uk spectrum policy forum

The future of the UHF band post 2034 in the UK

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Agenda

Background and Summary

Key Trends and Issues

DTT
PMSE
Mobile Broadband
Fixed Broadband

DTT Scenarios and Cases

Future of the 470-694 MHz Band post 2034 in the UK

This project sought to understand how UHF spectrum could be best allocated technically

- Traditionally, this band had been primarily allocated to broadcasting with PMSE on a secondary basis
- WRC 23 granted mobile services a secondary allocation within the UHF band (470 to 694 MHz) in Europe
- Ofcom has assessed future UHF band use and see three post-2034 options
  - Investment in a more efficient DTT service
  - Reduce DTT down to a core service
  - Move towards DTT switch-off over the 2030s
- It is a follow on from a similar project conducted in 2022 by Coleago
- As part of this project we interviewed 17 stakeholder organisations and conducted a thorough literature review

There is a lot at stake

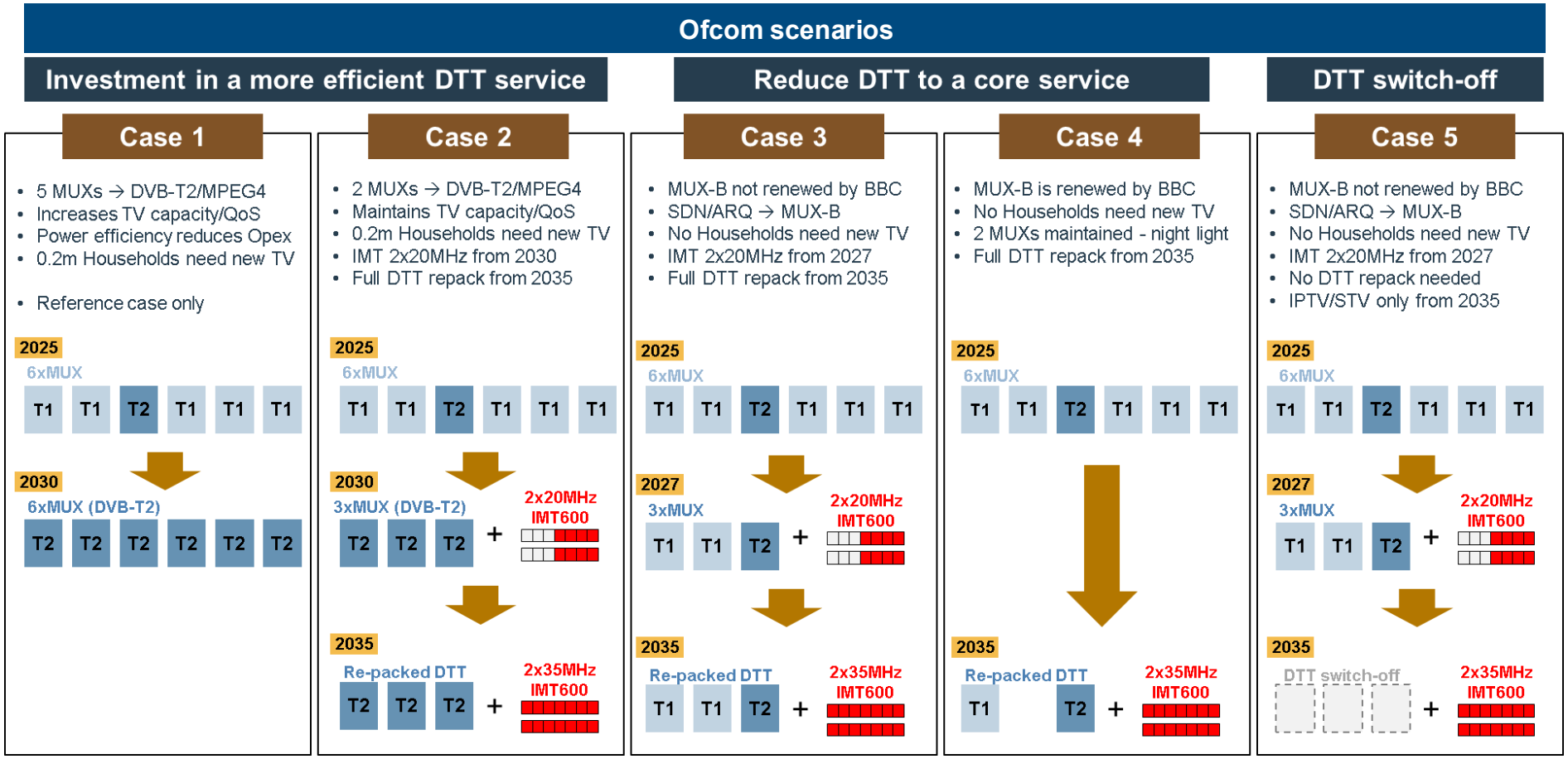
	Economic and social harm	Economic, cultural and social harm	Mainly social harm
Higher social harm	Perpetuating the Digital Divide	Hampering creative industries, performing arts and special events	Depriving vulnerable social groups of TV
	More limited access to mobile broadband where alternatives exist	*Affordability issues when mobile used as a substitute for fixed Broadband access*	Fewer TV channels accessible by vulnerable social groups
	SD rather than HD mobile video and gaming (at certain times)	Replacement of PMSE equipment (with government support)	Some channels SD only, others HD only
Lower social harm	MNOs having to explain temporary bandwidth limitations to customers	*e.g. in PMSE UHF sharing scenarios*	Lower competitiveness of DTT versus alternative platforms

Key findings

UHF spectrum in the UK is vital to DTT, mobile communications, and PMSE but trade offs are inevitable

- Despite a shift toward online content, DTT remains essential for millions of UK households, particularly vulnerable groups
- Mobile operators need more sub-1 GHz spectrum to address rural coverage gaps, indoor signal issues, and network performance
- PMSE is crucial to the UK's growing creative sector and its spectrum use is highly localised and predictable
- Five DTT evolution scenarios were assessed, ranging from a full DTT network upgrade (case 1) to complete switch-off by 2035 (case 5); cases 3 to 5 are seen as more probable, with major decisions (e.g., BBC's MUX-B licence in 2026) likely to shape outcomes

Our report envisages five main cases covering the three Ofcom scenarios



Key recommendations

- **Spectrum sharing**
  - Dynamic allocation mechanisms between mobile and PMSE need to be explored
- **Targeted infrastructure investments**
  - Expanding fixed broadband affordability and availability can mitigate coverage and congestion issues
- **DTT modernisation and public support**
  - If DTT is to remain viable (cases 1 to 4) then investments in network upgrades and public funding schemes should be explored
- **International coordination**
  - UK spectrum policy should align with global standards to maintain economies of scale and cross-border interoperability

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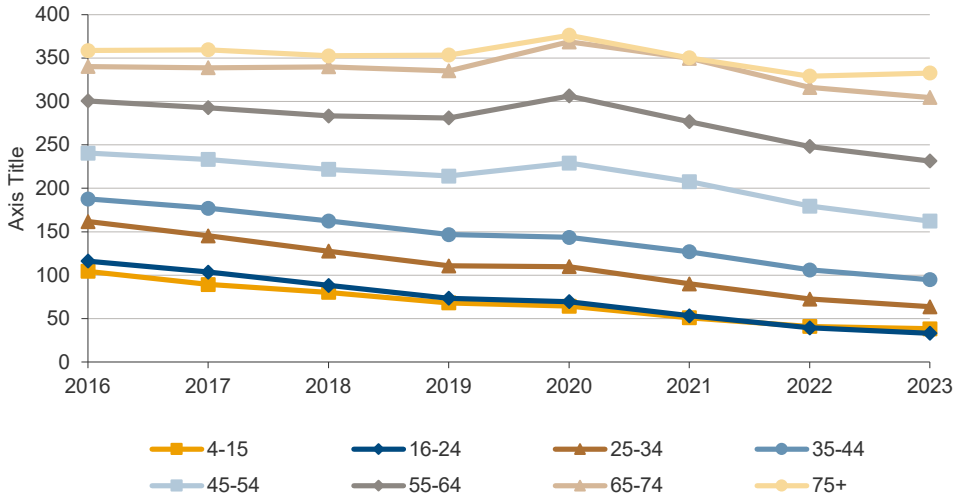
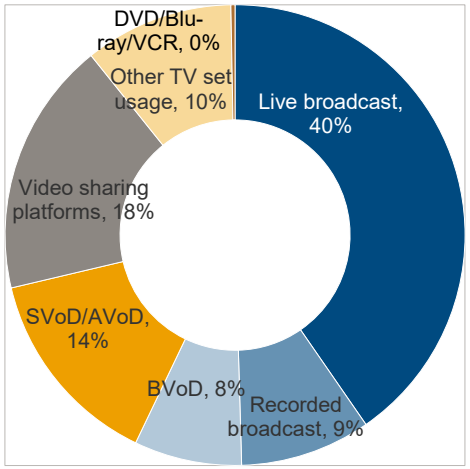
DTT Scenarios and Cases

The decline in linear TV viewing is now unmistakeable and stakeholders have recognised the landscape is changing

Total minutes viewed per day - Broadcast TV



Share of total video viewing minutes per day, all individuals, 2023



The decline in linear TV viewership continues

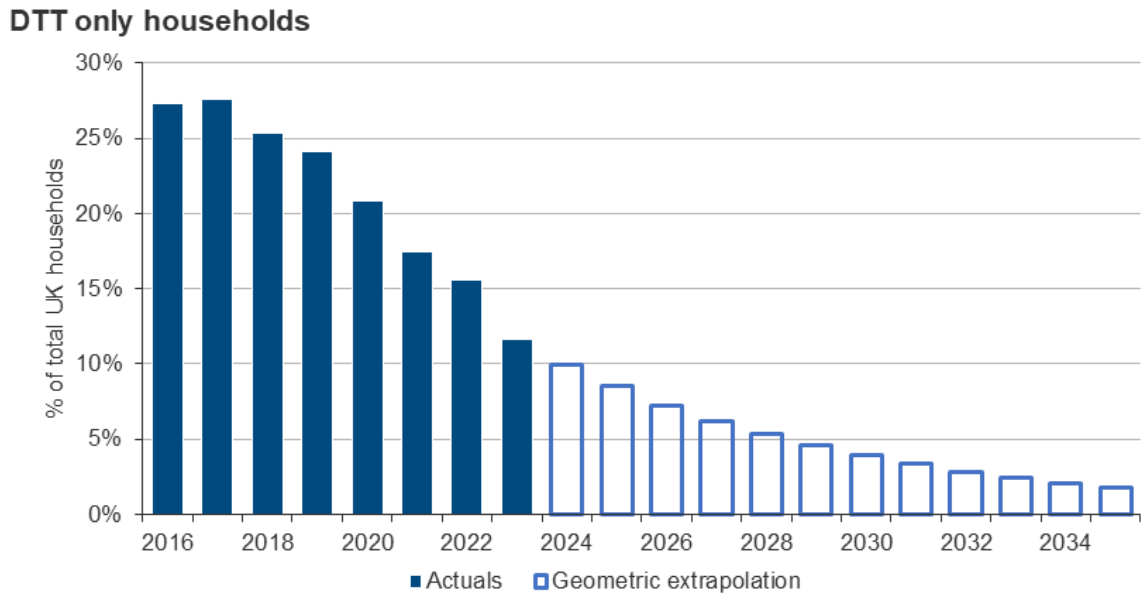
- The decline in linear TV reach has increased since the previous study, falling from 86% to 75% (2021-23)
- The number of minutes of DTT viewing also continues to fall across most age groups especially younger viewers
- There have been corresponding rises in viewing on other platforms

Many in the industry have recognised the need to follow the audience as they move to other platforms

- E.g. BBC, the creation of Everyone TV
- However, those who still rely on linear TV will still need to be served

DTT only households have continued to fall - by 2035 a minority of homes would potentially be affected by changes to DTT broadcasting, but their interests will likely need protecting

DTT only households are declining and, if trends continue, could fall to 2% (550,000 homes) by 2035

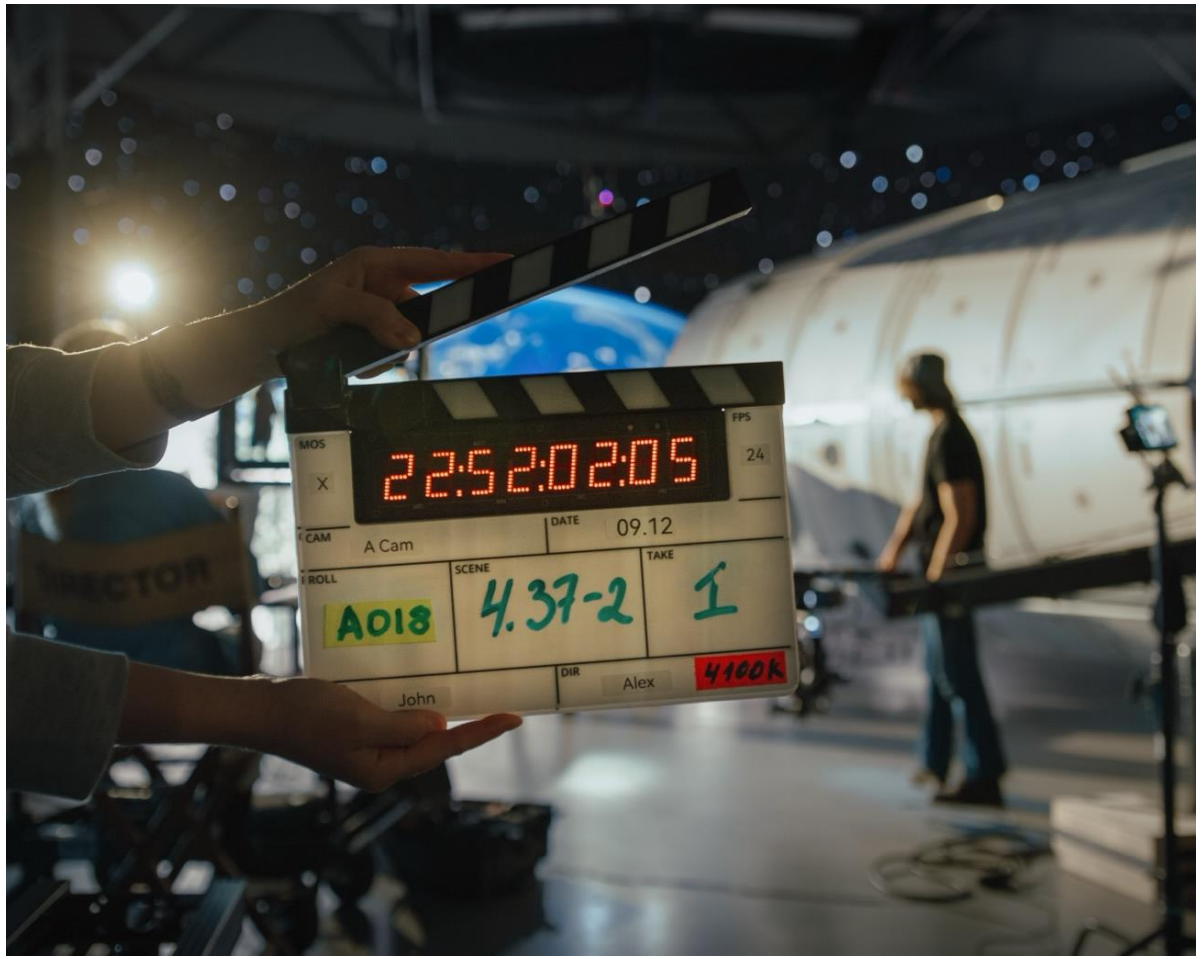


- DTT only households are falling, and reached 3.3 million, 11.6% of households, in 2023
  - Our simple extrapolation projects 1.2 million by 2030 and approximately half that by 2035
- Though numbers are relatively small, these users' interests should still be protected
- Universal broadband access is essential if IPTV becomes the platform for TV content longer term
- The need to avoid social exclusion is paramount, however there may also be social benefits if more households gain internet connectivity

There are options for deploying more spectrally efficient technologies, but the business case for broadcasters is uncertain

- Broadcasters must weigh the trade-offs of investing in DVB-T2 etc. to improve efficiency in a declining DTT platform, in terms of viewing, versus investing in online platforms where viewing is increasing
- Many of the benefits of efficiency improvements will fall to consumers and society rather than broadcasters, if spectrum was released for other uses
- Our research found little appetite for deploying other technologies such as 5G Broadcast and Single Frequency Networks (SFNs)

PMSE demand continues to grow since the last study - progress has been made in using the DME band, but demand and spectrum supply currently seem finely balanced



Growth in the creative industries that PMSE serves has continued particularly in film and high-end TV

- The opening of Sky Studios Elstree in 2023

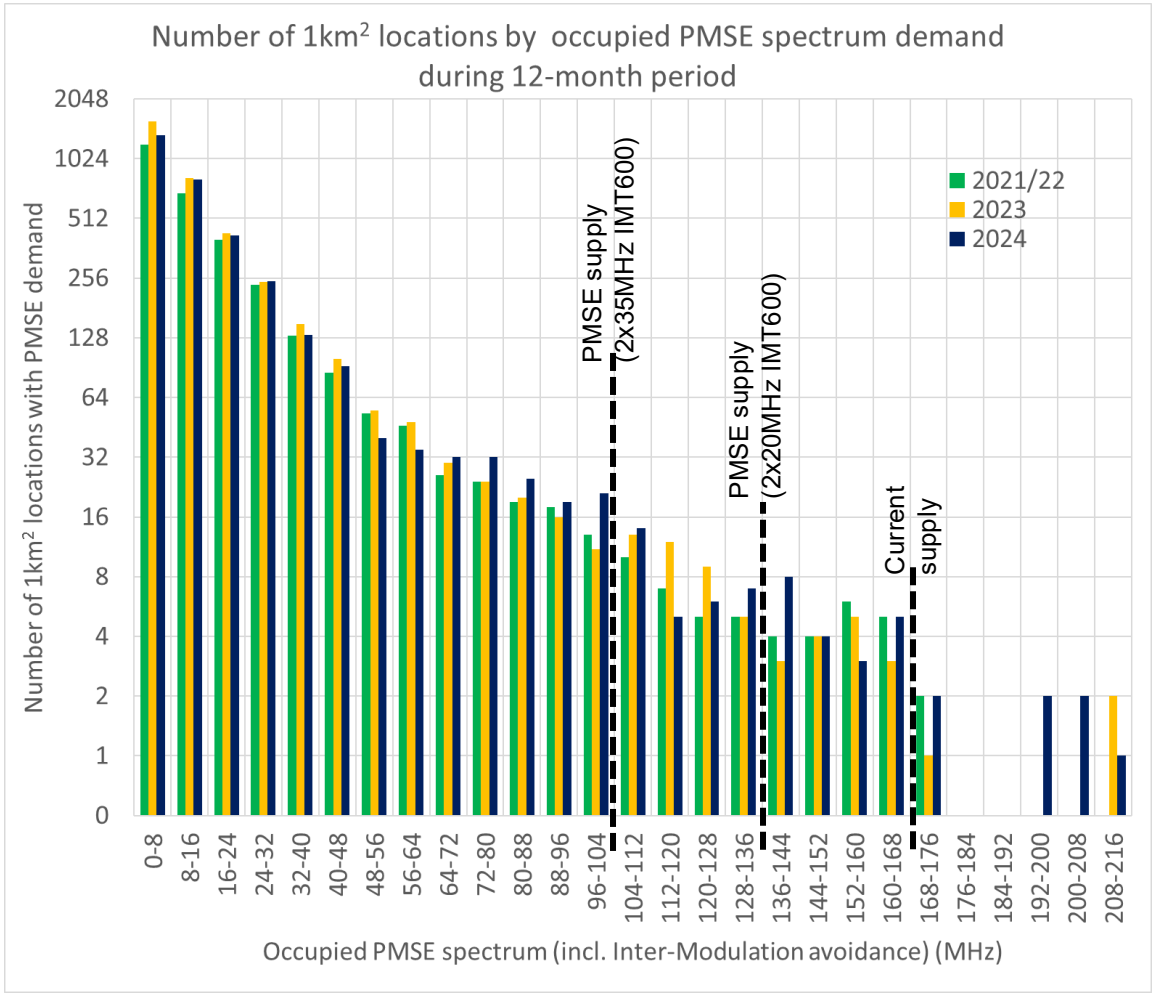
PMSE continues to play an important role in the economically and culturally significant creative industries

- 11% increase in actual PMSE licences from 2022 to 2024 data
- Increase in very high-demand PMSE spectrum applications but number is small and can vary by year

The DME band is starting to see some growth

- Interviewees emphasised that the band was a replacement for 700 MHz and would not compensate for further loss of UHF spectrum
- Possible introduction of new aeronautical services in the band could reduce spectrum available for PMSE

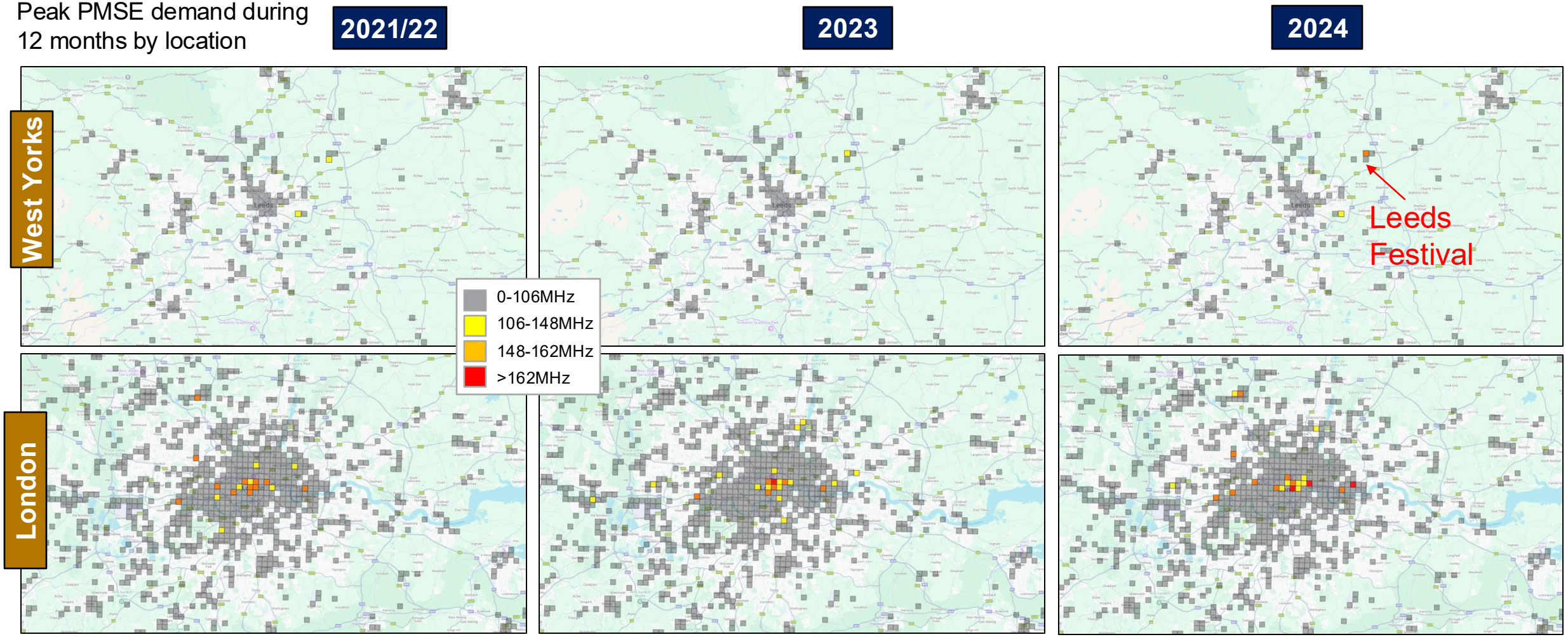
Analysis of over 330,000 PMSE UHF licences reveal some growth in high-demand PMSE events



- Data analysed includes 470-702 MHz licences over
  - Oct 2021 – Sept 2022 (from previous SPF study)
  - Jan 2023 – Dec 2023
  - Jan 2024 – Dec 2024
- For Narrowband PMSE licences we assumed inter-modulation avoidance means that for a 200kHz licence, 500kHz of spectrum is effectively needed
- PMSE usage has been increasing since 2021/22
  - 11% increase in UHF PMSE licences
  - 30% increase in UHF PMSE spectrum supply
- Reduced PMSE spectrum supply if IMT600 deployed
  - 2x20MHz IMT600 means ~138MHz for PMSE
  - 2x35MHz IMT600 means ~106MHz for PMSE

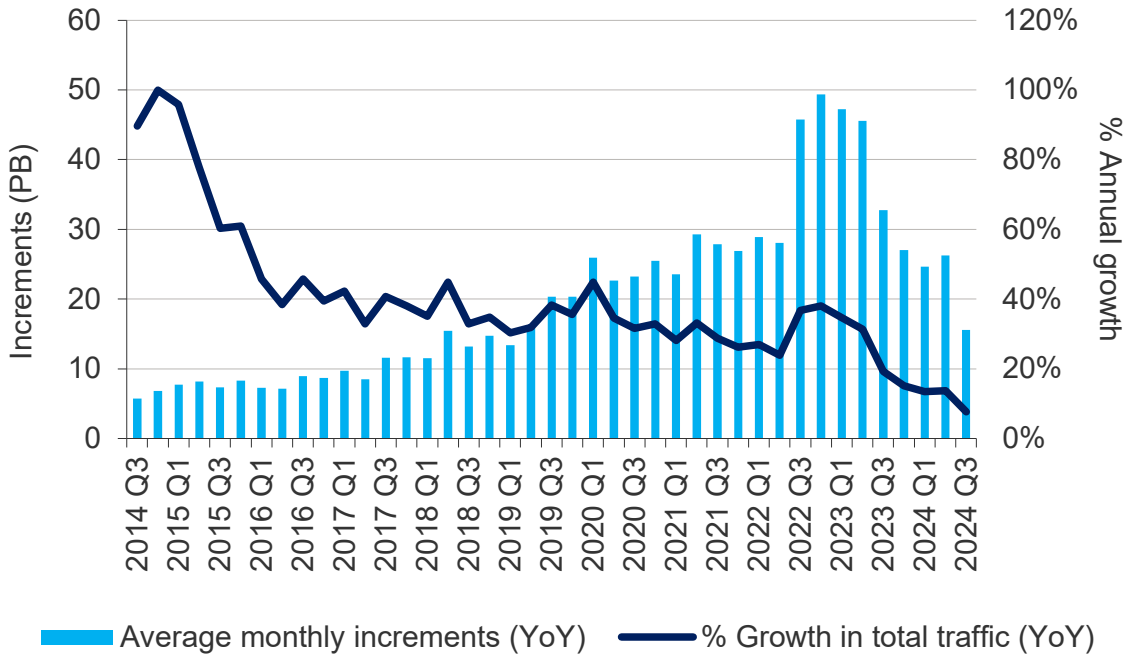
Analysis reveals high-demand PMSE spectrum is typically in the same locations. Outside of London there are often only a handful of locations with high PMSE spectrum demands

Peak PMSE demand during 12 months by location

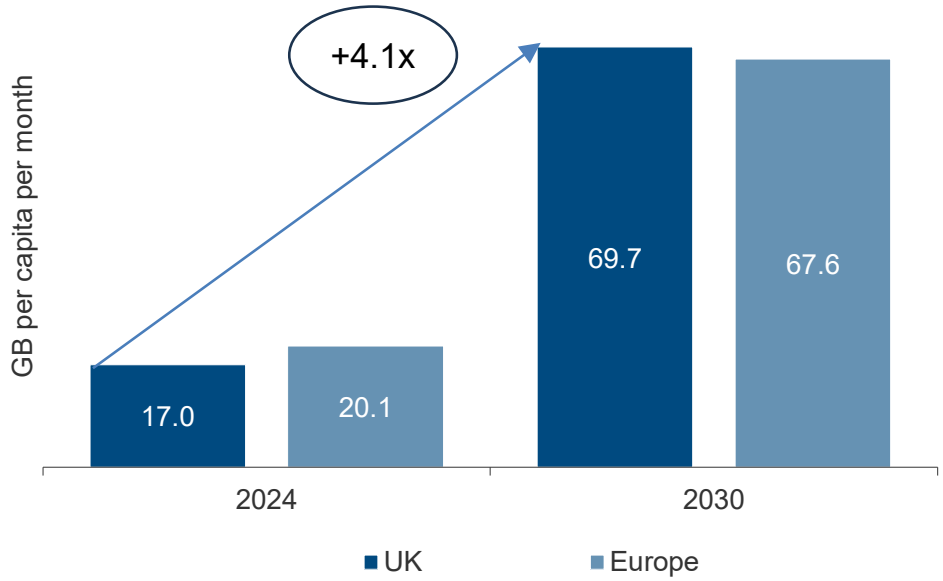


Mobile traffic growth is slowing in percentage terms but it continues in absolute terms

- Rising year-on-year increments in traffic to 2023 - albeit trend is very 'noisy'
- Very pronounced spike 2022 - end of the Covid pandemic, coinciding with 3.5 GHz deployment
- More moderate increments following the spike, but too soon to infer a permanent inflection in the long-term trend
- GSMA project a 4x increase between 2024 and 2030 - greater uncertainty around timing than quantum



Source: Coleago analysis based on Ofcom data



Source: Coleago analysis based on GSMA forecasts

Growth in overall mobile traffic also drives increased demand for low band capacity

- Rising 5G smartphone use and better networks are increasing video streaming, aided by larger data plans
- Higher video/gaming resolutions greatly boost data use—e.g. shifting from 480p to 720p nearly quadruples mobile traffic
- Mobile in some cases is replacing fixed broadband, pushing demand for both indoor and edge coverage
- Low bands remain crucial despite newer high-band capacity gains, as they handle hidden demand and reach hard-to-cover areas

The value of 600 MHz to mobile lies in broad consumer benefits, not in operator's willingness to pay—its socio-economic impact outweighs direct revenue potential.

- No new low-band option offers such a strong device ecosystem as IMT600; Wi-Fi cannot cover all indoor demand, and LEO satellite capacity is too limited and only available outdoors
- Expanding low-band via cell splits is costly, impractical, and often socially undesirable due to site constraints and consumer impact
- 6G viewed in Europe and the UK as essential to maintain national competitiveness (cf. UK Wireless Infrastructure Strategy, Letta report for the EU)
- Like previous technology generations, 6G needs a low band (600 MHz) for coverage and a mid band (U6) for capacity, forming the next key spectrum pair

IPTV-compatible broadband availability will likely exceed DTT coverage by 2034

Broadband infrastructure availability is unlikely to be the main issue for future IPTV substitution of DTT

- Superfast (30Mbps or more) is already available to 98% of premises; FWA filling some of the gaps
- Gigabit-capable broadband projected to reach 98% by 2027 – likely to exceed DTT footprint by 2034 or sooner
- Subject to reliability and traffic around peak events being suitably managed, IPTV appears to present a good alternative to DTT (with Satellite TV an option in most cases where adequate broadband is unavailable)

	Gigabit-capable (residential)	Full fibre (residential)	Superfast (residential)	Unable to get decent (all properties)
UK	83%	69%	98%	0.2%
Scotland	77%	62%	96%	0.5%
Northern Ireland	94%	93%	98%	0.2%
Wales	74%	68%	96%	0.5%
England	84%	69%	98%	0.1%

Source: Ofcom

Broadband exclusion is a more significant barrier to IPTV adoption

- Around 5% of UK households (~1.4 million) lack internet access at home, mostly due to lack of interest rather than affordability or skills
- Cost is a barrier for about 27%, while digital complexity affects others—issues that could be addressed with installation help or social tariffs
- Vulnerable groups most affected by broadband exclusion may rely solely on DTT, making it their only connection to news and entertainment
- For these users, a low-cost SD ‘night-light’ DTT service might be more appropriate than HD, supporting broader channel availability

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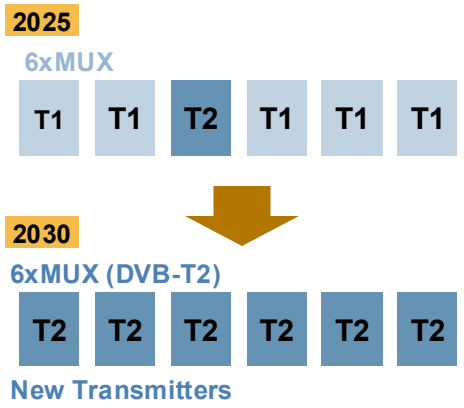
DTT Scenarios and Cases

There are dozens of possible DTT evolution outcomes - we looked at five different cases falling into the three Ofcom scenarios for the future of TV distribution

Investment in a more efficient DTT service

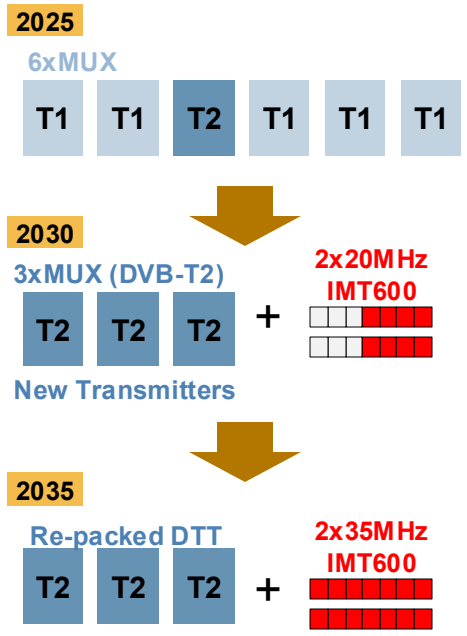
Case 1

- 5 MUXs → DVB-T2/MPEG4
- New Xmitters → lowers Opex
- Increases TV capacity/QoS
- 0.2m Households need new TV



Case 2

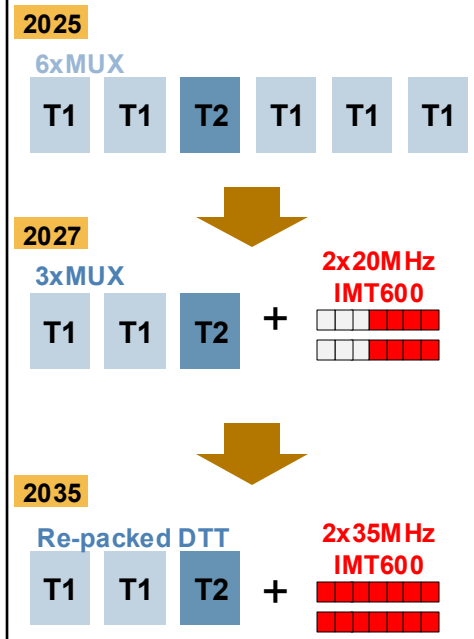
- 2 MUXs → DVB-T2/MPEG4
- New Xmitters → lowers Opex
- Maintains TV capacity/QoS
- 0.2m Households need new TV
- IMT 2x20MHz from 2030
- Full DTT repack from 2035



Reduce DTT to a core service

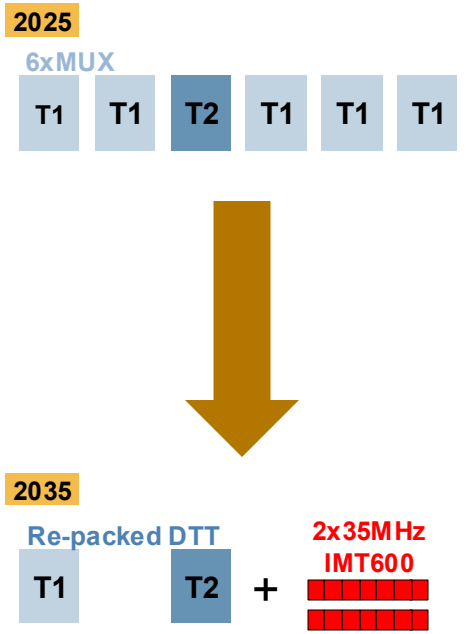
Case 3

- MUX-B not renewed by BBC
- SDN/ARQ → MUX-B
- No Households need new TV
- IMT 2x20MHz from 2027
- Full DTT repack from 2035



Case 4

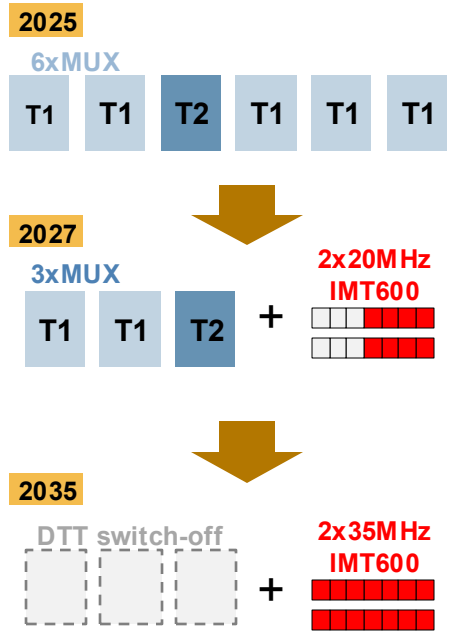
- MUX-B is renewed by BBC
- No Households need new TV
- 2 MUXs maintained - night light
- Full DTT repack from 2035



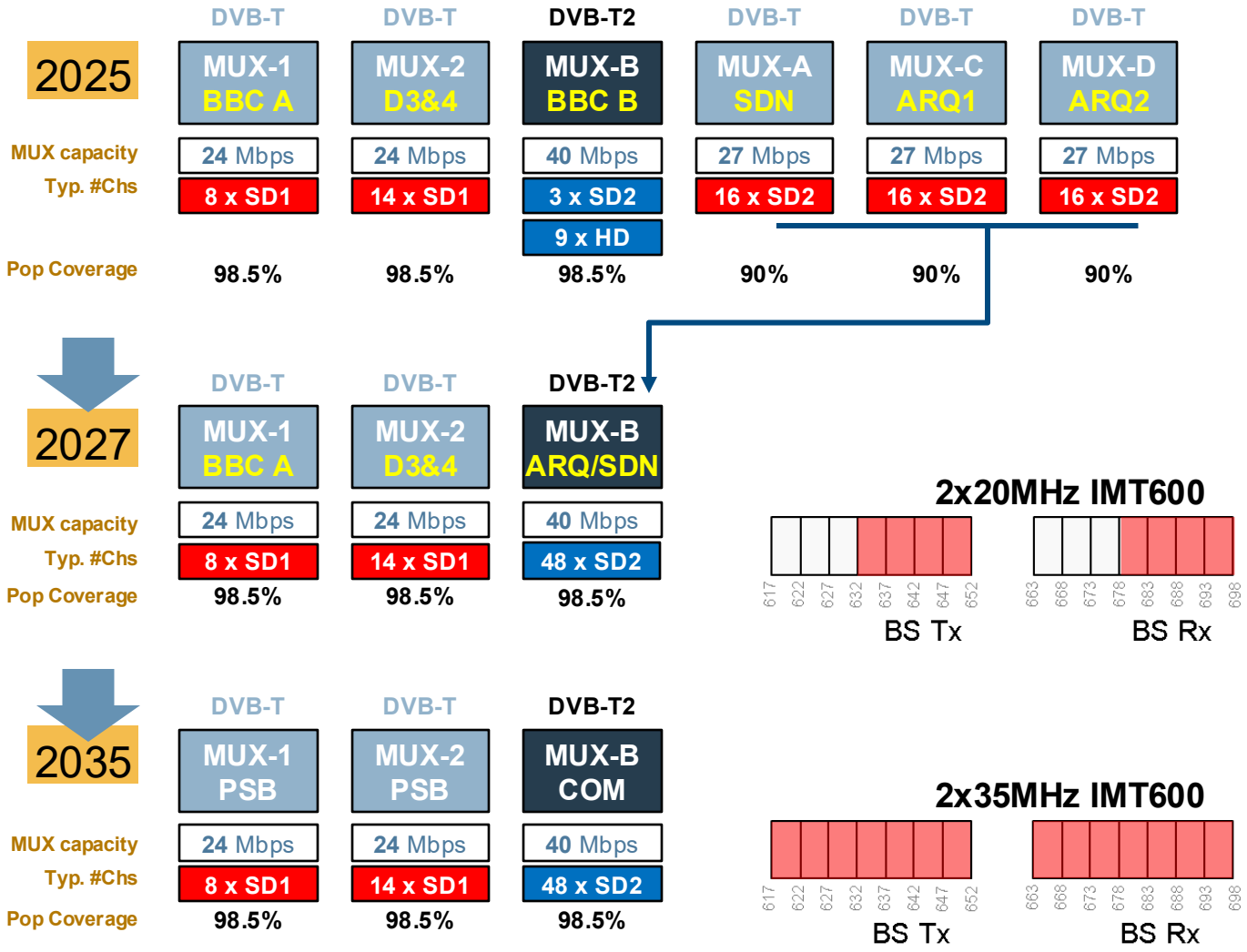
DTT switch-off

Case 5

- MUX-B not renewed by BBC
- SDN/ARQ → MUX-B
- No Households need new TV
- IMT 2x20MHz from 2027
- No DTT repack needed
- IPTV/STV only from 2035



Case 3: Reduced PSB (>2027) but COM capacity maintained with 3x MUXs without TV upgrades
IMT600 2x35MHz would require further study if neighbour countries do not clear 600 MHz



- **DTT PSB capacity reduced, COM maintained into 2030s**
  - Key premise: BBC does not renew MUX-B at end of 2026
  - Arqiva and SDN share MUX-B. Vacate MUX-A, C, and D
  - Arqiva/SDN get improved coverage although can't address ~1M HH's with DVB-T/MPEG2 only receivers
- **2027: Opportunity to introduce 2x20 MHz in IMT600**
  - 2x20 MHz could be supported without repack or Int. co-ord
  - DTT ←→ IMT X-border Interference mitigation required
  - PMSE loses ~32 MHz impacting ~24 locations/events
- **2035: 2x PSB MUXs and 1x COM MUXs offered for 5 yrs**
  - All MUXs remain – no investments made
  - Allows any transition to IPTV case to be >2040 as needed
- **2035: Repacking UHF from 28 to 17 channels needed**
  - 2x35 MHz possible if 600 MHz is also cleared in EU
  - 2x35 MHz needs further study if 600 MHz not cleared in EU
  - PMSE loses ~64 MHz impacting ~46 locations/events
  - PMSE could however gain up to ~32 MHz with co-ord.

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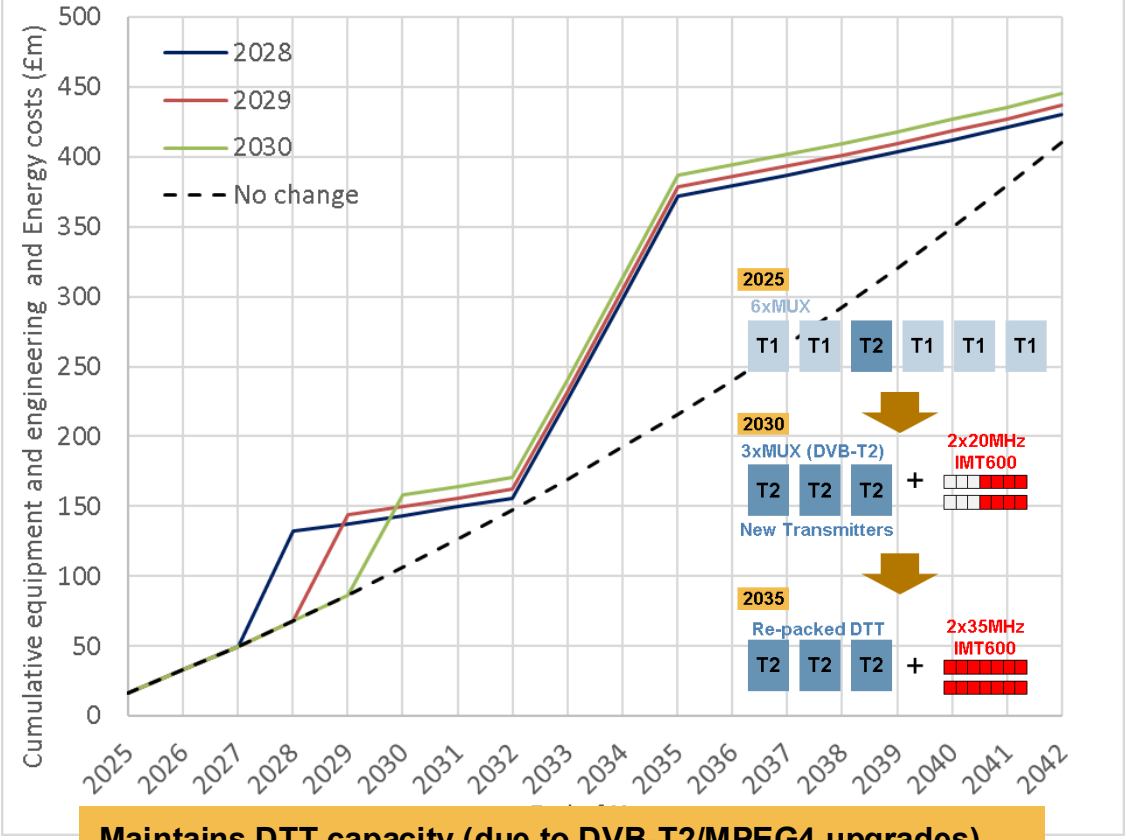
MPEG2 AVC/MPEG4

Case 2 exploits energy efficiencies by reducing MUXs and using new DTT transmitters
Case 3 exploits energy efficiencies by reducing MUXs only

Case 2

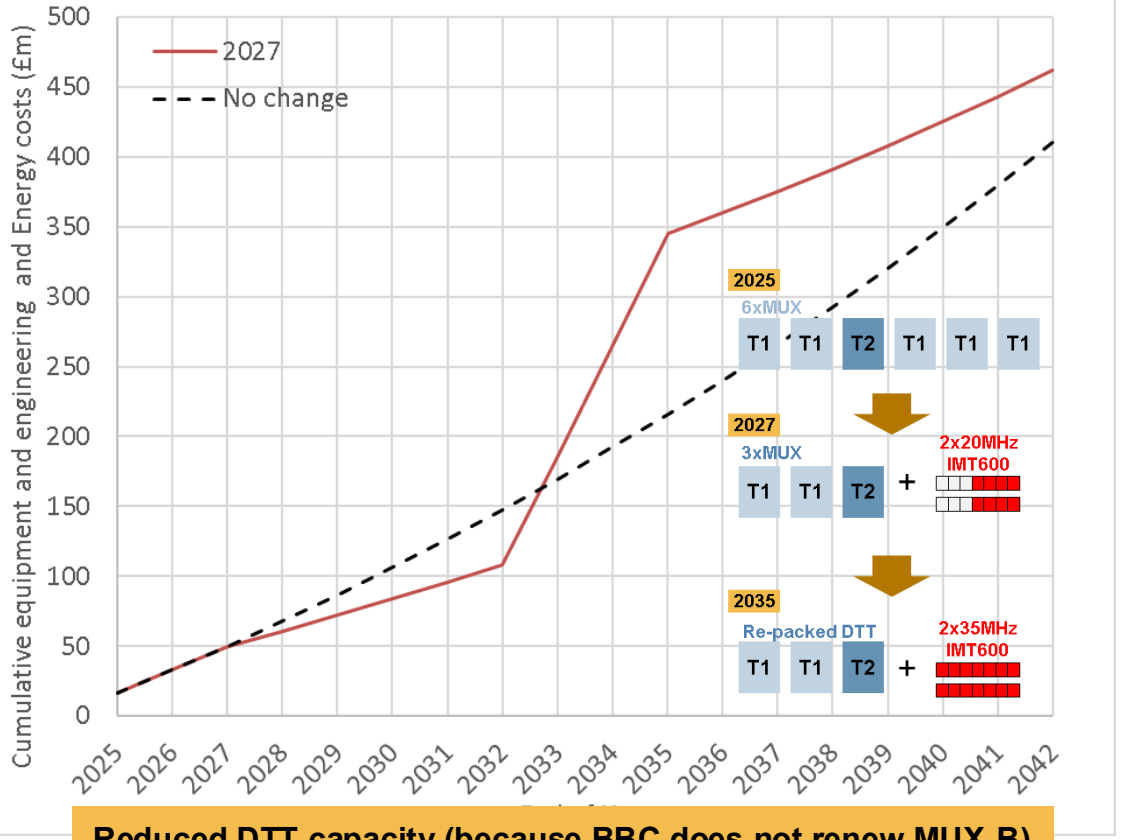
Cumulative costs for DTT network upgraded for 3x DVB-T2 MUX by upgrade year followed by IMT600 clearance by 2035



Maintains DTT capacity (due to DVB-T2/MPEG4 upgrades)
- Requires ~£75M investment (DVB-T2 TVs and Transmitters)
- New transmitters are >50% Energy Efficient
- UHF full re-pack ~£200M investment

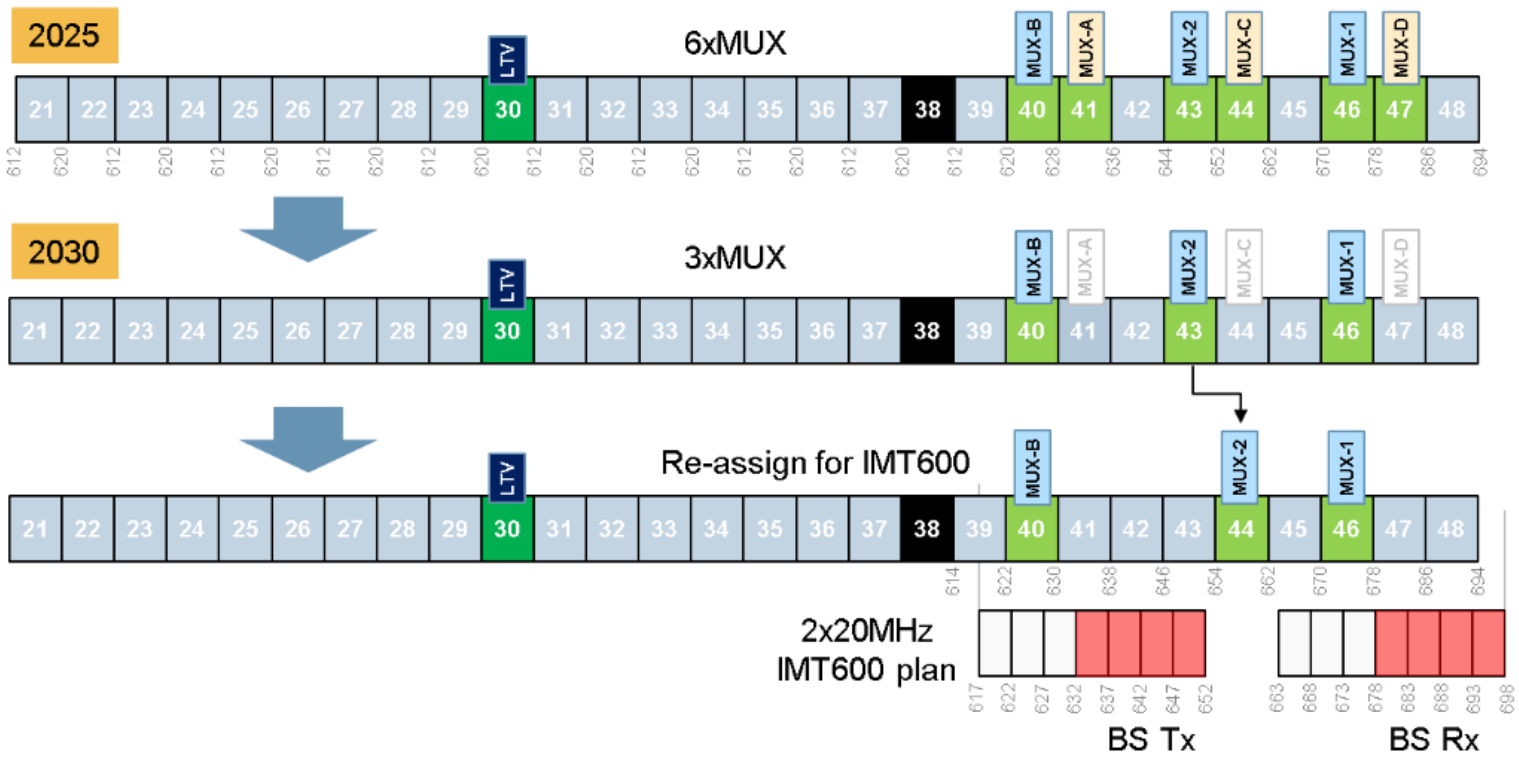
Case 3

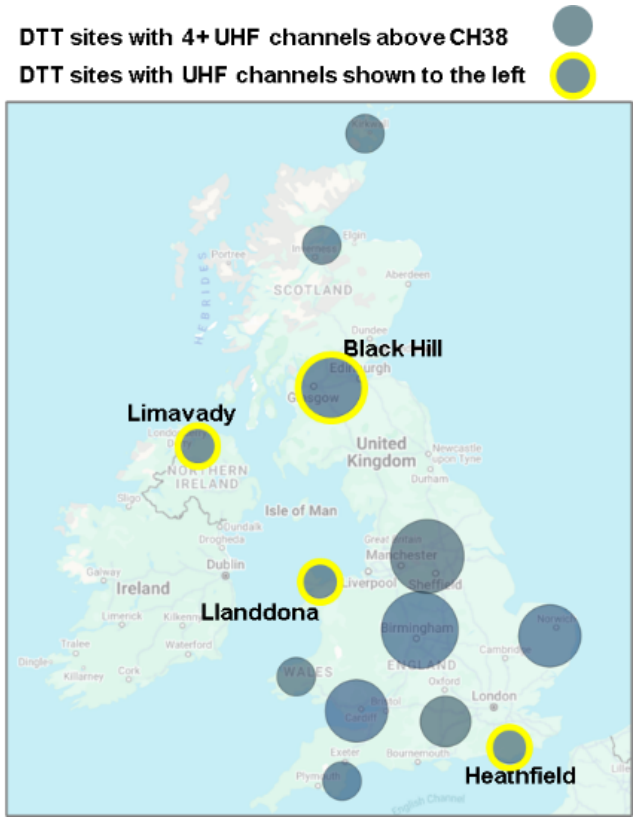
Cumulative costs for DTT network reduced to 3x MUX by 2027 followed by IMT600 clearance by 2035



Reduced DTT capacity (because BBC does not renew MUX-B)
- No initial investment needed
- Existing transmitters <25% Energy Efficient
- UHF full re-pack ~£200M investment

Cases 2, 3 and 5 suggest it is possible to offer up to 2x20 MHz of IMT600 within existing spectrum user rights - this may offer a migration to IMT without needing a full re-pack of band





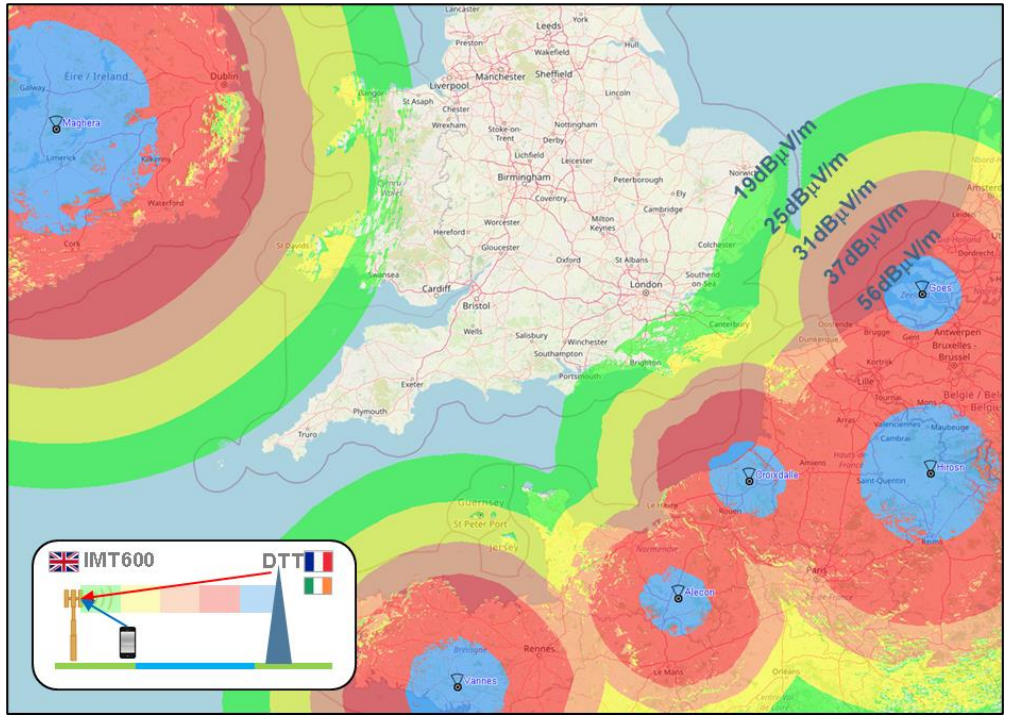
- **2x20 MHz IMT600 within existing DTT allotments**
  - DTT Stations using UHF channels below CH38 are fine and do not need adjustments
  - DTT Stations using UHF channels above CH38 need to three of the six allotments for cases 2 and 3
  - Our initial examination of UHF allotments and ERP assigned suggests that 2x20 MHz could be freed up without needing re-pack
  - 13 Main DTT sites require channel swaps - example shown above
  - DTT using CH44 is maintained - adjacent channel and out-of-band interference protection from IMT→ DTT is maintained too

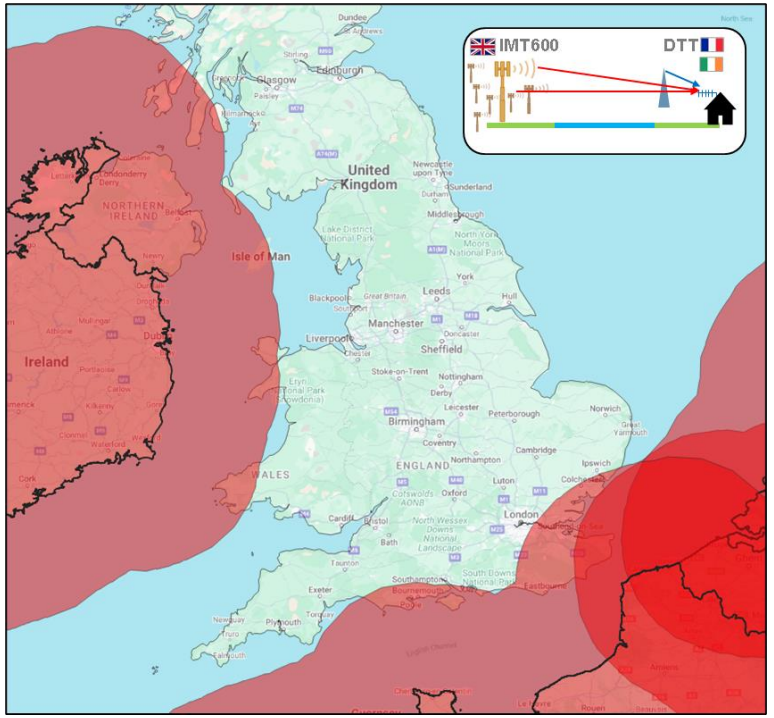
If IMT600 is to be released, then mitigations for a potential PMSE spectrum loss need to be put in place

Reducing DTT from six to three multiplexes and adopting a 2x35MHz IMT600 plan would cut available PMSE spectrum to ~106MHz, though a 2x20 MHz plan could retain ~138 MHz

- Reducing the bandwidth to 106 MHz could affect up to 50 high-demand PMSE uses, including festivals, theatres, and sports, requiring mitigation
- Time and geographic sharing with IMT600 may allow temporary spectrum access for planned events like festivals
- PMSE efficiency can improve through better planning, reuse strategies, and new technologies like Wireless Multi-Channel Audio Systems (WMAS)
- The 960–1154 MHz DME band has already relieved UHF pressure and offers more potential for events not yet using it

An early release of IMT600 spectrum or in the event our neighbours continued with DTT in 600 MHz, Mobile services will need to implement protection measures to and from DTT





- **DTT interference into IMT Uplink**
  - Previous studies suggest 100-200km co-ordination distances
  - Some acceptance and tolerance to interference
  - Many mitigation options available
  - Suggest these be investigated and explored further

- **IMT interference into DTT Receivers**
  - Previous studies suggest 50-150km co-ordination distances
  - There is no acceptance and tolerance to interference
  - Many mitigation options available
  - Suggest these be investigated and explored further

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