Indicative evaluation of making digital dividend spectrum available for mobile broadband in Egypt

Report for the GSM Association

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1 Executive summary

This report has been produced by Aetha Consulting (Aetha) as a summary of our assessment of the value of making digital dividend spectrum available for mobile broadband services in Egypt, undertaken on behalf of the GSM Association.

The transition from analogue to digital terrestrial broadcasting in Egypt will result in spectrum, known as the 'digital dividend', becoming available. Terrestrial broadcasting could continue to use this spectrum, allowing for extra television services. Alternatively, this spectrum could be allocated to mobile services, allowing mobile operators to provide cost-effective high-speed mobile broadband, particularly in rural areas and deep indoors.

In many countries, digital dividend spectrum has been awarded to mobile operators via auctions. Scaling the proceeds of these auctions to the relative wealth (GDP/capita) of Egypt provides estimates of hypothetical auction proceeds with an average of approximately 0.5 EGP/MHz/pop and a range of 0.15–1.15 EGP/MHz/pop. In other words, this equates to a range of EGP12–93 million per MHz of direct revenue that could be recognised if the spectrum were to be auctioned, considering the population of Egypt.

The main focus of this study is to provide estimates of the economic benefits of making the digital dividend spectrum available for mobile broadband services, or instead using the spectrum for digital terrestrial broadcasting. We have scaled the results of other studies to the Egyptian market, taking account of parameters such as population, relative wealth (GDP/capita) and take-up of terrestrial broadcasting and mobile services. From these we have calculated indicative estimates for the level of economic benefits. A more detailed study could be undertaken if required, in order to provide a more precise estimation.

The results of our estimations are:

- the economic benefit of mobile use of the digital dividend is estimated as EGP9 billion, with a range for the estimation of EGP3.6 billion to EGP19 billion
- the economic benefit of digital terrestrial broadcasting use of the spectrum is estimated to be EGP0.3 billion.

We therefore conclude that the economic benefits of making the digital dividend spectrum available for mobile broadband services are approximately 30 times greater than the economic benefits of continued use for providing digital terrestrial broadcast television. Hence we believe that the economic benefits would be maximised if the digital dividend were made available for mobile broadband services in Egypt.

2 Introduction

This report has been produced by Aetha Consulting (Aetha) as a summary of our assessment of the economic value of making digital dividend spectrum available for mobile broadband services in Egypt, undertaken on behalf of the GSM Association.

2.1 Background

In Egypt, the transition of analogue to digital terrestrial broadcasting is planned to be complete by 2015.[1] This transition to digital technology will enable terrestrial broadcasting to use spectrum more efficiently, resulting in the availability of spectrum for either additional television services or other services. In particular, some of this spectrum could be allocated to mobile services, and is often referred to as the 'digital dividend'. The spectrum beneath could still be used for terrestrial broadcasting, as well as for public protection and disaster relief (PPDR).

In many countries, the digital dividend has already been awarded to mobile operators. It is key for the deployment of 4G services, which enables operators to offer faster mobile broadband services. Being low frequency, this spectrum has better propagation characteristics than higher frequencies, enabling cost-effective rural and deeper indoor coverage for 4G services.

Typically digital dividend spectrum has been awarded to mobile operators via auctions. These auctions have raised significant funds, showing how valuable mobile operators consider it to be. To date, auctions of digital dividend spectrum have raised an average of approximately 0.65 EUR/MHz/pop, with a range of 0.3–1.4 EUR/MHz/pop.[2] Scaling to the relative wealth (GDP/capita) of Egypt provides estimates of hypothetical auction proceeds with an average of approximately 0.5 EGP/MHz/pop and a range of 0.15–1.15 EGP/MHz/pop. In other words, this equates to a range of EGP12–93 million per MHz, considering the population of Egypt of 81 million in 2012.

In Egypt there is a particularly high adoption of mobile services. Indeed the mobile penetration reached 115% in 2012.[3] This is in contrast with the use of fixed broadband services, where the penetration is low (less than 3% of population in 2012[4]). Thus much of the population, especially in rural areas, rely on mobile services for their internet access. Hence it is likely that making the digital dividend available for mobile use will be of particular value and could be critical for reducing the risk of a 'digital divide' occurring between urban and rural areas.

If the digital dividend spectrum were not to be made available for mobile use, then it could be used to offer additional terrestrial television channels. This would have benefits for consumers that view terrestrial broadcasting services. However, terrestrial television use is relatively low in Egypt, with only 5% of television users receiving television primarily via the terrestrial platform.[5] Instead, the main platform for television is satellite.

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1 ITU, 'Working Document On Options For The Refinement Of The Lower Edge Of The Frequency Band 694-790 MHz In Region 1', 30 July 2013, Appendix 1.

2 Annual fees are included, assuming a discount rate of 10%. Some of the auctions were 'combinatorial clock' auctions, for which operators bid for packages of spectrum across multiple frequency bands. For these we have used estimates of the price for bands within the digital dividend from a third party source; New Street Research, available at http://www.newstreetresearch.com

3 ITU, 'Mobile-cellular subscriptions', available at http://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2013/Mobile_cellular_2000-2012.xls

4 ITU, 'Fixed (wired)-broadband subscriptions', available at http://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2013/Fixed_broadband_2000-2012.xls

5 ITU, 'Working Document On Options For The Refinement Of The Lower Edge Of The Frequency Band 694-790 MHz In Region 1', 30 July 2013, Appendix 1.

2.2 Objectives of this report

This report provides an estimation of the economic benefits of making the digital dividend available for mobile broadband services in Egypt. This involves estimating:

- the economic benefit of the additional spectrum being used for mobile services
- the economic benefit of continuing to use the spectrum for terrestrial broadcasting, assuming transition to digital technology.

By the 'economic benefits' we refer to the direct benefits that arise from the use of the spectrum for a particular service (i.e. the producer surplus and the consumer surplus).

3 Approach to estimation of economic benefits

In this section we provide an overview of the approach taken to estimate the economic benefit of using digital dividend spectrum for mobile broadband or terrestrial broadcasting services. Our approach has been firstly to review a wide variety of studies undertaken in other markets regarding digital dividend spectrum; and then scaling the results of these studies to produce a high-level estimate for Egypt.

3.1 Overall approach

We have assessed the economic benefits resulting from digital dividend spectrum being used for either mobile services or digital terrestrial broadcasting. Thus we have estimated the following two benefits:

- the incremental economic benefit of using the digital dividend for mobile services
- the incremental economic benefit of continuing to use the digital dividend for terrestrial broadcasting.

Use of the spectrum for each service would provide the following economic benefits:

- For mobile broadband services, the spectrum would provide cost-effective indoor and rural coverage, due to fewer base stations being required. This would enable 4G services to be deployed over wider areas and also provide higher capacities.

- For terrestrial broadcasting, continued use of the spectrum would allow for additional standard definition channels and/or high definition/3D channels.

To estimate these economic benefits we have scaled results from previous studies undertaken for other markets. The studies that we have used consider Australia[6], Belgium[7], the European Union[8], Latin America[9], Netherlands[10] and Russia[11].

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[6] Spectrum Value Partners and Venture Consulting, 'Getting the most out of the digital dividend in Australia', April 2009.

[7] Aetha Consulting, 'Economic benefits from use of the 790-862MHz band for DTT and mobile broadband', 27 February 2013.

[8] Spectrum Value Partners, 'Getting the most out of the digital dividend', March 2008.

[9] Telecom Advisory Services LLC, 'Beneficios Económicos del Dividendo Digital Para América Latina'.

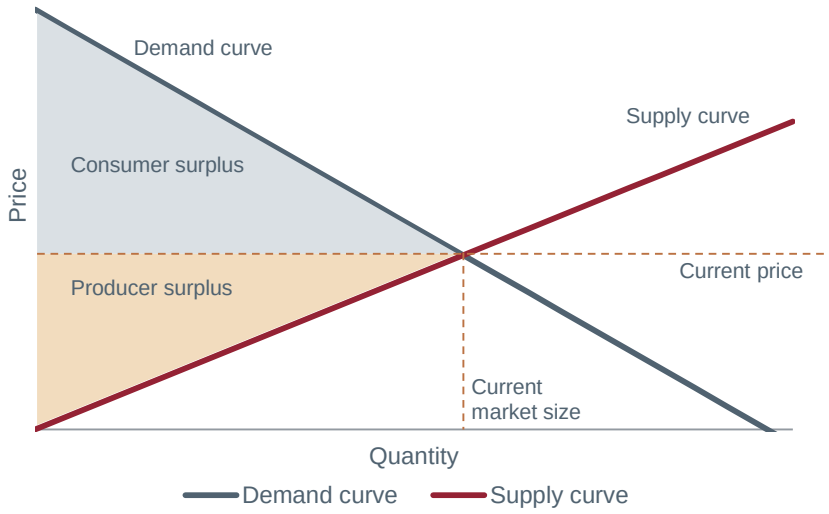
3.2 Approach of studies considered

The typical approach taken in the reviewed studies is to assess the direct economic benefits from using the spectrum for both mobile broadband services and terrestrial broadcasting. This constitutes two elements:

- **Producer surplus** – the profits earned by the producers of the service, i.e. the revenues of the service less the cost incurred to provide the service.
- **Consumer surplus** – the difference between the amount that consumers are willing to pay for the service and the amount that they actually pay.

These concepts are illustrated in Figure 3-1, below, assuming for simplicity that supply and demand are in equilibrium and that the supply and demand curves are linear.

Figure 3-1: Illustration of producer and consumer surplus



For mobile services, typically price (average revenue per user) and subscriber numbers are forecast along with the demand curve, to derive consumer surplus and also producer revenues. Producer costs are assumed to reduce due to network savings from having access to the spectrum.

For terrestrial broadcasting, additional multiplexes would provide a more attractive service and hence increase consumers' willingness to pay. This alters the demand curve (an upward shift) and hence increases consumer surplus. Producers may experience increased revenues from increased subscriptions and advertising, but also additional costs from operating the additional multiplexes.

The consumer and producer surpluses are calculated for the case that the service (mobile broadband or terrestrial broadcasting) has access to the spectrum and the case it does not. The difference between these is then the incremental economic benefit of the spectrum to the service.

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[10] Analysys Mason, 'Economic and Social Limitations to Alternative Uses of 'Digital Dividend' Spectrum', 24 July 2008.

[11] Analysys Mason, 'Benefits of the digital dividend spectrum in Russia', 24 June 2010.

Note that these studies consider the economic benefits over a number of years, typically using a period of around 20 years.

The studies for Australia and for the European Union also consider 'indirect benefits' and 'externalities' (e.g. job creation), on top of the producer and consumer surplus benefits. In both cases these additional benefits were seen not to have a significant effect on the results for mobile. Thus, compared to those studies considering only producer and consumer surplus, these studies are likely to attach more value to the spectrum for terrestrial broadcasting.

3.3 Scaling of results

In order to use the results of studies from other markets, we scale them to provide appropriate estimates for Egypt as follows:

- For the mobile results, we scale to the number of active subscribers (using data sourced from the ITU[12]) and GDP/capita (using data sourced from the World Bank[13]) of Egypt.
- For terrestrial broadcasting we scale to the number of television users receiving television primarily via terrestrial broadcasts (using data sourced from the ITU[14] and various news reports) and the GDP/capita (again, using data from the World Bank[13]) in Egypt. In particular this scaling takes account of the relatively low use of terrestrial broadcasting in Egypt.

Where available we have used the results of the base case scenario in each study. However, for some studies no explicit base case was considered. Instead we considered a range of scenarios, taking the average of the highest and lowest.

We have then averaged the scaled results from the various studies to estimate the value of the digital dividend to both mobile and to terrestrial broadcasting in Egypt.

4 Results

In this section we provide the results of our assessment. Estimates for the economic benefit of the digital dividend being made available for mobile broadband, scaled to Egypt by active subscribers and GDP/capita, or continuing to be used for terrestrial broadcasting, scaled by the number of television users receiving television primarily via terrestrial broadcasts and GDP, are shown below in Figure 4-1.

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[12] ITU, 'Mobile-cellular subscriptions', available at http://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2013/Mobile_cellular_2000-2012.xls

[13] World Bank, 'World Development Indicators', 2013, available at http://databank.worldbank.org/data/views/reports/tableview.aspx

[14] ITU, 'Working Document On Options For The Refinement Of The Lower Edge Of The Frequency Band 694-790 MHz In Region 1', 30 July 2013, Appendix 1.

Figure 4-1: Economic benefit of the digital dividend scaled to Egypt

Market studied	Economic benefit from mobile use (EGP m)	Economic benefit from terrestrial broadcasting use (EGP m)
Australia	9022	43
Belgium	5394	(762)
European Union	18 920	317
Latin America	3599	145
Netherlands	8524	1713
Russia	8546	Not included in study
Average	**9001**	**291**

The economic benefits for mobile broadband range from approximately EGP3.6 billion to EGP19 billion, with an average of approximately **EGP9 billion**; whilst the range for the economic benefits for terrestrial broadcasting is approximately (EGP0.8 billion) to EGP1.7 billion, with an average of approximately **EGP0.3 billion**. Considering the averages, the economic benefit of the digital dividend being made available to mobile is approximately 30 times the economic benefit of continuing to use the spectrum for terrestrial broadcasting.

5 Conclusions

Within this study we have assessed the economic benefit of making available digital dividend spectrum to mobile services. We have also assessed the economic benefit of using the spectrum instead for digital terrestrial broadcasting. The conclusions of the study are:

- The economic benefit of mobile use of the digital dividend is estimated as EGP9 billion, with a range for the estimation of EGP3.6 billion to EGP19 billion
- The economic benefit of digital terrestrial broadcasting use of the spectrum is estimated to be EGP0.3 billion.

These results indicate that the economic benefit of making the digital dividend available to mobile would be approximately 30 times greater than using the spectrum for terrestrial broadcasting.

It is important to note that these results have been gained by scaling results from studies that considered other markets. Therefore, they should be taken only as a high-level indication of the economic benefits for Egypt. A more detailed study, including specific modelling of the Egyptian market, could produce a more accurate estimation. Nonetheless, we are confident in the overall order of magnitude of economic benefits found in the study, and therefore we believe that it is unlikely that the overall conclusions would change.

We also note that if the spectrum were to be awarded to mobile operators in an auction, this is estimated to raise proceeds in the range EGP12–93 million per MHz, based on proceeds from auctions of digital dividend spectrum in other countries, scaled to the relative wealth (GDP/capita) of Egypt.

In conclusion, we believe that the economic benefits would be maximised if the digital dividend spectrum were made available for mobile broadband services in Egypt. Considering the high usage of mobile and low usage of fixed broadband in Egypt, this spectrum will be critical to providing high-speed internet access to the entire population.