



# Future use of the 470–694MHz band - Executive summary version

Report for Abertis, Arqiva, BBC, BNE,  
EBU and TDF

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# 1 Summary of findings

The World Radiocommunication Conference in 2015 (WRC-15) will consider the award of co-primary status to mobile in the 470–694MHz band in Region 1. A consortium of Abertis, Arqiva, BBC, BNE, EBU and TDF has therefore requested Aetha to consider the economic benefits that would arise across the EU’s 28 member states from mobile gaining access to the 470–694MHz band, compared to continued use for DTT and other existing uses.

We have considered a scenario in which DTT transmissions cease and consumers are required to migrate to alternative platforms (a mixture of satellite, cable and IPTV). All 224MHz of spectrum in the band then becomes available for mobile services. We have calculated the costs and benefits of this scenario over a 15-year period (2015 to 2029) and compared them to the costs and benefits of continued use of the spectrum for DTT and other existing uses (PMSE, radio astronomy and ‘white spaces’).

The benefits from making spectrum available for mobile are highly sensitive to forecast traffic levels. Therefore, we have considered a range of traffic forecasts, the highest of which is based on forecasts from the ITU and UMTS Forum.

The result of our economic assessment is provided in Figure 1-1 below.

**Figure 1-1:**  
**Results of our economic assessment across the EU**  
[Source: Aetha]

	EUR billion
Cost of consumer equipment	19.7
Cost to set up new free-to-view platform	10.8
Cost of reduction in TV platform competition	14.2
Net avoided cost of operating DTT network	(6.2)
<b>Total cost of DTT migration</b>	<b>38.5</b>
<b>Value of spectrum to mobile</b>	<b>0–10.3</b> (depending on traffic forecast)

Our results show that even in the most aggressive mobile traffic forecast, the **costs of clearing DTT from the spectrum (EUR38.5bn) significantly outweigh the potential value of using the spectrum for mobile (EUR10.3bn) by a factor of almost four**. When a less aggressive traffic forecast is used, the costs of clearing DTT are unchanged but the value of using the spectrum for mobile would be near to zero.

It is clear that the economic benefits for the EU are maximised if the 470–694MHz band continues to be used for DTT for at least the next 15 years – **there is clearly no economic case for switching-off existing DTT networks across Europe** on the grounds of spectral efficiency.

Further, the introduction of a co-primary allocation to mobile at WRC-15 **would have considerable negative impacts on DTT**. Given the history of DTT spectrum being awarded co-primary status for mobile and that then leading to the spectrum being cleared for mobile, granting a co-primary allocation to mobile in the 470–694MHz band would **undermine investor confidence in the future of the platform**. This would lead to the DTT platform falling behind other television platforms and even unnecessarily risk its viability, with little benefit to be derived.

## 2 Executive summary

This report has been prepared by Aetha Consulting Limited (Aetha) for a consortium of organisations comprising Abertis Telecom Terrestre, Arqiva Limited, British Broadcasting Corporation, Broadcast Networks Europe, European Broadcasting Union and TDF SAS. It provides a summary of our assessment of alternative uses of the 470–694MHz band across the European Union.

### 2.1 Background

World Radiocommunication Conference 2015 (WRC-15) will consider motions to award co-primary status to mobile services in the 470–694MHz band in Region 1, which is currently used for the provision of Digital Terrestrial Television (DTT) services across the European Union (EU). Adoption of similar motions relating to adjacent frequencies in the UHF band in previous World Radiocommunication Conferences (WRCs) have led to the creation of the 800MHz band for mobile broadband services across Europe and interest in the creation of a 700MHz band. Given a move could then lead to pressure for the release of spectrum in the 470–694MHz band for mobile broadband services, the above consortium of organisations has requested Aetha to consider this alternative future use of the 470–694MHz band and estimate the economic benefits arising for EU citizens relative to the benefits that accrue from continued use of the band for DTT and other existing uses, such as Programme Making and Special Events (PMSE), radio astronomy and ‘white space’ applications.

Our research has indicated that the reception of linear television continues to be of importance to European households. Whilst there has been significant increases in the amount of viewing of audio-visual content over the Internet (e.g. catch-up services and viewing of content from aggregators such as Netflix), viewing of linear television has remained relatively constant. Instead, it appears that the consumption of content over the Internet is largely substituting home-recorded content or content on physical formats such as DVDs and Blu-Rays. Additionally, the rapid growth in adoption of social media may further support the continuation of viewing of linear broadcasts – e.g. tweets regarding a particular television programme are mostly of interest to others viewing the same programme at the same time.

Given the current importance of linear television viewing, which is likely to remain for the foreseeable future given current trends, an assessment of alternative uses of the 470–694MHz band must consider alternative means of delivering linear television to those European households that currently depend on the DTT platform for either their main television set (‘primary set’) or other televisions in the household (‘secondary sets’).

### 2.2 Economic assessment of alternative use of the 470–694MHz band

In developing our economic assessment, we have considered two scenarios for the future use of the 470–694MHz band as follows:

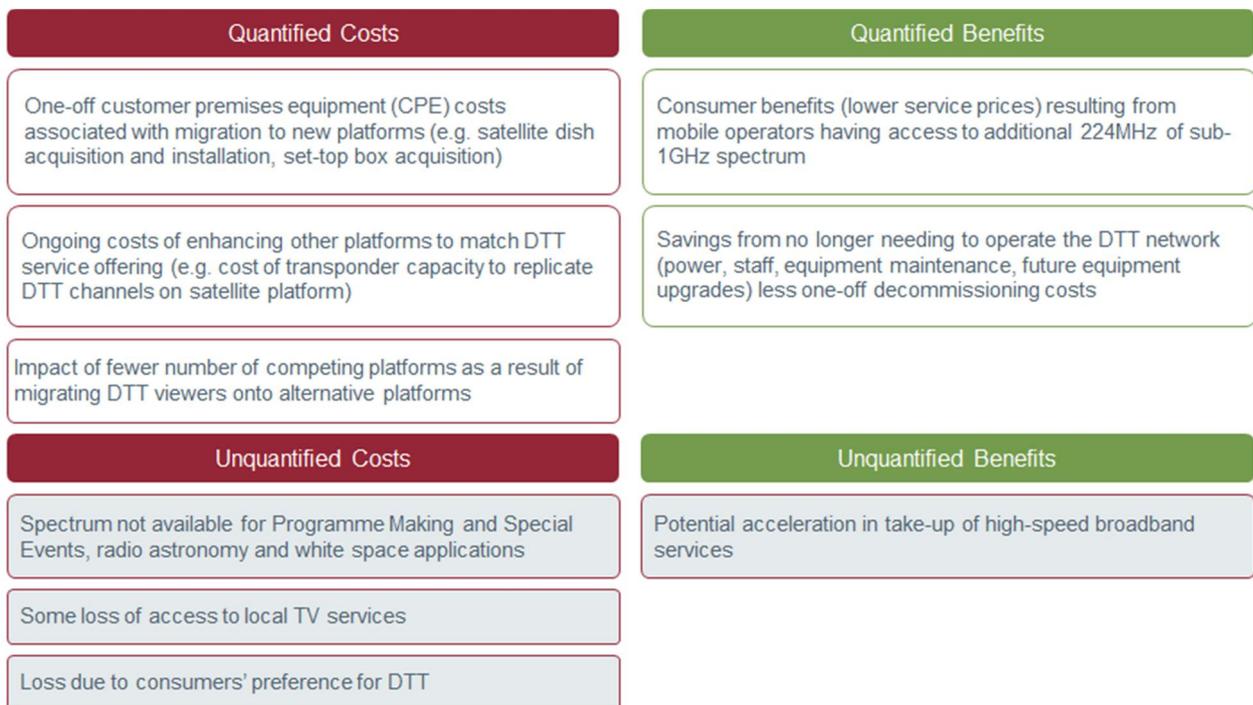
**Scenario 1)** The whole band continues to be used for the provision of DTT. No spectrum in the band becomes available for mobile services.

**Scenario 2)** DTT transmissions cease and consumers are migrated to alternative platforms (a mixture of satellite, cable and IPTV). All 224MHz of spectrum in the band becomes available for mobile services.

Note that in this study we have not considered options for part re-allocation of 470–694MHz to mobile services, for example a new ‘600MHz band’. This is because we do not detect that there is any appetite for further ‘salami slicing’ of the UHF band, given the amount of time and effort that is required to enable this to occur in terms of the international coordination process as well as the cost of migrating DTT transmitter sites onto new frequencies, which would be required on a widespread basis across the EU. Additionally the creation of 32MHz of spectrum in a new mobile sub-band (which is the approximate amount that could be made available if DTT operated with one fewer multiplex) is unlikely to be sufficient in terms of the amount of spectrum that the mobile industry would be interested in given the intensity of work required to internationally harmonise the band. Additionally it would reduce the number of DTT channels which could be offered, thereby detrimentally affecting the attractiveness of the platform. Further, the inclusion of 72MHz (plus a duplex gap) of spectrum in a mobile sub-band (the minimum amount that is likely to be of interest to the mobile industry) would result in the loss of approximately two or three multiplexes on the DTT platform which would, in many countries, substantially reduce platform capacity. This would make the DTT platform no longer viable in respect of there being a minimum amount of content available for it to be considered as a valid alternative to satellite and cable.

Our economic assessment thus aims to quantify the incremental costs and benefits arising under Scenario 2, when compared to Scenario 1. The incremental costs and benefits that arise under Scenario 2 are summarised in the diagram below. In particular, we have quantified those costs and benefits that are highlighted in white boxes. It can be seen that these comprise only some of the costs but the majority of the benefits. For this reason, our assessment should be considered as a lower bound estimate of the incremental costs associated with making the band available for mobile broadband.

**Figure 2-1: Incremental costs and benefits associated with Scenario 2 (migration to alternative platforms) when compared to Scenario 1 (continued use of the whole band for DTT)**



Our economic assessment is undertaken over a 15-year period – namely from 2015 to 2029 inclusive. We calculate the net present value (NPV) of all costs and benefits over this period using a social discount rate of 3.5%.

Our calculation of the costs and benefits associated with the migration of the DTT platform to alternative platforms has shown that there can be significant variations between countries due to specific circumstances – for example current levels of adoption of existing television platforms. Consequently we have selected eight case study countries (France, Germany, Italy, Poland, Romania, Spain, Sweden, UK), which represent a range of differing circumstances, and model the cost/benefits of platform migration in detail in each of these countries. We then calculate the total values for the EU by mapping each of the remaining 20 member states to one of the case study countries and scale the results with population. We note that 76% of the EU’s population lies within our case study countries and therefore the majority of value is likely to be represented by our case study countries alone. The assignment of the remaining 20 EU member states is shown in Figure 2-2 below.

**Figure 2-2: Assignment of remaining EU member states to case studies [Source: Aetha]**

France	Germany	Italy	Poland	Romania	Spain	Sweden	UK
	Austria Belgium Luxembourg Netherlands	Croatia Greece	Slovakia	Bulgaria Estonia Hungary Slovenia		Denmark Finland Latvia Lithuania Malta Portugal	Cyprus Czech Rep Ireland

For calculating the benefits of making additional spectrum available for mobile broadband services, we consider a hypothetical country with a population of 50 million and then scale with population to obtain a total for the EU as a whole. Such an approach is possible since the differences in mobile markets across the EU are less pronounced than the differences in the television markets. Aetha has previously utilised a similar approach for the calculation of the economic benefits arising from making the 2.7–2.9GHz band available in Europe on behalf of the GSM Association<sup>1</sup>. The economic benefits from making spectrum available for mobile broadband services are highly sensitive to forecast traffic levels – consequently in addition to the forecast based on ITU/UMTS Forum projections utilised in our study for the GSM Association, we have also calculated the economic benefits using a second forecast adjusted from the UK forecast used by Ofcom in its recent consultation on the future use of the 700MHz band<sup>2</sup>.

We have assumed that as much high-frequency spectrum as is required to provide sufficient capacity on mobile networks is made available, since the opportunity cost of making this spectrum available for mobile services is likely to be considerably lower than that of the 470–694MHz band. Nonetheless there will be elements of the traffic demand (for example in rural areas or deep indoors) that cannot economically be met using high frequencies. This is where the economic benefit of making the 470–694MHz band available for mobile broadband services arises. This benefit would arise in the form of costs savings for network operators from not having to deploy new base station sites to make more intensive use of other low-frequency spectrum (for example in the 900MHz, 800MHz and 700MHz bands). In our assessment we assume that 100% of these cost savings gained by the mobile network operators are passed on to consumers in the form of lower prices, This essentially assumes a perfectly competitive market – in reality we note that this may not necessarily be the case and therefore our assessment of the economic benefits resulting from the use of the band for mobile are likely to be overstated.

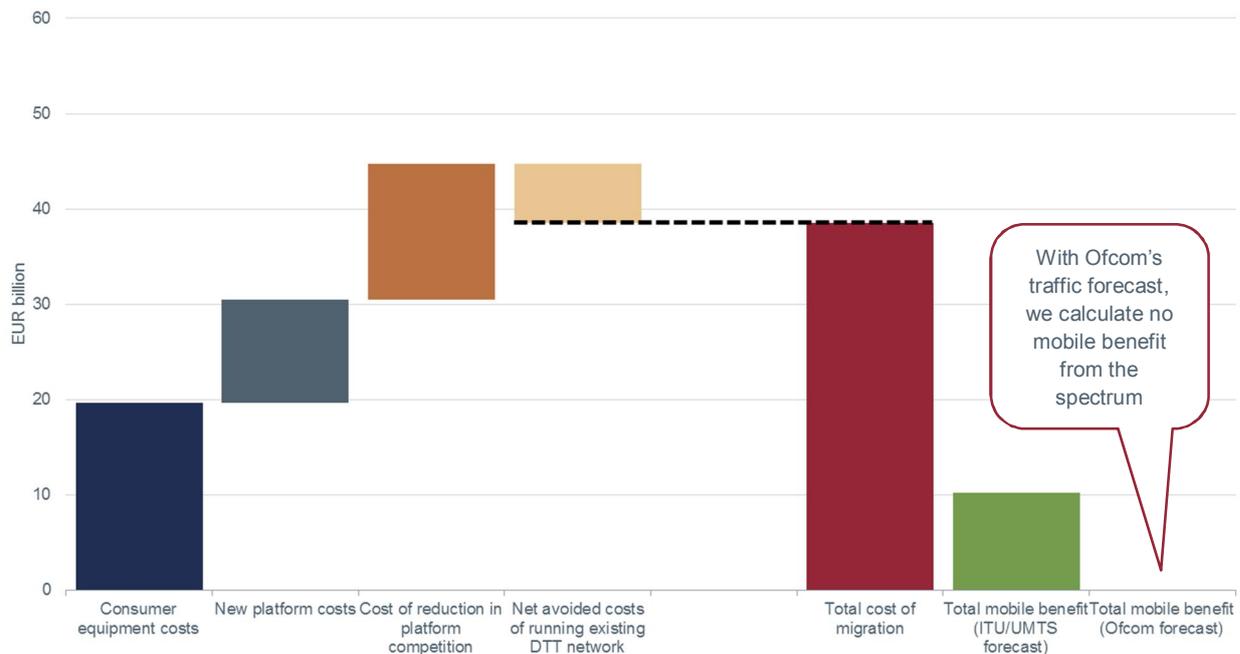
<sup>1</sup> Aetha Consulting report for the GSM Association, ‘Economic benefits from making the 2.7–2.9GHz band available for mobile broadband services in Western Europe’, June 2013.

<sup>2</sup> Ofcom, ‘Consultation on future use of the 700MHz band – cost-benefit analysis of changing its use to mobile services’, 28 May 2014.

## 2.3 Results of our quantitative assessment

In comparing the cost of migrating DTT viewers to alternative platforms with the benefits arising from clearing the entire 470–694MHz band for mobile services, we note that the **costs outweigh the benefits by a factor of almost four** (when using the ITU/UMTS-based traffic forecast), as shown in Figure 2-3 below.

**Figure 2-3: Comparison of costs of migration of DTT to alternative platforms with benefits of making the 470–694MHz band available for mobile broadband [Source: Aetha]**



It is clear that the economic benefits for the EU are maximised if the 470–694MHz band continues to be used for DTT for at least 15 years – on the grounds of spectral efficiency, **there is clearly no economic case for switching-off existing DTT networks across Europe**. Furthermore, as indicated earlier, the costs of DTT migration are likely to be an underestimate of the true costs, as our assessment does not consider the value lost from displacing other users of the band such as PMSE, radio astronomy and ‘white space’ applications.

## 2.4 Conclusions and recommendations

Our assessment has clearly demonstrated that, on current trends, the economic benefits are maximised for EU citizens if the 470–694MHz band continues to be used for DTT (as well as compatible uses such as PMSE, radio astronomy and white space applications) over the next 15 years. The costs associated with providing linear broadcast television services to all EU households in the absence of the DTT platform are many multiples of the benefits that would arise from making the 470–694MHz band available for mobile services. In summary, the digital terrestrial platform remains key for the cost effective delivery of linear broadcast content to EU consumers and use of the 470–694MHz band is a critical element of the platform.

Whilst Aetha normally encourages the removal of any unnecessary technology and service restrictions applying to spectrum, in this particular instance we are concerned that the introduction of a co-primary allocation for 470–694MHz spectrum to mobile at WRC-15 (in ITU Region 1) could risk undermining investor confidence in the future of the DTT platform, particularly in view of the history of previous

allocations in the UHF band. Specifically, the historic re-purposing of DTT spectrum for mobile use following co-primary allocations being made to mobile at WRC-07 and WRC-12 could raise expectations that 470–694MHz spectrum could be taken away from DTT in the event that a co-primary allocation is made at WRC-15. This would be an inappropriate message to send to both the investment community and wider public at a time when investment in the next generation of digital broadcast technology (for example in DVB-T2 technology) by both network operators and consumers needs to be encouraged. As such, a co-primary allocation to mobile at WRC-15 would have considerable negative impacts on DTT. This would lead to the DTT platform falling behind other television platforms and even unnecessarily risk its viability, with little or no benefit to be derived. Consequently we recommend that European national administrations do not support making a co-primary allocation to mobile at WRC-15.

Whilst it is true that there is a lead-time between spectrum being identified for mobile services at a WRC and the spectrum becoming available for use, a delay in considering a co-primary allocation for mobile in the 470-694MHz band to a subsequent WRC is likely to be compatible with the timescale over which the spectrum might yield material economic benefits. As such, we would agree with the Lamy recommendation for a review by 2025, as proposed in his report to the European Commission regarding the results of the work of the High Level Group on the future use of the UHF band<sup>3</sup>.

*A full version of the report is available on Aetha's website – [www.aethaconsulting.com](http://www.aethaconsulting.com)*

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<sup>3</sup> Pascal Lamy, Report to the European Commission, 'Results of the work of the High Level Group on the future use of the UHF band (470–790 MHz)', 1 September 2014.