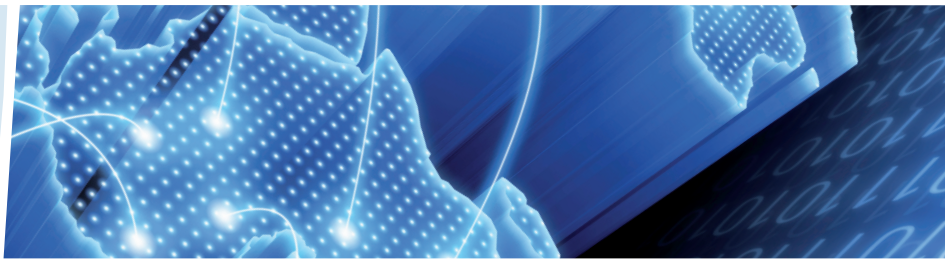

FEMIP

Summary Report

Evaluation of the market, business and financial aspects for the development of broadband access for FEMIP countries

European Investment Bank

Summary Report

EVALUATION OF THE MARKET, BUSINESS AND FINANCIAL ASPECTS FOR THE DEVELOPMENT OF BROADBAND ACCESS FOR FEMIP COUNTRIES

Contract: 2010/S 154-237201, TA2010014 R0 FTF

Beneficiary country: All FEMIP countries

The study/technical assistance operation is financed under the FEMIP Trust Fund. This Fund, which was established in 2004 and has been financed – to date– by 16 EU Member States and the European Commission, is intended to support the development of the private sector via the financing or studies and technical assistance measures and the provision of private equity.

Ref: 18398-305

Contents

About Analysys Mason

Analysys Mason is an independent strategy consultancy in telecoms, media and technology. See www.analysysmason.com for more information about our company and the services we provide.

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Disclaimer

This document summarises the conclusions of work undertaken between April 2011 and November 2011. This work was based on available quantitative data from the end of 2010 in addition to information collected from stakeholders between May 2011 and July 2011.

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1 Introduction

Analysys Mason has been commissioned by the European Investment Bank ('EIB') to undertake the study *Evaluation of the market, business and financial aspects for the development of broadband access for FEMIP countries* (Ref.: 2010/S 154-237201, TA2010014 R0 FTF).

The ultimate objective that the EIB would like to achieve is to identify ways to reduce the digital divide for broadband services within each of the countries in the FEMIP (Facility for Euro-Mediterranean Investment and Partnership) region and across the region. There are nine beneficiary countries: Algeria, Egypt, Gaza/West Bank, Israel, Jordan, Lebanon, Morocco, Syria[1] and Tunisia. Therefore, the specific objectives of this study are to:

- analyse the current status of fixed and mobile broadband services in each FEMIP country, including demand and supply
- assess the future needs of fixed and mobile broadband services in each FEMIP country, including demand and supply
- estimate the future demand and related investment needs for the roll-out of an economic mixture of broadband infrastructures in each FEMIP country under different scenarios.

The European Space Agency (ESA) is undertaking a complementary study of a possible satellite solution for the entire region, including most other countries around the Mediterranean Sea. The results of this study will feed into ESA's study.

This document, or **Summary Report,** consolidates the results from each of the nine country reports that we have developed throughout this project.

The remainder of this document is laid out as follows:

- Section 2 provides an overview of the macro-economic situation in FEMIP countries
- Section 3 provides an overview of the telecoms market in FEMIP countries
- Section 4 carries out an assessment of broadband market demand in FEMIP countries
- Section 5 compares and evaluates the costs associated with the roll-out of different technical options in FEMIP countries
- Section 6 analyses the socio-economic impact of broadband services in FEMIP countries
- Section 7 outlines the conclusions of our analysis.

This Summary Report includes the following annexes containing supplementary material:

- Annex A provides some background on the socio-economic impact of broadband
- Annex B presents the list of stakeholders interviewed during the course of this project
- Annex C includes a glossary of terms used throughout this report.

[1] The EIB has currently suspended technical assistance operations in Syria.

2 Macro-economic overview of FEMIP countries

This section provides an overview of the macro-economic situation in each of the nine FEMIP countries. It is structured as follows:

- description of the political situation in FEMIP countries (Section 2.1)
- demographics of each FEMIP country (Section 2.2)
- overview of the macro- and socio-economic factors of each FEMIP country (Section 2.3)
- assessment of the macro- and socio-economic factors that are likely to have a positive or negative impact on broadband development in FEMIP countries (Section 2.4)

2.1 Political situation

Four of the FEMIP countries (Algeria, Egypt, Morocco and Tunisia) are located in the African continent, whereas the other five countries (Gaza/West Bank, Israel, Jordan, Lebanon and Syria) are situated in the Asian continent.

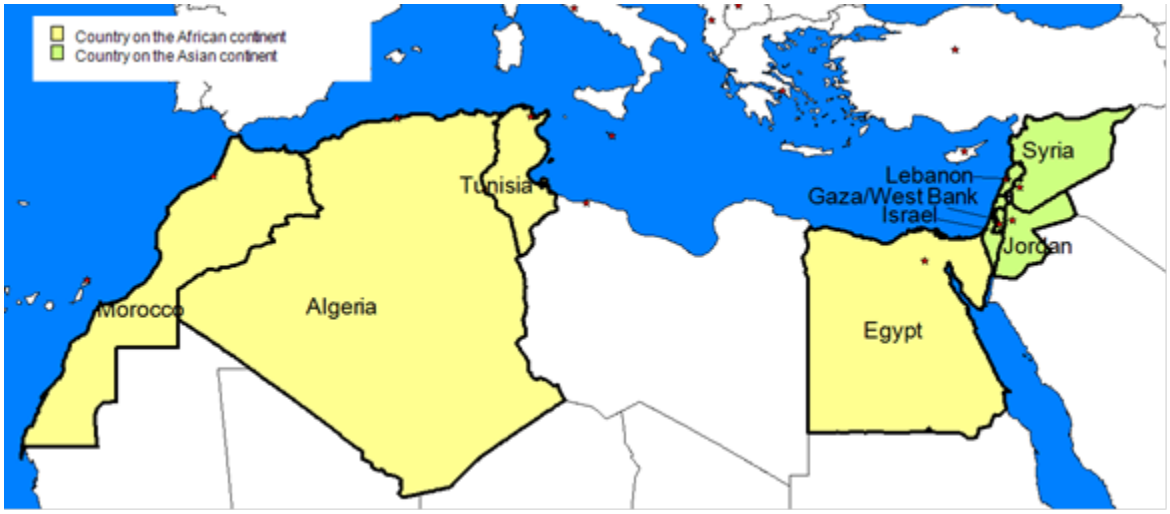

Figure 2.1: Map of the FEMIP region [Source: Analysys Mason]

Since December 2010 a series of demonstrations and protests demanding constitutional reforms and more democracy (the 'Arab Spring') have been taking place throughout the Arab world, including in most FEMIP countries. Tunisia, Egypt and Syria have been the countries most affected by this wave of protests. Other countries such as Jordan, Lebanon, Morocco and Algeria have been less impacted, and Gaza/West Bank and Israel have not been affected by the recent political turmoil facing Arab nations. The situation in some of these countries, if it lasts long, may lead to uncertainty about future roll-out plans for broadband infrastructures both for the private and public sectors. The unstable political situation in the FEMIP region has meant that most FEMIP countries have been able to attract only low levels of foreign direct investment (FDI) per capita, as shown below in Figure 2.2.

As a comparison to Western European countries:

- Germany and Italy had an FDI per capita between USD6000 and USD8000 in 2009
- France, Spain and UK had an FDI per capita between USD13 000 and USD19 000 in 2009
- Belgium, Holland and Switzerland had an FDI per capita between USD40 000 and USD80 000 in 2009.

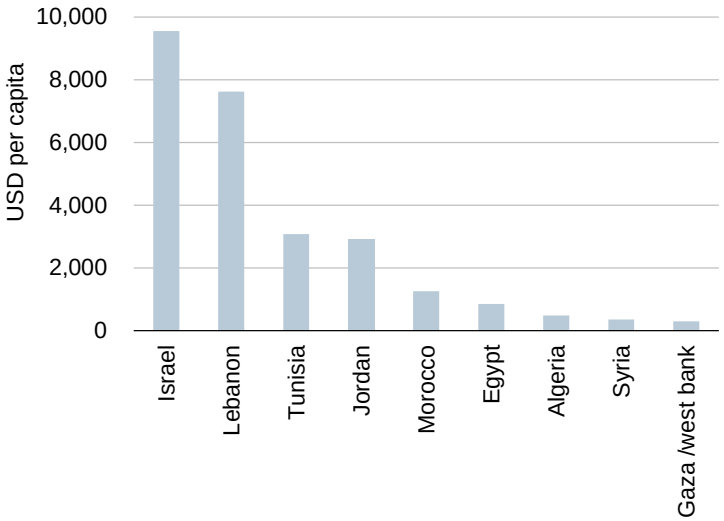

Figure 2.2: Inward and outward FDI per capita in FEMIP countries in 2009 [Source: United Nations]

When taking into account a wide range of risks (security, political stability, government effectiveness, legal and regulatory, macro-economic, foreign trade and payments, financial, tax policy, labour market and infrastructure), the level of risk in most FEMIP countries is high, with Israel and Jordan having the lowest rate among FEMIP countries (see Figure 2.3). The risk ratings of 30–65 compare with an average level of risk of 26 for countries in the European Union.

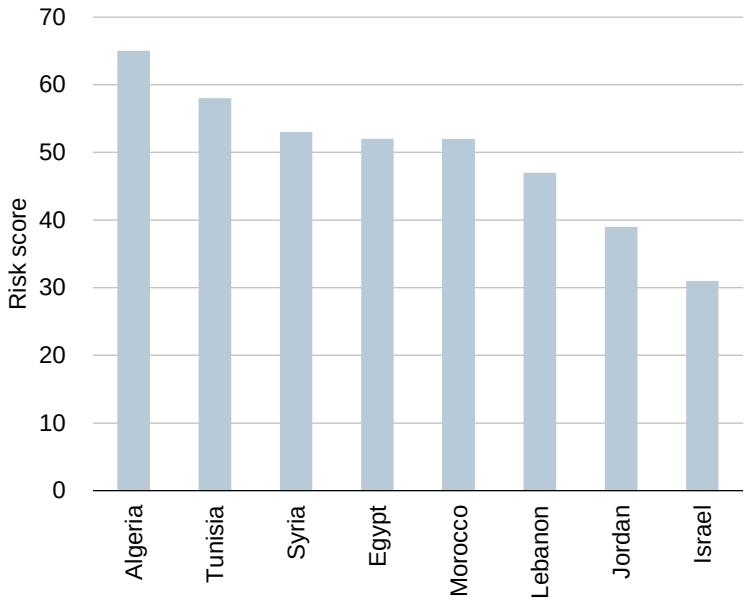

Figure 2.3: Risk rating in FEMIP countries (2010) [Source: EIU]

Note 1: Information on Gaza/West Bank is not available and therefore is not included in the chart

Note 2: The EIU quantifies the risks to business profitability by using an operational risk model that considers ten risk criteria whereby 0 indicates very little risk to business profitability and 100 indicates very high risk

Note 3 : The data is for 2010 and therefore does not take into account the 'Arab Spring'

As a result of the low level of FDI and the high level of risk in most FEMIP countries, the development of a nationwide broadband infrastructure could be challenging in these countries.

2.2 Country demographics

The population in FEMIP countries is estimated to total around 204 million in 2010 and is expected to reach 235 million in 2020 (see Table 2.4). The population in FEMIP countries has been growing at an average rate of 1.7% per annum in the last three years, and is expected to continue growing at an average rate of 1.4% per annum in the period to 2020. Egypt's population is the largest of FEMIP countries with 80 million in 2010, accounting for 39% of the total population in FEMIP countries. Algeria, Morocco and Syria have a relatively sizeable population between 20 million and 40 million (2010), whereas Israel, Lebanon, Gaza/West Bank, Jordan and Tunisia are the least populated FEMIP countries with a population of less than 10 million each in 2010.

	Population in 2010 (in million)	*Population in 2020 (in million)*	*Compound annual growth rate (CAGR)*	*Share of FEMIP population in 2020*
Algeria	35.95	41.12	1.35%	18%
Egypt	79.56	93.07	1.58%	40%
Gaza/West Bank	4.05	4.66	1.42%	2%
Israel	7.63	8.67	1.28%	4%
Jordan	6.15	7.74	2.32%	3%
Lebanon	4.29	4.62	0.75%	2%
Morocco	32.77	36.56	1.10%	16%
Syria	23.01	26.89	1.57%	11%
Tunisia	10.48	11.46	0.90%	5%
Total	**203.89**	**234.78**	**1.42%**	**100%**

Table 2.4: Population growth and share in FEMIP countries [Source: Euromonitor]

The average number of persons per household is relatively high in all FEMIP countries, ranging from 3.4 in Israel to 6.9 in Gaza/West Bank, as shown in Figure 2.5. Identifying the number of households in each country is even more important than population as broadband is mainly a household infrastructure to which access is shared between all members of the household.

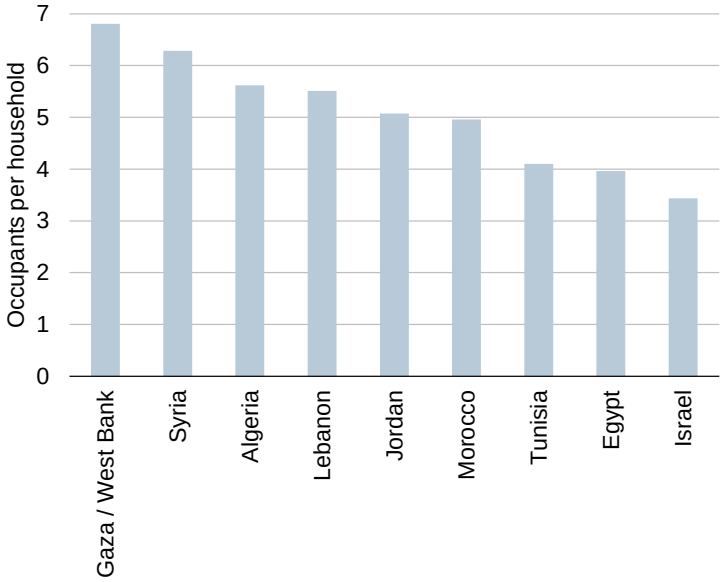

Figure 2.5: Average number of persons per household [Source: Euromonitor, 2010]

Population density varies significantly across FEMIP countries. It is extremely high in Gaza/West Bank, Lebanon and Israel, with more than 300 inhabitants per square kilometre, whereas Algeria has the lowest population density of all FEMIP countries with around 15 inhabitants per square kilometre. It should be noted that the weighted average of FEMIP countries is lower than eight FEMIP countries due to the significant land area of Algeria (2.4 million square kilometres,[2] which is around half the size of all FEMIP countries). It should be noted that the results of our analysis in section 5 is not based on a simple density average across the country but is rather based on a distribution population curve taking into account the different levels of density on a regional basis within a country.

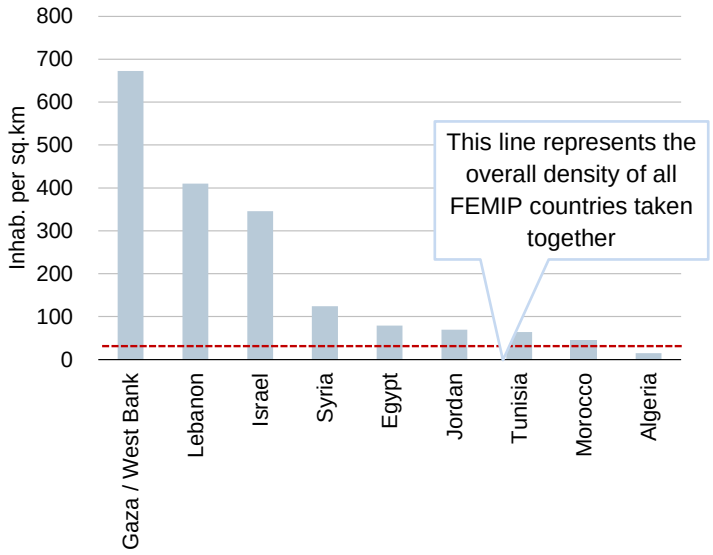

Figure 2.6: Population density in FEMIP countries [Source: Euromonitor, 2010]

Using the maximum level of data available for each country, we extrapolated a curve for the population distribution across the country, by dividing existing (real) divisions into (artificial) sub-divisions and assuming that population in a given division was exponentially distributed across sub-divisions. The results show that a large proportion of the population is concentrated in only a small part of the total land area in most of these countries. For example, Figure 2.7 shows that 90% of the total population live in less than 50% of the total land area in all FEMIP countries, except for Lebanon where 90% of the population live in 52% of the total land area.

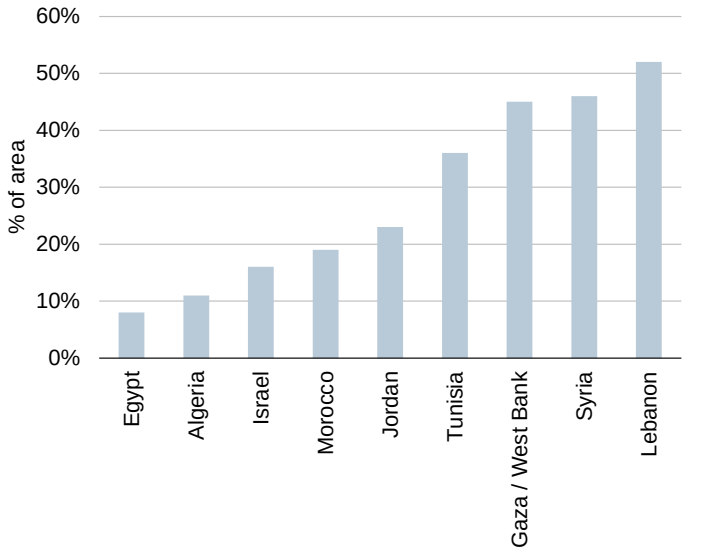

Figure 2.7: Proportion of the total land area that concentrates 90% of the population [Source: Analysys Mason]

[2] Source: CIA's *World Factbook.*

2.3 Country economics

2.3.1 Macro-economic indicators

Israel and Lebanon have the highest GDP per capita (in nominal terms) of FEMIP countries, at EUR21 800 and EUR6900 in 2010, respectively. The other FEMIP countries have a GDP per capita between EUR3500 and EUR1500, with Egypt and Gaza/West Bank standing in last position with approximately EUR1500 and EUR220 per capita in 2010 and 2008, respectively (see Figure 2.8).

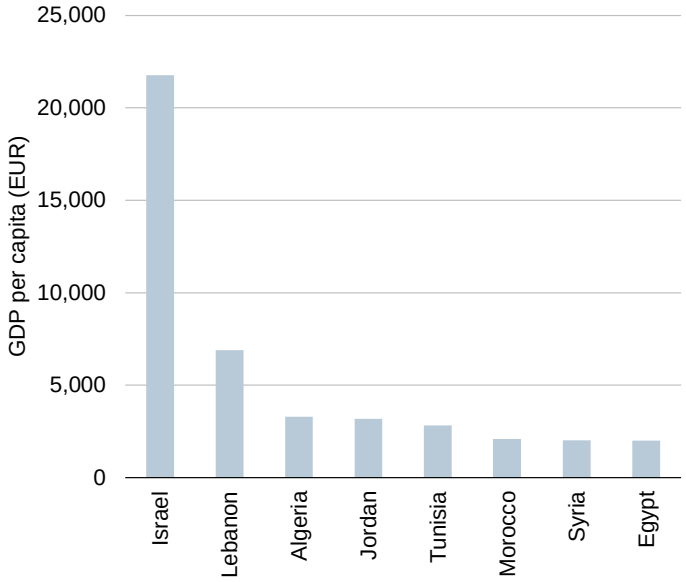

Figure 2.8: GDP per capita in nominal terms in FEMIP countries [Source: Euromonitor, 2010]

Note: Gaza/West Bank had a GDP per capita of EUR221 in 2008

When using the purchasing power parity (PPP) equivalence, all FEMIP countries have a higher GDP per capita than in nominal terms, as shown in Figure 2.9. It is also worth noting that:

- Israel's GDP per capita at PPP is at the lower end of the Western European countries in our benchmark, alongside Spain, Italy or Greece, higher than neighbouring Cyprus, and significantly higher than other countries in East Asia, Africa and Eastern Europe.
- Lebanon's GDP per capita at PPP is in the upper range of international benchmarks at EUR12 600, including Malaysia, African and East European countries.
- Algeria's GDP per capita at PPP is higher than in the Eastern European countries in our benchmark, such as Ukraine and Georgia.

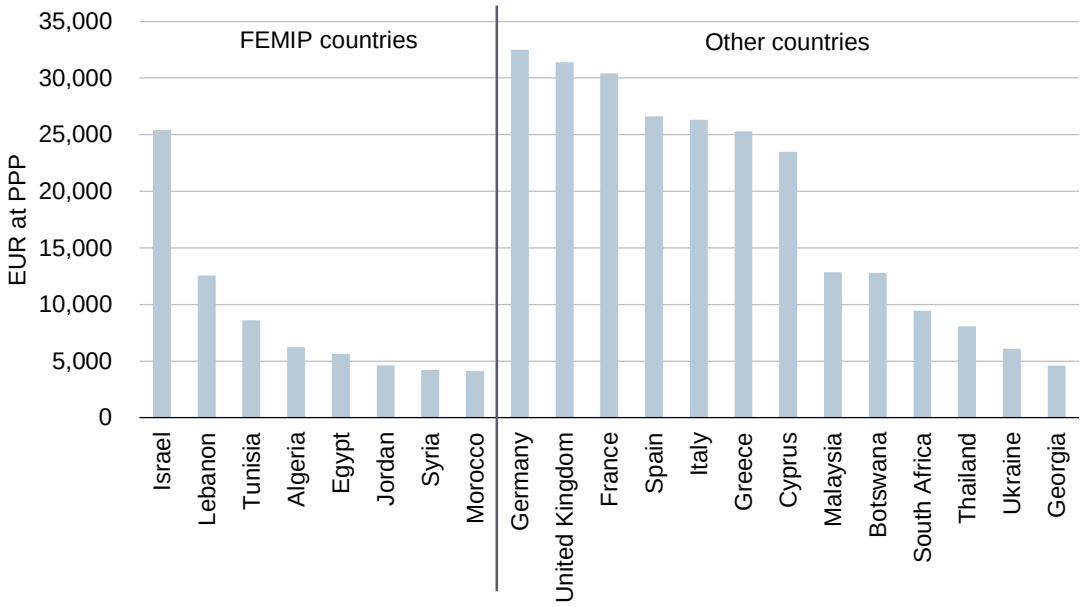

Figure 2.9: *GDP per capita at PPP in benchmarked countries [Source: Euromonitor, 2010]*
Note: Information on Gaza/West Bank is not available and therefore is not included in the chart

The informal economy plays an important role in most FEMIP countries, contributing between 31% and 35% to the overall economy in Tunisia, Egypt, Morocco, Algeria and Lebanon, whereas it represents between 17% and 21% of the overall economy in Jordan, Syria and Israel.

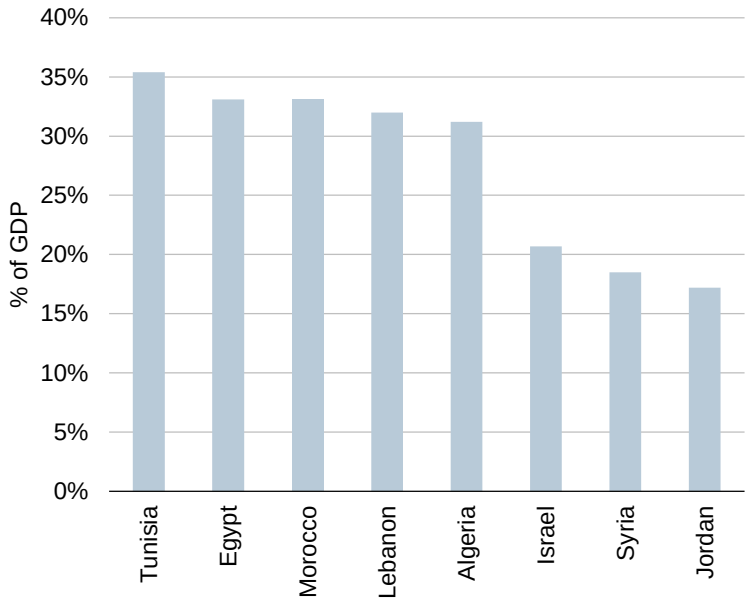

Figure 2.10: Importance of the informal economy in FEMIP countries in 2007 [Source: Schneider]

Note: Information on Gaza/West Bank is not available and therefore is not included in the chart

Inflation rates have remained relatively low (between 0% and 5%) in FEMIP countries between 2007 and 2010, with the exception of the year 2008 where the inflation increased significantly in countries such as Egypt, Syria, Jordan and Lebanon. In addition, the inflation in Egypt was higher than all other FEMIP countries reaching a maximum of 18% in 2008 before decreasing to 11% in 2010 due to the rising food and oil prices, and exacerbated by the depreciation of the Egyptian

Pound as a result of the political crisis. Going forward, Euromonitor expects inflation to stabilise in practically all FEMIP countries at around 2–3%, except for Syria and Egypt, where the inflation rate is forecast to be 5% and 6%, respectively, in the long term.

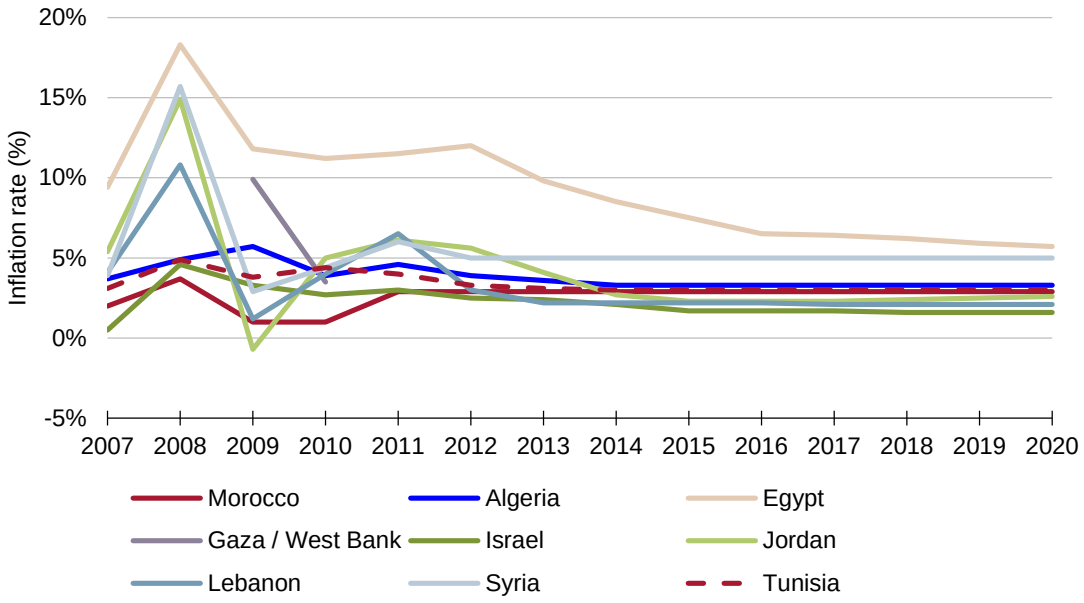

Figure 2.11: Historical evolution and forecast of inflation [Source: Euromonitor]

The VAT rate in FEMIP countries ranges from 10% to 20%. Syria is the only FEMIP country where VAT has not yet been introduced (see Figure 2.12).

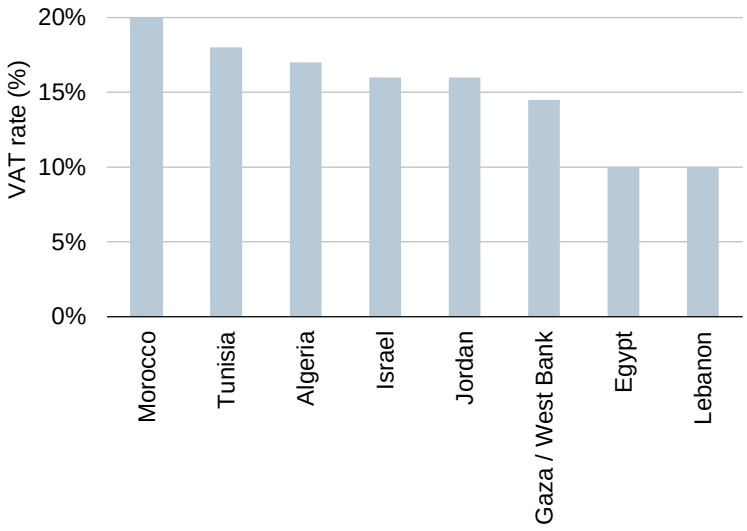

Figure 2.12: VAT rate in FEMIP countries [Source: Public sources]

Note: VAT has not yet been introduced in Syria, hence that it is excluded from the chart

2.3.2 Socio-economic indicators

The Human Development Index (HDI) is an indicator used by the World Bank which measures the level of human development in terms of individual and collective welfare (e.g. life expectancy, literacy, education and standards of living). With the exception of Israel, which has a rate comparable to Western European countries, all other FEMIP countries are in the middle range of the HDI rating as shown in Figure 2.13.

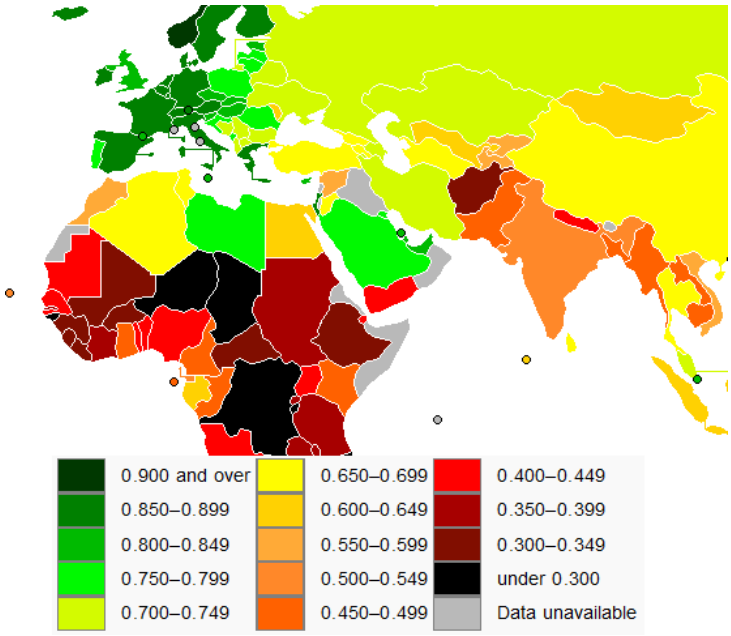

Figure 2.13: HDI for various countries in the Middle East and North Africa (MENA) and Europe region [Source: United Nations Development Programme]

The GINI coefficient measures inequality of income or wealth between various segments of the population. A GINI coefficient of 0 indicates perfect equality, while an index of 100 indicates perfect inequality. The GINI coefficient for most FEMIP countries is between 35% and 40%, as shown in Figure 2.14. The GINI average for the European Union (EU) is 33%.

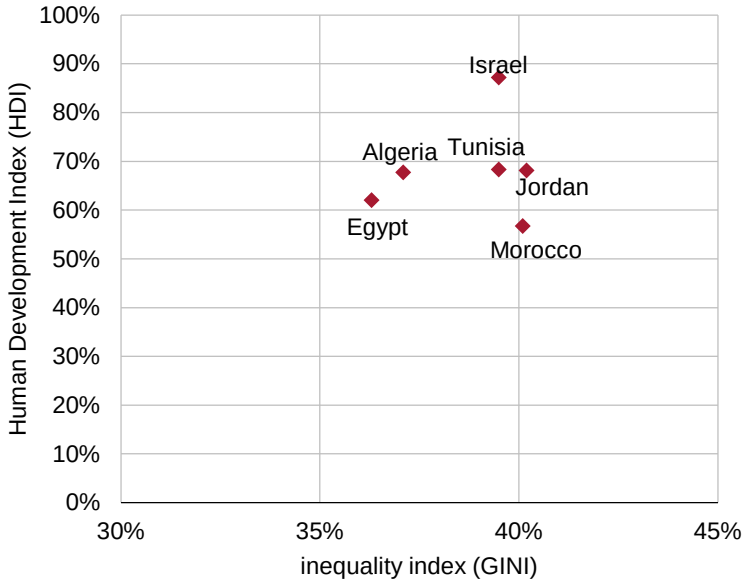

Figure 2.14: GINI index as a function of the HDI in some FEMIP countries [Source: World Bank, 2010]

Note: Information on Gaza/West Bank, Lebanon and Syria is not available and therefore they are not included in the chart

Private consumption is very high in Jordan, Lebanon, Gaza/West Bank and Egypt) at approximately 75% of nominal GDP. Countries like Syria, Tunisia, Israel and Morocco have a private consumption as a percentage of nominal GDP similar to the EU average, as shown in Figure 2.15. Private consumption in Algeria is around 36% of nominal GDP, which is the lowest among FEMIP countries. This is primarily due to Algeria being a major gas and oil exporter, which means that public expenditures represent the stronger share of the country's GDP (versus private consumption).

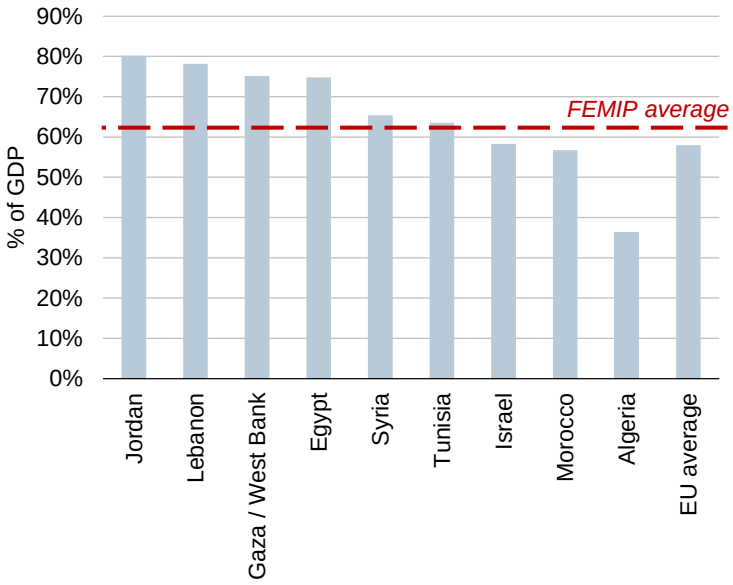

Figure 2.15: Private consumption in FEMIP countries [Source: EIU]

In terms of education levels, in all FEMIP countries except Morocco more than 74% of the population aged above 15 is literate (Figure 2.17). The literacy rate is particularly high in Israel, Jordan and Lebanon (97%, 96% and 91%, respectively), which is likely to lead to sustainable high levels of demand and consumption of broadband services in these countries. On the other hand, Morocco has the lowest literacy rate among FEMIP countries at 59%, which may hinder broadband take-up.

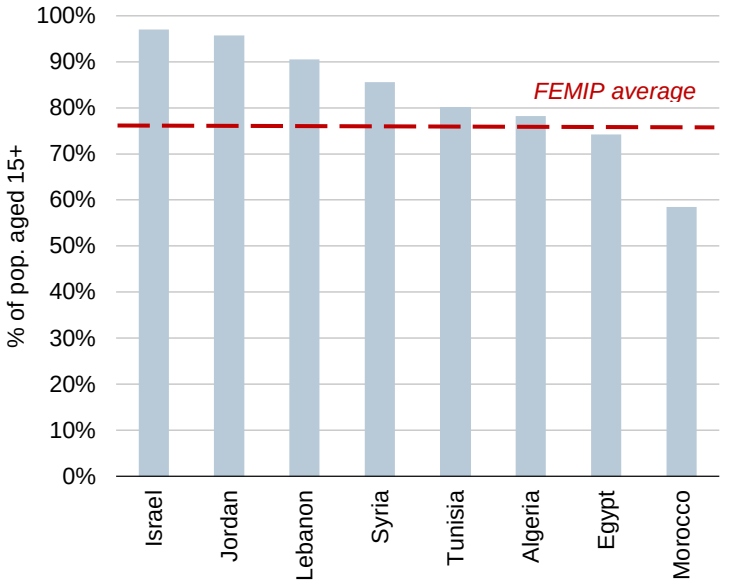

Figure 2.16: Adult literacy rate in FEMIP countries [Source: Euromonitor]

Note: Information on Gaza/West Bank is not available and therefore is not included in the chart

The electricity household access rate measures the share of households in a country that are connected to the electric grid and that are able to use electric appliances. This rate is extremely high and does not represent a major issue for broadband development in most of the FEMIP

countries except Morocco, where the electricity household access rate stood at 82% of households at the end of 2010. However, in some of these countries, such as Lebanon and Syria, the reliability of the power supply is often also a major issue in certain areas, as electricity may be cut for several hours a day during certain periods of the year.

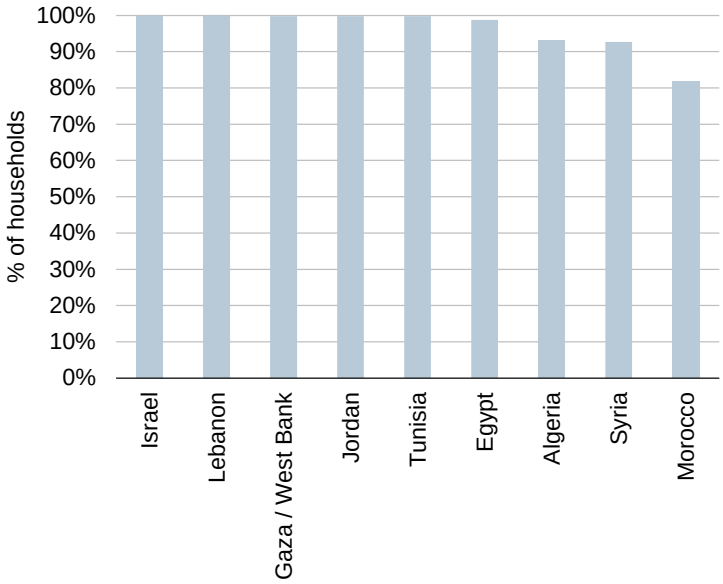

Figure 2.17: Electricity household access rate in FEMIP countries [Source: Euromonitor, UNDP, 2010]

2.4 Impact of the macro-economic situation on broadband development in FEMIP countries

In Table 2.18 below we present the main macro-economic factors in each FEMIP country that have a positive or negative impact on broadband development.

	Morocco	*Algeria*	*Egypt*	*Gaza/ West Bank*	*Israel*	*Jordan*	*Lebanon*	*Syria*	*Tunisia*
Political stability/ risk		-	-	-				-	-
FDI		-	+	-	+	+	+	-	+
Population density	-	-	-	+	+	-	+	+	-
Topology			+	+	+		-		+
International connectivity	+	+	+	-					+
Disposable income/ GDP per capita	-		-	-	+		+	-	+
Exchange rate stability and inflation	+		-	-	+				-
Literacy rate	-	-	-		+	+	+		-
Availability of electricity	-	-	+	+	+	+	+	-	+

Table 2.18: Main macro-economic factors promoting and hindering broadband development [Source: Analysys Mason]
Note: + means factor promoting broadband; - means factor hindering broadband

This assessment shows that the most favourable macro-economic environment for broadband development appears to be in countries like Israel and Lebanon. On the other hand, the least favourable environment appears to be in countries like Algeria and Syria.

3 The telecoms market in the FEMIP countries

This section provides an overview of the telecoms market in the FEMIP countries. It is structured as follows:

- Section 3.1 highlights the importance of the telecoms sector in FEMIP countries
- Section 3.2 provides an overview of the regulatory framework and environment governing the telecoms sector in FEMIP countries
- Section 3.3 describes the fixed and mobile markets
- Section 3.4 describes the broadband market.

3.1 Importance of the telecoms sector in the FEMIP countries

Telecoms revenues in FEMIP countries account for 2.5–6.7% of GDP , which is higher than in Europe where the figure is 1.5–4% in Western European (WE) countries and 3–5% in Eastern European (EE) countries.

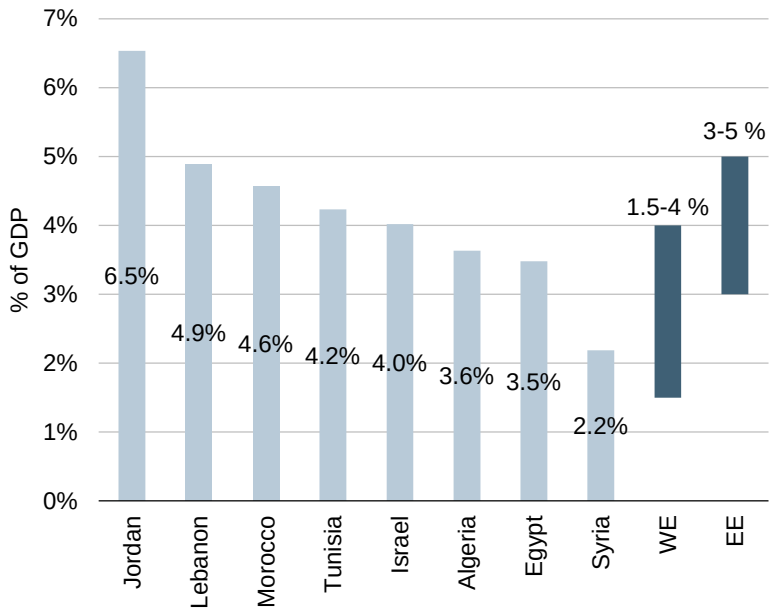

Figure 3.1: Importance of telecoms revenues as a share of GDP in FEMIP countries [Source: ITU, 2009]

Note: Data for Israel is for 2008 and data for Lebanon is for 2007

Note: Information on Gaza/West Bank is not available

Telecoms operators in FEMIP countries invest between 10% and 25% of their revenues in their respective countries (Figure 3.2), which is similar to the level in the benchmarked Western and Eastern European countries.

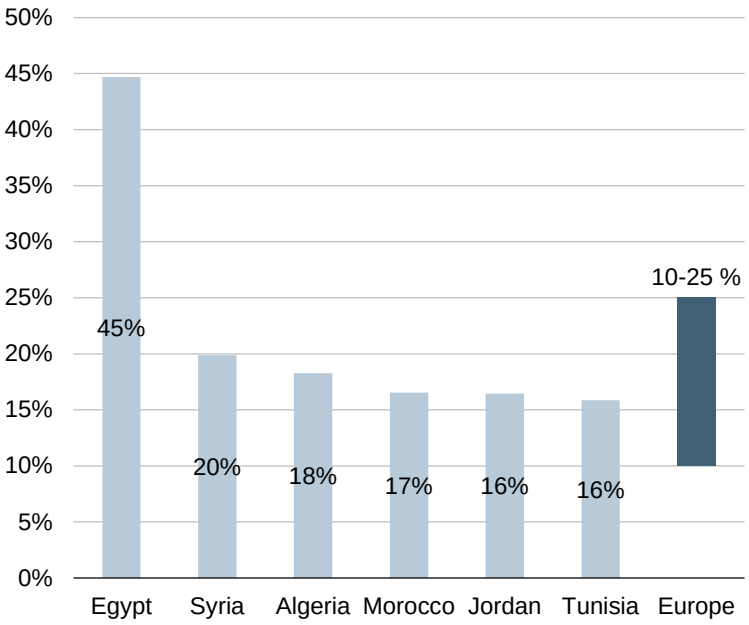

Figure 3.2: Telecoms investments as a proportion of telecoms revenues [Source: ITU, 2009]

Note: Data for Egypt is for 2008 and data for Algeria is for 2007

Note: Information on Gaza/West Bank, Israel and Lebanon is not available

Note: The figure for Egypt is high due to the acquisition of 3G licences in 2007 and 2008 and the extensive roll-out of 3G networks by operators

The share of employees working in the telecoms sector ranges from 0.25% to 1.25% of the total workforce, as shown below in Figure 3.3. In European countries this figure ranges from 0.25% to 1.27% in 2009, and the majority of the countries lie between 0.35% and 0.69%.

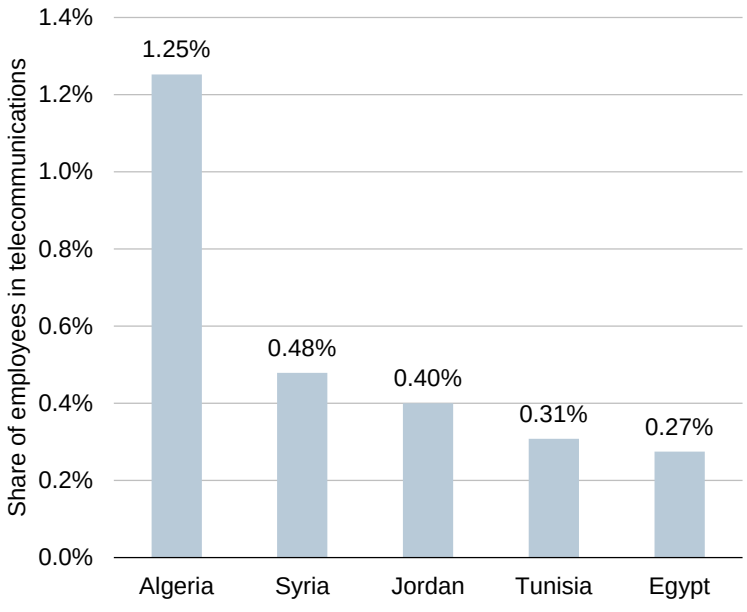

Figure 3.3: Share of employees in telecoms [Source: Euromonitor, ITU]

Note: Data for Algeria and Syria is for 2007; data for Tunisia and Egypt is for 2008; data for Jordan is for 2009

Note: Information on Gaza/West Bank, Israel, Morocco and Lebanon is not available

The share of international bandwidth used for Internet lies between 80% and 87% (Figure 3.4), indicating that Internet is becoming an important means of communication even if the broadband take-up is still relatively low in some of these countries. Furthermore, international bandwidth usage in these countries has been increasing dramatically in recent years.

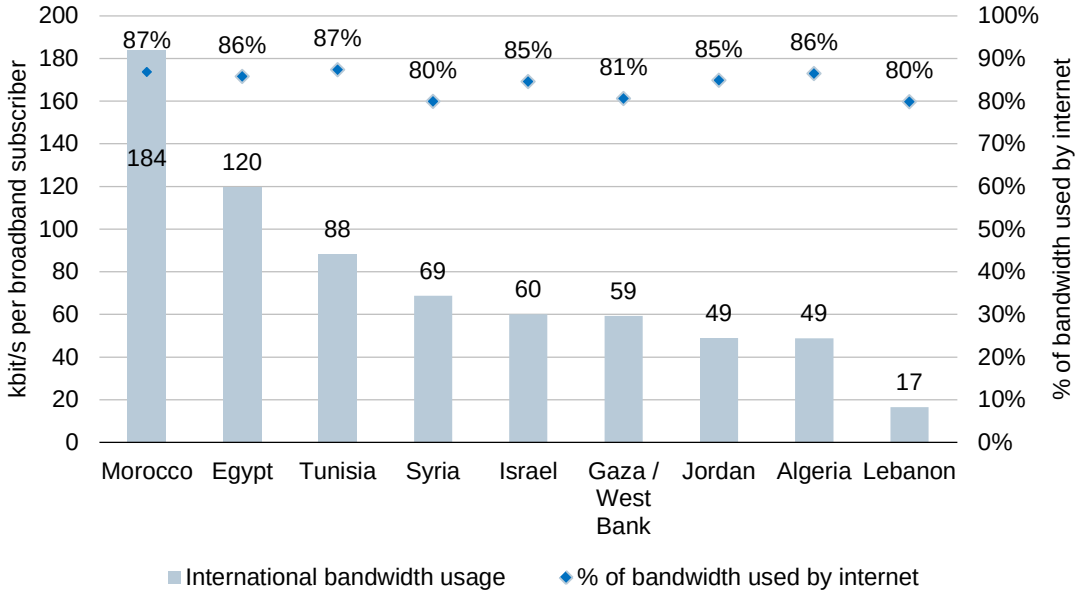

Figure 3.4: International bandwidth usage in FEMIP countries [Source: TeleGeography, 2010]

3.2 Regulatory environment

In Table 3.5 below we present an overview of telecoms regulation in each FEMIP country. Countries with the most advanced national broadband strategies are listed first.

Ranking of most advanced national broadband strategy	*Existence of an independent regulator*	*Fixed market liberalised*	*Mobile market liberalised*
Israel	×	✓	✓
Morocco	✓	✓	✓
Algeria	✓	✓	✓
Lebanon	✓	×	×
Jordan	✓	✓	✓
Tunisia	✓	✓	✓
Egypt	✓	×	✓
Gaza/ West Bank	×	×	✓
Syria	In progress	×	×

Table 3.5: Overview of telecoms regulation [Source: Analysys Mason, regulators]

In Table 3.6 below we present the status of the broadband market in each FEMIP country. Countries with the most advanced national broadband strategies are listed first.

Ranking of most advanced national broadband strategy	*Existence of 3G operators*	*HSPA service availability*	*HSPA+ service availability*	*Existence of LLU*	*Efficient use of LLU*	*Roll-out of NGA*	*Expected date for award of spectrum for mobile broadband*
Israel	✓	✓	×	×	×	✓	2.6GHz in short term
Morocco	✓	✓	✓	✓	×	×	Unknown
Algeria	×	×	×	×	×	In deployment	2015 for 800MHz
Lebanon	Launched end 2011	×	✓	×	×	In progress	2015 for 800MHz
Jordan	✓	×	✓	Expected in late 2012	×	Limited to school and universities	2.6GHz available 2015 for 800MHz
Tunisia	✓	×	✓	✓	×	×	2014 for 800MHz
Egypt	✓	✓	✓	✓	✓	Very limited	Unknown
Gaza/West Bank	×	×	×	×	×	×	Unknown
Syria	✓	✓	×	×	×	×	2014 at the earliest

Table 3.6: Status of the broadband market [Source: Analysys Mason, regulators]

Table 3.7 provides an overview of the regulatory framework and environment governing the telecoms sector in FEMIP countries.[3]

Country	*Existence of an independent regulator*	*Mobile market*	*Fixed market*
Algeria	The ARPT (*Autorité de Régulation de la Poste et des Télécommunications*) was established in August 2000 as the regulatory authority responsible for administering, monitoring and developing the telecoms sector in Algeria	The market is liberalised. There are three 2G operators (Algérie Mobile Network launched the country's the first GSM network in 1999, and two other mobile licences were awarded to Orascom Telecom and Wataniya Telecom in August 2001 and December 2003, respectively). Award of 3G licences is expected in 2012	The second fixed national licence was awarded to Lacom (a subsidiary of Orascom Telecom and Telecom Egypt) in March 2005. However, it was subsequently liquidated by its shareholders in November 2008
Egypt	The National Telecommunications Regulatory Authority (NTRA) was established in 2003 as the independent regulatory authority overseeing the telecoms sector in Egypt	The market is liberalised. There are three 2G operators (Mobinil, which launched mobile services in 1996; Vodafone Egypt, which launched the second GSM network in 1999; and Etisalat Misr, which was awarded the third mobile licence in 2007). There are also three 3G operators	The fixed-line market was officially fully opened up to competition on 31 December 2005. However, Telecom Egypt remains the sole provider of fixed-line voice services after the NTRA decided to postpone the auction of the second fixed-line licence in mid-2009

[3] For more details please refer to the relevant country report.

Country	*Existence of an independent regulator*	*Mobile market*	*Fixed market*
Gaza/ West Bank	The Ministry of Telecom and Information Technology (MTIT) is responsible for the regulation of the telecoms market in Palestine. A decree issued by the President in June 2009 calls for the establishment of a regulator in the form of the Palestine Telecommunication Regulatory Authority (PTRA) with clear separation of responsibilities from the MTIT	The market is liberalised. There are two 2G operators (PalTel, which is also the incumbent fixed-line operator, and Wataniya)	The market is not liberalised. PalTel is the country's only fixed-line telecoms provider
Israel	The telecoms market is regulated by the Ministry of Communications (MoC). The creation of an independent national regulatory body, the National Telecommunications Authority (NTA), was proposed in 2003 but has fallen off the agenda primarily as a result of the high turnover of communications ministers	The market is liberalised. There are four 2G operators (Pelephone, Cellcom, MIRS and Partner, which were awarded four mobile licences between 1986 and 1998) There are also five 3G operators, but only three have already launched services	The market is liberalised. There are two fixed operators (Bezeq, which owns the PSTN infrastructure, and HOT Telecom, which owns the cable infrastructure) There are also other service-based providers
Jordan	The Telecommunications Regulatory Commission (TRC) was established in 1995 as the independent regulatory body for the telecoms sector in Jordan	The market is liberalised. There are three 2G operators (Zain Jordan, which obtained the country's first GSM licence in 1994; Orange Mobile, which was awarded the second licence in 1999; and Umniah, which started operations in 2004) Two of these operators also hold 3G licences	The market is liberalised There are five fixed wireless operators in addition to the wireline incumbent Jordan Telecom
Lebanon	The Telecommunications Regulatory Authority (TRA) was established in March 2007. However, in June 2011, the Ministry of Telecommunications (MoT) announced that a government legal authority had suspended the powers of the TRA, thus making the Ministry of Telecoms the sole body authorised to set new rules and guidelines for the sector	The market is not liberalised There are two state-owned 2G operators (Alfa and MTC Touch)that provide services on a build-transfer-operate (BTO) basis 3G is expected to be launched later this year	The Lebanese government has expressed its intention to privatise the incumbent wireline provider Ogero Telecom but this has not yet materialised There are seven licenced data service providers (DSPs) owning fixed wireless infrastructure, of which only four have rolled out a network and launched services

Country	*Existence of an independent regulator*	*Mobile market*	*Fixed market*
Morocco	The ANRT (*Agence Nationale de Réglementation des Télécommunications*) was established in February 1998 as the regulatory authority responsible for administering, monitoring and developing the telecoms sector in Morocco	The market is liberalised. There are three 2G operators (Maroc Telecom, which launched services in 1994; Medi Telecom, which was awarded the second GSM licence in 1999; and WANA, which obtained the third GSM licence in 2009) There are also three 3G operators	The market is liberalised. The ANRT awarded two 'new generation' licences in July 2005 to Medi Telecom and WANA, ending the monopoly of Maroc Telecom in the fixed market
Syria	The Telecommunications Regulatory Authority (TRA) was established as an independent regulatory authority in June 2010. The TRA is now taking over all regulatory tasks previously entrusted to incumbent Syrian Telecommunication Establishment (STE). The TRA, however, yet is still in the process of setting itself up operationally	The market is not liberalised There are two 2G operators (Syriatel, controlled by Orascom Telecom, and Lebanese-owned Investcom (later acquired by MTN Syria) providing services on a BOT basis) There are also two 3G operators providing services on a BOT basis The creation of a proper licencing scheme has been delayed due to the political unrest sweeping the country	The market is not yet liberalised. Syrian Telecommunication Company (STC) continues to have the monopoly on the fixed telecoms market, retaining a five-year exclusivity both for the provision of fixed-line telecoms services and the operation of the international gateway
Tunisia	The National Authority of Telecommunications of Tunisia (*Instance Nationale des Télécommunications* or INT) was established in January 2001 as the financially and administratively independent regulatory authority in Tunisia	The market is liberalised. There are three 2G operators and two 3G operators	The market is liberalised with two operators: Tunisie Telecom, the incumbent, and Orange Tunisie, which was awarded a unified fixed and mobile licence in June 2009

Table 3.7: Overview of the regulatory situation in FEMIP countries [Source: Analysys Mason, regulators]

Table 3.8 provides an overview of the most recent policies governing the telecoms sector in each FEMIP country, as well as a summary of the plans and objectives set for national broadband.[4]

Country	*Main recent policies and plans published*	*National broadband strategy and objectives*	*Universal service and access status*
Algeria	Strategic plan *e-Algérie 2013*, published in January 2009, sets the vision, goals, strategic priorities and accompanying measures with regards to the development of ICT in Algeria	The plan is articulated around 13 main streams including, including: • accelerating the use of ICT in public administrations and private companies • improving the development of high-speed and very-high-speed networks • updating the ICT legal and regulatory framework	The law encompasses the notion of universal service (which includes the provision of 512kbit/s Internet since 2009). However, it is only in 2011 that the government has created a universal service fund
Egypt	The MCIT has recently announced the government's strategy for the next six months (i.e. until January 2012)	In December 2009 it was announced that Egypt was working on a national plan to develop broadband services in urban and rural areas, committing USD1 billion [EUR700 million] of government funds for the infrastructure needed. Although it was indicated at the time that a national broadband plan would be published in the first quarter of 2010, no plan has yet been released by the government	Information not available
Gaza/ West Bank	A Statement of National Telecommunication Policy roadmap was issued in 2010 with the main objectives of implementing a new regulatory authority; creating a comprehensive legal framework; introducing wholesale broadband services; and establishing a sound interconnection and pricing regime	The Statement of National Telecommunication Policy identified a number of topics which require work in the next two to three years, including: • LLU/bitstream services • national backbone policy • award of WIMAX licence • direct access to international connectivity • access to rights of way and municipal consents for operators • licensing for the provision of a broad range of services, including Internet and VoIP	A universal service/access scheme is included among the main regulatory measures that need to be implemented in the next two to three years

[4] For more details please refer to the relevant country report.

Country	*Main recent policies and plans published*	*National broadband strategy and objectives*	*Universal service and access status*
Israel	The Gronau Committee, one of the several expert committees commissioned by the MoC to recommend policies and future regulatory measures, is arguably the one whose recommendations have had the strongest impact in the Israel telecoms market: • LLU and wholesale line rental (WLR) should be introduced in the fixed (wireline) market • new licences for WiMAX and MVNOs in the wireless market The MoC is considering the creation of a wholesale market, which would allow ISPs to package infrastructure products with ISP products on one single bill	Fibre and DOCSIS3 cable are being rolled out extensively in Israel without the need for government intervention	The current universal service scheme imposes coverage obligations on Bezeq and HOT Telecom, but it is not really enforced
Jordan	In 2007, the MoICT published the Statement of Government Policy 2007, which defines guidelines for the regulatory developments and future policies in the telecoms sector Int@j, a voluntary non-profit, private organisation representing, promoting and advancing the Jordanian software and IT services industry in the global market, published its own view on the development of ICT in Jordan in a document National ICT Strategy 2007-11, which has been accepted by both the government and the private sector, which have been working towards achieving the targets set out in this document The TRC published in late 2010 its own strategic plan until 2012 TRC Strategic plan through 2012, identifying a number of tasks to achieve the strategic objectives set out in both the Statement of Government Policy 2007 and the National ICT Strategy 2007–2011	The National ICT Strategy 2007-11 sets the following main goals for Jordan by 2011: • Internet usage penetration to reach 50% • ICT sector revenues to reach USD3 billion • ICT sector employment to reach 35 000 jobs The Strategic plan through 2012 sets the following objectives: • implementation of LLU • stimulation of the affordability and accessibility of broadband services by setting performance indicators to monitor fixed wireless broadband providers' performance	The universal service is defined as including access to telephony and "data communications sufficient for functional access to Internet services [.., i.e. with a] data rate, reliability and continuity of service [equivalent] to that used by a majority of subscribers taking account technical factors that may limit the performance of such technologies in certain geographic locations". However, the TRA finds that it is not necessary at this time to also include broadband access in the definition of the universal service

Country	*Main recent policies and plans published*	*National broadband strategy and objectives*	*Universal service and access status*
Lebanon	In November 2010 the TRA and the MoT gave a joint presentation on broadband objectives for Lebanon	Main priorities and objectives: • expand and modernise the national fibre backbone • connect 300 local exchanges nationwide via fibre-optic networks • roll out FTTP/FTTB to 1000 corporate sites and enable FTTC+VDSL to 350 street cabinets • roll out mobile broadband services based on HSPA+ in 2011 • ensure the timely introduction of digital terrestrial television (DTT) before the deadline of 2015, in the process freeing up digital dividend spectrum to be reallocated for mobile services	No universal service scheme is currently in place in Lebanon
Morocco	*Maroc Numeric 2013* strategic plan for the Digital Economy, published in mid-2008, presents the vision, goals, strategic priorities and accompanying measures with regards to the development of ICT in Morocco *Policy paper*, published at the beginning of 2010, aims to achieve a social transformation, develop more public services towards citizens, increase SMEs' productivity, develop the ICT industry (including the telecoms industry), increase the digital trust and improve the digital governance by 2013	Main targets set for 2013: • 35% broadband household penetration • 100% of public schools connected to broadband Internet • 100% of Science students equipped with broadband Internet	In 2005, a new amendment to the Telecoms Act broadened the definition of universal service to cover value-added services, including Internet services. This universal service fund is used to finance two projects: • the GENIE project (GENeralization of Information Technologies and Communication in Education), which aims at installing computers in schools in 2008–2013 • the PACTE programme (Programme d'Accès aux Télécoms), aimed at encouraging network operators to roll out infrastructure in rural areas
Syria	A new Telecommunications Law came into force in 2010 which established the TRA as the independent regulatory authority in Syria. In 2004 the Syrian government, in co-operation with the United Nations Development Programme (UNDP), issued its *National ICT Strategy for Socio-Economic*	No formal broadband strategy has been identified	No universal service scheme is currently in place

Country	*Main recent policies and plans published*	*National broadband strategy and objectives*	*Universal service and access status*
	Development in Syria.[5] This is still the reference document for development of the country's telecoms sector even though it is now significantly outdated		
Tunisia	In May 2011 Infocom released for consultation its draft action plan *Plan d'action pour l'Economie Numerique,*[6] which presents the government's vision, goals, strategic priorities and accompanying measures with regards to the development of ICT in Tunisia	The draft action plan aims to: • consolidate ICT infrastructures in regions • strengthen access to the Internet and improve usage of ICT • stimulate the development of digital services and digital contents that generate local employment	The draft action plan includes aspects such as defining schemes similar to the universal service to finance the roll-out of mobile broadband in rural areas

Table 3.8: Overview of recent policies and broadband strategy and objectives in FEMIP countries [Source: Analysys Mason, regulators]

Relevant and specific aspects to broadband regulation and national broadband strategy are provided in Table 3.9. [7]

	LLU status	*NGA status*	*Satellite broadband status*	*Spectrum for mobile broadband status*
Algeria	LLU is not yet introduced	As part of the *e-Algérie 2013* strategic plan, the government requires that a secure, high-quality infrastructure be set up. The strategic plan considers that this will include the upgrade of the existing national telecoms infrastructure	Satellite broadband operators need to pay a licence fee to the ARPT. There is currently three licenced VSAT operators	The Algerian government was planning to leapfrog directly to 4G; however, recent announcements suggest that 3G licences will be awarded by the end of 2011 DTT is expected to be launched in 2011. According to the local press, the digital switch-over is not expected to occur before 2015
Egypt	Shared LLU introduced in 2002 and made effective in 2003 According to the NTRA, full LLU will not be introduced until the licensing of the country's second fixed-line provider	No concrete actions have yet been taken	There are three VSAT operators	No plans to award LTE licences and spectrum

5 Available at http://www.undp.org.sy/publications/national/E-Strategy/ICT_Strategy_en.pdf.

6 Available at http://www.mincom.tn/index.php?id=1600.

7 For more details please refer to the relevant country report.

	LLU status	*NGA status*	*Satellite broadband status*	*Spectrum for mobile broadband status*
Gaza/ West Bank	LLU is not yet introduced	The MTIT is planning to award a telecoms wholesale licence to the Palestine Electricity Company (PEC) to provide FTTx services. The licence is expected to be granted by 2012	There is no licensed provider of broadband over satellite	Although operators have the required licence to launch 3G services, it is quite unlikely that mobile broadband services are launched in Gaza/West Bank until Israel frees up the required spectrum. However, the MTIT intends to enter into negotiations with the Israeli authorities in the next two to three years so that they free up the required spectrum, thus enabling mobile operators in Gaza/West Bank to launch mobile broadband services such as 3G and LTE.
Israel	LLU is not yet introduced	Bezeq is currently upgrading its DSL network to fibre Israel Electric Corporation (IEC) will form a new venture to leverage its existing fibre backbone and lay a wholesale FTTH network covering every home in the country	Satellite broadband has not yet been launched in Israel because no operator has expressed an interest for such a licence to date	The MoC plans to release spectrum in the 2.6GHz band for LTE in the short term, but no firm timetable has yet been released. Analogue TV switch-off has been delayed till the end of 2011. However, there is some spectrum in the 800MHz band currently being used for CDMA and the full digital dividend band will not become available for LTE immediately after the analogue switch-off
Jordan	LLU has been finally imposed by the TRC as a result of its market reviews, but still remains to be implemented, which is expected to happen in late 2012	A national broadband network provides broadband access using fibre to schools and universities. According to the TRC, if there were extra capacity on the network, it would make it available to operators However, the TRC pointed out that operators invest themselves in NGA plans. The government provides incentives and facilities such as reduced taxes on Internet, but no direct funding is envisaged at this stage	There are three VSAT operators	One of the goals of the National ICT Strategy 2007-11 is the development of a national policy for digital broadcasting including the development of policies and a timetable for the digital switchover and the re-use of freed-up spectrum The TRC plans to start the analogue TV switchover in 2012, which will free up spectrum in the 800MHz band. This spectrum will be allocated to mobile services in 2015. According to the TRC, spectrum in the 2.6GHz band is also currently available to the existing mobile operators even though none of them has shown any interest in this spectrum yet

	LLU status	*NGA status*	*Satellite broadband status*	*Spectrum for mobile broadband status*
Lebanon	LLU is not yet introduced	To remove any potential barrier to broadband development, the Ministry announced in 2010 that it would invest around USD170 [EUR120] million in the domestic local Internet backbone, by deploying a 4400km fibre-optic transmission network connecting all major locations in the country	Satellite broadband is provided by only one VSAT operator, which has managed to gain a very limited number of subscribers	The government wants to launch 3G by the end of 2011, despite resistance from both market players and the TRA The TRA has developed a plan whereby DTT would be introduced in 2012 and analogue switch-off would occur by June 2015. After the analogue switch-off, the TRA plans to allocate some of the freed up spectrum to LTE
Morocco	Shared and full LLU introduced in 2007 and 2008, respectively. However, LLU is not yet used due to its high prices and operational difficulties	Currently developing a national broadband strategy aimed at stimulating the roll out of NGA infrastructure Considering the award of new licences for the roll-out of NGA networks by the end of 2011 to new wholesale-only operators such as ONE – the National Office of Electricity – or ONCF – the National Railway Company	Several VSAT operators are licenced and satellite broadband operators need to pay landing rights to the ANRT, which differ according to the frequency band used	No plans to award LTE licences and spectrum. The digital switch-over is underway, but its timing is unknown. Also, importantly enough, a part of the 800MHz band has already been awarded to WANA for its limited-mobility services in 2007
Syria	LLU is not yet introduced	No concrete actions have yet been taken	Only one operator provides satellite broadband in Syria, which has managed to acquire a limited number of business subscribers	DTT is due to be launched in 2012. The date and process for the switch-off of analogue TV has not been defined In addition, spectrum in the 800MHz and 2.6GHz bands is currently occupied. Therefore, a decision on spectrum refarming for LTE is likely not to happen before 2013
Tunisia	Shared LLU and full LLU are provided by the incumbent. However, due to operational difficulties it has been reported that no lines have been unbundled so far	The draft action plan for the digital economy includes aspects with regards to the stimulation of broadband roll-out, such as accelerating the roll-out of fibre and considering new financing schemes such as public–private partnerships (PPP) for the roll-out of fibre-based fixed broadband	Only one VSAT licence was awarded in 2004	The draft action plan for the digital economy includes aspects such as re-organising the spectrum to facilitate convergence and create a favourable environment for wireless broadband Tunisia intends to switch-off analogue TV in 2014, but has no plans to award the digital dividend spectrum soon

Table 3.9: Overview of broadband regulation in FEMIP countries [Source: Analysys Mason, regulators]

3.3 The fixed and mobile market

Below we provide an overview of the fixed and mobile market in the FEMIP countries.

3.3.1 Overview of the fixed market

Fixed-line penetration varies significantly across countries in the FEMIP region, as shown below in Figure 3.10. It worth noting that:

- Fixed-line penetration as a share of households is higher than 100% in Israel, Syria and Lebanon, which is comparable to, and even higher than, penetration in the Western European countries in our benchmarks. Fixed line penetration of households in the EU was around 89% in 2009.
- Fixed-line penetration in the other FEMIP countries ranges from 42% to 65% of households, which is at the lower end of benchmarks but still higher than in countries such as Thailand, South Africa and Botswana.

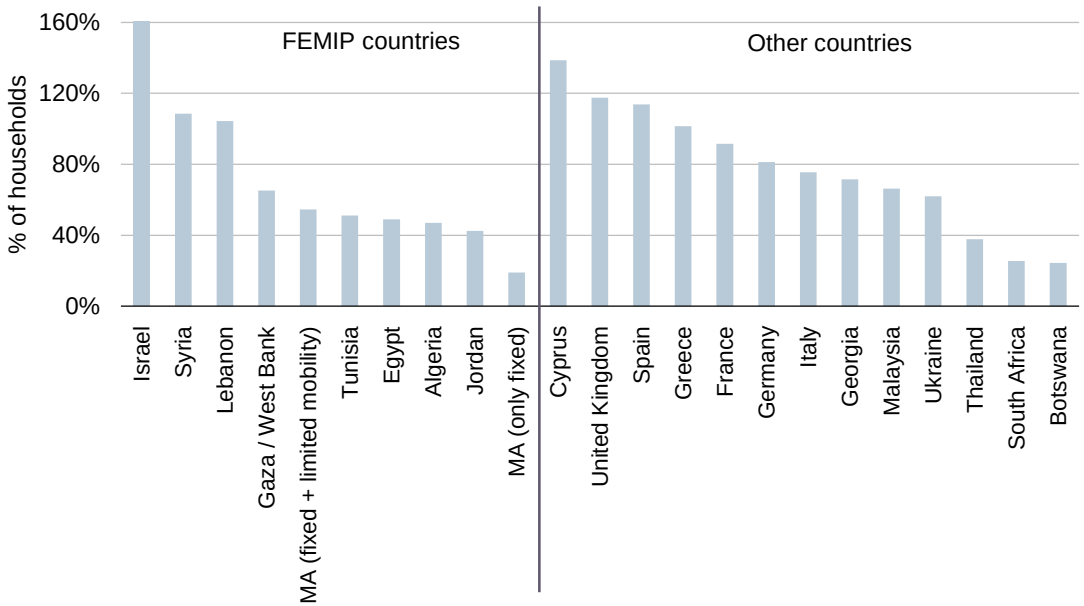

Figure 3.10: Benchmark of fixed-line penetration [Source: GlobalComms, Euromonitor, 2009] [8]

[8] In reality, 100% household penetration does not mean that each household will have access to a fixed line as the number of lines includes business lines (penetration is calculated as total lines including fixed and business lines divided by the total number of households).

3.3.2 Overview of the mobile market

Mobile penetration has been growing rapidly in all FEMIP countries (see Figure 3.11):

- mobile penetration as a share of the population has exceeded 100% in Israel, Jordan and Tunisia, and is approaching the 100% mark in Morocco and Algeria
- mobile penetration is lower in Lebanon, Gaza/West Bank and Syria at 66%, 64% and 48% of the population, respectively.

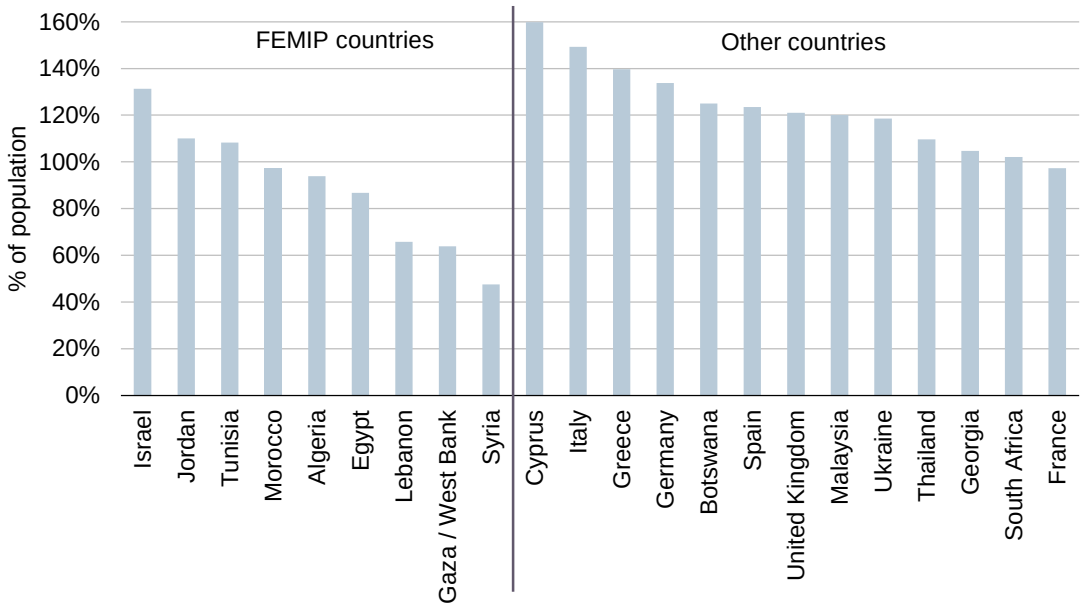

Figure 3.11: Benchmarks of mobile penetration by population in 2010 [Source: Wireless Intelligence, Euromonitor]

The mobile market is more than 80% prepaid in most FEMIP countries, except for Israel where prepaid subscribers accounted for only 21% of the total mobile subscriber base in 2010 (Figure 3.12).

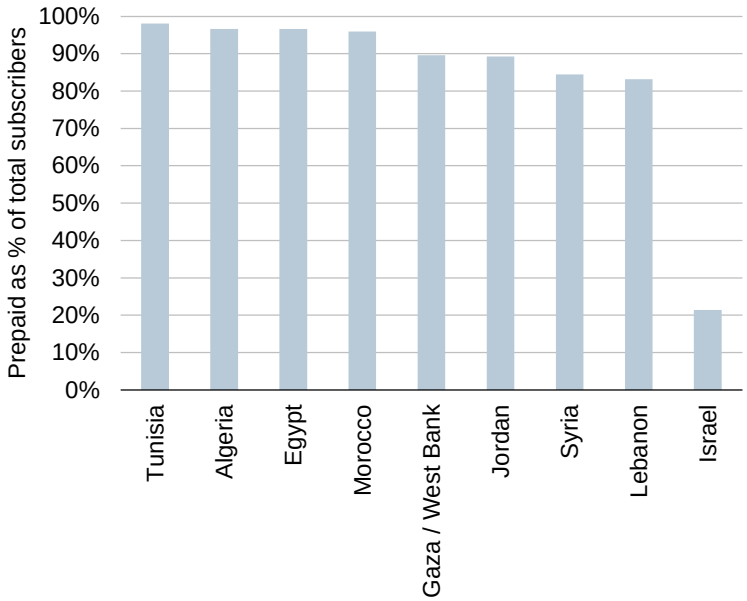

Figure 3.12: Share of prepaid subscriptions in FEMIP countries in 2010 [Source: Wireless Intelligence]

The number of 3G mobile subscribers is still very low in all FEMIP countries (accounting for less than 10% of total mobile subscribers) except Israel, where 3G subscribers as a share of total mobile subscribers grew steadily from 41% in 2007 to 55% in 2010. 3G is expected to be launched in Algeria and Lebanon in 2012 and 2011, respectively, whereas there are no plans to launch 3G in Gaza/West Bank (Figure 3.13).

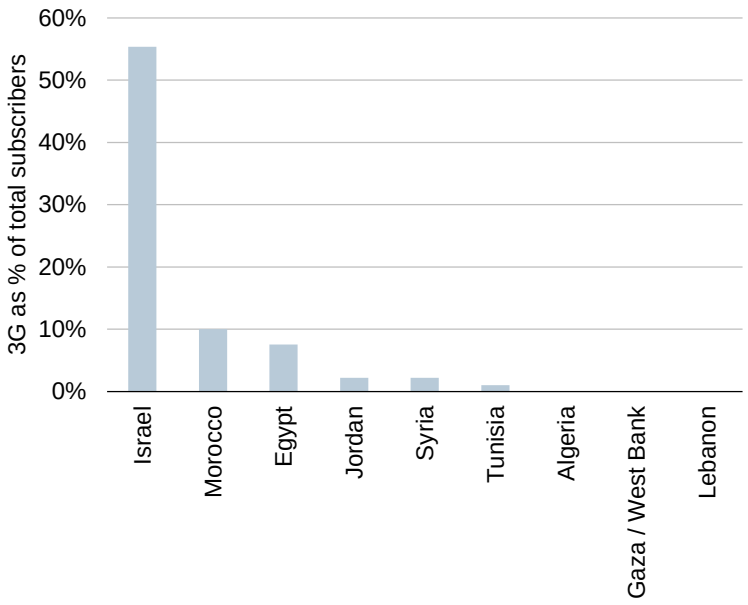

Figure 3.13: Share of 3G mobile subscribers in FEMIP countries in 2010 [Source: Wireless Intelligence]

In 2010, mobile average revenue per user (ARPU) was less than EUR12 per month in all FEMIP countries except Lebanon and Israel, at EUR28 and EUR29 per month, respectively. The comparatively higher ARPU in Lebanon and Israel is primarily due to their higher share of postpaid subscribers. Mobile ARPU is extremely low in Algeria and Egypt at EUR6 per month. Mobile ARPU in most Western European countries is above EUR30.

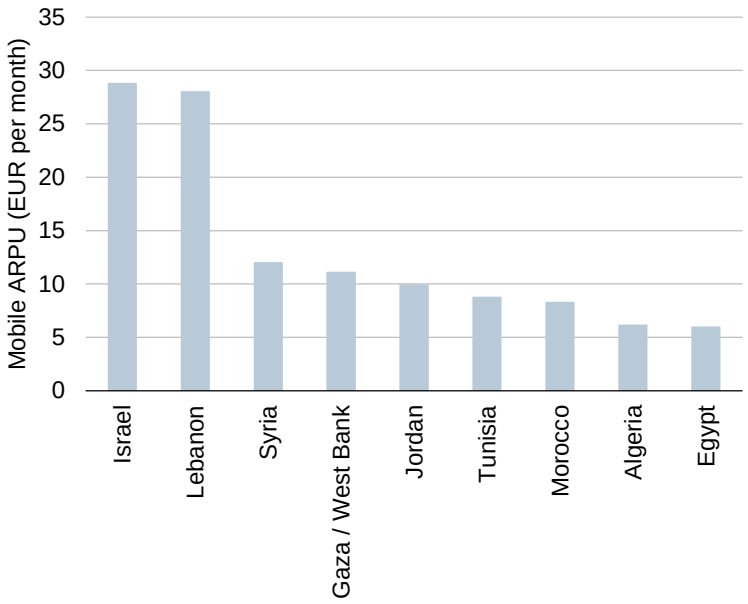

Figure 3.14: Mobile market ARPU in FEMIP countries in 2010 [Source: Wireless Intelligence]

3.4 The broadband market

Below we describe the key features of the broadband market in FEMIP countries.

3.4.1 Market overview

The broadband market is still in its early stages of development in all FEMIP countries except Israel, where fixed broadband[9] penetration stood at 81% of households in 2010. Penetration in all other countries except Jordan and Lebanon is still lower than 20% of households, as shown below in Figure 3.15.

Compared to benchmarks, penetration in Israel is higher than in Western European countries, whereas other FEMIP countries have penetration levels that are comparable to, and even higher than, countries such as Georgia, Thailand, Ukraine, South Africa and Botswana.

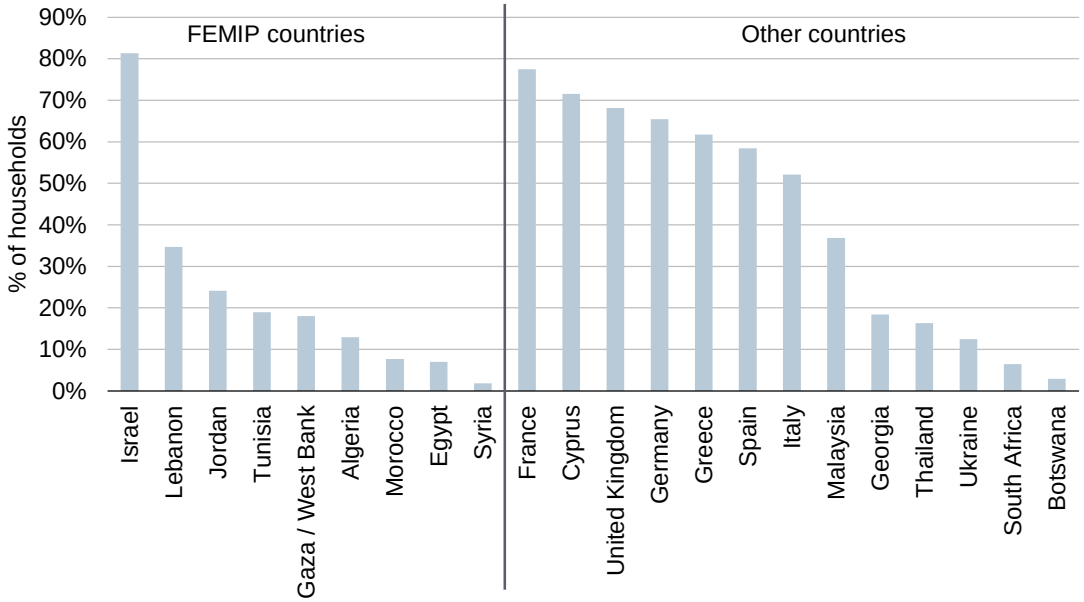

Figure 3.15: Fixed broadband penetration of households in benchmark countries in 2010 [Source: TeleGeography, Euromonitor]

Penetration of mobile broadband[10] has been growing rapidly in recent years in most FEMIP countries, reaching 36% and 17% of households in Israel and Jordan in 2010, respectively (Figure 3.16). Mobile broadband penetration in Morocco, Egypt and Syria has exceeded the penetration of fixed broadband. Mobile broadband has not yet been launched in Lebanon, Algeria and Gaza/West Bank.

9 Fixed broadband includes DSL, cable, fibre (FTTC, FTTH), fixed WiMAX and satellite technologies.

10 Mobile broadband includes HSPA, HSPA+ and LTE technologies.

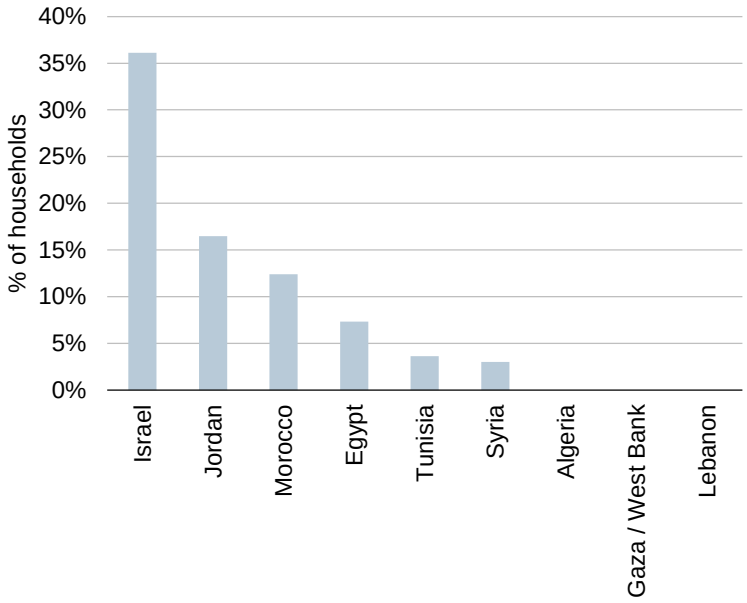

Figure 3.16: Mobile broadband penetration of households in FEMIP countries in 2010 [Source: Operators, Regulators, Analysys Mason, Euromonitor]

The total number of fixed and mobile broadband subscribers in all FEMIP countries reached approximately nine million in 2010, with Egypt and Israel respectively accounting for 31% and 28% of total broadband subscribers. Broadband penetration reached 117% of households in Israel and 41% of households in Jordan in 2010, whereas it remains extremely low in Syria at 5% of households (Figure 3.17).

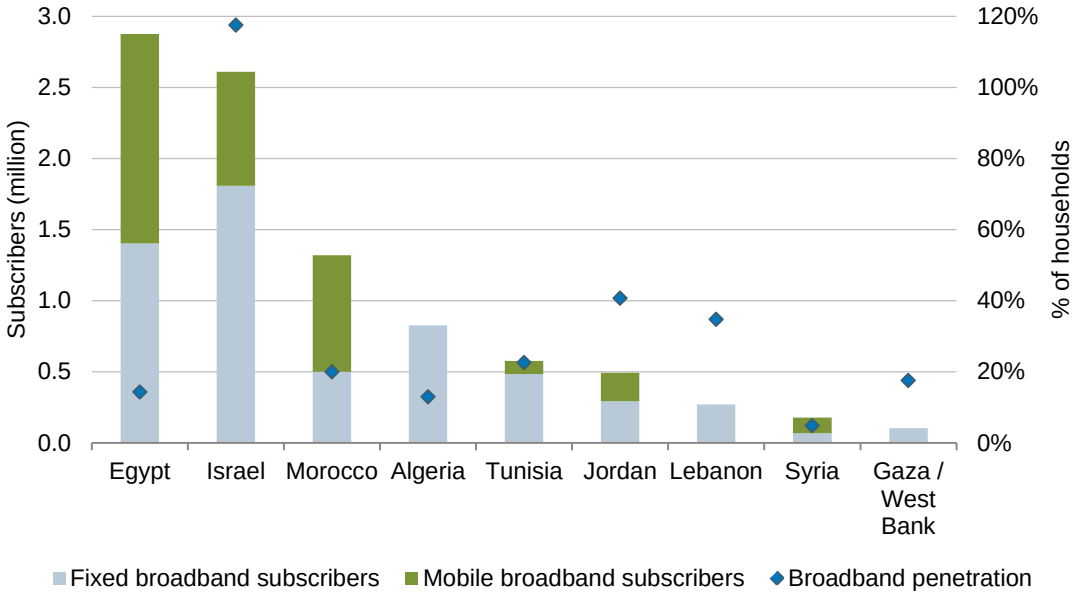

Figure 3.17: Broadband subscribers and penetration in FEMIP countries in 2010 [Source: TeleGeography, operators, regulators, Analysys Mason, Euromonitor]

Prices for a fixed broadband subscription of up to 1Mbit/s range from EUR9 per month in Morocco to EUR63 per month in Lebanon (see Figure 3.18 below). Syria and Lebanon are at the upper end of FEMIP countries in terms of fixed broadband prices, whereas Morocco, Egypt, Tunisia and Gaza/West Bank have the lowest prices. Note that the broadband packages available in Algeria, Israel, Morocco and Tunisia offer unlimited data usage, whereas the other FEMIP countries have imposed usage caps on their broadband offers.

Figure 3.18 also illustrates the price for the cheapest mobile broadband packages available in each FEMIP country, ranging from EUR3 per month in Egypt to EUR25 per month in Syria. Note that mobile broadband is in direct competition with fixed broadband in most of the FEMIP countries, and sometimes the prices for mobile broadband are cheaper than for fixed broadband such as in Egypt, Jordan and Syria.

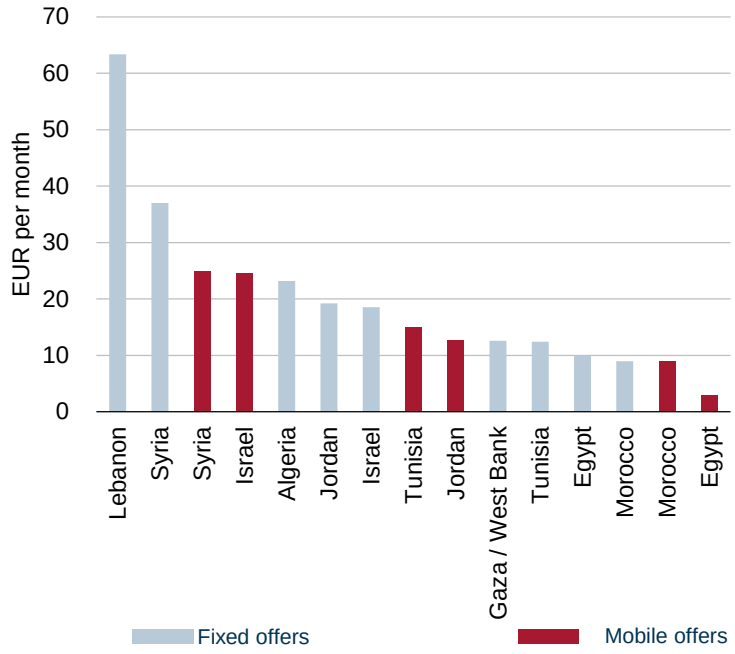

Figure 3.18: Prices for fixed broadband offers of up to 1Mbit/s and for the cheapest mobile broadband offers in the FEMIP countries [Source: Operators]

Note: Prices include VAT

Note: Mobile broadband is not available in Gaza/West Bank, Lebanon and Algeria

Computer penetration is low in all FEMIP countries except Israel and Lebanon, where computer penetration as a share of households stood at respectively 119% and 78% in 2010, as shown in Figure 3.19. Notwithstanding the low computer penetration in countries such as Syria, Jordan and Tunisia compared to Western European countries, it is still higher than in other benchmarked countries such as Thailand, South Africa, Georgia, Botswana, Ukraine and Greece.

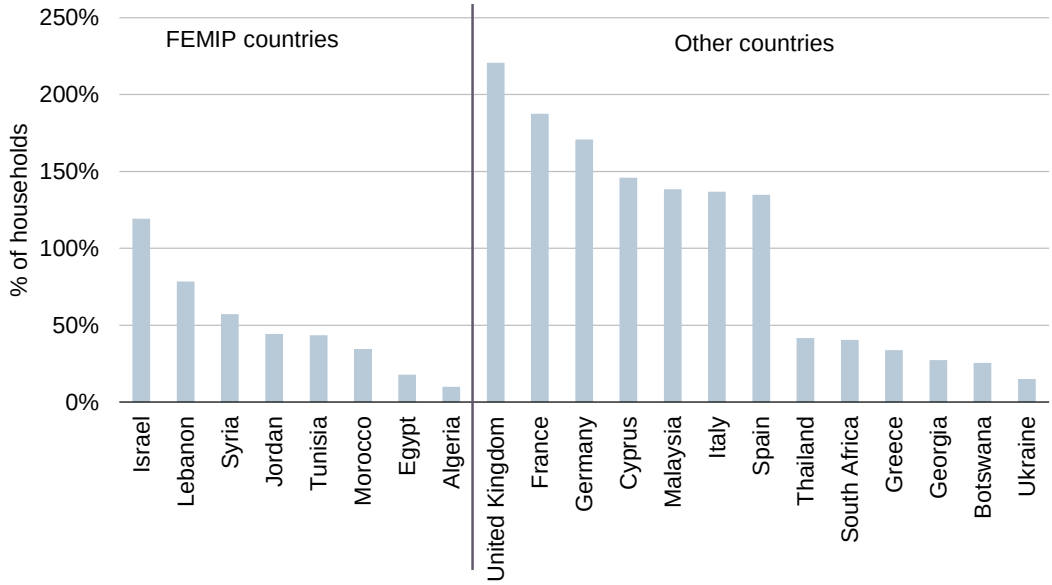

Figure 3.19: Computer penetration in FEMIP and other benchmark countries [Source: Euromonitor, public sources]
Note: Information on Gaza/West Bank is not available and therefore is not included in the chart

Satellite broadband has not yet been launched in some FEMIP countries, or has managed to gain only a very limited number of subscribers. However, satellite TV penetration is extremely high at more than 60% of households in six countries, and it is closely reaching 90% of households in Gaza/West Bank and Algeria (Figure 3.20).

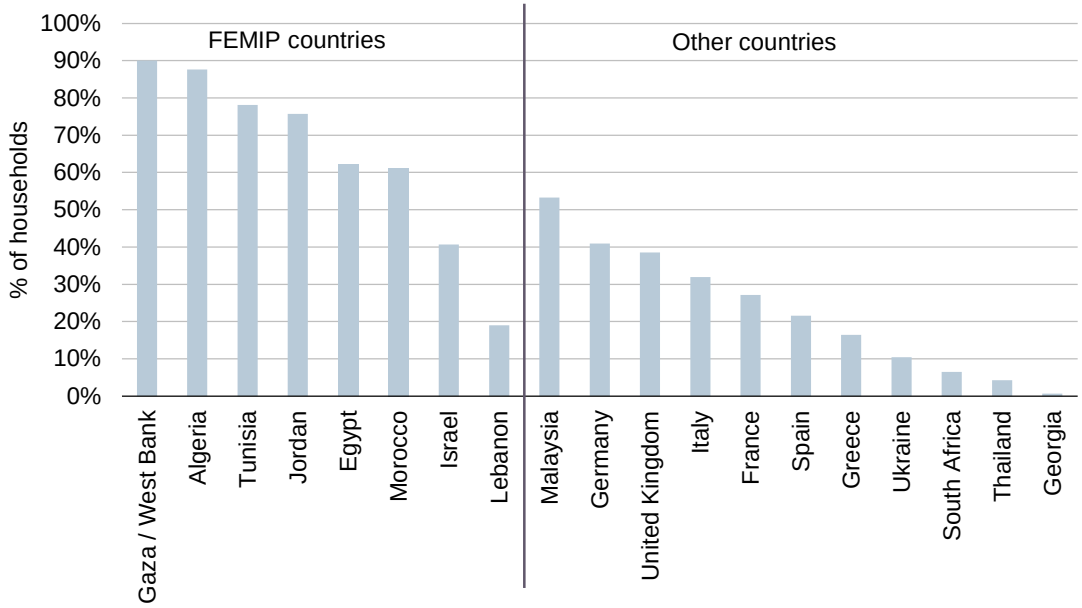

Figure 3.20: Penetration of satellite TV in benchmarked countries [Source: Euromonitor, Analysys Mason] Note: Information on Syria is not available and therefore is not included in the chart

3.4.2 Existing operators and infrastructure

Table 3.21 summarises the characteristics and coverage of the existing broadband networks in each of the FEMIP countries.

Country	*Operator*	*Technology*	*Maximum headline download speed*	*Coverage (end of 2010)*
Algeria	Algérie Télécom	ADSL2+	8Mbit/s	70% of the population for DSL technologies
	Algérie Télécom	FTTH	8Mbit/s	<1% of households
	Algérie Télécom	WiMAX	2Mbit/s	10–15% of the population
Egypt	Telecom Egypt	ADSL2+	24Mbit/s	99% of the population for DSL technologies
	Mobinil	HSPA	7.2Mbit/s	60% of the population
	Etisalat Misr	HSPA+	42Mbit/s	87% of the population
	Vodafone Egypt	HSPA+	21Mbit/s	25% of the population
Gaza/West Bank	PalTel	ADSL	8Mbit/s	72% of the population

Country	*Operator*	*Technology*	*Maximum headline download speed*	*Coverage (end of 2010)*
Israel	Bezeq	ADSL2+	5Mbit/s	99% of households for DSL technologies
	Bezeq	FTTC	100Mbit/s	50% of households
	Pelephone	HSPA	7.2Mbit/s	90% of households
	HOT Telecom	Cable (hybrid fibre-coaxial)	100Mbit/s	85% of households
	Partner	HSPA	7.2Mbit/s	80% of the population
	Cellcom	HSPA	2.8Mbit/s	95% of the population
Jordan	Jordan Telecom	ADSL2+	Up to 24Mbit/s	70% of households for DSL technologies
	Jordan Telecom	HSPA+	21Mbit/s	60% of the population
	Zain	HSPA+	21Mbit/s	0% of the population
	Umniah	WiMAX	3Mbit/s	34% of the population
	Mada Communications	WiMAX	2.4Mbit/s	37% of the population
	wi-tribe	WiMAX	3Mbit/s	15–20% of the population
	Kulacom	WiMAX	2Mbit/s	11% of the population
Lebanon	Ogero Telecom	ADSL2+	20Mbit/s	70% of households for DSL technologies
	Cedarcom	WiMAX	1Mbit/s	60–70% of the population
	GDS	WiMAX	1Mbit/s	60–70% of the population
	PESCO	FWA	512kbit/s	Data unavailable
	Cable One	WiMAX	1Mbit/s	50% of the population
Morocco	Maroc Telecom	ADSL2+	20Mbit/s	30% of households for DSL technologies
	Maroc Telecom	HSPA+	7.2Mbit/s	Not available
	Meditel	WiMAX	Up to 8Mbit/s	10% of the population
	Meditel	HSPA	1.8Mbit/s to 7.2Mbit/s	40–60% of the population
	Meditel	HSPA+	21Mbit/s	A few areas in Casablanca and Rabat
	Wana	CDMA EVDO Rev A (3G)	1Mbit/s	40–50% of population
Syria	STC	ADSL	8Mbit/s	50% of the population
	Syriatel	HSPA	7.2Mbit/s	50% of the population
	MTN Syria	HSPA	7.2Mbit/s	60% of the population
Tunisia	Tunisie Telecom	ADSL2+	20Mbit/s	99% of the population for DSL technologies
	Orange Tunisie	WiMAX	3Mbit/s	50% of the population
	Orange Tunisie	HSPA+	7.2Mbit/s	70% of the population

Table 3.21: Characteristics and coverage of existing broadband networks in FEMIP countries [Source: TeleGeography, operators, Analysys Mason]

4 Assessment of broadband market demand in FEMIP countries

This section provides an assessment of broadband market demand in FEMIP countries. It is laid out as follows:

- Section 4.1 outlines the results of our assessment of the evolution of broadband take-up by technology
- Section 4.2 outlines the results of our assessment of the evolution of broadband revenues.

4.1 Broadband take-up

Below we estimate the proportion of households in FEMIP countries that will subscribe to broadband services by different technologies over the forecast period, if these services were available. Our assessment of broadband take-up does not include the costs associated with rolling out new networks (e.g. fibre); therefore, the expected increasing demand for broadband services in these countries may not be satisfied if the business case for the roll-out of broadband technologies (e.g. HSPA, WiMAX) is not viable or if no public funding is available to support these deployments.

4.1.1 Broadband penetration

Total broadband penetration, including fixed and mobile broadband, is expected to grow significantly from 21% of households in 2010 to 70% of households in 2020 when summing all FEMIP countries. Except for Israel, which already had a penetration close to 120% of households as at the end of 2010, FEMIP countries can be grouped into three categories according to the penetration level that broadband is expected to achieve by the end of the forecast period (see Figure 4.1):

- Morocco, Jordan and Lebanon are expected to have a penetration close to 95–100% of households by 2020
- Algeria and Tunisia are forecast to have a penetration close to 75–80% of households by 2020
- Egypt, Syria and Gaza/West Bank are estimated to have a penetration close to 50–55% of households by 2020.

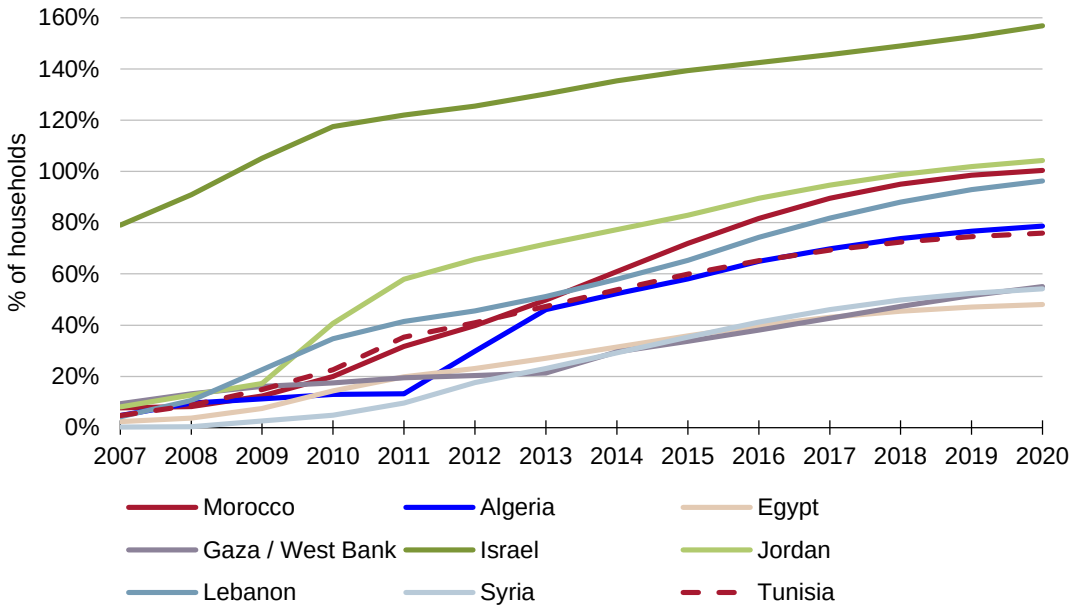

Figure 4.1: Forecast evolution of broadband penetration in FEMIP countries [Source: Analysys Mason]

The forecast evolution of broadband penetration takes into account its historical evolution, operators' forecasts and plans, and a number of factors such as PC penetration, availability of electricity, literacy rate and poverty levels. We have cross-checked our penetration forecasts with coverage forecasts for each technology which were based on the results of our coverage-viability analysis (detailed in Section 5), announcements made or inputs provided by operators, and our understanding of the likely evolution of the market.

The number of broadband connections, including fixed and mobile broadband, is estimated to increase from 9.3 million connections in 2010 to 38.8 million in 2020 based on the penetration forecasts above. Egypt is expected to continue to be the country with the largest share of broadband subscribers in the FEMIP region, increasing from 31% in 2010 to 32% in 2020 despite a low penetration forecast. The number of broadband subscribers in Morocco and Algeria is estimated to outperform the number of subscribers in Israel by 2013, reaching 8.1 million and 6.5 million in 2020, respectively (see Table 4.2).

	Broadband subscribers in 2010 (million)	*Broadband subscribers in 2020 (million)*	*CAGR (2010–2020)*	*Share of total FEMIP broadband subscribers in 2020*
Algeria	0.8	6.5	23%	17%
Egypt	2.9	12.6	16%	32%
Gaza/West Bank	0.1	0.4	15%	1%
Israel	2.6	4.0	4%	10%
Jordan	0.5	1.6	12%	4%
Lebanon	0.3	0.8	12%	2%
Morocco	1.3	8.1	20%	21%
Syria	0.2	2.4	30%	6%
Tunisia	0.6	2.4	15%	6%
Total	**9.3**	**38.8**	**15%**	**100%**

Table 4.2: Broadband subscribers growth and share in FEMIP countries [Source: Analysys Mason]

Mobile broadband is forecast to account for approximately 71% of total broadband connections in 2020 in all FEMIP countries (up from 38% in 2010), as shown in Figure 4.3. We expect the increase in penetration to come mainly from the mobile rather than the fixed market, for several reasons:

- fixed broadband penetration has stagnated in countries such as Morocco, or has reached saturation as in Israel
- the footprint of the existing copper network in some countries is low (e.g. 30% of households in Morocco), and we do not foresee that the existing copper networks will be expanded further
- mobile broadband penetration has experienced strong growth in recent years in most FEMIP countries, outperforming fixed broadband in Egypt, Morocco and Syria
- mobile broadband offers are cheaper than fixed broadband packages in most of the FEMIP countries such as Egypt, leading to lower mobile broadband ARPUs.

Morocco, Algeria, Egypt and Syria are the countries where mobile broadband is expected to represent the highest share of the total broadband market in the FEMIP countries, primarily due to their relatively large size, thus making it easier and less costly to roll out wireless rather than wired technologies. It should be noted that we expect mobile broadband to be launch in 2012 in Algeria and 2014 in Gaza/West Bank. Our forecast for the evolution of mobile broadband subscribers as share of broadband subscribers in FEMIP countries is shown in Figure 4.3.

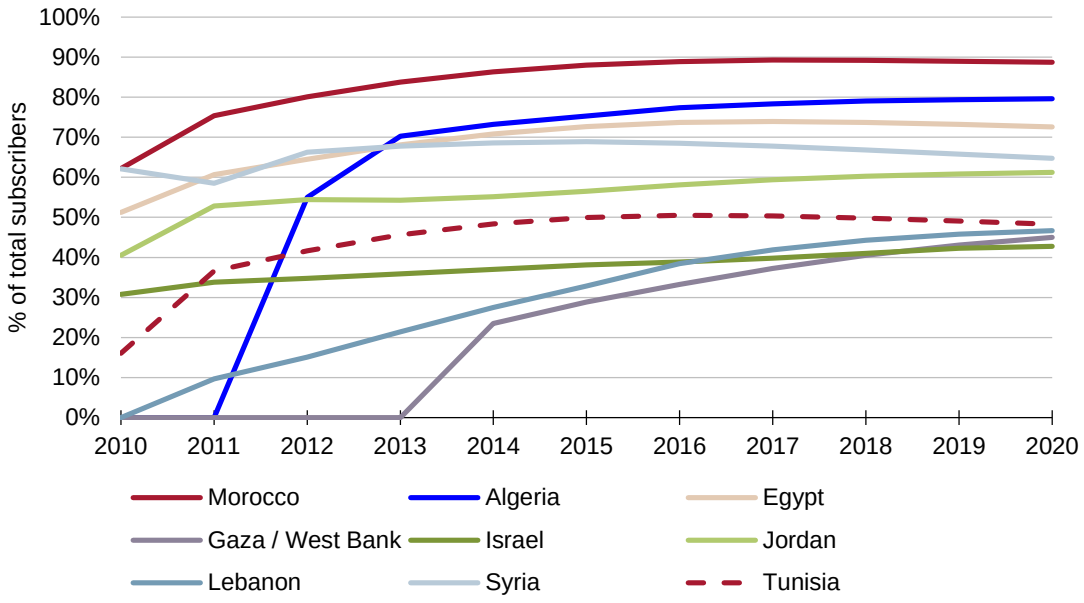

Figure 4.3: Forecast evolution of mobile broadband subscribers as a share of broadband subscribers in FEMIP countries [Source: Analysys Mason]

Some parameters which are not specifically taken into account in our model may have an impact (positive or negative) on our forecasts:

- **Political instability –**Major protests calling for political reform and greater freedom have been taking place across countries in the FEMIP region since December 2010. If the political instability persists for a prolonged period, this may have a negative impact on our forecasts as it may hinder the inflow of foreign investment to the country.

- **Stage of liberalisation of the telecoms sector and impact on future developments** – Liberalisation of the fixed market in some FEMIP countries, either through the partial privatisation of the incumbent or by imposing on the incumbent the obligation to offer local loop unbundling (LLU), is likely to stimulate competition in the broadband market. The development of a framework allowing large infrastructure owners to enter the broadband market may boost the roll-out of next-generation access (NGA) networks.

- **Political considerations such as regulatory and spectrum co-ordination between countries** – The switchover from analogue to digital division will free up a significant amount of spectrum (the so-called as 'digital dividend'). If this happens sooner than expected, this is likely to have a positive impact on the penetration of LTE.

- **Award of 3G (and LTE) licences –** 3G licences have not yet been awarded in Algeria, Gaza/West Bank and Lebanon. Our forecasts for the launch of 3G services in these countries are based on our discussions with relevant stakeholders. However, any further delays on the award of 3G licences in these countries will have a negative impact on our forecasts. Uncertainty regarding the licencing of 4G spectrum in most of the FEMIP countries could also have an impact on our forecast (positive or negative depending on situation).

- **Additional costs that may pose a barrier to network roll-out** – The fees that operators will have to pay to purchase rights of way to lay down new fibre will be a key factor incentivising (or dis-incentivising) current operators to roll out NGA networks. Municipalities might waive operator fees for use of rights of way in ducts, and if operators were able to use the public rights of way free of charge, this could provide a significant boost to NGA. Licence fees for mobile licence renewal or LTE spectrum fees could also pose a barrier to the rapid roll-out of LTE networks.

- **Provision of Internet centres in rural areas as a low-cost alternative** – The implementation of this type of initiative can contribute towards stimulating the demand for broadband services and increasing broadband awareness among the population, ultimately boosting overall broadband penetration (in particular mobile broadband).

- **Level of censorship** – A potential increase in censorship levels may have a negative impact on the population's interest in taking up broadband services.

- **International connectivity bandwidth** – It needs to be increased to take into account the rise in demand for broadband services.

4.1.2 Bandwidth demand

We forecast the increase in bandwidth demand based on benchmarks from other countries as information was not publically available or provided to us by operators.

As shown in Figure 4.4, we estimate that:

- the average download consumption per fixed-line subscriber will increase from 6.1GB per month in 2010 to 12.6GB per month in 2020
- the average download consumption per mobile subscriber will increase from 2.8GB per month in 2010 to 7.7GB per month in 2020.

FEMIP countries are expected to be in the lower range of benchmarked Western European countries in 2020 in terms of fixed broadband usage (currently at 10GB to 20GB per month in Western European countries). The opposite trend is expected in the case of mobile broadband usage, which is estimated to be higher than benchmarks (currently at 1GB and 3GB per month in Western European countries).

However, the proliferation of applications such as video streaming and catch-up TV in FEMIP countries could lead to a much higher usage of fixed broadband than forecast.

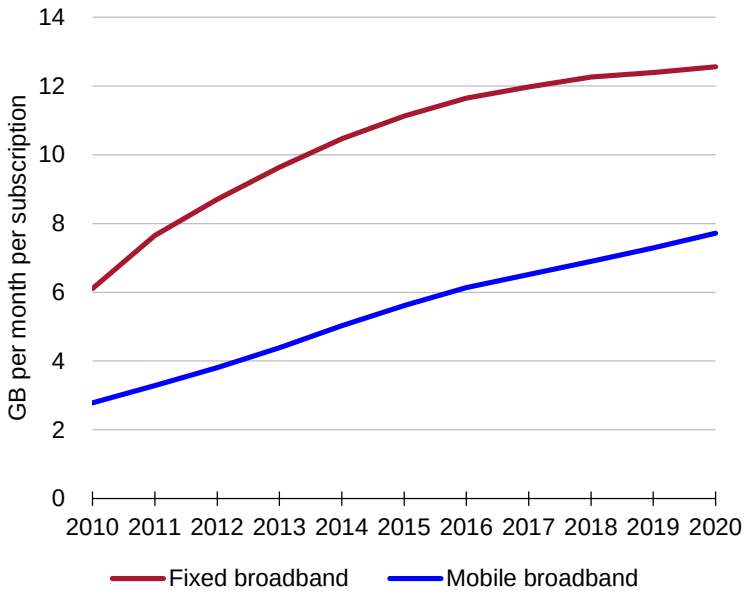

Figure 4.4: Forecast evolution of bandwidth usage for fixed and mobile broadband users [Source: Analysys Mason

Mobile broadband usage is used to drive the costs of network roll-out as it has a major impact on the deployment of wireless networks given that capacity is the main driver of wireless networks after a few years from launch.

4.2 Broadband revenues

This section forecasts the evolution of revenues from broadband services in FEMIP countries for the period 2011–2020.

Our starting point for forecasting the evolution of broadband ARPU is to estimate ARPU for the different broadband technologies. Our ARPU forecasts are based on an affordability analysis where the average revenue per broadband user (or per household) is calculated as a percentage of GDP. As broadband penetration increases, ARPU as a percentage of GDP is expected to decrease as the less-affluent segments of the population take-up broadband services (i.e. ARPU dilution).

ARPU for 2011 has been estimated based on public data regarding broadband offers available in FEMIP countries, as well as input from operators.

Fixed broadband ARPU is forecast to continue its decreasing trend in most FEMIP countries in the short term and to stabilise in the longer term (Figure 4.5):

- this forecast follows a similar trend to what has happened historically in FEMIP and European countries
- ARPU for fixed broadband is expected to stabilise in countries such as Morocco where it has already reached a very low figure

If we exclude Morocco, which has a very low ARPU at EUR13 per month in 2011, and Israel, which has a very high ARPU at EUR37 per month in 2011, in all the other FEMIP countries fixed broadband ARPU ranges from EUR19 per month to EUR31 per month in 2011. The difference between the highest and lowest ARPU levels is expected to decrease during the forecast period, ranging from EUR16 per month and EUR26 per month in 2020.

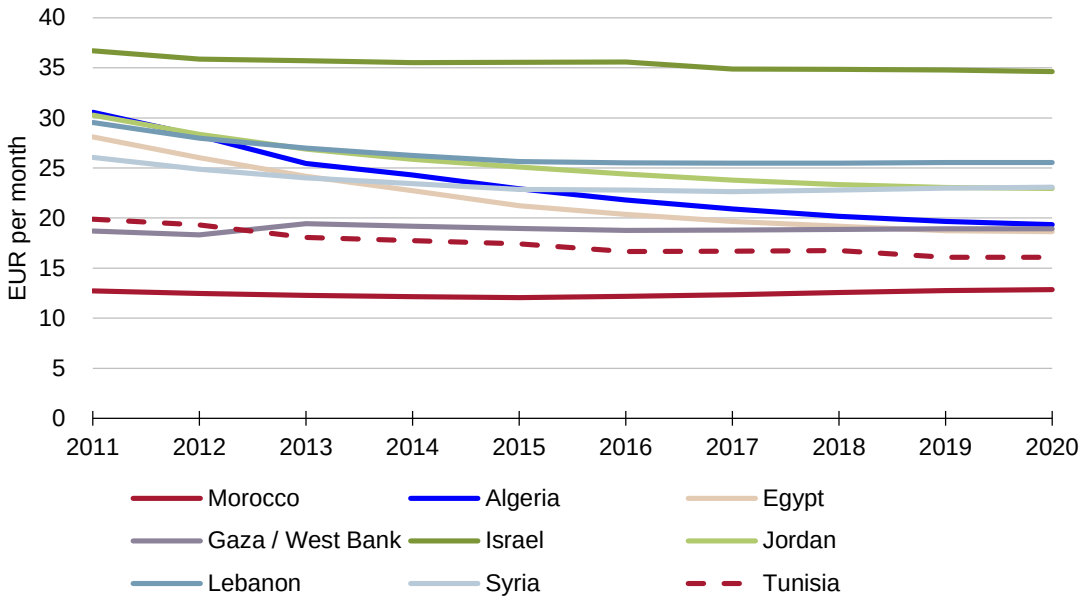

Figure 4.5: Fixed broadband ARPU forecasts in the FEMIP countries [Source: Analysys Mason]

Overall, mobile broadband ARPU is also expected to decrease in the period to 2020 in most of the FEMIP countries, as shown in Figure 4.6 below. Mobile broadband ARPU is very low in Morocco and Egypt at EUR8 per month and EUR11 per month in 2011, respectively, whereas it is above

EUR21 per month in Syria and Israel. Mobile broadband ARPU is expected to decrease to EUR14–24 per month in most of the FEMIP countries by 2020, except in Morocco and Egypt, where it is estimated to be much lower at EUR6 per month and EUR9 per month, respectively. Mobile broadband ARPUs are expected to be lower than fixed broadband ARPUs as the competitive intensity is higher in the mobile markets in all FEMIP countries.

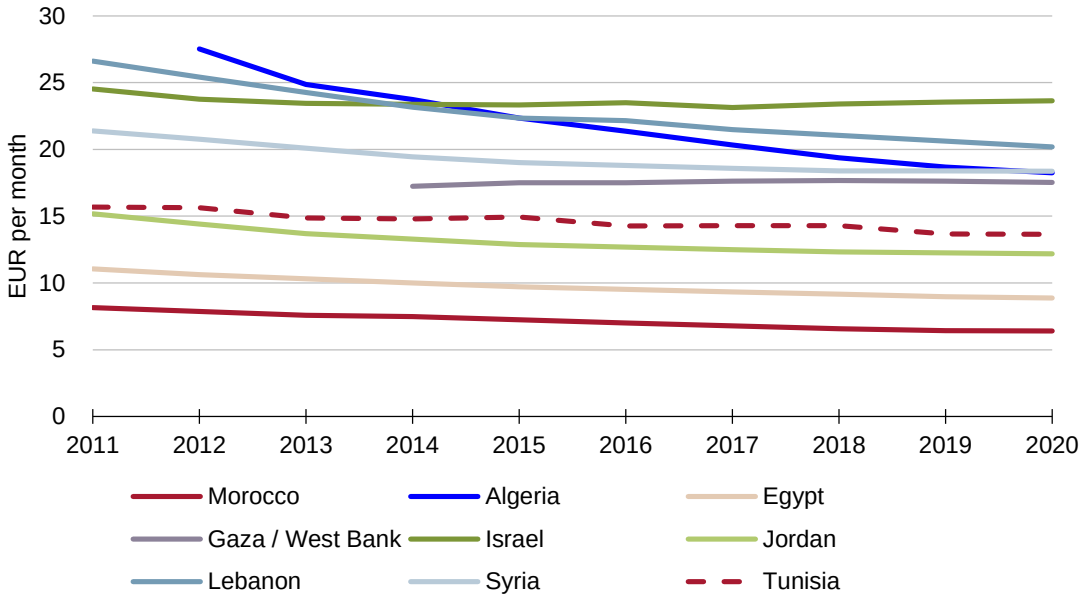

Figure 4.6: Forecast evolution of mobile broadband ARPU in FEMIP countries [Source: Analysys Mason]

Details on fixed and mobile broadband ARPU growth are provided in Table 4.7.

	Fixed broadband ARPU (EUR/month)			*Mobile broadband ARPU (EUR/month)*		
	2011	*2020*	*CAGR (2011-2020)*	*2011*	*2020*	*CAGR (2011-2020)*
Algeria	31	19	-4.95%	N/A	18	-5.01%[11]
Egypt	28	19	-4.46%	11	9	-2.39%
Gaza/West Bank	19	19	0.13%	N/A	18	0.28%[12]
Israel	37	35	-0.65%	25	24	-0.40%
Jordan	30	23	-3.03%	15	12	-2.40%
Lebanon	30	26	-1.60%	27	20	-3.03%
Morocco	13	13	0.11%	8	6	-2.67%
Syria	26	23	*-1.34%*	21	18	-1.68%
Tunisia	20	16	*-2.33%*	16	14	-1.53%

Table 4.7: Fixed and mobile broadband ARPU forecasts in FEMIP countries [Source: Analysys Mason]

11 CAGR calculated between 2012 and 2020.

12 CAGR calculated between 2014 and 2020.

We have calculated broadband revenues based on the resulting ARPU and penetration forecasts. Broadband revenues are expected to total EUR6.8 billion in 2020, up from EUR2.9 billion in 2011. The share of broadband revenues in Israel and Egypt is expected to decrease from 37% and 27%, respectively, in 2011 to 21% and 25% in 2020 (Figure 4.8). However, the share of broadband revenues in Algeria is expected to increase from 11% in 2011 to 21% in 2020.

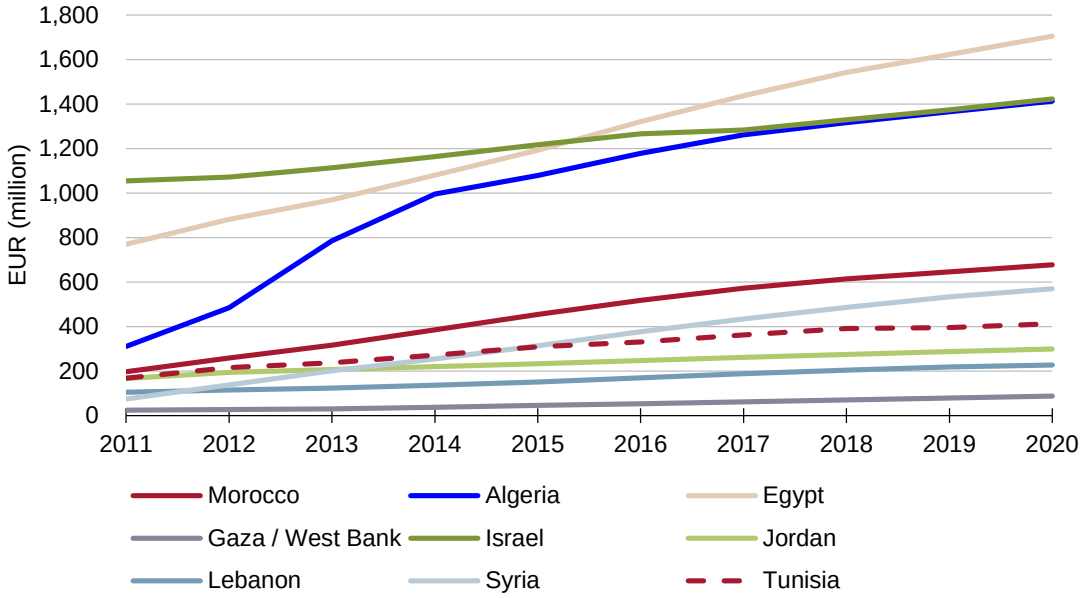

Figure 4.8: Forecast evolution of broadband revenues in FEMIP countries [Source: Analysys Mason]

Revenues from mobile broadband are forecast to account for 27% and 57% of total broadband revenues in 2011 and 2020, respectively. Mobile broadband revenues as a share of total broadband revenues are expected to be:

- extremely high in Morocco and Algeria (around 80% of total revenues in 2020)
- high in Syria and Egypt (around 60% of total revenues in 2020)
- significant in all other FEMIP countries (40–45% of total revenues in 2020)
- modest in Israel (around 35% of total revenues in 2020)

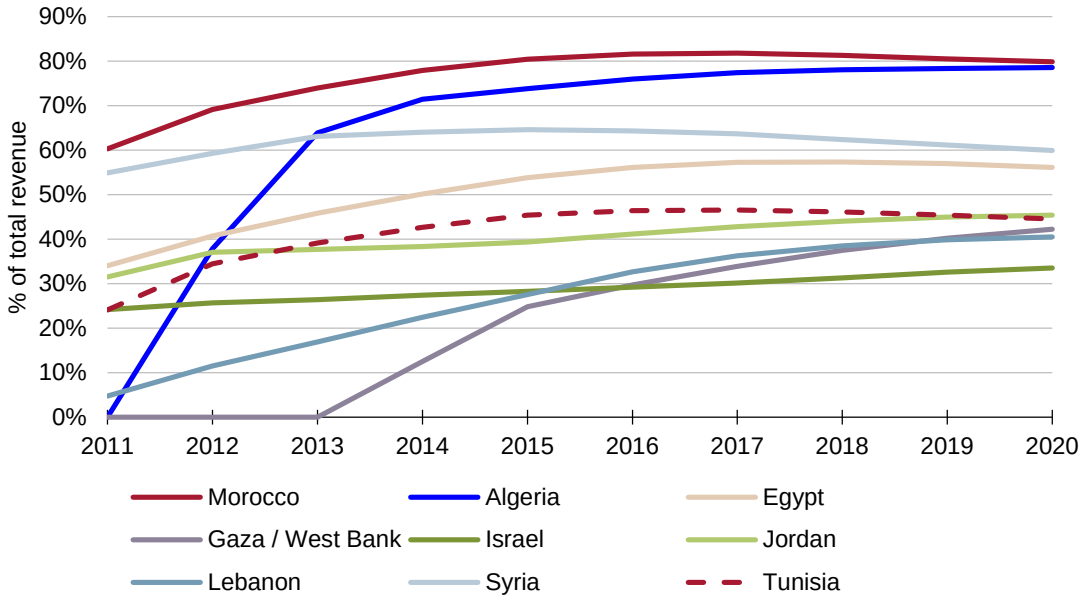

Figure 4.9: Forecast evolution of mobile broadband revenues as a share of total broadband revenues in FEMIP countries [Source: Analysys Mason]

Details on revenues growth, share of mobile broadband revenues and split of total revenues between FEMIP countries are provided in Table 4.10.

	Broadband revenues in 2011 (EUR million)	*Broadband revenues in 2020 (EUR million)*	*CAGR (2011-2020)*	*Share of total FEMIP broadband revenues in 2020*	*Share of mobile broadband revenues of total broadband revenues in 2020*
Algeria	311.4	1412.5	18%	21%	79%
Egypt	769.7	1704.5	9%	25%	56%
Gaza/West Bank	25.0	87.6	15%	1%	42%
Israel	1054.6	1422.4	3%	21%	34%
Jordan	167.5	299.5	7%	4%	45%
Lebanon	105.2	227.7	9%	3%	41%
Morocco	197.2	677.0	15%	10%	80%
Syria	75.1	569.7	25%	8%	60%
Tunisia	167.8	413.1	11%	6%	45%
Total	**2873.4**	**6814.0**	**10%**	**100%**	**57%**

Table 4.10: Broadband revenues growth and share in FEMIP countries [Source: Analysys Mason]

Broadband revenues as a share of GDP are expected to increase from 0.4% in 2011 to 0.7% in 2020 (based on a simple average of the nine FEMIP countries). As a comparison, 2010 broadband revenues as a share of GDP in most European countries are estimated to be between 0.3% and 0.8%.

5 Comparison and evaluation of the costs associated with the roll-out of different broadband technologies

This section provides a comparison and evaluation of the costs associated with the implementation of different broadband technologies under a range of scenarios. It is laid out as follows:

- Section 5.1 presents the different scenarios used in our analysis
- Section 5.2 describes the methodology used for the analyses carried out for terrestrial technologies
- Section 5.3 provides an assessment of the commercial viability of broadband coverage for the different terrestrial technologies
- Section 5.4 presents an assessment of the costs associated with implementing the different terrestrial technologies.
- Section 5.5 assesses the costs of implementing a satellite solution
- Section 5.6 presents the results by scenario using a mix of technologies

5.1 Scenario definition

We start by defining the scenarios and cost types we have used in our analysis.

► *Scenarios*

We have defined three illustrative scenarios consisting of a mix of technologies that will provide the most economical access to broadband services. As a starting point, we should use scenarios based on the political agenda, regulatory requirements and future plans if available in each FEMIP country. However, this would result in country-specific targets which would not allow for an easy comparison of the results among FEMIP countries. Therefore, the scenarios defined for our analysis are similar to those included in the Digital Agenda for Europe (DAE),[13] but with lower absolute speed targets which we believe are more realistic for all FEMIP countries except for Israel, where we use the same targets as in the DAE as broadband infrastructure deployment in Israel is more advanced than other FEMIP countries. These scenarios are presented below in Table 5.1 below.

Scenario	*2015 target*		*2020 target*	
	Coverage target (as % of population)	*Minimum real download speed (Mbit/s)*	*Coverage target (as % of population)*	*Minimum real download speed (Mbit/s)*
Scenario 1	50%	1Mbit/s	100%	1Mbit/s
Scenario 2	50%	4Mbit/s	50% 100%	10Mbit/s 4Mbit/s
Scenario 3	50%	10Mbit/s	50% 100%	30Mbit/s 10Mbit/s
Scenario 1 for Israel	50%	4Mbit/s	100%	4Mbit/s
Scenario 2 for Israel	50%	10Mbit/s	100%	10Mbit/s
Scenario 3 for Israel	50%	30Mbit/s	100%	30Mbit/s

Table 5.1: Coverage scenarios used in the costs forecasts [Source: Analysys Mason]
Note: For scenario 2 and 3, both coverage/speed targets must be met in 2020 (e.g. 50% at 10 Mbit/s and 100% at 4Mbit/s for scenario 2).

[13] The Digital Agenda is Europe's strategy for a flourishing digital economy by 2020.

For each scenario, we first assess which technology may achieve the speeds required and then we determine which technology mix is the least costly.

Table 5.2 illustrates the headline and real download speeds for the different technologies we consider in our assessment.

Technology	*Headline download speed*	*Real download speed*	*Download speed considered*
ADSL2+	Up to 24Mbit/s	Depends on line length	Depends on line length
FTTP	Up to 1000Mbit/s	≈ 100Mbit/s	100Mbit/s
FTTC	Up to 100Mbit/s	≈ 30Mbit/s	30Mbit/s
WiMAX (in the 2.6GHz band)	Up to 10Mbit/s	≈ 4Mbit/s	4Mbit/s
HSPA (in the 2.1GHz band)	Up to 14.4Mbit/s	≈ 2–3Mbit/s	2Mbit/s
HSPA+ (in the 2.1GHz band)	Up to 42Mbit/s	≈ 4–6Mbit/s	4Mbit/s
LTE (in the 2.6GHz band)	Up to 100Mbit/s	≈ 10–20Mbit/s	10Mbit/s
Satellite (next generation Ka-band)	Up to 30Mbit/s	≈ 30Mbit/s	30Mbit/s

Table 5.2: Headline and real download speeds by broadband technology [Source: Analysys Mason, CDG, WiMAX Forum, Ericsson, ABI research, Qualcomm, satellite vendors]

It should be noted that, for simplicity reasons, we use one average real download speed for each technology (with the exception of DSL). However, the real speed available to end users for one given technology depends on several factors – especially in the case of wireless technologies – such as the network design, the network load, the time of the day and the location of the user (outdoors, indoors, on the move, etc.).

The speed of DSL connections is mainly dictated by the copper line length, which is mainly dictated by how far the user is from the local exchange: the closer the user is to the local exchange, the higher the speeds they can achieve.

As the minimum download speed targets are lower than those in the DAE, the total costs of achieving them will be lower than in European countries, and the contribution of wireless is likely to be greater.

► *Cost types*

We have defined several types of cost by technology which are used in our analysis. These cost types are presented below in Table 5.3.

Cost type	*Description of cost type*	*Why we are modelling this cost type*
'50% costs': costs associated with covering 50% of the population	Cost needed to cover 50% of the population irrespective of commercial viability	Needed as an input to reach scenario targets in 2015
'100% costs': costs associated with covering 100% of the population	Costs needed to cover 100% of the population irrespective of commercial viability	Needed as an input to reach scenario targets in 2020 if terrestrial infrastructure is used to cover 100% of the population
'Adjusted costs': adjusted costs associated with covering 100% of the population	Costs needed taking into account that the 'very remote', i.e. the final few percentages of the population living in the most remote areas, are unlikely to be covered by terrestrial technologies. (more details are provided below)	Needed as an input to reach the targets in each scenario in 2020 using terrestrial infrastructure, which will be complemented by satellite to reach the remaining population not covered by terrestrial technologies
'Viable costs': costs associated with achieving commercially viable coverage	Costs based on our model results, which are likely to be close to a maximum of what private operators may invest in the future	Needed to estimate the amount of funding required for terrestrial technologies in commercially viable areas
'Unviable costs': costs associated with achieving commercially unviable coverage	The difference between the costs for achieving the population coverage target (i.e. 50%, 100%) and the commercially viable cost	Needed to estimate the amount of funding required for terrestrial technologies in commercially unviable areas

Table 5.3: Type of costs for each terrestrial broadband technology [Source: Analysys Mason]

After calculating the different cost types by technology, we use the most cost-effective technologies to reach the scenario targets by looking at the existing coverage of each technology, the cost for commercially viable coverage calculated in our model, and the costs to reach the adjusted population covered by terrestrial technologies in 2020.

5.2 Description of the methodology for terrestrial technologies

There are two main types of outputs to this section:

- the costs for commercial viable broadband coverage by terrestrial technology
- the different cost types as described above.

Figure 5.4 below illustrates a simplified flow-chart of the approach used to build these two outputs.

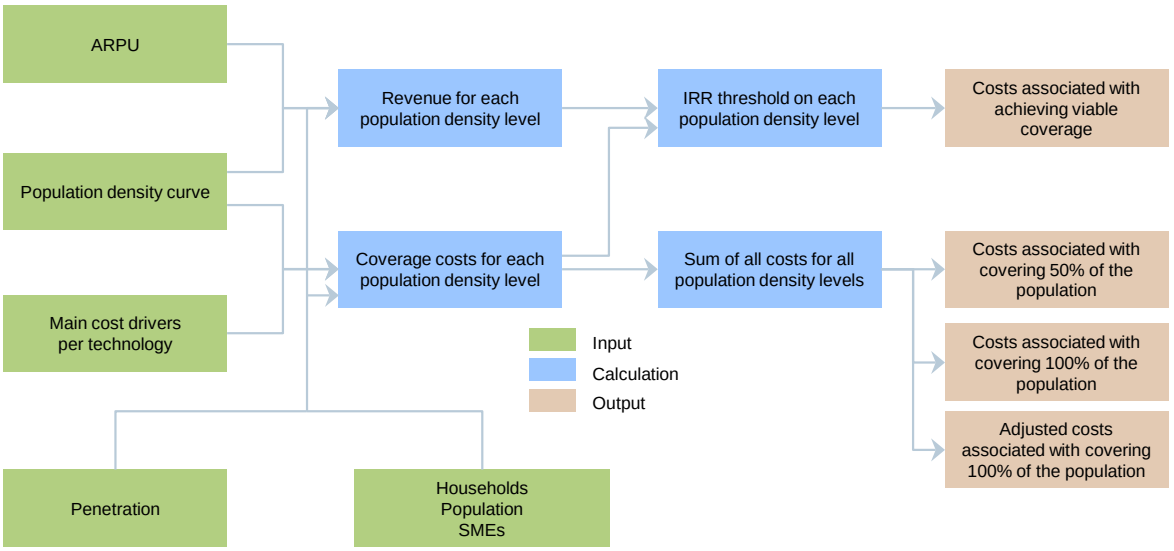

Figure 5.4: High-level methodology used in this section [Source: Analysys Mason]

Below we detail how each of these two outputs is calculated.

► *Coverage commercial viability*

The costs of deploying and operating a broadband network for each technology are a function of population density in a given area. As a rule, the lower the population density, the higher the cost per person or household.[14]

The commercial viability of broadband coverage is defined as the maximum population coverage that is likely to be commercially viable to achieve[15] for each broadband technology (i.e. excluding public intervention or public funds) taking into account the demand assumptions (i.e. expected revenues) described in the previous section, through the use of a revenue-density analysis. For each level of population density, our revenue-density analysis takes into account the revenue potential arising from serving these areas with broadband and the costs (upfront and ongoing) required to deliver broadband to these areas. Finally, we assume that it is likely to be economically

14 This may not always be true. For instance, in the case of wireless technologies, in areas of very high population density it is necessary to increase the capacity of the network to satisfy the increasing demand for bandwidth. Thus, it may be more expensive to cover the higher-density areas than those areas with lower densities. However, outside very densely populated areas, the rule applies.

15 We define an area to be commercially viable whenever the business case for covering this area provides an internal rate of return (IRR) above 15%, as described later in this section.

viable to deploy a particular broadband technology in a given area when the internal rate of return (IRR) is at least 15% for ten years.[16]

Figure 5.5 provides an example of the revenue-density approach. The chart shows that using a threshold IRR of 15% the viability of FTTH and FTTC is lower than 5% of the population, whereas the viability of DSL,[17] WiMAX, HSPA, HSPA+ and LTE is between 50% and 60% of the population. The FTTH and FTTC results are driven primarily by the high costs of rollout and this limits viability significantly. It should be noted that the IRR is very sensitive to revenues and costs and these both vary significantly with population density, hence there is a compound effect which drives the IRR down (i.e. in less populated areas revenues reduce and costs increase).

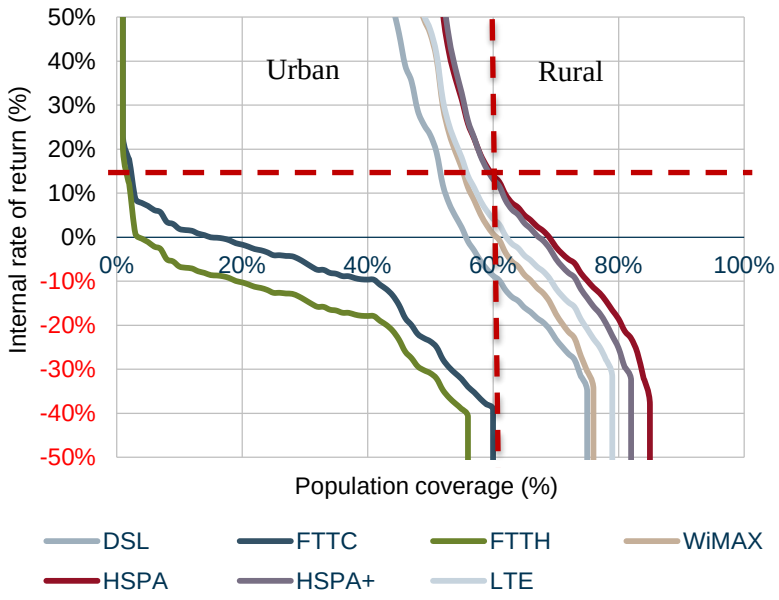

Figure 5.5: Illustration of the revenue-density approach [Source: Analysys Mason]

Note: The viability calculation for DSL and FTTC does not take into account the limited footprint of the existing copper network. Therefore, this result is theoretical and assumes that the existing copper network covers 100% of the population

Note: The dotted red line represents an IRR of 15%

The methodology assumes that it is more commercially viable to deploy a network in higher-density areas (due to the lower costs of deployment and the higher number of subscribers) – this assumption is borne out in practice when looking at operators' investment decisions.

Cable networks are excluded from our revenue-density analysis, as we think it is unlikely that there will be large-scale extensions of current cable networks in the FEMIP countries, if any at all.

► *Different cost types*

We calculate several cost types for each terrestrial technology:

- **'50% costs' – The costs associated with covering 50% of the population**, which is needed to reach the scenario targets in 2015.

16 Typically, the weighted average cost of capital (WACC) for European operators is 10–12%.

17 The viability calculation for DSL and FTTC does not take into account the limited footprint of the existing copper network. Therefore, this result is theoretical and assumes that the existing copper network covers 100% of the population.

- **'100% costs' – The costs associated with covering 100% of the population,** independently of what is commercially viable. The population coverage would exceed the commercially viable coverage (calculated on the basis of the revenue-density analysis described above).
- **'Adjusted costs' – The 'adjusted' costs of covering 100% of the population**, taking into account that the 'very remote', i.e. the final few percentages of the population living in the most remote parts of the country, are unlikely to be covered by terrestrial technologies. In these areas, satellite broadband tends to be the most cost-effective means to provide broadband. We have made a simplifying assumption that where terrestrial infrastructure exists then it could potentially be re-used to support terrestrial broadband rollout. The most extensive terrestrial infrastructure in this market is 2G mobile base station sites, and we believe it is reasonable to expect over the long term that these sites could be used to extend broadband coverage, taking account of the potential for use of lower frequency (<1GHz) spectrum. The implication of this is that satellite is used to cover those very remote areas beyond the 2G network footprint. This simplifying assumption is reasonably consistent with what we have seen in some developed markets where a combination of terrestrial wireless and satellite technologies have been used to address rural broadband 'not-spot' areas, e.g. in Ireland. In the case of Ireland the Government ran a competition to determine the most cost-effective way to deliver rural broadband and our estimates suggest that satellite is being used to provide 3–5% of the targeted premises, which equates to less than 1% of all premises in the country; this compares with 2G population coverage in Ireland being around 99%.
- **'Viable costs' – The costs associated with achieving commercially viable coverage**. These costs are likely to be close to a maximum of what private operators may invest in the future. The commercially viable coverage is derived from our revenue-density analysis and will result in partial population coverage. However, operators may decide to fully invest in one technology and not in another. It cannot be expected that private operators will invest in all technologies.
- **'Unviable costs' – The difference between the costs for achieving the population coverage target (i.e. 50%, 100%) and the commercially viable cost.** These costs are needed to cover the commercially unviable areas and those areas may require public funding.

We also assume that operators will not expand their existing copper networks, as fibre is widely accepted as the fixed technology for the future. Therefore, DSL and FTTC technologies cannot be rolled out beyond the current reach of the existing copper network.

It should also be noted that the costs are calculated for the roll-out of a single network for any given technology (i.e. we assume that several networks will not be rolled out at the same time). This assumption is reasonable for fixed access networks. However, several mobile operators provide services over their own infrastructure at least in the commercially viable areas.

After calculating the different cost types, we also carried out an assessment of the costs associated with three different scenarios consisting of a mix of technologies that will provide the most economical access to broadband services.

5.3 Assessment of commercially viable coverage by terrestrial broadband technology

Table 5.6 below illustrates the current coverage of the copper network in each of the FEMIP countries and of the different terrestrial broadband technologies that we consider in our assessment. (LTE technology has not yet been deployed in any FEMIP country.)

Country	*Copper footprint*	*DSL*	*FTTP*	*FTTC*	*WiMAX (fixed wireless)*	*HSPA*	*HSPA+*
Algeria	85%	70%	0%	0%	13%	0%	0%
Egypt	99%	99%	0%	0%	0%	87%	87%
Gaza/ West Bank	90%	72%	0%	0%	0%	0%	0%
Israel	100%	99%	0%	50%	0%	95%	0%
Jordan	95%	70%	0%	0%	50%	60%	60%
Lebanon	90%	70%	0%	0%	63%	0%	0%
Morocco	30%	30%	0%	0%	10%	50%	10%
Syria	75%	40%	0%	0%	0%	60%	10%
Tunisia	99%	99%	0%	0%	50%	70%	70%

Table 5.6: Coverage of existing networks in FEMIP countries in 2010 [Source: Analysys Mason, GlobalComms, and operators]

The results of our revenue-density analysis and our penetration and revenue forecasts are shown in Table 5.7. The result for each technology shows the maximum commercially viable population coverage, subject to the operator obtaining an IRR of at least 15%. For example, it would be commercially viable for an operator to deploy WiMAX in Morocco to up to 55% of the population.

Country	*DSL*	*FTTP*	*FTTC*	*WiMAX (fixed wireless)*	*HSPA*	*HSPA+*	*LTE*
Algeria	75%	8%	12%	67%	63%	59%	53%
Egypt	93%	8%	25%	68%	82%	82%	74%
Gaza/ West Bank	90% due to the limitations of the existing copper network	26%	62%	95%	84%	80%	78%
Israel	100%	86%	96%	99%	96%	96%	96%
Jordan	95%	47%	74%	91%	74%	69%	68%
Lebanon	90% due to the limitations of the existing copper network	44%	82%	100%	86%	83%	81%
Morocco	30% due to the limitations of the existing copper network	1%	1%	55%	59%	59%	56%
Syria	66%	9%	10%	53%	55%	54%	48%
Tunisia	84%	7%	29%	75%	57%	57%	51%

Table 5.7: Commercially viable coverage by technology based on demand forecasts [Source: Analysys Mason]

It should be noted that this analysis is done per technology on a standalone basis and does not take into account the existing coverage of each technology. The results of our analysis show that Israel has the highest commercially viable coverage for all technologies. This is mainly due to the following factors: very high density, small area, high current and forecasted penetration of mobile and fixed broadband, and high fixed and mobile broadband ARPU. In contrast, Morocco has the lowest commercially viable coverage for fixed technologies, and one of the lowest commercially viable coverage for mobile technologies. This is mainly due to the following factors: very low density, big area, low current and forecasted penetration of fixed broadband, and low fixed and mobile broadband ARPU.

5.4 Assessment of different cost types for a nationwide roll-out of terrestrial broadband technologies

Table 5.8 below illustrates the costs needed to roll out DSL and FTTC technologies to 50% of the population and to reach coverage of the copper network footprint in all FEMIP countries, as we assume that operators will not expand their existing copper networks. Therefore, DSL and FTTC technologies cannot be rolled out beyond the current reach of the existing copper network.

Costs for rolling out DSL to the copper footprint are high in Syria and Algeria due to the limited coverage of DSL and the topology of the country (i.e. large countries in terms of land area and low population densities). Regarding FTTC, costs are higher in Algeria and Egypt as they are the largest countries in terms of area and population. On the other hand, costs are lower in small and very densely populated countries such as Lebanon, Gaza/West Bank and Morocco due to the limited footprint of the copper network (i.e. 30% of households).

Country	*Copper coverage (as % of households)*	*DSL coverage (as % of households)*	*DSL costs to 50% of population (EUR mn)*	*DSL costs to copper coverage (EUR mn)*	*FTTC costs to 50% of population (EUR mn)*	*FTTC costs to copper coverage (EUR mn)*
Algeria	85%	70%	N/A*	208	1219	3143
Egypt	99%	99%	N/A	N/A	1493	6014
Gaza/ West Bank	90%	72%	N/A	10	52	140
Israel	100%	99%	N/A	12	N/A [18]	733
Jordan	95%	70%	N/A	61	157	523
Lebanon	90%	70%	N/A	20	88	269
Morocco	30%	30%	N/A	N/A	N/A	188
Syria	75%	40%	27	124	480	1002
Tunisia	99%	99%	NA	NA	432	1788

Table 5.8: Costs of rolling out DSL and FTTC technologies to 50% of the population and costs to reach full coverage of the copper footprint [Source: Analysys Mason]
**N/A = Not applicable*

[18] FTTC covers 50% of population at the end of 2010 in Israel

Figure 5.9 to Figure 5.13 below illustrate the costs needed to roll out the different technologies (WiMAX, HSPA, HSPA+, LTE and FTTP) to 50% of the population (i.e. costs for 50%), to 100% of the population (i.e. costs for full coverage), and to the adjusted coverage of 100% of the population (i.e. costs for 'adjusted' full coverage) in all FEMIP countries. Note that:

- the costs of rolling out the different technologies are the highest in those countries with a large land area and low population density, such as Algeria, Morocco and Egypt
- the costs of rolling out the different technologies are the lowest in those countries with a small land area and high population density, such as Gaza/West Bank, Lebanon and Israel
- the costs associated with rolling out the different technologies to reach full coverage represent a large share of the total costs (between 20% and 75%) required to cover less than 3% of the population in Algeria, Egypt and Morocco (the largest countries in terms of land area).

It should be noted that the results take into account the coverage of the existing technologies at the end of 2010. For example, HSPA coverage in Morocco stood at 50% of the population in 2010. This means that the costs required to achieve 50% population coverage are zero, whilst the costs required to achieve 100% population coverage includes covering 50% of the population (from 50% to 100% of the population and excluding the 50% of the population living in the most dense areas).

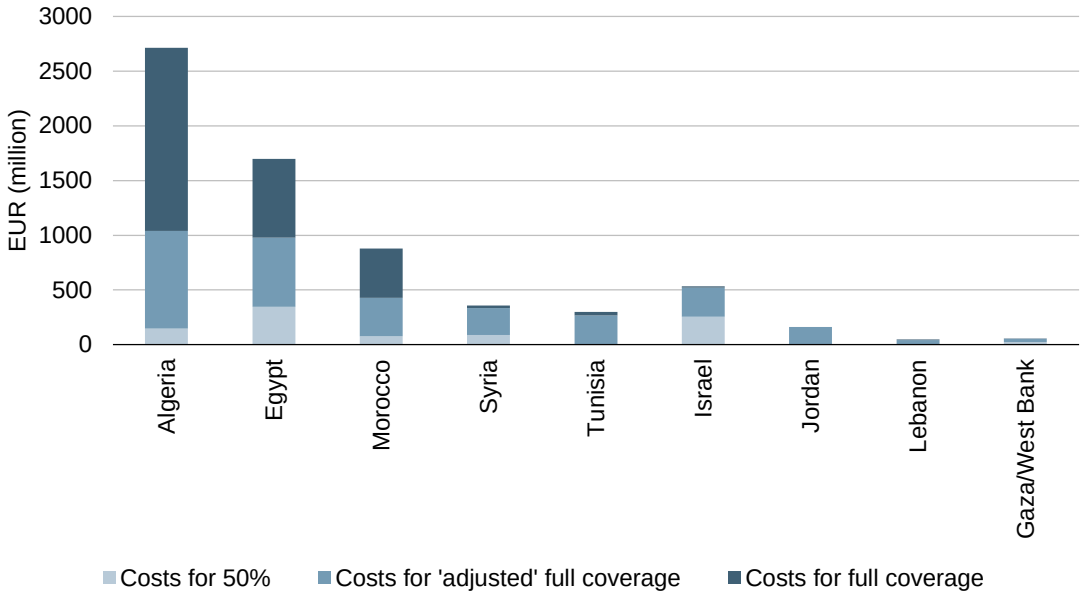

Figure 5.9: Costs of rolling out WiMAX technology to 50% of the population, 'adjusted' full coverage and full coverage [Source: Analysys Mason]
Note: As a reminder, the 'adjusted full coverage' corresponds to the 2G actual coverage in each country (i.e. between 97% and 99.9%)

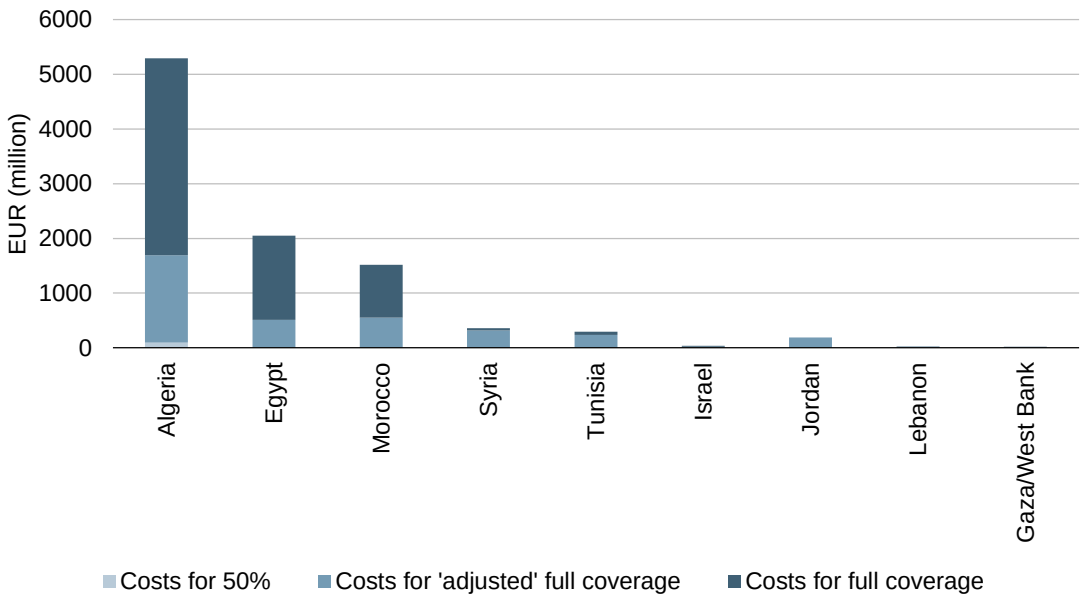

Figure 5.10: *Costs of rolling out HSPA technology to 50% of the population, 'adjusted' full coverage and full coverage [Source: Analysys Mason]*
Note: As a reminder, the 'adjusted full coverage' corresponds to the 2G actual coverage in each country (i.e. between 97% and 99.9%)

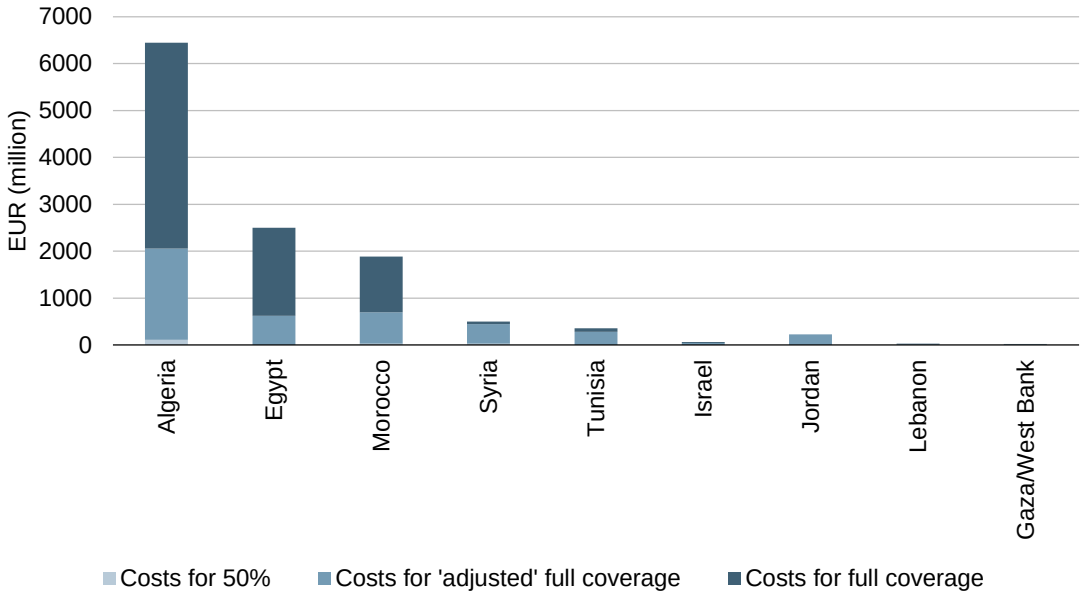

Figure 5.11: *Costs of rolling out HSPA+ technology to 50% of the population, 'adjusted' full coverage and full coverage [Source: Analysys Mason]*
Note: As a reminder, the 'adjusted full coverage' corresponds to the 2G actual coverage in each country (i.e. between 97% and 99.9%)

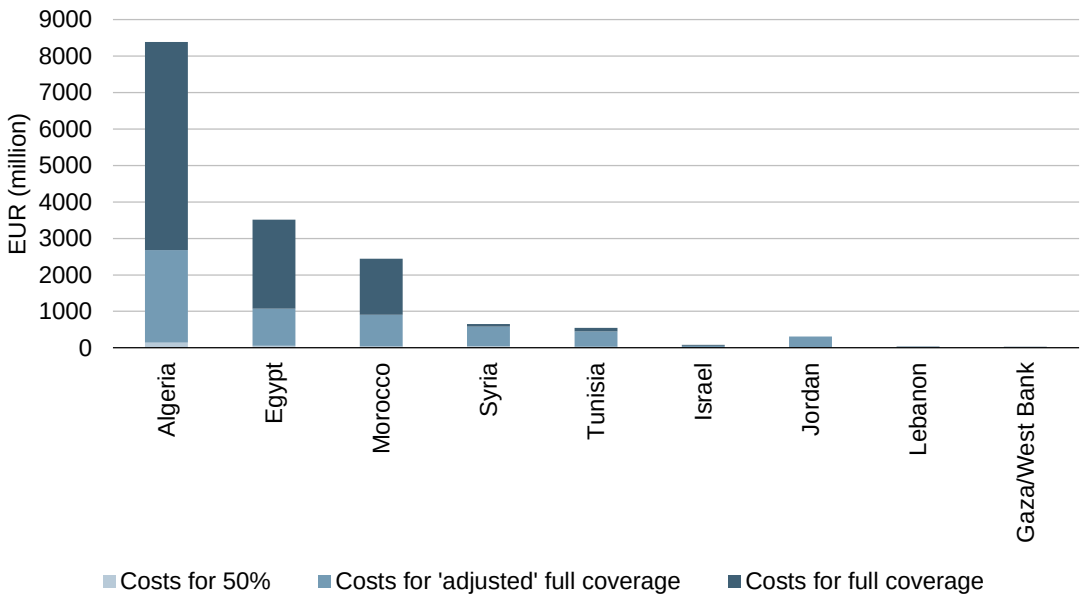

Figure 5.12: *Costs of rolling out LTE technology to 50% of the population, 'adjusted' full coverage and full coverage [Source: Analysys Mason]*
Note: As a reminder, the 'adjusted full coverage' corresponds to the 2G actual coverage in each country (i.e. between 97% and 99.9%)

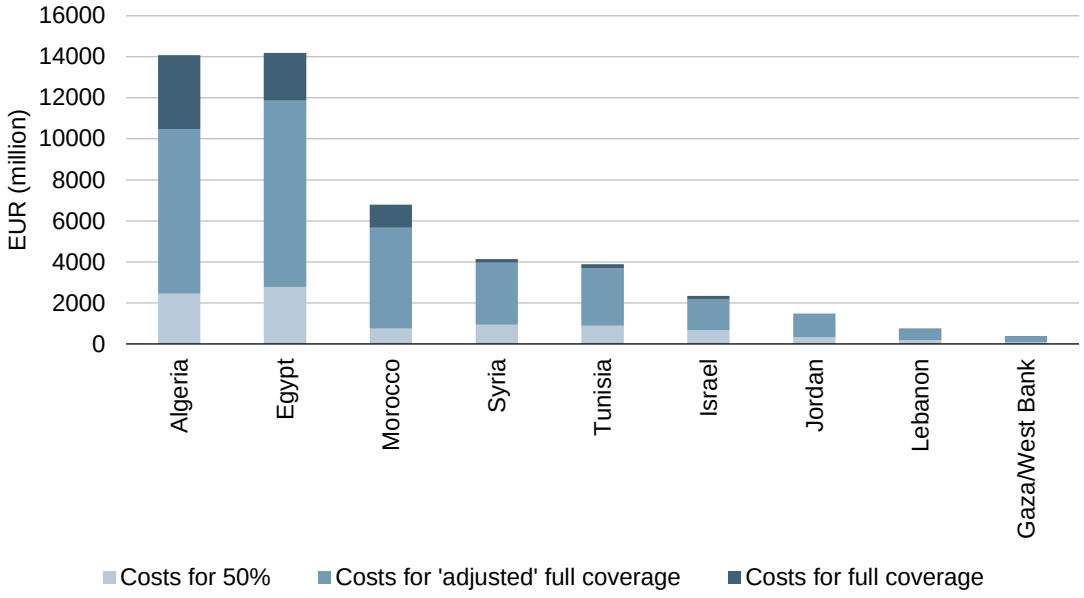

Figure 5.13: *Costs of rolling out FTTP technology to 50% of the population, 'adjusted' full coverage and full coverage [Source: Analysys Mason]*
Note: As a reminder, the 'adjusted full coverage' corresponds to the 2G actual coverage in each country (i.e. between 97% and 99.9%)

Several public sources provide additional benchmarking points for the costs of rolling out FTTH, as shown below in Table 5.14. The unit cost of rolling out FTTH varies significantly from EUR850 to EUR2900 per household passed. This can be explained by the different population densities and size of the country. We have also added the results of our analysis for the FEMIP countries which provides a cost range per household between EUR500 and EUR1700.

Country	*Cost of rolling out FTTH per household passed*	*Cost of rolling out FTTH per population*	*Cost as % of telecoms investment for 2009*
USA[19]	1750	665	431%
France[20]	1000	435	460%
France[21]	850	372	395%
Germany[22]	2900	1419	1932%
UK[23]	1000	441	477%
Netherlands[24]	1900	840	n.a
Algeria	1697	343	2194%[25]
Egypt	541	152	763%[26]
Gaza/West Bank	503	82	n.a
Israel	911	271	n.a
Jordan	1000	193	853%
Lebanon	866	164	n.a
Morocco	843	186	1379%
Syria	920	154	2438%
Tunisia	1257	340	2060%

Table 5.14: Benchmark of costs associated with rolling out FTTH to 100% of the population [Source: Public sources, Analysys Mason, ITU, Euromonitor]

It should be noted that these figures from public sources are estimates (generally provided by regulators and public bodies to inform the industry of upcoming investment levels) as there are few real-life examples of large-scale FTTH deployments.

In general, the cost per household for the FEMIP countries is lower than Western European countries and USA mainly due to lower cost of labour. However, other factors would increase these costs as some investments are needed to upgrade exchanges and the fixed network due to lower quality compared to Western European fixed networks. However, we note the following:

19 Federal Communications Commission (2009)

20 Autorité de Régulation des Communications Electroniques et des Postes (2010)

21 Autorité de Régulation des Communications Electroniques et des Postes (2011)

22 WIK (2009)

23 Broadband Stakeholder Group (2008)

24 JP Morgan (2011)

25 Data for Algeria is for 2007

26 Data for Egypt is for 2008

- The costs per household for Morocco, Israel, Jordan, Lebanon, Syria and Tunisia are comparable to the costs for France and UK.

- The costs per household for Egypt and Gaza/ West Bank are low compared to other FEMIP countries as they have the lowest GDP per capita among these countries (lower labour costs are lower). In addition, Gaza/West Bank is a very small country with a very high density (over 650 inhabitants per square kilometre), and the population in Egypt is highly concentrated next to the Nile (90% of the population lives over less than 8% of the country's area).

- The costs per household in Algeria are high compared to other FEMIP countries, and comparable to the costs for the Netherlands and the USA. This is mainly due to the high costs in getting to the large areas of low population density

Fibre roll-out in most of the FEMIP countries seems to be possible due mainly to the relative low cost of labour, which gives a lower cost per home passed when compared to most European countries. However, this is not always the case: Algeria is the largest country in Africa in terms of land area and, away from the coast, it is very sparsely populated; this means that the costs of covering the entire country with fibre will be very high. Also, the cost of labour in Israel is comparable to European levels. The low GDP per capita in most of the FEMIP countries leads to low broadband penetration and/or low ARPU, and this factor would likely limit the deployment of fibre in most of these countries.

If we look at the costs of rolling out FTTH to 100% of households as a proportion of annual telecoms sector investment in these countries, we find that in benchmark countries these costs are around 4 to 5 times the annual investments (except for Germany where this factor is very much higher). In contrast, for most FEMIP countries costs are around 10 to 20 times annual investments. This could be explained by the lower level of investments in emerging economies as compared to developed countries due to the lower level of competition and lower end user revenues.

Figure 5.15 and Figure 5.16 overleaf show the evolution of costs as coverage increases for LTE and FTTP technologies in all FEMIP countries to reach 100% of the population. The level of costs required to cover the last 5–10% of the population increases significantly. In addition, the cumulative cost curve shows a steep increase when coverage reaches the last few percentages of the population, which in our opinion would be the key market for satellite.

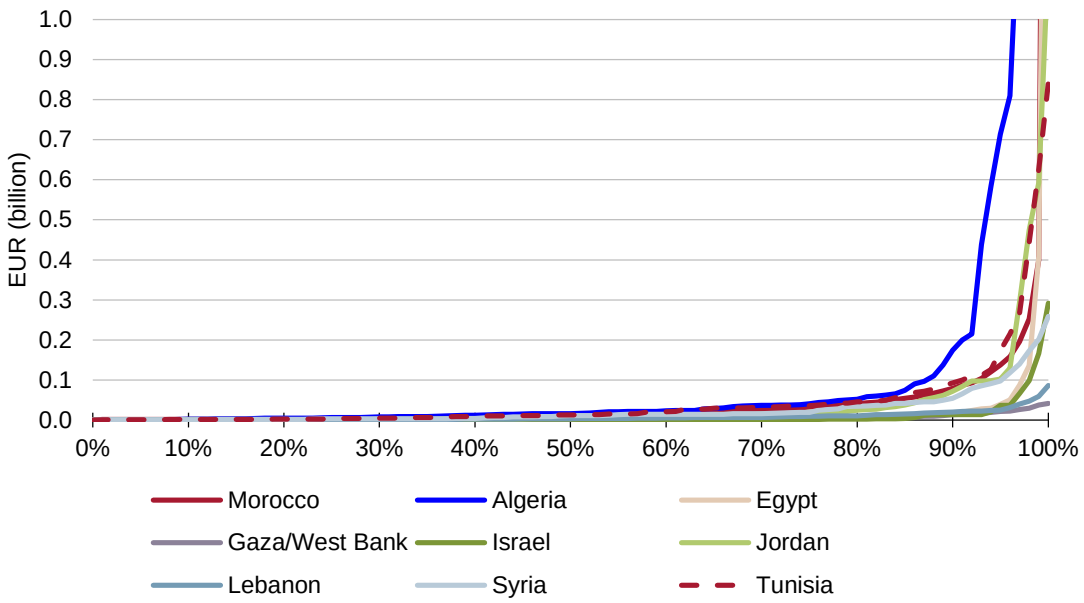

Figure 5.15: Evolution of total coverage costs for LTE [Source: Analysys Mason]

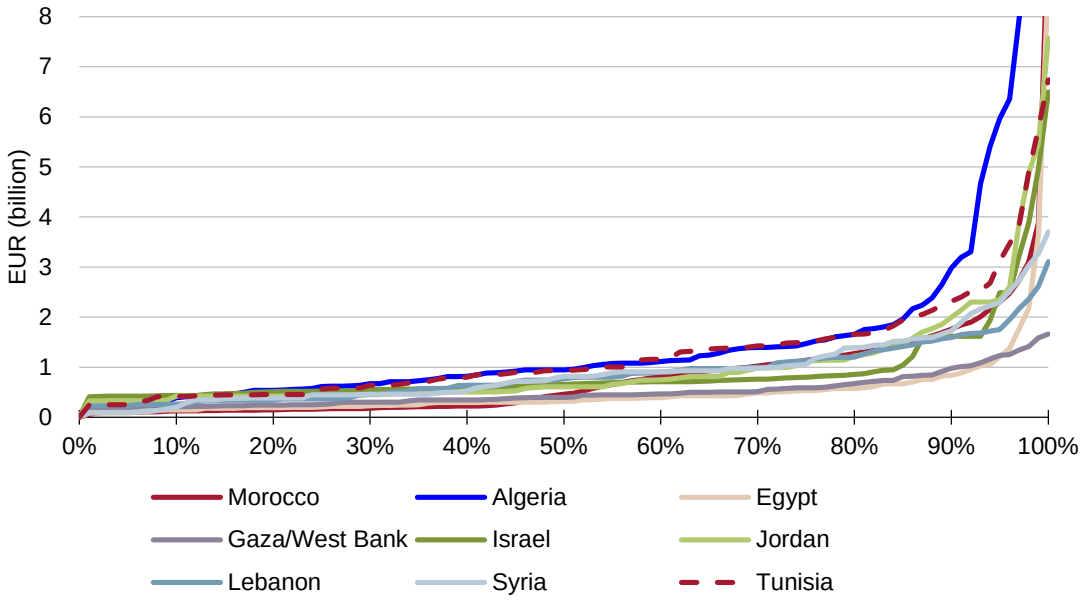

Figure 5.16: Evolution of total coverage costs for FTTP [Source: Analysys Mason]

5.5 Assessment of coverage and costs for a satellite solution

The FEMIP countries are currently covered by satellite using the Ku-band. In our assessment we consider the provision of broadband services over satellite using the next generation Ka-band. The Tooway offering over current generation Ka-band today provides a headline download speed of 10Mbit/s, and is capable technically of delivering higher speeds. In addition, in good weather conditions (i.e. with no rain fade), satellite is technically capable of delivering the headline download speed to end users. However, in reality, satellite operators may choose to offer lower speeds as the economics may be more favourable given the essentially fixed cost base of satellite.

Regarding satellite technology, and based on the demand forecast for satellite broadband in the FEMIP countries, we believe that one satellite in the Ka-band would be enough to serve all FEMIP countries and to cope with the demand expected, which is forecast at around 234 000 subscribers by 2020. The costs of this satellite are shared among all FEMIP countries on the basis of a simple allocation of costs by country based on its land area and number of households (50% on each parameter), as presented in Table 5.17 and in Figure 5.18.

Country	*Area (square km)*	*Households in 2020 (million)*	*Contribution of satellite costs (%)*	*Satellite costs allocated (EUR million)*
Algeria	2 381 741	8 299 600	34%	121.4
Egypt	995 841	26 202 100	34%	124.0
Gaza/West Bank	6010	756 044	1%	2.7
Israel	22 070	2 574 200	3%	9.2
Jordan	88 794	1 493 600	2%	8.3
Lebanon	10 396	874 100	1%	3.2
Morocco	687 184	8 048 600	15%	53.2
Syria	185 180	4 498 000	6%	21.9
Tunisia	154 530	3 095 900	4%	16.1
FEMIP region	**4 531 746**	**55 842 144**	**100%**	**360**

Table 5.17: Allocation of satellite costs by FEMIP country [Source: Analysys Mason]

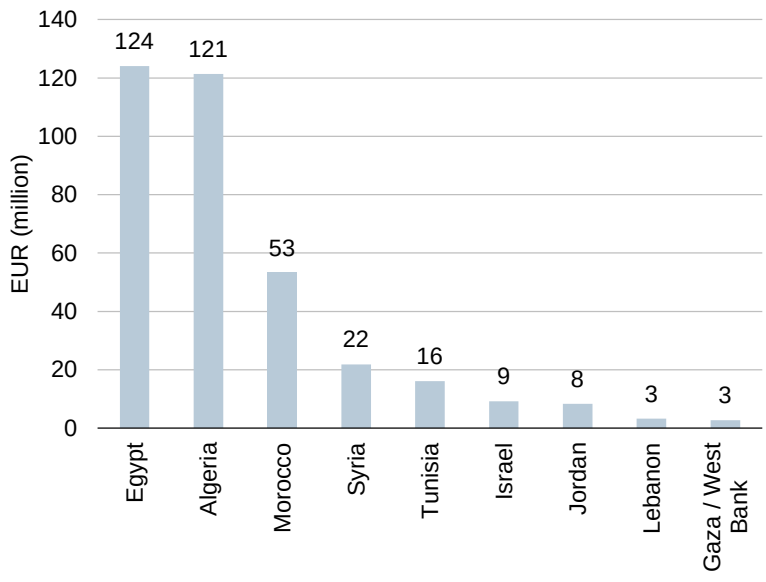

Figure 5.18: Satellite cost for FEMIP countries [Source: Analysys Mason]

5.6 Costs for different scenarios

Finally, we have analysed the most economically viable option to provide access to broadband services in each FEMIP country across three different scenarios.

We have identified the technologies that could potentially achieve the coverage targets set for each scenario.

Scenario	*2015 target*		*2020 target*	
	Minimum real download speed (Mbit/s)	*Technologies that could be used to achieve targets*	*Minimum real download speed (Mbit/s)*	*Technologies that could be used to achieve targets*
Scenario 1	1Mbit/s	All technologies except DSL (HSPA)	1Mbit/s	All technologies except DSL (HSPA and satellite)
Scenario 2	4Mbit/s	FTTP, FTTC, WiMAX, HSPA+, LTE and satellite	10Mbit/s	FTTP, FTTC, LTE and satellite
Scenario 3	10Mbit/s	FTTP, FTTC, LTE and satellite	30Mbit/s	FTTP, FTTC and satellite
Scenario 1 for Israel	4Mbit/s	FTTP, FTTC, WiMAX, HSPA+, LTE and satellite	4 Mbit/s	FTTP, FTTC, WiMAX, HSPA+, LTE and satellite
Scenario 2 for Israel	10Mbit/s	FTTP, FTTC, LTE and satellite	10 Mbit/s	FTTP, FTTC, LTE and satellite
Scenario 3 for Israel	30 Mbit/s	FTTP, FTTC and satellite	30 Mbit/s	FTTP, FTTC and satellite

Table 5.19: Coverage scenarios used in the cost forecasts [Source: Analysys Mason]

It should be noted that DSL technology does not allow all the objectives of scenarios 1 and 2 (i.e. 100% coverage with a minimum real download speed of 1, 4 and 10Mbit/s) to be achieved. This is mainly due to the limitation of line lengths, and hence DSL subscribers will have access to different speeds depending on their location (i.e. the further a subscriber is from the telephone exchange, the lower the speed they can get). For example, it is assumed that a small share of households (i.e. between 5% and 10%) will not be able to get a download speed of 1Mbit/s. Therefore, DSL has been excluded from our scenario assessment as another technology would need to be rolled out simultaneously to achieve 100% population coverage for any given download speed that DSL can achieve.

For each of the three scenarios, we show the lowest cost required to achieve the targets set out for each scenario. However, other technology combinations are possible, which, even though they may be more capital intensive, operators may choose to implement them.

We also assume that the threshold for terrestrial coverage is the coverage of 2G networks, and that satellite broadband will be used to cover the remaining percentages of the population not covered by 2G.[27]

The cost forecast in 2020 for scenario 1 is summarised below in Figure 5.20. This corresponds to a target of 1Mbit/s to 100% of the population for all FEMIP countries except Israel, which has a target of 4Mbit/s for 100% of the population. HSPA and WiMAX are the most cost-effective technologies capable of achieving these targets in all FEMIP countries except Israel, where HSPA+ is used to achieve the targets.

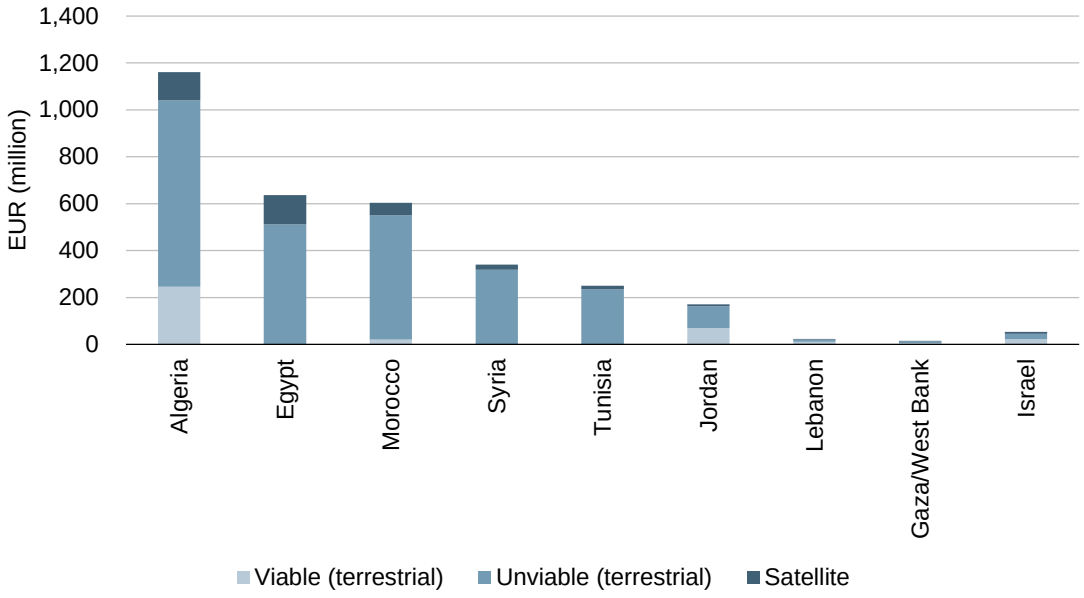

Figure 5.20: Costs forecast to reach 2020 targets for scenario 1 [Source: Analysys Mason]
Note: We have not made assumptions on what percentage of the costs required to deploy satellite broadband would come from public funding

The cost forecast in 2020 for scenario 2 is summarised below in Figure 5.21 overleaf. This corresponds to a target of 4Mbit/s to 100% of the population and 10Mbit/s to 50% of the population in all FEMIP countries except Israel, where the target is set at 10Mbit/s for 100% of the population. HSPA+ and LTE were the most cost-effective technologies capable of achieving these targets.

[27] It should be noted that if a satellite is launched, it is assumed that 100% of the population will be covered. Therefore, potential satellite subscribers could also come from different areas covered by other technologies.

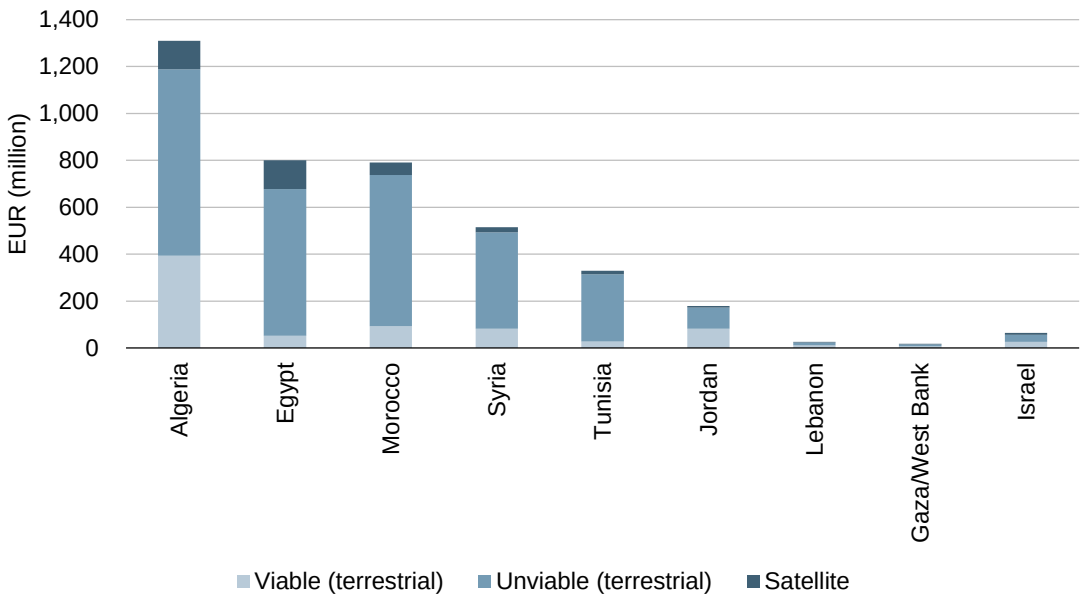

Figure 5.21: Costs forecast to reach 2020 targets for scenario 2 [Source: Analysys Mason]
Note: We have not made assumptions on what percentage of the costs required to deploy satellite broadband would come from public funding

The cost forecast in 2020 for scenario 3 is summarised below in Figure 5.22. This corresponds to a target of 10Mbit/s to 100% of the population and 30Mbit/s to 50% of the population in all FEMIP countries except Israel, where the target is set at 30Mbit/s for 100% of the population. LTE and FTTC were the most cost-effective technologies capable of achieving these targets.

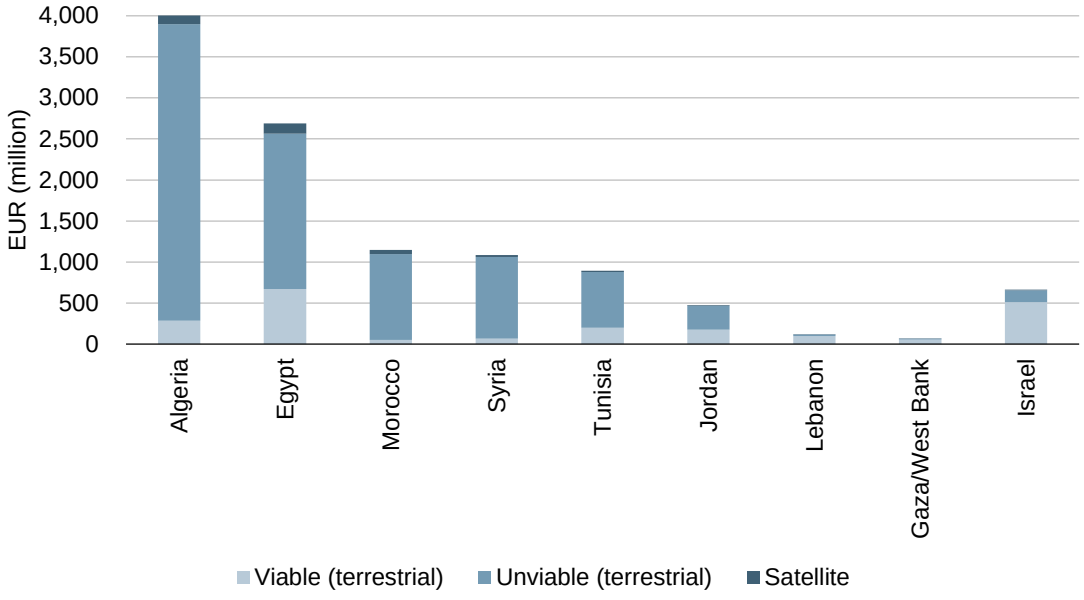

Figure 5.22: Costs forecast to reach 2020 targets for scenario 3 [Source: Analysys Mason]
Note: We have not made assumptions on what percentage of the costs required to deploy satellite broadband would come from public funding

The results by scenario for each FEMIP country for 2015 and 2020 are presented below in Table 5.23 and Table 5.24, respectively:

Country	*Scenario 1*	*Scenario 2*	*Scenario 3*
Algeria	0	147	148
Egypt	0	0	53
Morocco	0	31	37
Syria	0	33	45
Tunisia	0	0	28
Jordan	0	0	9
Lebanon	0	0	3
Gaza/ West Bank	3	2	2
Israel	0	0	0
Total	**3**	**213**	**325**

Table 5.23: Results for the different scenarios to reach the 2015 targets in EUR million [Source: Analysys Mason]

Country	*Scenario 1*	*Scenario 2*	*Scenario 3*
Algeria	1161	1309	4018
Egypt	636	801	2689
Morocco	604	791	1149
Syria	340	515	1086
Tunisia	251	330	896
Jordan	171	180	478
Lebanon	24	30	122
Gaza/ West Bank	16	19	73
Israel	54	65	665
Total	**3257**	**4040**	**11176**

Table 5.24: Results for the different scenarios to reach the 2020 targets in EUR million [Source: Analysys Mason]

The costs to achieve the targets in each scenario are not extremely high and therefore the different scenario targets seem achievable in most of the countries. This is mainly due to the high reliance on wireless technologies, coupled with the fact that the scenario targets are lower than the ones in the DAE.

However, this assessment may be impacted by a number of factors:

- **The evolution of the political situation** –The political instability facing most FEMIP countries may hinder the inflow of foreign investment, including in the telecoms sector, which may postpone or even put at risk any national government plans on broadband development.
- **The evolution of the economic context and the reduction of poverty** – The economic development in FEMIP countries based on offshoring, petrol or tourism may reduce poverty,

increase access to electricity and ultimately contribute to increasing the addressable market for broadband.

- **The availability of spectrum** – Because mobile broadband is key to the development of broadband in most FEMIP countries, it is crucial that a large amount of spectrum be made available to support the launch of LTE. In particular, the re-use of digital dividend spectrum may be key to the development of broadband as it would lower the costs for LTE roll-out.

- **The review of the regulatory and legal context** – There are a number of issues surrounding the current legal and regulatory context that hinder effective competition in most of the FEMIP markets. Further liberalisation of the telecoms market in some FEMIP countries, coupled with a well-developed national broadband plan and the introduction of full LLU may further contribute to promote broadband growth and stimulate investment in broadband infrastructures.

- **The continuation and extension or creation of an efficient universal service scheme** – In order to cover remote areas with broadband and allow all citizens to benefit from broadband access, it is important that a universal service scheme be extended or implemented in the next few years.

In any case, from a government's point of view, subsidies for a large-scale roll-out of broadband infrastructure needs to be assessed in view of the socio-economic benefits that broadband may generate.

6 Analysis of the socio-economic impact of broadband services

Despite a large number of academics and others researching the socio-economic impact of broadband services, there still does not appear to be a strong consensus on the quantification of the benefits of broadband, although several suggest the impact on GDP to be of the order of 1% for a ten percentage-point increase in broadband penetration of the population.

For the purposes of this work, we have assumed that broadband can have a maximum potential impact of 1% of GDP for a ten percentage-point increase in broadband penetration of the population.

From a market-development perspective, it is instructive to compare the potential benefits of broadband in the unviable area with the costs of deployment in the unviable area. This kind of assessment is done by governments when considering the case for intervention in the broadband market.

From our economic viability analysis (see Section 5) we have calculated the size and cost of deployment in these unviable areas. We then estimate the potential GDP impact in the unviable area, adjusting for the fact that GDP per head in the unviable will be significantly lower than the national average.

It is not possible to accurately correlate the unviable area with the geographical distribution of GDP. Hence we have made an assumption that, firstly, GDP in the unviable area is the national GDP scaled down by the number of households in the unviable area, and secondly, further scaled down by a factor of 50%[28], reflecting the fact that some industry sectors contribute more to the "rural" economy, e.g. agriculture and mining, than others, e.g. services.

We then calculate an economic 'payback' period, i.e. the number of years it takes for the cumulative benefits to exceed the costs of deployment in the unviable areas.

More background and details on the methodology used is provided in Annex A.

The reminder of this section provides an analysis of the socio-economic impact of broadband services in FEMIP countries. It is laid out as follows:

- Section 6.1 quantifies the direct economic benefits and associated costs in unviable areas in FEMIP countries
- Section 6.2 summarises the indirect (non-monetary) benefits of broadband.

[28] The factor of 50% is an assumption.

6.1 Direct economic benefits and associated costs in unviable areas in FEMIP countries

Figure 6.1 shows the estimated direct economic benefits of broadband in FEMIP countries. The impact is high in Israel, Algeria and Egypt at around EUR1028 million, EUR805 million and EUR791 million per annum, respectively, whereas it is comparably modest in Gaza/West Bank, Jordan and Lebanon at EUR12 million, EUR118 million and EUR176 million per annum, respectively.

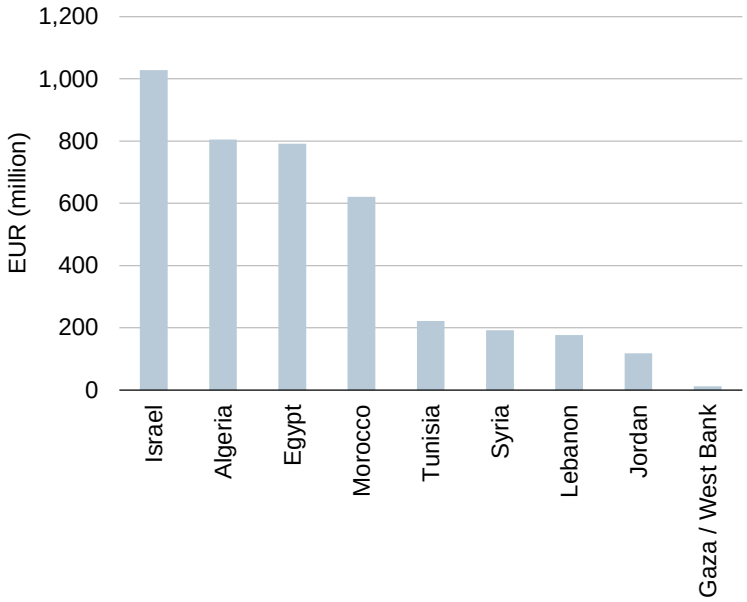

Figure 6.1: GDP impact per annum in FEMIP countries [Source: Analysys Mason]

We have also estimated the cost of providing coverage in the unviable areas in FEMIP countries (adjusting for the 'very remote', i.e. the final few percentages of the population that live in the most remote areas, based on the 2G coverage and are removed from our analysis as we consider that the very remote areas to be served by satellite), using HSPA technology as an illustration as well as the associated benefits per annum, resulting in a pay-back period[29] as shown in Figure 6.2.

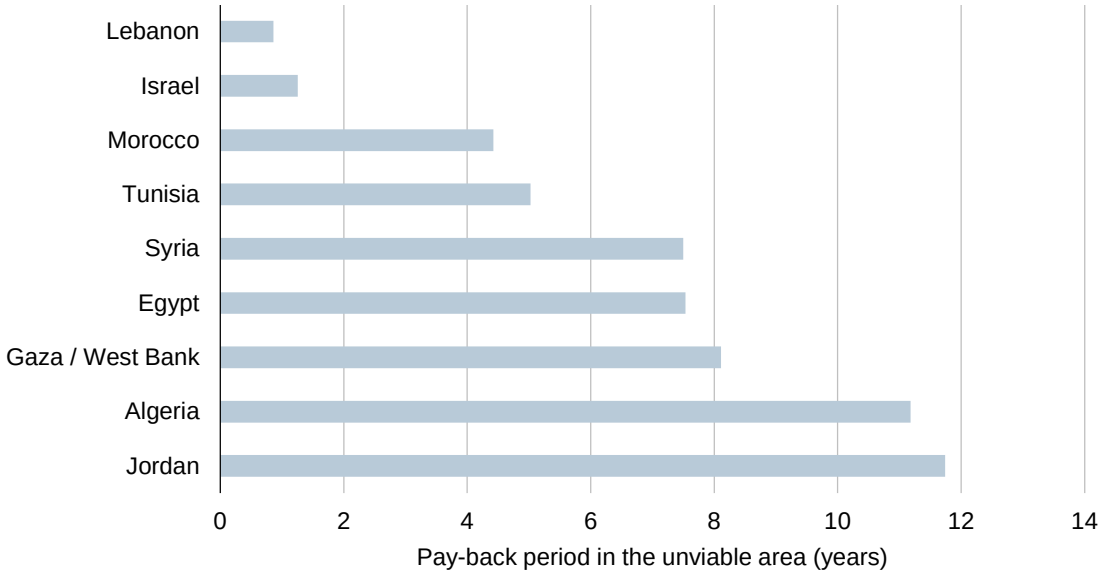

Figure 6.2: Economic impact assessment across FEMIP countries using HSPA technology [Source: Analysys Mason]

29 Pay-back is calculated on non-discounted terms.

The pay-back period for fibre technologies (FTTC and FTTP) would be significantly longer than those shown above for all countries studied because the costs are so much higher and there is little evidence available at present to suggest that the economic benefits of fibre-based services significantly exceed those from services delivered using other technologies, although this may change in the long term.

6.2 Indirect (non-monetary) benefits of broadband

'Pillar VII: ICT for Social Challenges' of the European Commission's (EC) Digital Agenda for Europe (DAE) states the following:

> "Digital technologies have enormous potential to benefit our everyday lives and tackle social challenges. The Digital Agenda focuses on ICTs capability to reduce energy consumption, support ageing citizens' lives, revolutionises health services and deliver better public services. ICTs can also drive forward the digitisation of Europe's cultural heritage providing online access for all."

It is implicit within much of the DAE that the EC believes there to be significant indirect (non-monetary) as well as direct economic benefits for Member States, and the same logic would hold true for FEMIP countries.

It is difficult to accurately measure or quantify the non-monetary benefits of broadband access. However, the Broadband Stakeholder Group (BSG) (an industry-government forum in the UK tackling strategic issues across the converging broadband value chain) commissioned a study[30] from Plum Consulting on the economic value of next-generation broadband. The study identifies non-monetary benefits, including environmental (reduced greenhouse gas emissions), reduced congestion and enhanced competition. The Plum Consulting study classifies the non-monetary benefits under various headings:

- educating citizens
- informing democracy
- cultural understanding
- social inclusion.

[30] Plum Consulting for the BSG (June 2008), *A Framework for Evaluating the Value of Next Generation Broadband*. Available at http://www.broadbanduk.org/component/option,com_docman/task,doc_view/gid,1009/Itemid,63/.

Table 6.3 below is adapted from the findings in relation to wider economic and social benefits.

Wider economic benefits	*Wider social benefits*
Externality	**Educated citizens**
(+) for reduced traffic congestion and greenhouse gas emissions once built, (-) during network build	(++) in relation to lifelong learning, health information
Competition	**Informed democracy & freedom of expression** (++)
Neutral for telecoms market	**Cultural understanding** (+)
(++) for wider economy	**Belonging to a community and inclusion**
	(++) large in relation to inclusion for disabled and hard of hearing
	Social capital, resilience and trust (++)

Table 6.3: Indicative estimates of incremental benefits; (+) is a benefit, (-) is a cost; number of (+)s indicates relative magnitude of the benefit [Source: Based on the framework developed by Consulting for the BSG]

It seems reasonable to believe that e-health (tele-care, symptom monitoring, specialist consultation) and e-learning (which can reduce the distance impact of highly distributed communities) can deliver significant benefits to certain groups of society who have to date been excluded.

We have identified the socio-economic impact of broadband on developed countries (i.e. Australia, the USA and European countries), which in principle could also apply to FEMIP countries. These are presented in the table below. However, it should be noted that the specific characteristics of the FEMIP countries need to be taken into account when evaluating the socio-economic impact of broadband.

Benefit category	*Main impact*
Finance and income	• According to the Columbia Telecommunication Corporation (2009), direct jobs related to the 'building and manufacture of broadband networks' pay 42% more than the average for manufacturing jobs in other sectors. IT jobs, on average, pay 85% more than other private-sector jobs. • If the 1.6 million children in the UK who live in families which do not use the Internet got online at home, their educational improvement could boost their total lifetime earnings by over GBP10 billion (EUR11.68 billion in July 2009) (PricewaterhouseCoopers, 2009).[31] • UK households which are offline are missing out on savings of GBP560 per annum (EUR654 in July 2009) from shopping and paying bills online.

[31] PricewaterhouseCoopers (2009), *Champion for digital inclusion: The economic case for digital inclusion*. Available at http://raceonline2012.org/sites/default/files/resources/pwc_report.pdf.

Benefit category	*Main impact*
Education and skills	• In the USA, the estimated effect of a 5% increase in capital spending resulting from second-generation broadband deployment would represent an increase of USD4.3 billion (EUR3.5 billion in July 2010) in GDP and 43 871 jobs in education services (Crandall and Singer, 2010). • E-learning courses are considered to be 50% less expensive than traditional face-to-face courses. • **Such initiatives could help to decrease the illiteracy rate which is high in most of the FEMIP countries which is between 8% and 41% except for Israel and Jordan**
Health and care	• Litan (2008) estimates that the net total benefit from telemonitoring is in the order of USD44 billion per annum (EUR27.89 billion in July 2008) for an average implementation cost of USD1.75 billion per annum (EUR1.11 billion in July 2008). • Connected Nation (2008) reports that if every state were to develop initiatives similar to ConnectKentucky, the USA could expect to reduce healthcare costs by USD662 million per annum (EUR420 million in July 2008). • Nooriafshar and Maraseni (2007) report that the introduction of teleconsulting in rural Queensland (Australia) saved AUD125 (EUR79 in July 2007) per visit avoided as opposed to sending patients to the nearest city. • Darkins et al. (2009)[32] found that reductions in hospitalisations due to telehealth were greater in remote areas (with a 50% decrease in the number of bed-days) compared to urban areas (a 29% reduction in the number of bed-days). • A study undertaken by Access Economics in Australia on behalf of the Department of Broadband, Communications and the Digital Economy in 2010 showed that a weekly telenurse visit to patients with congestive heart failure resulted in 84% lower readmission rates and also had significantly fewer emergency visits. • Growth in healthcare and social assistance sectors average 7.4% due to an increase in broadband availability (Kolko, 2010).[33] • **All these initiatives could help to increase the life expectancy, decrease the maternal mortality ratio, decrease the under-five mortality rate which are high in most of the FEMIP countries except Israel.**
Environment	• A 7% increase in adoption and use of broadband could achieve savings of USD18.2 million (EUR11.54 million in July 2008) in carbon credits. • In 2007, 17% of broadband users regularly used computers to work at home for their employers (Dutz et al., 2009);[34] this compared to 8% of dial-up users. • Broadband-enabled smart-grid services and devices could result in over USD1.2 trillion (EUR850 billion in July 2009) in gross energy savings. According to Davidson et al. (2009),[35] this approach is expected to reduce end-user energy consumption in the USA in 2020 by roughly 23% of projected demand.

32 Darkins, A. et al. (2009), 'Care Coordination/Home Telehealth: The Systematic Implementation of Health Informatics, Home Telehealth, and Disease Management to Support the Care of Veteran Patients with Chronic Conditions', *Telemedicine and eHealth,* Vol. (10), pp.1118–26. Available at http://www.liebertonline.com/doi/pdf/10.1089/tmj.2008.0021.

33 Kolko, J. (2010), Does Broadband Boost Local Economic Development? Available at http://www.ppic.org/content/pubs/report/R_110JKR.pdf.

34 Dutz, M. et al. (2009), *The Substantial Consumer Benefits Of Broadband Connectivity For U.S. Households*. Available at http://www.reelseo.com/wp-content/uploads/2009/07/CONSUMER_BENEFITS_OF_BROADBAND.pdf.

35 Davidson, C. M. et al. (2009), 'Broadband Adoption: Why It Matters And How It Works', *New York Law School's Media Law & Policy Journal*, Vol. 19, pp.14–56. Available at http://www.nyls.edu/user_files/1/3/4/30/84/88/Vol%2019.1%20BROADBAND%20Adoption.pdf.

Benefit category	*Main impact*
Employment and economy	• The annual average investment by broadband service providers in the USA over 2010–2015 is predicted to be USD30.4 billion (EUR24.7 billion in July 2010) in all broadband technologies, which corresponds to over 509 000 new jobs created. (Crandall and Singer, 2010). • Dutz et al. (2009)[36] estimate that the benefits of an increase in broadband speed from 100 times the typical historical speed of dial-up Internet service to 1000 times dial-up are in the order of USD6 billion (EUR4.26 billion in July 2009) per annum for existing home broadband users. • Broadband has contributed a very significant proportion – perhaps 10–20% – of productivity growth in some OECD countries (LECG Ltd, 2009).[37] • Data from 1999 to 2006 revealed that communities with new access to broadband experienced 6.4% higher employment growth on average than before they had broadband (Milano, 2010).[38] • The Internet is a catalyst for generating jobs. Among 4800 SMEs surveyed, broadband access and technology created 2.6 jobs for each lost to technology-related efficiencies (McKinsey, 2011).[39] • Kolko (2010) looked at broadband availability and economic activity throughout the USA between 1999 and 2006 and concluded that the boost to employment growth was 5.0%.[40] • The Internet in the USA employs 1.2 million people directly in jobs that build or maintain the infrastructure, facilitate its use, or conduct advertising and commerce on that infrastructure (Hamilton Consultants, 2009).[41] • **Such initiatives could help to decrease the unemployment rate in the FEMIP countries which is between 7% and 27%**
Well-being	• A key benefit from having access to broadband at home is the opportunity to save time. A prime example is increased teleworking, reducing the amount of time people spend on commuting to work. Connected Nation (2008) estimates that USD35.2 billion (EUR22.31 billion in July 2008) in value could be attributed to 3.8 billion more hours saved per annum by accessing broadband at home (if every state in the USA were to develop initiatives similar to ConnectKentucky).

Table 6.4: Impact of broadband for each of the benefits categories [Source: Analysys Mason]

36 Dutz, M. et al. (2009), The Substantial Consumer Benefits Of Broadband Connectivity For U.S. Households. Available at http://www.reelseo.com/wp-content/uploads/2009/07/CONSUMER_BENEFITS_OF_BROADBAND.pdf.

37 LECG Ltd (2009), *Economic Impact of Broadband: An Empirical Study*. http://www.connectivityscorecard.org/images/uploads/media/Report_BroadbandStudy_LECG_March6.pdf.

38 Milano, J. (2010), *Where Jobs Come From: The Role of Innovation, Investment and Infrastructure in Economic and Job Growth.* Available at http://www.dlc.org/documents/WhereJobsComeFrom.pdf.

39 McKinsey&Company (2011), *Measuring the Net's growth dividend*. Available at http://www.mckinseyquarterly.com/Measuring_the_Nets_growth_dividend_2812.

40 Kolko, J. (2010), *Does Broadband Boost Local Economic Development?* Available at http://www.ppic.org/content/pubs/report/R_110JKR.pdf.

41 Hamilton Consultants, Inc. (2009), *Economic Value of the Advertising-Supported Internet Ecosystem*. Available at http://www.iab.net/media/file/flyin09-deighton.pdf.

Finally, we highlight two references that support the idea that being online has a positive social impact:

> "Our analysis suggests that IT has an enabling and empowering role in people's lives, by increasing their sense of freedom and control, which has a positive impact on well-being or happiness."[42]
>
> "The biggest uplift in life satisfaction is achieved by people getting online for the first time. In their first couple of years online the difference that the internet makes in improving life satisfaction is most noted. The BCS [see above] research also found the biggest benefit to wellbeing from being online would be achieved by providing access to those on low incomes and with fewest educational qualifications."[43]

42 BCS Chartered Institute of IT survey reported May 2010. See http://www.bcs.org/.

43 UK Online Centres (April 2011), *The digital divide and happiness – a presentation of the evidence*.

7 Conclusion

This section provides our main conclusions from the study. It is laid out as follows:

- Section 7.1 presents the scenarios results
- Section 7.2 describes the main barriers to and opportunities for broadband development in the FEMIP countries
- Section 7.3 provides an assessment of the investment opportunities in the FEMIP countries

7.1 Scenarios results

Table 7.1 shows the costs required to achieve the coverage targets set for Scenario 1 in 2020: 100% population coverage with a minimum real download speed of 1Mbit/s for all countries except Israel, which has a target of 4Mbit/s.

The total costs required to achieve the Scenario 1 target ranges from EUR16 million in Gaza/West Bank to EUR1162 million in Algeria. We believe that a significant proportion of the costs required to deploy terrestrial technologies is likely to be unviable, with Lebanon, Israel, Gaza/West Bank and Jordan standing at the lower end of FEMIP countries at 43%, 49%, 54% and 57%, respectively, whereas in Egypt, Syria and Tunisia the proportion of unviable costs is expected to be 100% of total costs required to achieve the scenario targets.

	Viable terrestrial (EUR million)	*Unviable terrestrial (EUR million)*	*% of terrestrial unviable*	*Satellite (EUR million)*	*Cost per population/ household in 2020 (in EUR)*	*Costs as a % of telecoms sector investments in 2009*	*Total (EUR million)*
Algeria	246	794	76%	121	28/140	181%[44]	**1162**
Egypt	0	512	100%	124	7/24	34%[45]	**636**
Morocco	21	530	96%	53	17/75	123%	**604**
Syria	0	318	100%	22	13/76	200%	**340**
Tunisia	0	235	100%	16	22/81	133%	**251**
Jordan	70	93	57%	8	22/115	98%	**171**
Lebanon	12	9	43%	3	5/29	n/a	**24**
Gaza/ West Bank	6	7	54%	3	3/21	n/a	**16**
Israel	23	22	49%	9	6/21	n/a	**54**
Total	**378**	**2520**	**87%**	**359**	**14/58**	**n/a**	**3257**

Table 7.1: Results for Scenario 1 for all FEMIP countries to reach 2020 targets [Source: Analysys Mason]

Table 7.2 shows the costs required to achieve the coverage targets set for Scenario 2 in 2020: 100% and 50% population coverage with a minimum real download speed of 4Mbit/s and 10Mbit/s, respectively, for all countries except Israel, which has a target of 10Mbit/s for 100% population coverage.

[44] Data for Algeria is for 2007

[45] Data for Egypt is for 2008

The total costs required to achieve the Scenario 2 target ranges from EUR19 million in Gaza/West Bank to EUR1310 million in Algeria. We believe that a significant proportion of the costs required to deploy terrestrial technologies is likely to be unviable, with Lebanon, Jordan, Israel and Gaza/West Bank, standing at the lower end of FEMIP countries at 46%, 52%, 52% and 56%, respectively, whereas in Egypt the proportion of unviable costs is expected to be as high as 92% (the highest among FEMIP countries).

	Viable terrestrial (EUR million)	*Unviable terrestrial (EUR million)*	*% of terrestrial unviable*	*Satellite (EUR million)*	*Cost per population/ household in 2020 (in EUR)*	*Costs as a % of telecoms sector investments in 2009*	*Total (EUR million)*
Algeria	394	794	67%	121	32/158	204%[46]	**1310**
Egypt	53	624	92%	124	9/31	44%[47]	**801**
Morocco	93	645	87%	53	22/98	161%	**792**
Syria	82	411	83%	22	19/114	303%	**515**
Tunisia	28	286	91%	16	29/107	175%	**331**
Jordan	82	90	52%	8	23/121	103%	**180**
Lebanon	14	13	46%	3	7/35	n/a	**31**
Gaza/ West Bank	7	9	56%	3	4/25	n/a	**19**
Israel	27	29	52%	9	8/25	n/a	**65**
Total	**780**	**2901**	**79%**	**359**	**17/72**	**n/a**	**4040**

Table 7.2: Results for scenario 2 for all FEMIP countries to reach 2020 targets [Source: Analysys Mason]

Table 7.3 shows the costs required to achieve the coverage targets set for Scenario 3 in 2020: 100% and 50% population coverage with a minimum real download speed of 10Mbit/s and 30Mbit/s, respectively, for all countries except Israel, which has a target of 30Mbit/s for 100% population coverage.

The total costs required to achieve the Scenario 3 target ranges from EUR73 million in Gaza/West Bank to EUR4019 million in Algeria. We believe that a significant proportion of the costs required to deploy terrestrial technologies is likely to be unviable, with Lebanon, Gaza/West Bank and Israel standing at the lower end of FEMIP countries at 15%, 17% and 22%, respectively, whereas in Morocco the proportion of unviable costs is expected to be as high as 95% (the highest among FEMIP countries).

46 Data for Algeria is for 2007

47 Data for Egypt is for 2008

	Viable terrestrial (EUR million)	*Unviable terrestrial (EUR million)*	*% of terrestrial unviable*	*Satellite (EUR million)*	*Cost per population/ household in 2020 (in EUR)*	*Costs as a % of telecoms sector investments in 2009*	*Total (EUR million)*
Algeria	288	3609	93%	121	98/484	626%[48]	**4019**
Egypt	674	1891	74%	124	29/103	145%[49]	**2688**
Morocco	54	1042	95%	53	31/143	234%	**1150**
Syria	70	994	93%	22	40/241	640%	**1086**
Tunisia	201	679	77%	16	78/290	475%	**897**
Jordan	177	293	62%	8	61/320	272%	**478**
Lebanon	101	18	15%	3	26/140	n/a	**122**
Gaza/ West Bank	58	12	17%	3	16/97	n/a	**73**
Israel	513	143	22%	9	77/258	n/a	**665**
Total	**2136**	**8681**	**80%**	**359**	**48/200**	**n/a**	**11176**

Table 7.3: Results for scenario 3 for all FEMIP countries to reach 2020 targets [Source: Analysys Mason]

The level of investment required to achieve the coverage targets set for Scenario 3 is 1.5–4 times higher than for Scenario 2 in all FEMIP countries except Israel, where it is 10 times higher. This is because the deployment of broadband networks in Israel is already very advanced and actual broadband coverage levels in the country are quite similar to the coverage targets set for Scenario 2. Likewise, the investment required to achieve the coverage targets for Scenario 2 is 1.05–1.5 time higher than for Scenario 1as very similar technologies in terms of cost are used to achieve the targets for 100% population coverage in Scenarios 1 and 2. The large difference between the level of investment required for Scenario 3 and that required for Scenario 2 is due to the use of fibre in addition to wireless technologies to be able to achieve the Scenario 3 targets (as the cost of rolling out fibre is much higher than the cost of rolling out wireless technologies). Therefore, the government and operators in each FEMIP country will need to assess which one would be the most economically viable option to provide access to broadband services.

In general, under all scenarios, countries are similarly ranked in terms of the investment required:

- The level of investment required in countries like Algeria, Egypt and Morocco is higher than in the other FEMIP countries due mainly to the large size of these countries and their low population density.
- The level of investment required in countries like Lebanon, Gaza/West Bank and Israel is lower in the other FEMIP countries due mainly to the small size of these countries and their high population density. In addition, the broadband infrastructure in Israel is at a relatively advanced stage of development , which results in a very low cost to reach the targets for each scenario (even taking into account that the target for Scenario 3 for Israel is much higher than for other FEMIP countries and similar to the DAE target).

[48] Data for Algeria is for 2007

[49] Data for Egypt is for 2008

The proportion of unviable costs is also similar across scenarios. Several factors other than those related to the size of the total investment required have an impact on the viability of technologies, which in turn has an impact on the proportion of unviable costs:

- Actual and expected evolution of broadband penetration – high penetration in countries such as in Israel, Lebanon and Jordan has a positive impact on the cost viability, whereas low penetration in countries such as in Syria, Gaza/West Bank and Egypt has a negative impact on the cost viability.

- Actual and expected evolution of ARPU – high ARPU in countries such as in Israel and Lebanon has a positive impact on the cost viability, whereas low ARPU in countries such as in Morocco, Algeria, Tunisia and Egypt has a negative impact on the cost viability.

We believe that wireless technologies will be the main driver of broadband growth in most FEMIP countries due to the limited footprint of the existing copper network, the quality-of-service provided over the copper network, and the cost of rolling out fixed broadband technologies in rural areas, among other factors.

Therefore, governments in FEMIP countries should consider very carefully the role that wireless technologies should play in their national broadband plans. This may be different to European markets where it is likely that wired technologies will play a more significant role.

It should be noted that if more ambitious scenario targets were defined for the FEMIP countries, then we may expect the reliance on wireless technologies to decrease, unless there were policy changes that would have a material impact on the supply side, e.g. significant amounts of new spectrum at suitable frequencies being made available.

We also believe that satellite broadband will play a role in FEMIP countries, especially to cover the last few percentages of the population living in the most remote parts of the country where the roll-out of other broadband technologies would be economically unviable.

7.2 Barriers to, and opportunities for, broadband development

Table 7.4 presents the main macro-economic factors that have a positive or negative impact on broadband development in each FEMIP country.

	Morocco	*Algeria*	*Egypt*	*Gaza/ West Bank*	*Israel*	*Jordan*	*Lebanon*	*Syria*	*Tunisia*
Political stability/ risk		-	-	-				-	-
FDI		-	+	-	+	+	+	-	+
Population density	-	-	-	+	+	-	+	+	-
Topology			+	+	+		-		+
International connectivity	+	+	+	-					+
Disposable income/ GDP per capita	-		-	-	+		+	-	+
Exchange rate stability and inflation	+		-	-	+				-
Literacy rate	-	-	-		+	+	+		-
Availability of electricity	-	-	+	+	+	+	+	-	+

Table 7.4: Main macro-economic factors promoting and hindering broadband development [Source: Analysys Mason]
Note: + means factor promoting broadband; - means factor hindering broadband

Israel and Lebanon appear to have the most favourable macro-economic environment for broadband development, whereas Algeria and Syria appear to be at the opposite end.

Table 7.5 presents the status of development of the broadband market in each FEMIP country. Countries with the most advanced national broadband strategies are listed first.

Ranking of most advanced national broadband strategy	*Existence of 3G operators*	*HSPA service availability*	*HSPA+ service availability*	*Existence of LLU*	*Efficient use of LLU*	*Roll-out of NGA*	*Expected date for award of spectrum for mobile broadband*
Israel	✓	✓	×	×	×	✓	2.6GHz in short term
Morocco	✓	✓	✓	✓	×	×	Unknown
Algeria	×	×	×	×	×	In deployment	2015 for 800MHz
Lebanon	Launched end 2011	×	✓	×	×	In progress	2015 for 800MHz
Jordan	✓	×	✓	Expected in late 2012	×	Limited to school and universities	2.6GHz available 2015 for 800MHz
Tunisia	✓	×	✓	✓	×	×	2014 for 800MHz
Egypt	✓	✓	✓	✓	✓	Very limited	Unknown
Gaza/WB	×	×	×	×	×	×	Unknown
Syria	✓	✓	×	×	×	×	2014 at the earliest

Table 7.5: Status of broadband market development [Source: Analysys Mason, regulators]

Israel and Morocco have the most developed broadband markets of all FEMIP countries, whereas the broadband market is in its very early stages of development in countries like Syria and Gaza/West Bank. The main factors that could boost the development of broadband in these countries include:

- liberalisation of the telecoms market and privatisation of operators (e.g. Lebanon, Syria)
- launch of HSPA/HSPA+ mobile networks in countries where mobile broadband is not yet launched (i.e. Algeria, Gaza/West Bank)
- emphasis on the efficient provision of LLU to alternative operators at reasonable prices
- implementation of a national broadband strategy over the short and long term
- availability of spectrum for 4G services as soon as possible (mainly in the lower bands – i.e. 800MHz)
- allowing the provision of broadband over satellite under reasonable conditions.

7.3 Investment opportunities

Table 7.6 presents the main indicators that need to be taken into account in order to assess any potential opportunity for broadband development in FEMIP countries.

	Countries with more opportunities for broadband investments	*Countries with less opportunities for broadband investments*
Macro-economic indicators		
Population	Egypt, Algeria and Morocco, with a population of over 30 million	Gaza/West Bank, Lebanon, Jordan and Israel, with a population less than 10 million
Density	Gaza/West Bank, Lebanon and Israel, with a density higher than 300 inhabitants per square kilometre	Algeria and Morocco, with a density lower than 50 inhabitants per square kilometre
GDP per capita	Israel and Lebanon, with a GDP per capita above USD6000	Gaza/West Bank, Egypt, Syria and Morocco, with a GDP per capita around or less than USD2000
Key broadband indicators		
Broadband penetration	Israel, with a broadband penetration of households above 100%	Syria, Algeria, Egypt and Gaza/West Bank, with a broadband penetration of households below 20%
Broadband subscribers	Egypt and Israel, with more than 2.5 million broadband subscribers	Gaza/West Bank, Syria and Lebanon, with less than 300 000 broadband subscribers
Broadband market outlook		
Broadband penetration forecast	Israel, Jordan, Morocco and Lebanon, with a broadband penetration of households estimated at above 95% in 2020	Gaza/West Bank, Syria and Egypt, with a broadband penetration of households estimated at less than 55% in 2020
Broadband subscribers forecast	Egypt, Morocco, Algeria and Syria, with more than 4 million broadband subscribers estimated in 2020	Gaza/West Bank and Lebanon, with less than 1 million broadband subscribers estimated in 2020

	Countries with more opportunities for broadband investments	*Countries with less opportunities for broadband investments*
Broadband revenues forecast	Egypt, Israel and Algeria, with broadband revenues estimated at more than 1 billion in 2020	Gaza/West Bank, with broadband revenues estimated at less than 100 million in 2020
Cost associated with rollout of broadband		
Viability of broadband technologies	Israel, Lebanon, Jordan and Gaza/West Bank, which have high coverage viability (e.g. above 60% coverage for FTTC)	Morocco, Syria and Algeria, which have low coverage viability (e.g. below 12% coverage for FTTC)
Cost of rolling out broadband technologies	Algeria and Egypt, with high levels of investment required to cover 100% of the population (e.g. more than EUR14 billion for FTTP)	Gaza/West Bank and Lebanon, with low levels of investment required to cover 100% of the population (e.g. less than EUR800 million for FTTP)
Socio-economic benefits		
Impact of broadband on GDP	Israel, Egypt and Algeria, with an impact above EUR700 million per annum	Gaza/ West Bank, with an impact of less than EUR20 million per annum
Pay-back period in non-economic areas	Lebanon and Israel, with a pay-back period of less than one year	Algeria and Jordan, with a pay-back period of more than nine years

Table 7.6: Broadband outlook in FEMIP countries [Source: Analysys Mason]

Overall, taking into account the macro-economic situation in each FEMIP country, as well as the dynamics in, and the outlook for, their respective telecoms markets, we expect that Israel and Egypt are the two FEMIP countries that will present the biggest opportunities for broadband investment, whereas the opportunities for broadband investment in Gaza/West Bank and Syria would be significantly lower.

Table 7.7 presents the main investment opportunities that we are aware of, either based on public information or identified based on interviews we have had with stakeholders in FEMIP countries.

Country	*Type of activity*	*Timing*	*Probability of implementation within the timescale*
Algeria	Award of 3G licences leading to roll-out of 3G networks	2011-2012	++
Algeria	Algérie Telecom announced several investment plans since 2009: - Around EUR5 billion in network upgrades announced in late 2009 and work undertaken in 2010 and still in progress in 2011 - Roll-out of FTTH to 250 000 households by end of 2011	2011-2012	+
Egypt	In December 2009, the Minister announced that Egypt was working on a national plan to develop broadband services in urban and rural areas, promising EUR700 million of government funds for the infrastructure needed	Not available	-

Country	*Type of activity*	*Timing*	*Probability of implementation within the timescale*
Egypt	Telecom Egypt is involved in many submarine cable systems including the EIG, organised around a 16-member consortium connecting the UK to India, at an anticipated cost of EUR560 million	Not available	-
Egypt	In 2010 Etisalat Misr announced that it had made cumulative network investments of EUR1 million between 2007 and mid-2010, and that it expects to invest an additional EUR1 million by 2013 to expand its network	2011-2013	++
Gaza/ West Bank	PalTel announced that it will soon connect a fibre-optic cable from Jerusalem to Jordan which it will then use for the transmission of international traffic	2012	+
Gaza/ West Bank	The Ministry is planning to assign a telecoms wholesale licence to the Palestine Electricity Company (PEC) as it has an existing fibre-optic network that can be used as a backbone by ISPs to provide FTTx services	2012	+
Israel	Spectrum in the 2.6GHz and 800MHz to be allocated for LTE use leading to operators rolling out 4G networks	2011-2013	++
Israel	Partner is upgrading its 3G network to HSPA+ and has also announced an LTE deployment plan worth EUR20 million in 2012	2011-2012	+++
Israel	A new high-speed submarine cable is announced to be deployed by Bezeq and Alcatel	2011-2012	+++
Israel	MIRS (an existing operator) and Golan Telecom (a new entrant) will invest in deploying 3G networks after being awarded licences in mid-2011	2011-2013	+++
Israel	Potential investment in the national FTTH project to be set up as a JV with the Israeli Electricity Company. IEC will use its existing 3000km of fibre backbone and install an estimated 20 000km of new fibre	2011-2013	+++
Jordan	The regulator plans to start the analogue TV switchover in 2012, which will free up spectrum in the 800 MHz band, suitable for LTE. This will be allocated to mobile and useable from 2015	2015	+++
Jordan	Umniah is expected to get a 3G licence for around EUR50 million and to roll out a 3G network	2012	+++
Lebanon	Mobile operators are planning to roll out 3G infrastructure and to start trials for LTE	2011-2013	+++
Lebanon	The Ministry announced in 2010 that it would invest around EUR120 million in the domestic local Internet backbone, by deploying a 4400km fibre-optic transmission network	2010-2012	+++
Morocco	A national broadband strategy aimed at stimulating the roll-out of NGA infrastructure is being developed by the regulator and expected to be published end of 2011. This study will include potential development plans for broadband infrastructure and potential public subsidies and financial levers to help achieve the plan	2012	+++

Country	*Type of activity*	*Timing*	*Probability of implementation within the timescale*
Morocco	Potential award of new licences for the roll-out of NGA networks by the end of 2011 to new wholesale-only operators such as ONE – the National Office of Electricity – or ONCF – the National Railway Company – as they both own a nationwide fibre network	2012	++
Morocco	The government's ICT strategic plan 'Maroc Numeric 2013' sets the target of 400 large Internet centres being created in rural areas in Morocco by 2013	2011-2013	++
Syria	The award of a third mobile licence was expected to happen in 2011	2012	+
Syria	STC plans to invest approximately EUR300 million to deploy a wireless network using CDMA in the context of the 'Third Rural Telecom' project	2011-2012	+
Syria	STC is considering the roll-out of an FTTH network, restricted to industrial areas in Damascus, Homs and Alep	2013	++
Tunisia	Orange Tunisie has plans to install and operate its own 400km fibre-optic backbone	Not available	-

Table 7.7: Investment opportunities in FEMIP countries [Source: Analysys Mason]
Note: +++ means high probability of implementation; ++ means medium probability of implementation; + means low probability of implementation

Annex A Background on the socio-economic impact of broadband

Many studies in the literature do not make a distinction between ICT, internet, broadband, and high-speed broadband, and this makes estimating the specific benefit of broadband difficult. The majority of studies also tend to be focussed on the USA rather than Europe which are arguably less useful for comparisons with FEMIP countries.

There is a general lack of disclosure in the studies on the technologies used to deliver broadband, although we expect most studies to have mainly considered fixed broadband. However, we do not believe this to be a key concern: broadband services rather than technologies deliver benefits to end users, and in the case of basic broadband, these can easily be delivered over fixed or mobile technologies, so the fact that we expect mobile to be prevalent in many FEMIP countries does not preclude us from drawing some conclusions from the existing, fixed-dominated, literature.

There is also little or no hard evidence for the benefits of high-speed broadband, mainly due to the fact that these networks have not been in existence for very long. However, this is less of a concern for the FEMIP countries, at least in the near- to mid-term, as the availability of 'basic broadband' is still at a relatively early stage (with the exception of Israel).

The results presented in our analysis on socio-economic impact of broadband should be viewed with caution as it is our view that isolating the true incremental impact of broadband remains very difficult and subject to potential significant error due to the complex, cross-sectorial interactions that occur in all markets.

A.1 International benchmarks of broadband take-up

We should not overlook indicators such as take-up as a useful guide of the benefits of broadband to end users. In Western Europe, the Internet dial up in the late 1990s increased to over 50% in some markets, but then fell off dramatically as basic broadband became available in the early 2000s as shown in the figures below. This is a clear demonstration of users valuing the incremental benefits of broadband over dial-up, namely higher speed, and better user experience by virtue of its 'always on' nature.

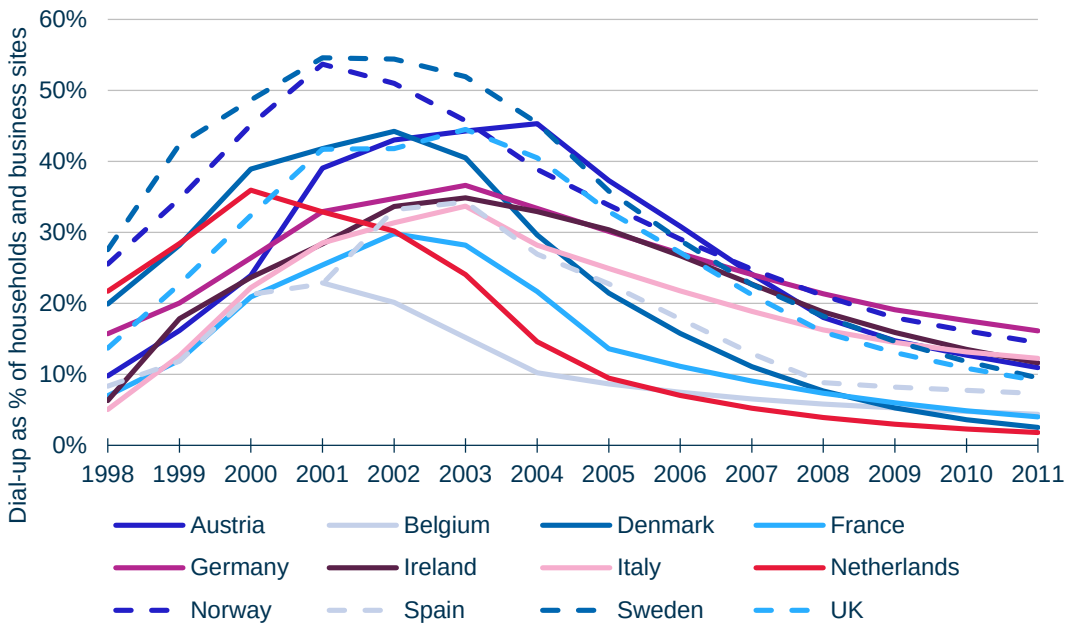

Figure A.1: Evolution of dial-up Internet take-up in a number of European markets [Source: Analysys Mason]

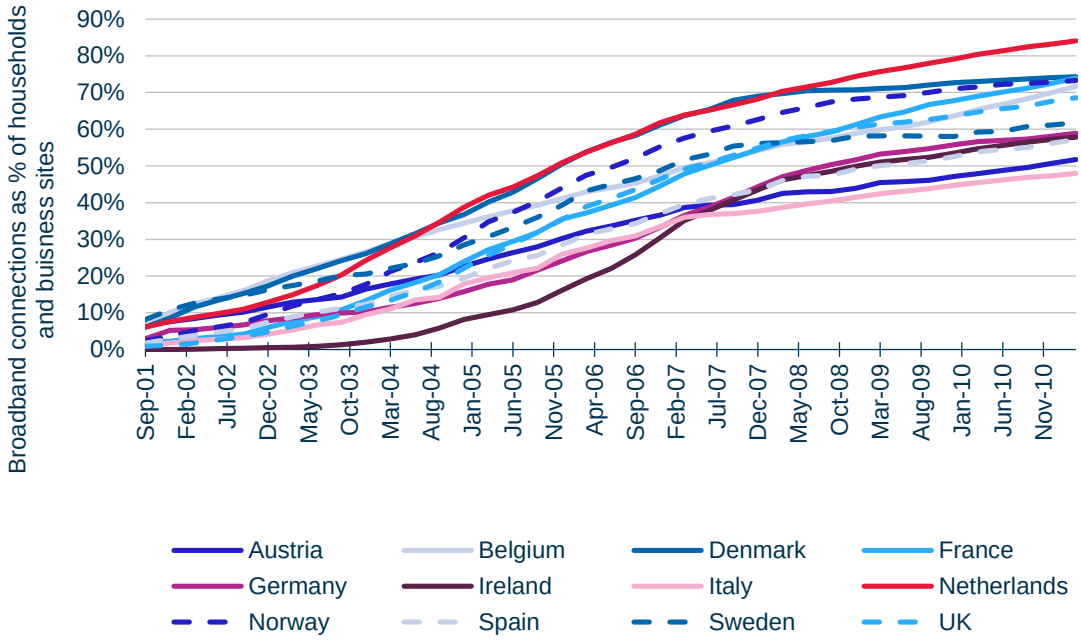

Figure A.2: Evolution of broadband take-up in a number of European markets [Source: Analysys Mason]

There is less data for next generation broadband take-up. Outside of the Nordic States, Western European next generation broadband take-up benchmarks to date are low. This is partially due to the existence of good copper networks (e.g. ADSL2+) and the 'sweating' of copper assets by incumbents and local loop unbundlers. In addition, the delay in provision of wholesale access in fixed networks in Eastern Europe has meant that in some areas new fibre networks were built by

alternative providers; this has served to increase take-up relatively quickly. Due to these country differences it is much harder to benchmark how next generation broadband penetration increase; however, additional analysis does indicate that reaching 20% take-up after 5 years to be possible as shown in the figure below, although this could be changed significantly by a wide range of factors including pricing, competition and potentially regulation.

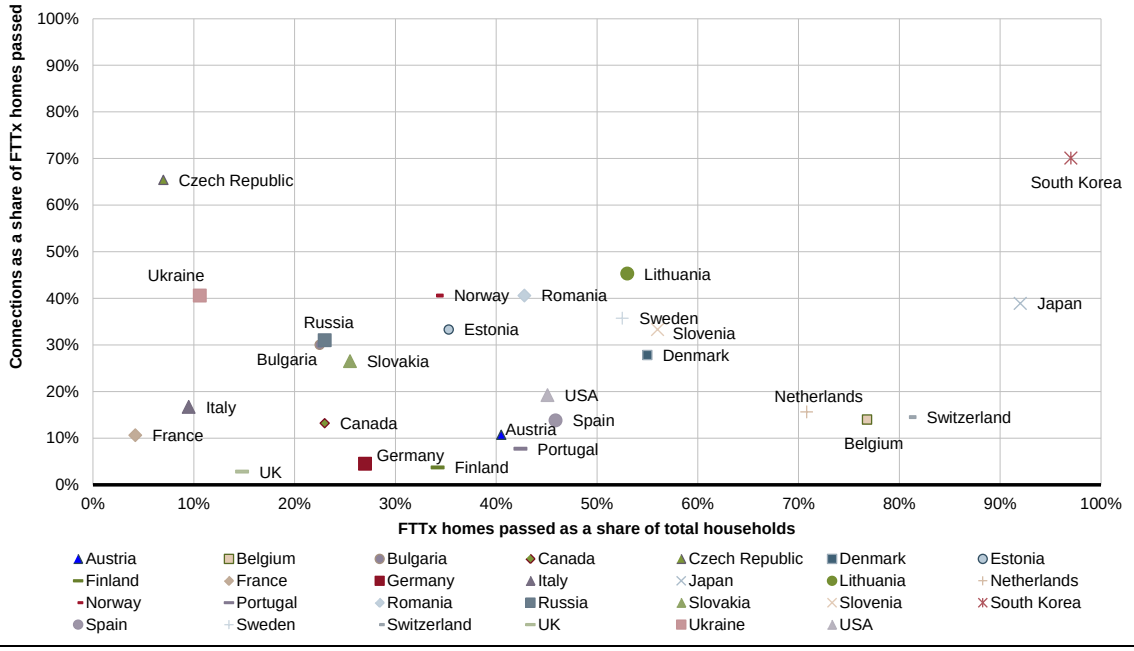

Figure A.3: FTTx take-up against FTTx availability (homes passed) [Source: Analysys Mason, 2010]

A.2 Quantifying the direct economic benefits of broadband

The direct economic benefits of broadband are diverse, ranging from businesses being able to:

- access new, cheaper and better suppliers
- reach wider markets, and service them more cost effectively
- research new methods of working
- seek partners and joint ventures
- reach potential employees and help retain existing ones by enhancing opportunities
- use online education and e-training
- access applications, such as online banking
- implement general productivity improvements – e.g. simpler file/information sharing.

The balance of the above depends on the business itself, though there are strong similarities within a given sector, and for companies of a similar size. In addition, it is expected that connectivity can deliver benefits for government, for example through e-procurement and other process efficiencies.

However, despite a large number of academics and others researching this topic there still does not appear to be a strong consensus on the quantification of the benefits of broadband, although several suggest the impact on GDP to be of the order of 1%:

- Looking at a panel of 25 OECD countries in 1996–2007, Czernich et al. (2011) find that a 10 percentage-point increase in broadband penetration raised annual GDP per-capita growth by 0.9–1.5 percentage points

- Zhen-Wei Qiang and Rossotto (2009)[50] (writing for the World Bank), concluded that a 10% increase in broadband penetration increased GDP growth by an additional 1.21% when looking at 66 high-income countries; and by an additional 1.38% in the remaining 120 low- and middle-income countries.

- Milano (2010)[51] suggested that investment in ICT (like broadband) contributed almost 0.8% to the average annual real GDP growth in the USA from 1994 to 2000.

McKinsey[52] recently estimated that the Internet (if considered as a 'sector') contributed to between 0.8% and 6.3% of GDP, with the lower figure being Russia and the upper figure being Sweden. France, Germany and India were all in the middle of the range at 3.2% contribution, although a much larger proportion of India's contribution was due to trade balance (exports). Whilst this study focussed on the contribution of the 'Internet' it seems reasonable to assume that this is closely related to broadband as this has been the key driver of the mass market take-up of Internet-delivered services in the last decade. McKinsey also concluded that as markets mature the contribution of the Internet to GDP growth increases; for example, in France the contribution increased from 10% in 1995-2009, but in the later period 2004-2009, it was 18%. Across the range of mature countries they considered, the Internet contributed 21% to GDP growth, so for economies growing at 5% per annum, the impact of the Internet (assuming it is closely related to the impact of broadband) would be around 1%.

However, there are 'benefits sceptics'. Some claim that GDP growth is a cause of higher broadband penetration and not vice-versa, and it is apparent that much of the work in this area fails to address this cause and effect problem satisfactorily. Others claim that broadband plays a role in actually destroying jobs by negatively impacting traditional industries. We are not aware of any studies that have undertaken a robust analysis of the *net* impact on jobs at anything more than a local level.

50 Qiang, C. Z. and Rossotto, C. M. (2009), *Economic Impacts of Broadband, Information and Communications for Development: Extending Reach and Increasing Impact*. (World Bank: Washington, D.C.), pp. 35–50.

51 Milano, J. (2010), *Where Jobs Come From: The Role of Innovation, Investment and Infrastructure in Economic and Job Growth.*

52 McKinsey Global Institute, May 2011. Internet matters: The Net's sweeping impact on growth, jobs, and prosperity. The countries covered were: Sweden, UK, South Korea, Japan, USA, Germany, India, France, Canada, China, Italy, Brazil and Russia.

It is our view that broadband is likely to play a larger role in maintaining (protecting) jobs rather than creating large numbers of new jobs in many economies. Nevertheless, this still provides a useful reference point for comparing the potential order of magnitude benefits against the costs of deployment, and for Governments and others who aim to promote market development, the case for intervention still holds whether jobs are being maintained or created.

For the purposes of this work, we have used the studies listed above as a guide to assessing the potential benefits of broadband. We have assumed that broadband can have a maximum potential impact of 1% of GDP for a ten percentage-point increase in broadband penetration of the population.

From a market development perspective, it is instructive to compare the potential benefits of broadband in the unviable areas, i.e. where the market is not expected to invest itself, with the costs of deployment in those unviable areas. This kind of assessment is done by governments when considering the case for intervention in the broadband market.

From our economic-viability analysis (see Section 5) we have calculated the size and cost of deployment in these unviable areas. We then estimate the potential GDP impact in the unviable area, adjusting for the fact that GDP per head in the unviable area will be significantly lower than the national average.

It is not possible to accurately correlate the unviable area with the geographical distribution of GDP. Hence we have made an assumption that, firstly, GDP in the unviable area is the national GDP scaled down by the number of households in the unviable area, and secondly, further scaled down by a factor of 50%[53], reflecting the fact that some industry sectors contribute more to the "rural" economy, e.g. agriculture and mining, than others, e.g. services.

We then calculate an economic 'payback' period, i.e. the number of years it takes for the cumulative benefits to exceed the costs of deployment in the unviable areas.

[53] The factor of 50% is an assumption.

Annex B List of stakeholders interviewed

This annex includes a list of the stakeholders interviewed in each FEMIP country in the context of this project. Note that we did not interview any stakeholders in Algeria, and in the case of Egypt we only interviewed EgyptSat, a VSAT (very small aperture terminal) operator.

Organisation	*Type*	*Title*
MTIT	Ministry of Telecom and Information Technology	Acting General Director of Telecom Regulation administration
PalTel	Fixed and broadband (DSL) and mobile (GSM)	CEO

Table B.1: List of stakeholders interviewed in Gaza/West Bank

Organisation	*Type*	*Title*
Partner Communications (trading as Orange Israel)	Mobile operator	Head of Strategy and Competitive Intelligence
HOT Telecom	Broadband operator (cable TV)	CTO, Marketing Director
Bezeq International	ISP (and international voice service provider)	Regulation & Business Development Manager, Economist
Bezeq	Broadband operator (fixed)	Head of Research & Planning
MoC	Ministry of Communications	Director General, Senior Advisor to the Director General

Table B.2: List of stakeholders interviewed in Israel

Organisation	*Type*	*Title*
Umniah	Mobile operator (GSM, EDGE, HSPA+ planned) and broadband operator (DSL, WiMAX)	Director of Government Relations and Regulatory Affairs, Regulatory Affairs & Carriers Relations Manager, Enterprise and IP Solutions Manager, Broadband Marketing Department, Mobile department
TRC	National regulatory authority	Advisor (former Vice Chairman), Director of Economic Department, Director of Regulatory Department, Director of Radio Spectrum Management Department
Wi-tribe	Broadband operator (WiMAX)	CEO

Figure B.3: List of stakeholders interviewed in Jordan

Organisation	*Type*	*Title*
TRA	National regulatory authority	Commissioner, Board Member, Head of Market and Competition Unit, Senior policy & universal service expert, Policy analysis expert, Market analysis expert, Cost accounting analysis expert, Tariffs analysis expert, Tariffs expert
MOT	Ministry of Telecommunications	Advisor to the Minister
Terranet and Cable One	Broadband operators (DSL and fixed wireless)	CEO, General Manager Terranet, General Manager Cable One
GDS and IDM	Broadband operators (DSL and fixed wireless)	General Manager GDS, General Manager IDM
Cedarcom	Broadband operator (fixed wireless)	Chairman & CEO
Alfa	Mobile operator (GSM, EDGE, HSPA+ planned)	CMO, CTO

Figure B.4: List of stakeholders interviewed in Lebanon

Organisation	*Type*	*Title*
ANRT	Regulatory authority	Competition Regulation Director, Technical Director, Regulation Director
Meditel	Mobile (GSM, EDGE, UMTS) and broadband (WiMAX)	Strategy Director
Inwi/Wana/Bayn	Mobile (GSM, EDGE, EVDO rev A) Broadband (WLL – CDMA)	Strategy and Regulation Director, Chief Marketing Officer
Nortis	VSAT service provider	CEO

Table B.5: List of stakeholders interviewed in Morocco

Organisation	*Type*	*Title*
TRA and MoCT	Ministry of telecommunications and national regulatory authority	Head of TRA
STE	Fixed and broadband (DSL)	CCO
Syriatel	Mobile (GSM, GPRS, EDGE, HSPA, HSPA+)	CEO, Head of product development & services management, Head of products & services marketing Unit, Head of data marketing section, Radio technical department
MTN	Mobile (GSM, GPRS, EDGE, HSPA, HSPA+)	CMO, Consumer segment senior manager, Product development analyst, Strategic Marketing Senior Manager, Head of research

Table B.6: List of stakeholders interviewed in Syria

Organisation	*Type*	*Title*
INT	Regulatory authority	Director of Studies
Orange Tunisie	Mobile (GSM, UMTS) Broadband (WiMAX)	Chief Marketing Officer, Regulatory and Wholesale Officer

Table B.7: List of stakeholders interviewed in Tunisia

Annex C Glossary of terms

ADSL	Asymmetric digital subscriber line
ANRT	Agence Nationale de Réglementation des Télécommunications
ARPT	Autorité de Régulation de la Poste et des Télécommunications
ARCEP	Autorité de Régulation des Communications Electroniques et des Postes
ARPU	Average revenue per user
BOT	Build operate transfer
BSG	Broadband Stakeholder Group
BTO	Build transfer operate
CAGR	Compound annual growth rate
CCO	Chief Commercial Officer
CDMA	Code division multiple access
CEO	Chief Executive Officer
CMO	Chief Marketing Officer
CTO	Chief Technical Officer
DAE	Digital Agenda for Europe
DOCSIS	Data over cable service interface specification
DSL	Digital subscriber line
DSLAM	Digital subscriber line access multiplexer
DSP	Data service provider
DTT	Digital terrestrial television
EC	European Commission
EE	Eastern Europe
EIB	European Investment Bank
EIU	Economist Intelligent Unit
ESA	European Space Agency
EU	European Union
EUR	Euro
EVDO	Evolution data optimised
FCC	Federal Communications Commission
FDI	Foreign direct investment
FEMIP	Facility for Euro-Mediterranean Investment and Partnership
FTTB	Fibre to the building
FTTC	Fibre to the cabinet
FTTH	Fibre to the home
FTTP	Fibre to the premises
FTTx	Fibre to the x
FWA	Fixed wireless access

GBP	Pound Sterling
GDP	Gross domestic product
GENIE	GENeralization of Information Technologies and Communication in Education
GPRS	General packet radio service
GSM	Global system for mobile communications
GSMA	GSM Association
HDI	Human development index
HH	Households
HSPA	High speed packet access
ICT	Information and communication technology
IEC	Israel Electric Company
INT	Instance Nationale des Télécommunications
IP	Internet Protocol
IRR	Internal rate of return
ISP	Internet service provider
ITU	International Telecommunications Union
Km	Kilometre
LLU	Local loop unbundling
LTE	Long Term Evolution
MENA	Middle East and Africa
MoC	Ministry of Communications
MoCT	Ministry of Communications and Technology
MoICT	Ministry of Information and Communications Technology
MoT	Ministry of Telecommunications
MTIT	Ministry of Telecom and Information Technology
MVNO	Mobile virtual network operator
NGA	Next generation access
NTA	National Telecommunications Authority
NTRA	National Telecommunications Regulatory Authority
OECD	Organization for Economic Cooperation and Development
PACTE	Programme d'Accès aux Télécoms
PACTE	Programme d'action communautaire sur le terrain de l'éducation
PEC	Palestine Electricity Company
PPP	Public-private partnership
PPP	Purchasing power parity
PSTN	Publish switched telephone network
PTRA	Palestine Telecommunications Regulatory Authority
RAN	Radio access network
SME	Small and medium enterprises
STC	Syrian Telecommunications Company

STE	Syrian Telecommunications Establishment
TRA	Telecommunications Regulatory Authority
TRC	Telecommunications Regulatory Commission
UMTS	Universal Mobile Telecommunications System
UNDP	United Nations Development Programme
USA	United States of America
USD	United States Dollar
VDSL	Very high bit-rate digital subscriber line
VoIP	Voice over Internet Protocol
VSAT	Very small aperture terminal
WACC	Weighted average cost of capital
WCDMA	Wideband code division multiple access
WE	Western Europe
WiMAX	Worldwide interoperability for microwave access
WLL	Wireless local loop
WLR	Wholesale line rental

European Investment Bank

Facility for Euro-Mediterranean Investment and Partnership

The study evaluates the market, business and financial aspects for the development of Telecom broadband access for the Mediterranean Partner Countries. To do so the current status for access to Telecom broadband services among the people in the region is analysed. Based on this analysis the study identifies the investment needs to increase the number of people having access to broadband. All in all, the study estimates the investment need for the rollout of broadband infrastructure in the Mediterranean Partner Countries based on a common target scenario for broadband service coverage by 2020.

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