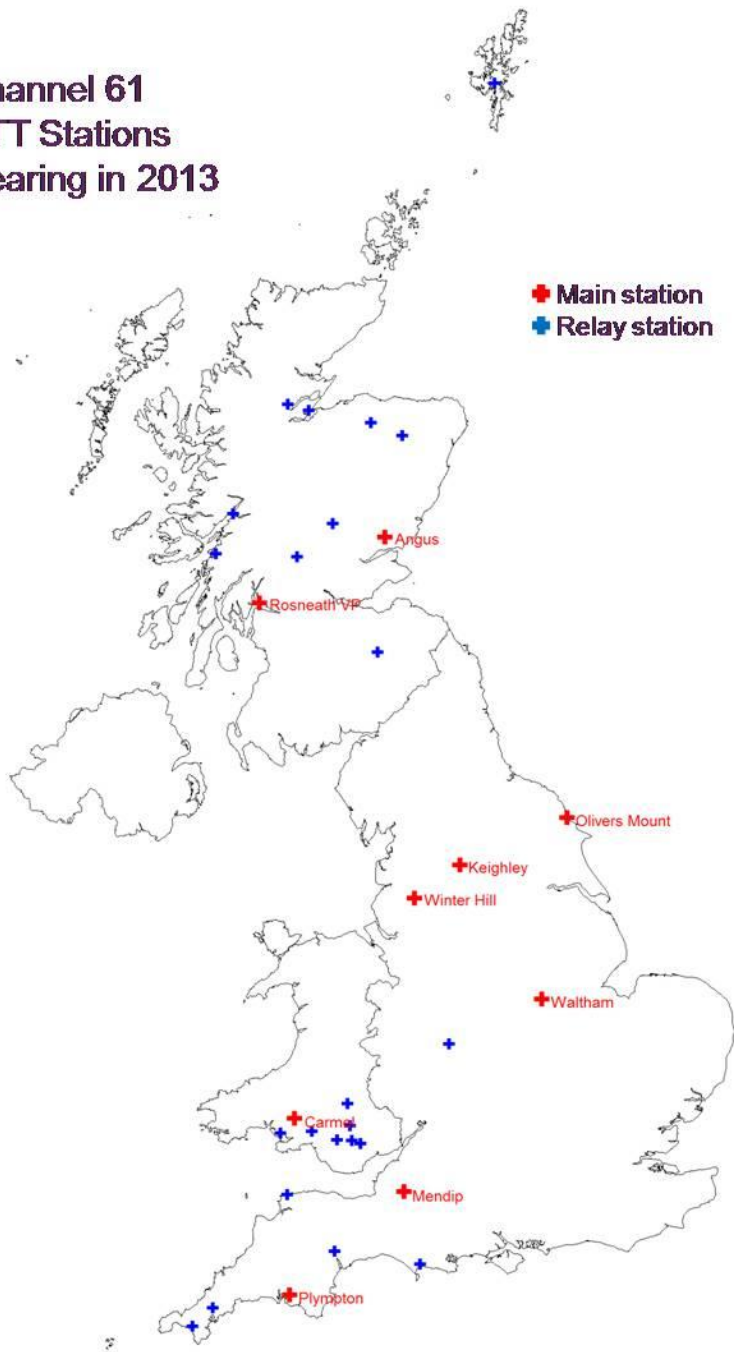
Draft DTT Clearance Timetable

Stations on channel 61 or 62 in 2013

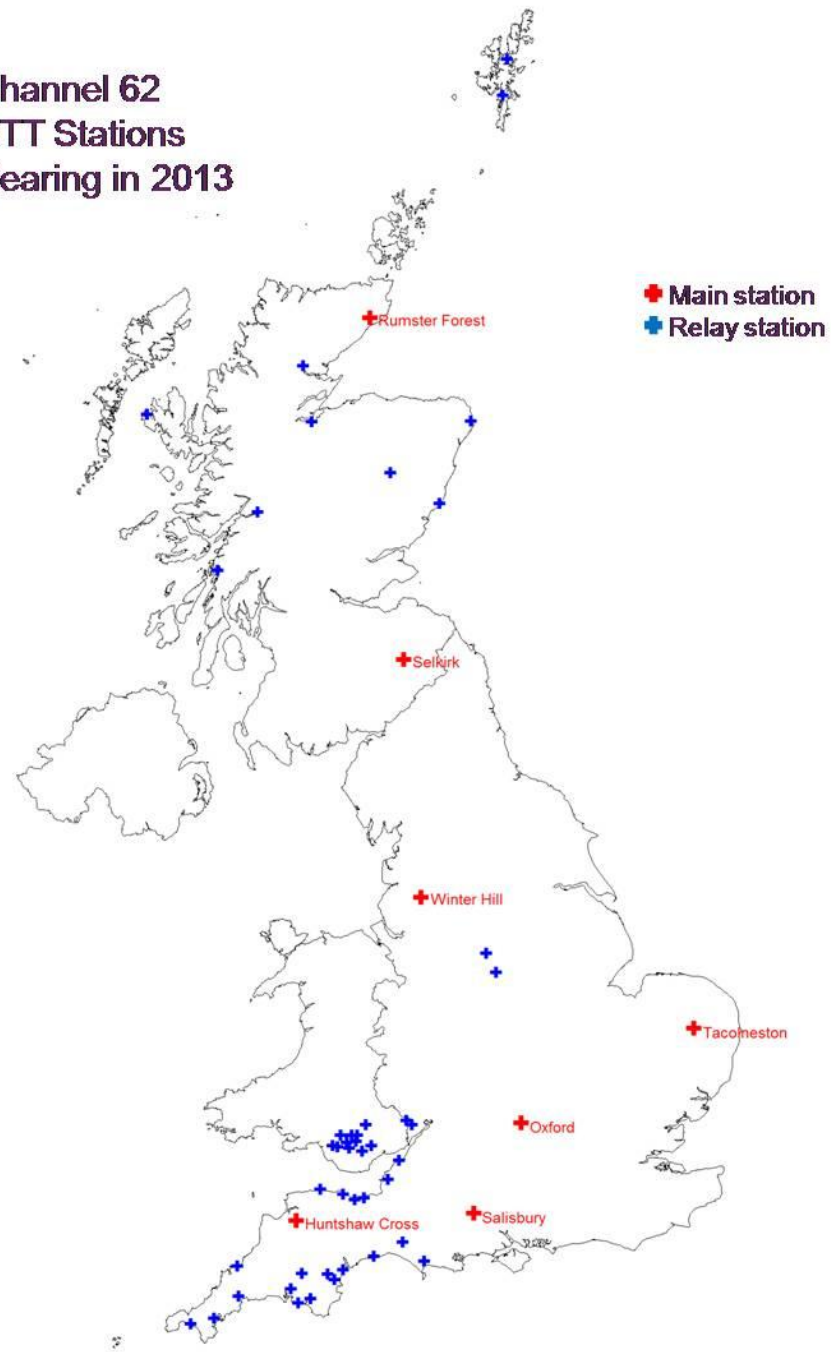


Note: There are also other DTT stations being modified in 2013 but are not shown above as they are on channels other than 61 or 62.

Channel 61 DTT Stations clearing in 2013



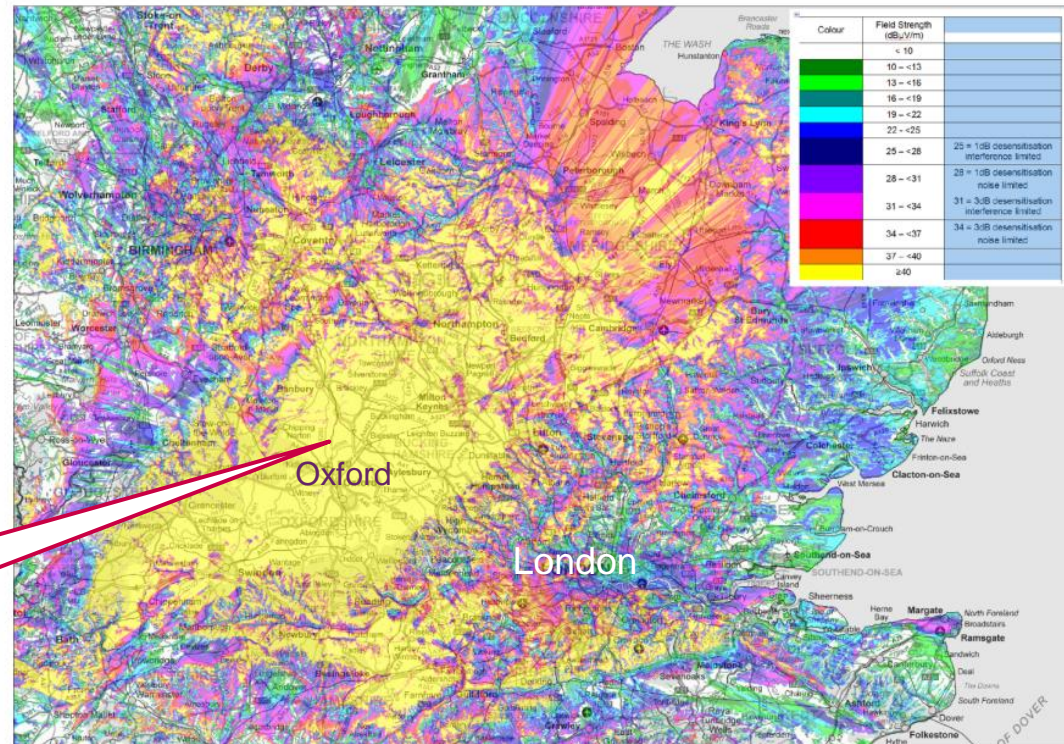
Channel 62 DTT Stations clearing in 2013



DTT Clearance Planning Assumptions

Co-channel interference between adjacent areas

- Some transmitters will have already undergone clearance during 2012 (integration) and early 2013 (retrofit) and hence channels 61 & 62 will not be used to broadcast DTT in these areas.
- However if surrounding areas continue using channel 61 & 62 to broadcast DTT the cleared area may still experience interference between DTT and mobile services.
- Hence, it is probable that before LTE can roll out in an area, any surrounding areas using channels 61 & 62 for DTT may also need to have been cleared.



DTT Transmitter in Oxford may interfere with mobile signal in London

Potential Impact on LTE Deployment











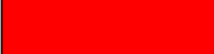
- The emergent DTT clearance plan proposes that DTT clearance programme will take place on a site by site basis through 2013
- This creates two issues which may affect LTE deployment:
 - Co-channel interference from the remaining high power DTT services into any LTE services operating in adjacent regions
 - Co-channel interference from any LTE deployment affecting the reception of DTT services in the remaining pre clearance areas
- Previous work suggested that interference into LTE services from high power DTT transmissions on the same frequency (DTT to LTE co-channel interference) could limit LTE deployment to between 100 and 200 km from the DTT high power site. More recent modelling has provided more detailed insight into interference levels
- We are also considering what technical licence conditions may be required to protect DTT services from co-channel LTE services

DTT Field Strength Predictions



- Last main stations to be cleared are Waltham, Oxford, Tacolneston in Q4 2013.
- Next six slides show field strength predictions from each station. The predictions were carried out using UK planning model (UKPM) for DTT.
 - UKPM developed by BBC, Arqiva & Ofcom as joint model for DTT predictions.
 - UKPM is based on a previous BBC prediction model (Causebrook).
 - Basis of UKPM is the prediction of received field strength from a DTT station at a 100m x100m pixel taking into account the environment in between (i.e. terrain & clutter).
 - UKPM was calibrated and validated against field measurements.
- DTT stations operating with DSO characteristics
 - Waltham ch61, 50kW ERP, 300m antenna height (above ground level)
 - Oxford ch62, 50kW ERP, 160m antenna height (above ground level)
 - Tacolneston ch62, 100kW ERP, 200m antenna height (above ground level)
- Predictions carried out at 10m receiver height, then corrected to 1.5m receiver height. Predictions carried out at 1% and 50% time.

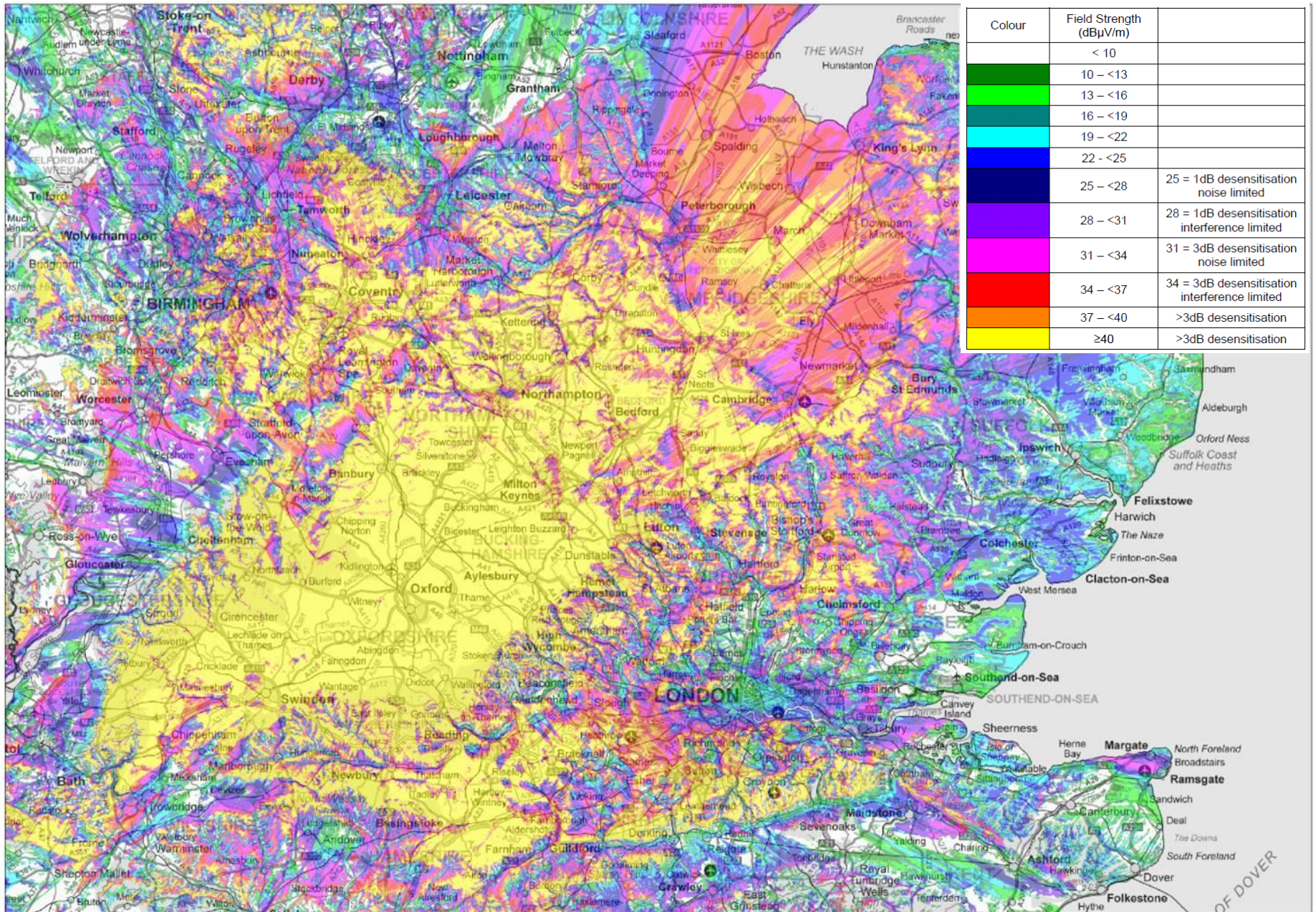
Field strength key is shown below.

Colour	Field Strength (dBµV/m)	
	< 10	
	10 – <13	
	13 – <16	
	16 – <19	
	19 – <22	
	22 – <25	
	25 – <28	25 = 1dB desensitisation noise limited
	28 – <31	28 = 1dB desensitisation interference limited
	31 – <34	31 = 3dB desensitisation noise limited
	34 – <37	34 = 3dB desensitisation interference limited
	37 – <40	>3dB desensitisation
	≥40	>3dB desensitisation

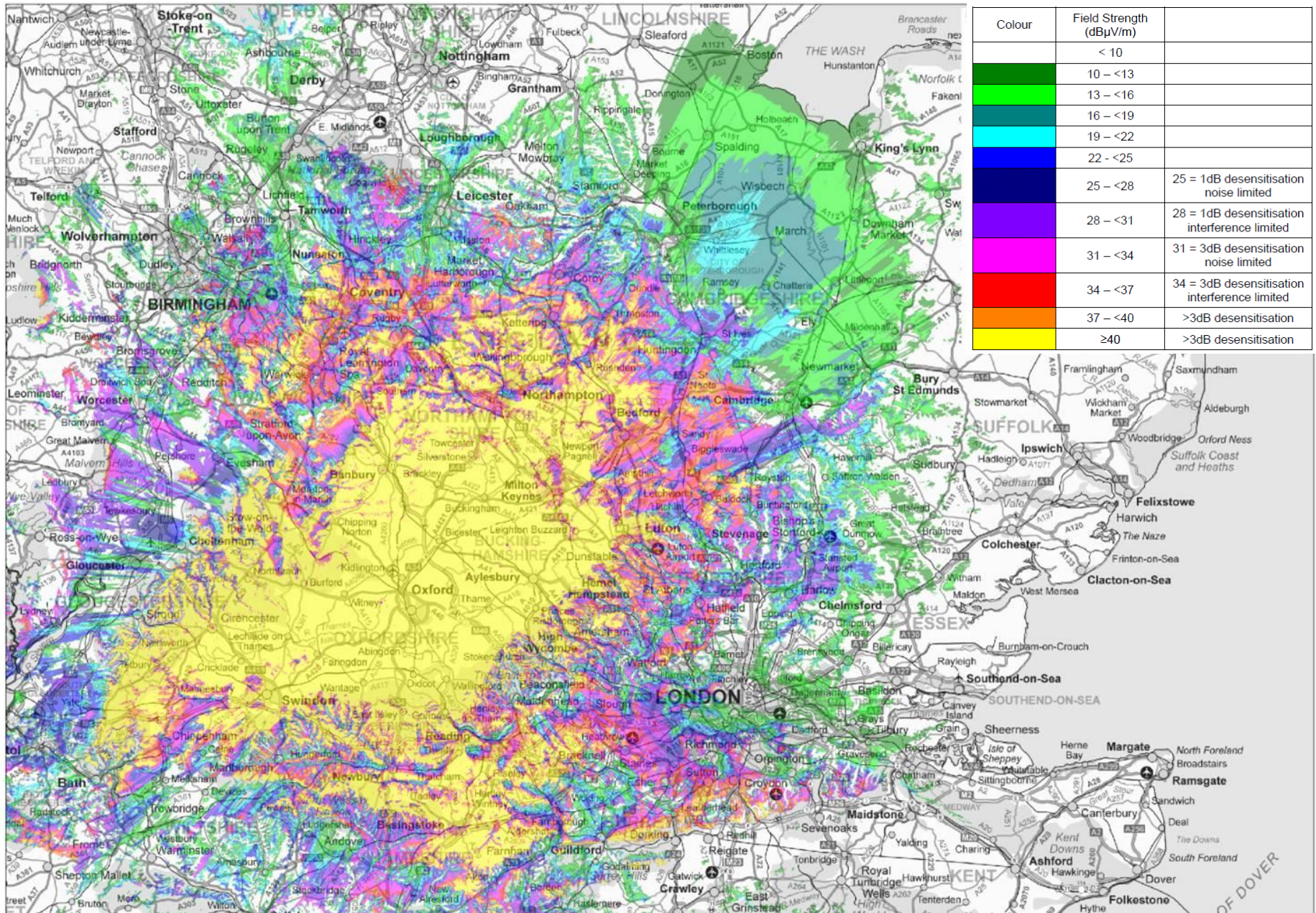


Potential impact of DTT on LTE

Oxford ch62 DTT Field Strength Prediction at 1% Time. 1.5m receiver height

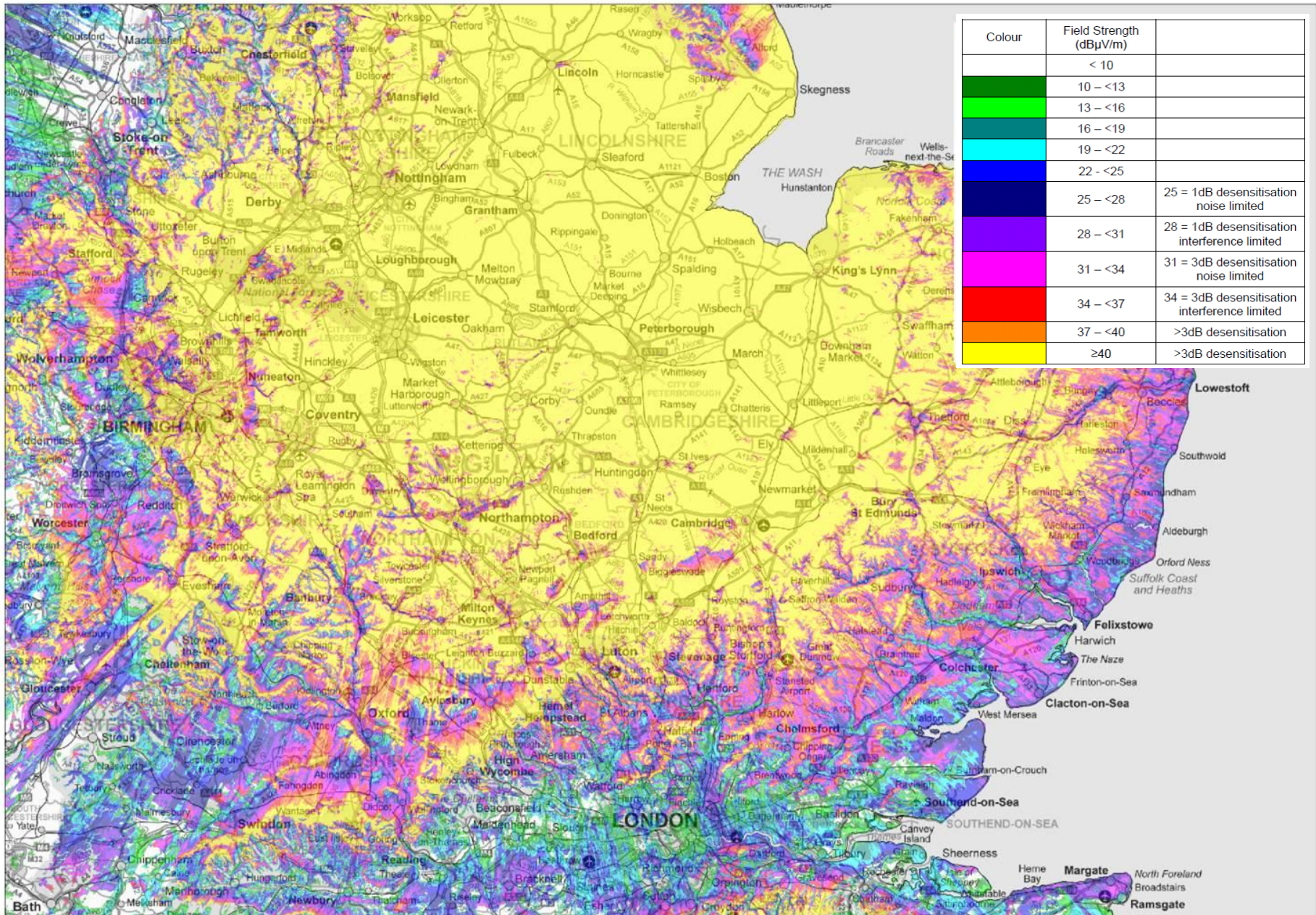


Oxford ch62 DTT Field Strength Prediction at 50% Time. 1.5m receiver height

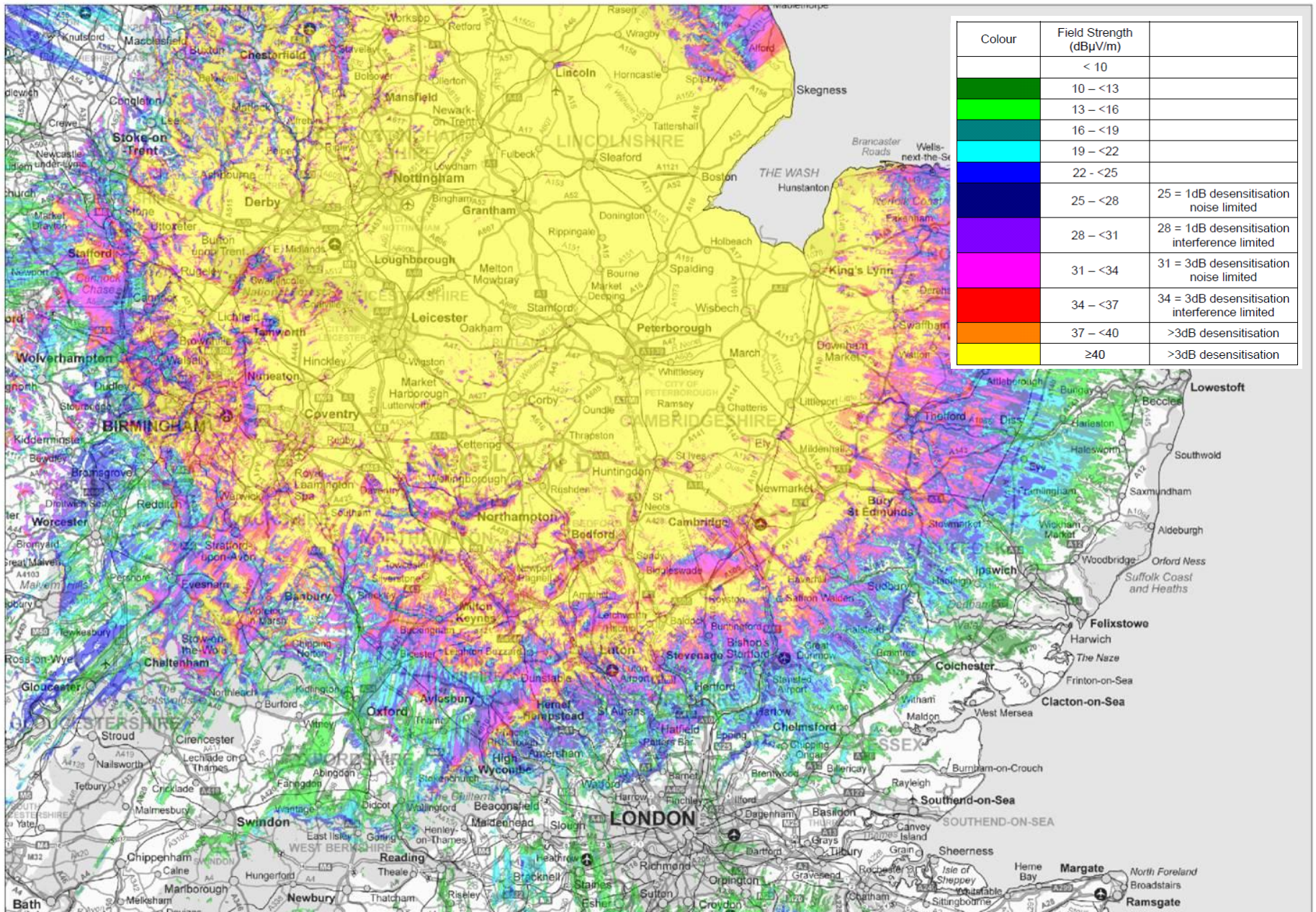


Colour	Field Strength (dBuV/m)	
Green	< 10	
Light Green	10 - <13	
Yellow-Green	13 - <16	
Yellow	16 - <19	
Orange	19 - <22	
Red-Orange	22 - <25	
Red	25 - <28	25 = 1dB desensitisation noise limited
Orange-Red	28 - <31	28 = 1dB desensitisation interference limited
Red-Orange	31 - <34	31 = 3dB desensitisation noise limited
Red	34 - <37	34 = 3dB desensitisation interference limited
Orange	37 - <40	>3dB desensitisation
Yellow	>40	>3dB desensitisation

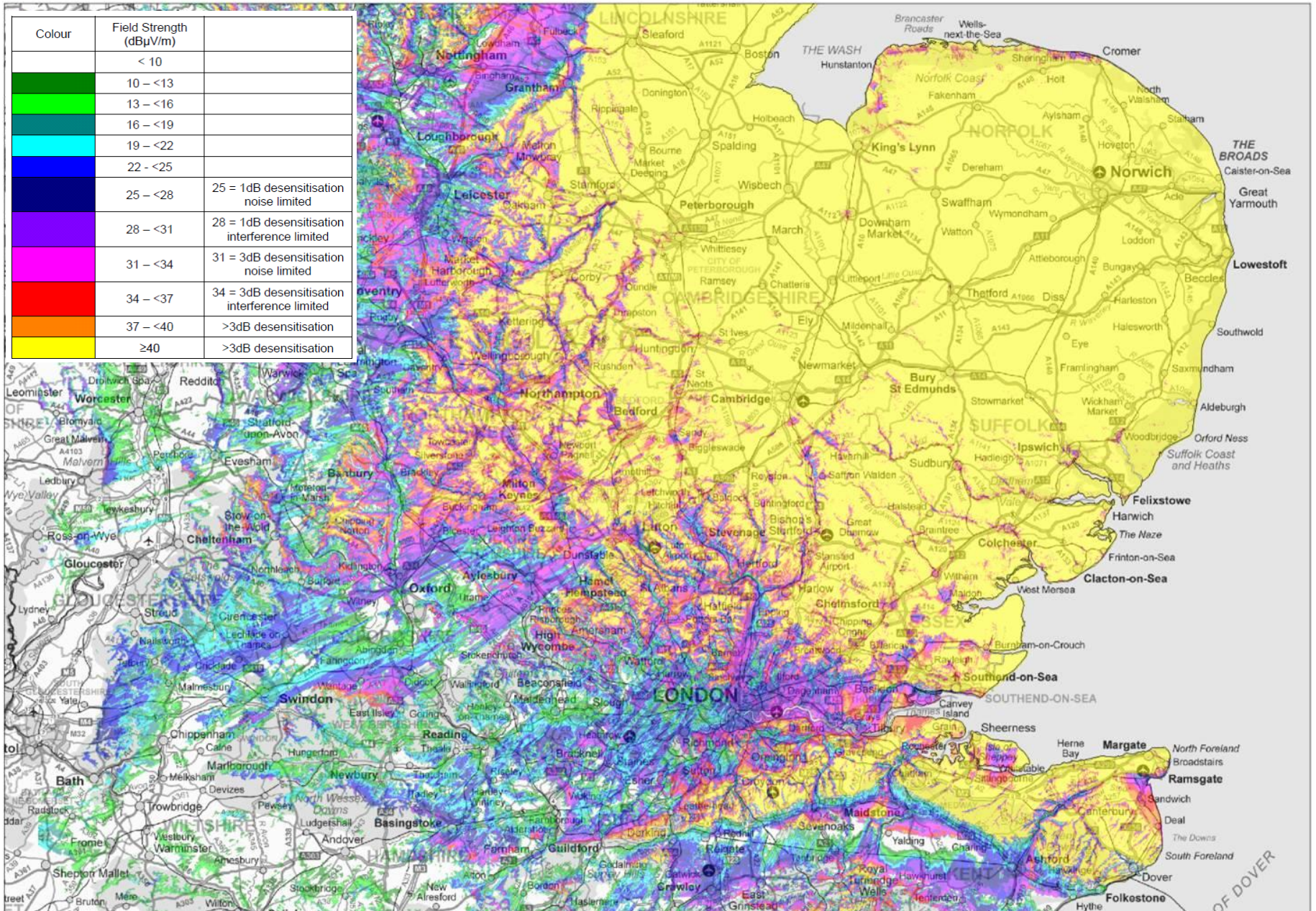
Waltham ch61 DTT Field Strength Prediction at 1% Time. 1.5m receiver height



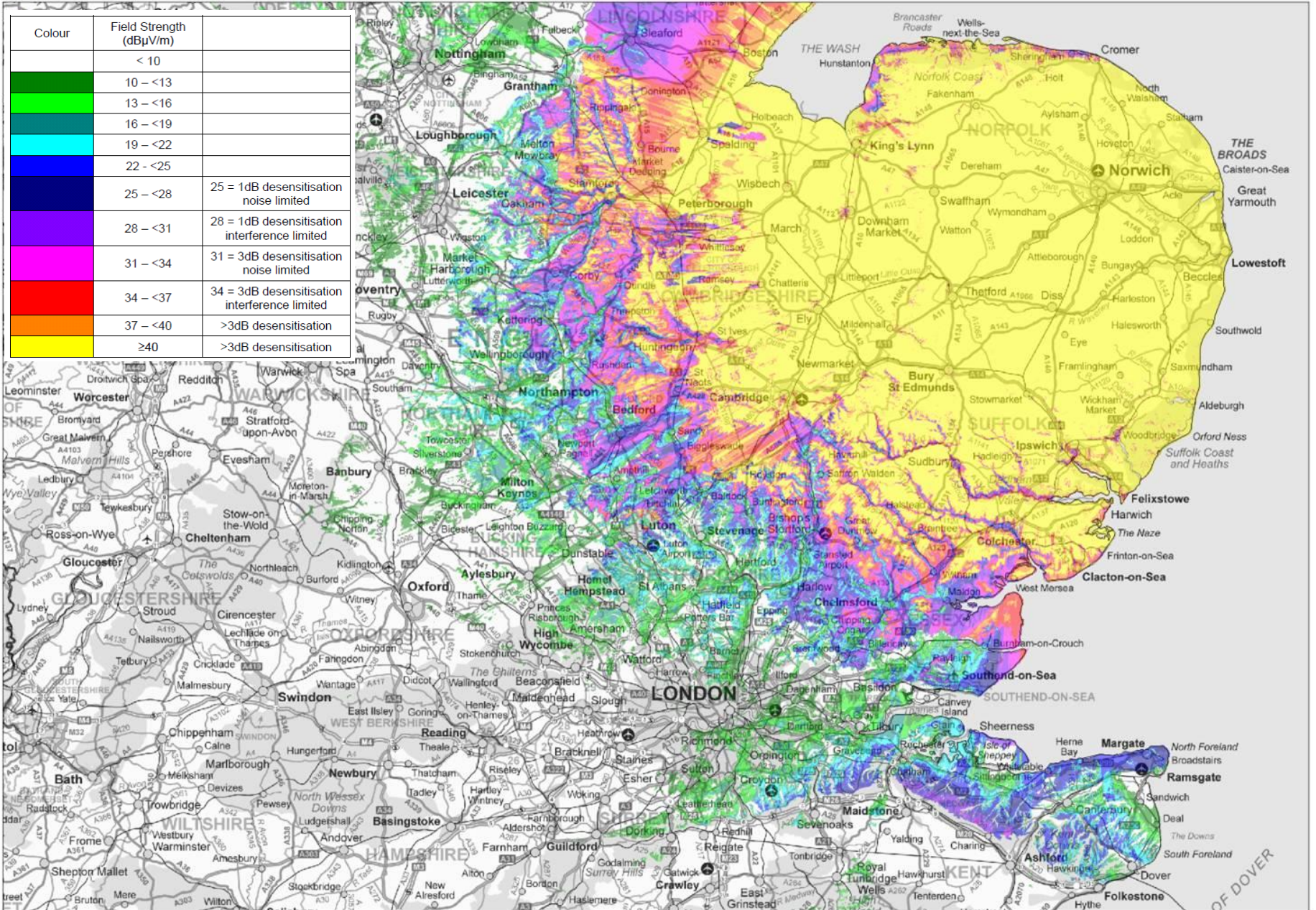
Waltham ch61 DTT Field Strength Prediction at 50% Time, 1.5m receiver height



Tacolneston ch62 DTT Field Strength Prediction at 1% Time, 1.5m receiver height



Tacolneston ch62 DTT Field Strength Prediction at 50% Time, 1.5m receiver height



Co-channel protection of DTT from LTE



- We also need to put in place measure to temporally protect DTT services broadcast from stations operating on channels 61 and 62 from LTE until they are moved to alternative channels
- Potential technical criteria:
 - Cumulative LTE field strength should not exceed 29dBuV/m at edge of DTT coverage area.
 - DTT coverage area defined by Digital Preferred Service Area (DPSA), described by contour or test points.
 - Propagation model could be Rec 1546 or CRC.
- Further technical work will be carried out to confirm appropriate parameters and any requirements will be included in the technical licence conditions (TLC) for the new users.

DTT Coexistence

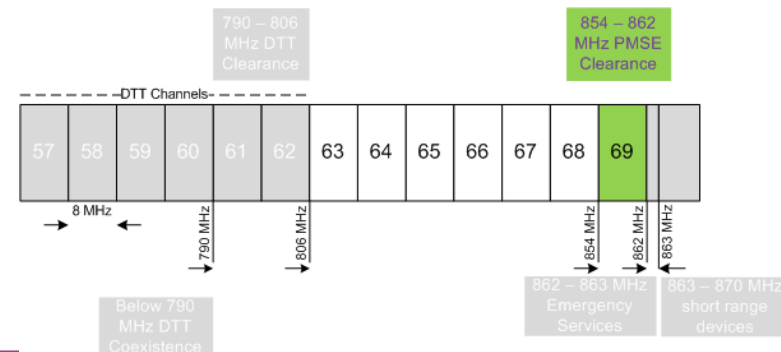
Mitigation of interference to DTT below 790 MHz (ch 60 downwards)

- New mobile services in the 800MHz band could affect the ability of some viewers to receive some or all of their DTT TV channels.
- Before roll out of 4G mobile services can occur in an area, the following arrangements will likely need to be in place:
 - MitCo (*the organisation to manage and deliver mitigation*) established and operational
 - Processes in place for delivering the required level of consumer support.
- Some dependencies with clearance timetable – for example:
 - If DTT receive filters are being used to mitigate interference they cannot be distributed before clearance has occurred in a channel 61/62 area. This is because a consumer fitting it before clearance would lose access to any multiplexes being transmitted in channel 61 and 62.
 - This would not be the case in a non clearance area.
- Decisions have not yet been taken regarding the policy to manage the mitigation of this interference

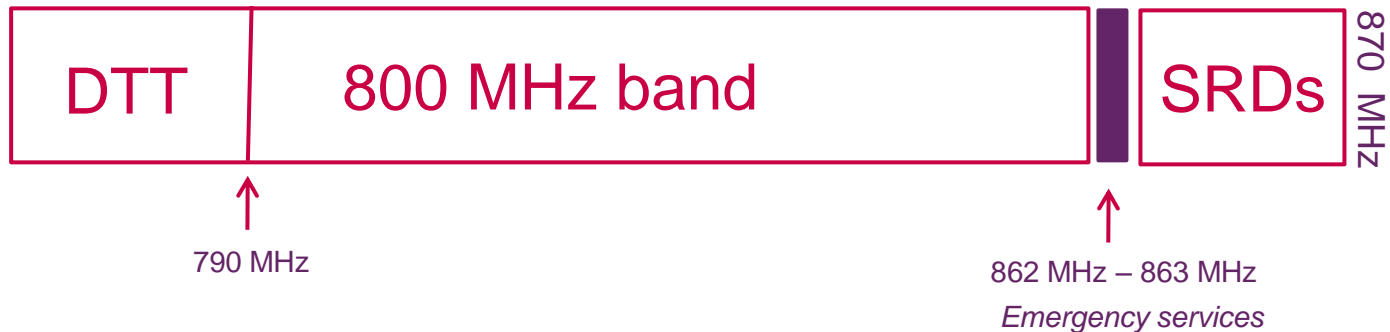
Update from Clearance and Interference Management Projects

Clear the use of 854 – 862 MHz (channel 69) by PMSE equipment

- 854 – 862 MHz (otherwise referred to as channel 69) is currently used by PMSE equipment across the UK
- A funding scheme has been set up to support eligible PMSE users affected by the clearing of channel 69.
- Ofcom has appointed Equiniti Limited to administer the funding scheme.
- Clearance of PMSE equipment operating in channel 69 by across the UK is expected to be completed by Q4 2012



Emergency services interference issues



- Technical work has indicated the potential for interference between LTE and adjacent communication systems used across the UK by the police and fire & rescue services
- We recognise that potential disruption to these systems is clearly undesirable. Consequently we are working with HMG and the relevant parties to assess the impact and develop plans to manage the interference risks
- HMG has committed to provide funding for any justifiable costs incurred by emergency services spectrum users to implement the mitigation plans (subject to the achievement of overall spectrum efficiency goals and value for money (VFM) considerations)
- Any details of plans relevant to potential bidders will be included in the information memorandum (IM)

Short Range Devices (SRDs)



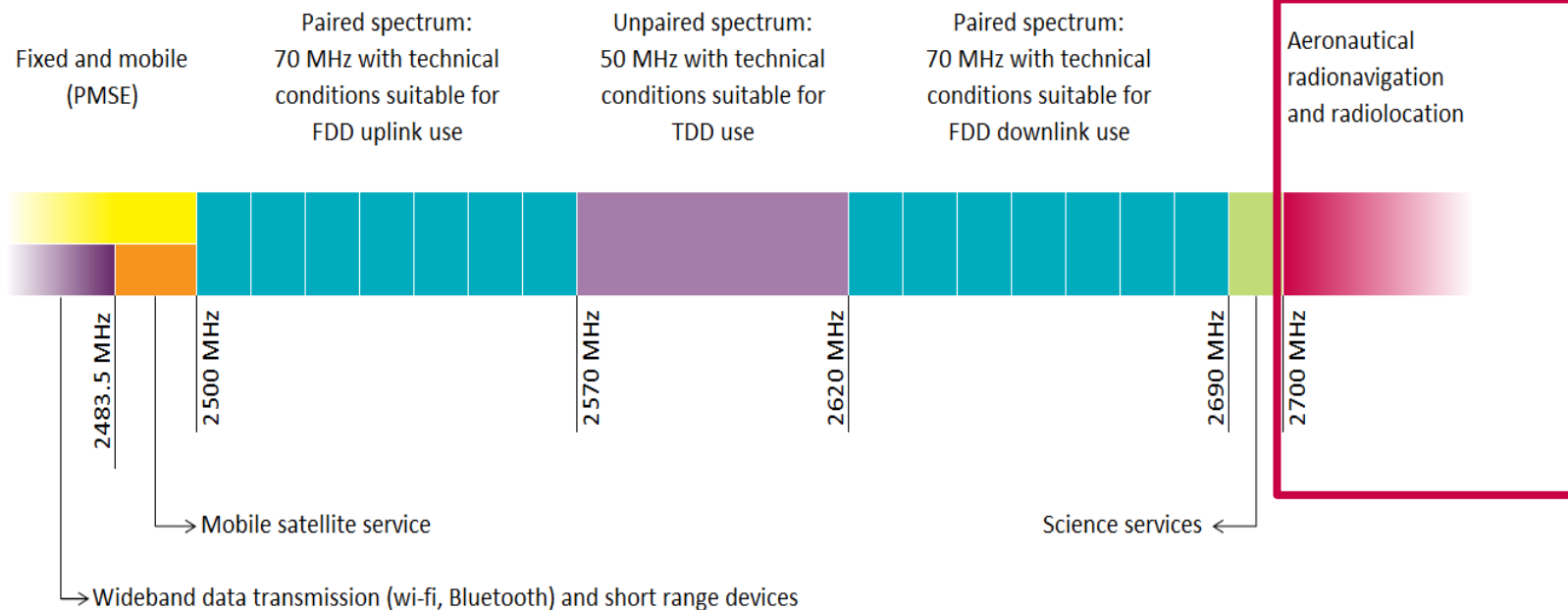
The Issue

- Many devices operate in the SRD frequency band (863 and 870 MHz). Mobile services in the 800 MHz band (e.g. 4G handsets and dongles) will introduce a potential risk of interference:
- **Frequencies between 863 and 865 MHz** are used mainly by audio devices (wireless headphones & microphones; listening devices)
- **Frequencies between 865 and 868 MHz** are used mainly by RFID devices (i.e. the tracking and monitoring of cargo or stock in manufacturing or distribution industries)
- **Frequencies between 868 and 870 MHz** are used mainly for telemetry devices (commercial fire alarms, domestic intruder alarms, routine medical monitoring, and social alarms)

Our approach

- **The SRD band is licence exempt Europe-wide and operates on the principle of no interference/no protection.** But Ofcom has a general duty to consider the impact of its decisions on other spectrum users
- We commissioned consultants to test a wide range of SRDs in the presence of simulated LTE signals. More detailed tests were run on social alarms and audio equipment. We believe the level of interference is manageable without the need for additional constraints on LTE in the 800 MHz band
- We will now make Ofcom technical facilities available for makers to test their equipment themselves - and will share information about LTE as this emerges.
- We are pushing European bodies to establish better EU wide standards – especially for safety-critical devices

The 2.6 GHz band and adjacent spectrum



- Air traffic control radars in the 2.7 GHz band are vulnerable to interference from 2.6 GHz use and need to be modified to become more resilient
- HMG programme (DCMS, DfT, MOD supported by Ofcom and CAA) in place to help radar operators make the change
- Before radars are modified, use of 2.6 GHz will be constrained. After modification, there will be limited coordination requirements around each radar site
- Aim is to complete modifications in areas covering majority of the UK population by end 2013, and across all UK as soon as possible thereafter