



Digital migration strategy for TV Broadcasting

Consultation Document
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Introduction

1. Legal Basis

1.1 Telecommunications Policy

1. The Government of Lebanon having determined to transform the telecommunications sector in Lebanon from a state-owned monopoly to a competitive market open to private participation promulgated the Telecommunications Law (Law No. 431/2002, hereafter called the “Law” or “Telecommunications Law”) to achieve this aim.

1.2 The Authority’s Mandate and the Telecommunications Law

2. Article 15 of the Telecommunications Law confers on the Authority the exclusive authority to manage, allocate and monitor the use of Radio Frequencies Spectrum in Lebanon. It provides for the Authority to develop an annual plan for the Allocation of Radio Frequencies, and requires the Authority to consult with the Ministry of Information and other concerned governmental agencies for the TV and Radio broadcasting frequency usage.
3. This Consultation is issued pursuant to the Authority’s powers and responsibilities in the aforementioned provisions of the Telecommunications Law.

2. Purpose of this Document

4. This consultation is addressing the issues related to the analogue to digital migration of terrestrial TV.
5. The Geneva 2006 Agreement is coordinating the allocation of frequencies for Digital TV broadcasting in Europe, Middle-East and Africa. The objective of this Agreement is to prevent harmful interference between the different countries. Currently Lebanon is using more frequencies for analogue terrestrial UHF TV broadcasting than allocated. As a consequence there is a higher probability of suffering from harmful interference caused by foreign TV stations as well as causing harmful interference to TV reception in neighbouring countries. Further a target date, 2015, for completion of the analogue switch-off has been set.
6. World Radio Conference 2007, a global coordination of spectrum usage, has reviewed the UHF spectrum use. Given the transition to Digital TV in most countries the “Digital Dividend” can be utilised to allow more and/or other services in the UHF band. For ITU region 1, the frequency band 790-862 MHz might be considered for future allocation to IMT applications following further study in ITU.

7. Digital TV technology allows more efficient use of the frequency spectrum. The spectrum used for a single analogue 'standard definition television' (SDTV) channel can accommodate multiple digital SDTV channels. Also digital TV technology enables the introduction of 'high definition television' (HDTV).

3. Status of the Existing Television Service in Lebanon

8. The existing television services are delivered via:
 - UHF Free to Air analogue TV,
 - MVDS in the 10 – 12 GHz band,
 - Unlicensed Cable TV and wireless distribution,
 - DTH Satellite TV
9. All the UHF terrestrial television broadcasters in Lebanon are employing analogue transmission networks with multiple transmitter locations. The household television receivers are typically analogue-based.
10. The main digital television services are delivered via satellite & DVB-MS operators. Subscribers use a satellite dish with a LNB and a set-top box to receive digital Free to Air TV and/or Pay-TV (encrypted) signals. The set-top box decrypts the signal if needed and converts the digital TV signal to the (mostly) analogue television.

4. The Digital Transition

11. The transition to digital TV can bring a number of benefits:
 - Better quality television service
 - Potentially a better TV coverage of Lebanon even with the same number of broadcast locations and less transmit power.
 - More spectrum efficient and therefore enables the distribution of many more TV channels in the same spectrum.
 - Lower protection ratio and therefore less sensitive for interference.
 - Enables more indoor and mobile reception of TV signals
 - Can provide additional services like an Electronic Programme Guide (EPG)
 - Allows for a single broadcast infrastructure instead of independent parallel networks reducing the cost for all broadcasters as well as the environmental impact

The transition to digital TV would ultimately benefit both the citizens and the broadcasters.

12. The transition from analogue TV to digital TV does require investments by:
 - Broadcasters: transmission infrastructure
 - Content providers: studios and content production, in particular if HDTV is desired as well
 - Households: Set-top box (or a new TV including a digital receiver)
 - Consumer Awareness

13. The Government role in the transition from analogue terrestrial UHF TV to digital terrestrial UHF TV is necessary to ensure that:

- Households will be protected
- Continuity of terrestrial TV broadcasting service should be secured and the transition should allow for a simulcasting period. Citizens should be well informed of the transition and broad availability of affordable receiving equipment will be required.
- Spectrum is used efficiently
- After analogue switch off the unused spectrum can be reused for broadcasting capacity and/or other services (mobile/broadband)
- Sustain a competitive market between the broadcasters.
- Support Public broadcasting
- Allow new entrants fair access to the digital broadcasting infrastructure.

5. Digital Transition Policy

14. International developments show that analogue TV services are being phased out:
 - Europe: 6 countries completed the analogue switch-off before the end of 2007. Most countries are currently running simulcast digital and analogue or migrate on a region by region base. The majority expects analogue switch-off before 2012.
 - USA: targets analogue switch-off by February 2009
 - Globally: mixed situation but many countries did communicate analogue switch-off dates between 2010 and 2015

The Government of Lebanon is planning an analogue switch-off no later than 2015 in line with the Geneva 2006 Agreement.

Further it is observed that higher quality services, like HDTV, are being introduced on Digital TV platforms.

15. The TRA considers a conversion to Digital TV based on the DVB-T standard.
16. Considerable benefits for the general public are anticipated:
 - Better quality TV reception
 - Capability to introduce more TV programmes
 - Capability to introduce HDTV
 - After Analogue Switch-Off spectrum can be freed-up for other usage (more TV, mobile TV, mobile services, broadband) benefitting the overall economy
17. The TRA is now seeking comment from stakeholders on ways in which this digital conversion policy might be implemented in Lebanon. Stakeholders like Broadcasters, Content providers, (potential) Broadcast Infrastructure providers, Consumer Organisations, Telecom Operators, Hardware distribution channels, Equipment vendors and other entities with an interest in the digital conversion policy are invited to participate.

Market Drivers

6. Implication of Migration to Digital for Consumers

18. Benefits to Consumers:

After completion of migration to digital television transmissions, a number of benefits can be offered to the consumers which include:

- More choice of channels: Digital transmission technology, when compared to analogue signal modulation technology, has the added benefit of supporting the simultaneous transmission of a significantly larger number of programmes. This automatically implies that the amount of programmes available on any platform would increase considerably.
- High quality sound and picture: Digital Television offers an overall better picture and sound quality as well as supporting a wide screen aspect ratio. Digital Television is also available in a number of different definition modes ranging from standard to high definition.
- More services: Digital Television also allows for new enhanced services, offering a richer viewing experience. An example of a new service is the Electronic Programme Guide (EPG).

19. Costs to Consumers:

In order to be able to receive digital television transmissions, a digital decoder in the form of a set-top-box (STB) is needed. Alternatively the consumer may opt to install a digital TV incorporating a digital tuner module. A consumer will therefore need to either:

- replace the analogue television set with a set equipped with a digital tuner; or
- Adapt the current TV set by means of an external set-top box.

In either case there is a cost involved.

7. Implication of Migration to Digital for Service Providers

20. Benefits to Service Providers:

Digital transmission will provide many opportunities to offer new programmes and services, which can result in new business opportunities for the service providers.

21. Costs to Service Providers:

Analogue Broadcasters will need to invest in new equipment in order to be able to fit digital transmission requirements. In general however, substantial investment in both equipment and human resource training will be required before the full potential of digital television can be realized.

Digital Dividend

22. “The Ultra-High frequency (UHF) bands currently reserved in most countries for broadcasting services are coveted for their excellent radio propagation characteristics. Compared to spectrum bands at higher frequencies, such as those used for the Third Generation (3G) mobile services around 2GHz, and those used for Mobile Wi-Max 802.16e 2005, the UHF bands reach significantly farther and penetrate buildings much better. This means that the goal of providing all households with access to affordable broadband may be achieved at a much lower cost and commercial service providers will cover a larger area because it is profitable. (Covering any area with the 700 MHz range is around 30% of providing the same coverage using spectrum around the 2000 MHz)
23. The ongoing digitization of the terrestrial TV broadcasting offers the opportunity to put to new use the radio spectrum resource that is freed by the higher efficiency of the digital transmission mode. The size of this resource is quite significant and is, according to the European Commission, over and above the frequencies which are required to support existing analogue broadcasting services in the digital environment.
24. Administrations and Regulators have the duty to manage the spectrum efficiently by putting it to the best social and economic uses rather than simply using it for more of the same. In many countries the choice was between a national spectrum resource to facilitate commercially viable broadband coverage for most of the population or more television channels in the terrestrial network, channels which may be already be available in alternative distribution channels(Cables, Satellite TV, etc.). This important amount of attractive Spectrum is sufficient to allow broadcasters to significantly develop and expand their services in the terrestrial delivery mode, while at the same time broadband applications can be provided with access to new spectrum.
25. The European Commission has recently defined its policy for the digital divide in a Communication outlining the benefit to society of uses other than broadcasting. It concluded that for the digital divide benefits to be fully available to EU consumers and societies, it needs to be harmonized with respect to the usage of the “digital dividend.” It proposes to subdivide the whole band of 470-862MHz into three sub-bands. The lowest band is proposed to be used for the existing radio and television services as well as the high definition television services. The middle band is proposed to be used for the unidirectional, high power services such as the narrow-band broadcast mobile TV. The final upper band is proposed for the bidirectional medium to low power networks, such as wireless broadband access and high speed mobile data access. This latest part, contrary to the 2 lower bands, is proposed to be harmonized in the EU on a flexible basis, with a gradual implementation to cope with the national constraints. This will enable EU-

wide interoperability of essential public safety applications such as public protection and disaster recovery.

26. In a longer range perspective, there is the question of whether the majority of the “digital dividend” should be re-used for interactive services. If a social obligation remains to offer public service TV channels via terrestrial broadcasting, it will be possible to do it in a single multiplex 56MHz in a multi frequency network and in one 8MHz slot for a future single frequency network. With the remaining spectrum capacity around 350MHz, the widely available radio technologies within the coming 5 to 10 years will offer enough capacity for highly interactive advanced services including the broadcasting services.”

Question 1

Do you think that the TRA should follow the same trend and suggestion as the one proposed by the EU Commission for the future usage of the digital divide?

Question 2

If the answer is yes, do you think that there should be an action of harmonization among the Arab Regulators and administrations for harmonizing the usage of a part of the leftover digital divide bands for applications such as public protection and disaster recovery?

Strategy Considerations

22. The use of digital transmission technology makes for more efficient use of spectrum than the analogue signal modulation technology.

Spectrum capacity is today at a premium and there are advantages in encouraging a fast migration and an early turn off.

23. The use of common transmission sites with multiplexed content insures efficient spectrum using SFN, reduced analogue to digital CAPEX, reduced OPEX (currently each operator is using his own infrastructure on an average of 20 transmission tower sites to cover nationwide. Cost of continue operating and upgrading all these transmission sites per operator is significant vs. A common site approach). Most channels are not registered by the ITU and as such are not protected. CAPEX & OPEX of transmission and broadcasting sites could be split by 8 if a single broadcasting network is established whereby the focus of the TV operator is to invest in content and new programs while achieving high spectrum efficiency and meet the technical requirements.

Technical Considerations

8. Technical Standards

24. DVB standards and specifications for terrestrial, cable and satellite transmissions to be adopted in Lebanon.
25. Specifically for terrestrial transmissions technical considerations such as power of signal level, antenna coverage patterns, location of transmitters, etc. have a determining effect on reception coverage, on the capability for indoor reception and interference with other users of the radio spectrum and other network operators and cross border.
26. DVB-T is the applicable standard for UHF Digital TV. Mass volume DVB-T UHF receivers, set-top boxes, USB receivers, etc. are widely available in the market.
An updated version of the standard, DVB-T2, is to be approved by the DVB Forum by mid-2008. However availability of mass volume receivers might take a few years and is mostly targeted at the post Analogue Switch-Off market.

9. Spectrum Efficiency

27. Digital TV networks can operate at lower power levels than analogue networks, and require lower protection ratios under ITU-R standards. The overall effect is to reduce substantially the bandwidth required to implement a TV network (like a nationwide series of licences). In addition, and unlike analogue licences, digital licences allow the simultaneous output of multiple programmes within a single transmission (a 'multiplex').

Proposed general approach for conversion from Analogue to Digital

10. Spectrum Issues

28. The general approach is to accommodate simulcast of Analogue and Digital TV for a certain period of time to facilitate migration of consumer equipment.
29. Initial investigations by TRA into the spectrum aspects have identified:
- The UHF spectrum is heavily used International frequency coordination is an issue: Most channels currently used for analogue transmission are not registered in the ITU.
 - Use of Single Frequency Network (SFN) would enable a full multiplex with multiple TV channels to be deployed on just 1 frequency nation-wide
 - 2 DVB-T Multiplexes would provide sufficient capacity for the existing 8 Free-to-Air SDTV stations.
 - Contrary to Analogue TV, DVB-T can be deployed on an adjacent analogue channel as long as the transmit power of DVB-T is 12-20 dB lower than the Analogue TV signal.
 - DVB-T coverage requires a much lower transmit power for the same coverage.
 - A number of potential channels for a DVB-T SFN's have been identified below 790 MHz. Frequencies above 790 MHz have not been considered given the revised allocation of the 790 – 862 MHz band during the WRC-2007.
 - The channels registered to Lebanon and coordinated with neighbouring countries during RRC06 for DVB-T are:
 - Band III: 11
 - Band IV\V: 24, 36, 40, 43, 55, 57, 58, 60
 - Although in principle a Multiple Frequency Network (MFN) strategy could be possible the TRA would prefer ultimately an SFN based approach for reasons of spectrum efficiency, coverage quality and ease of communication with the consumers.
 - SFN's do require synchronisation between the different transmission locations. Today's commercially available equipment is capable to support synchronisation and there is a broad experience with SFN's globally.
 - Implementing 2 nation-wide SFN's to accommodate the introduction of digital simulcast seems possible given the current spectrum usage:
There are several options to create a second nation-wide channel:
 - Use one of the nation-wide available channels. Coordination with the neighbouring countries would be required to prevent harmful interference.
 - Alternatively one of the channels already registered to Lebanon in RRC06 could be released and made available. This would require at

least one of the Analogue TV stations to change one of their frequencies in the near future. Even in these cases the actual situation in the neighbouring countries should be reviewed.

- If spectrum usage does not allow 2 nation-wide SFN's then Lebanon can be divided into regions, in such regions a SFN policy can be deployed while different frequencies can be used in the different regions for the transition period. So, a mixed MFN/SFN scenario could be applied as alternative.

Question 3

Do you agree with the initial focus on digitisation of the existing 8 analogue TV Programmes in 2 DVB-T multiplexes?

Question 4

When should additional TV Programmes be considered? Should this be an objective before Analogue Switch-Off or should this be considered after Analogue Switch-Off?

Question 5

Do you agree with the focus on SFN given the coverage benefits and the spectrum efficiency?

11. Transmission and Coding

30. Initial investigations by TRA into the Video Coding aspects have identified:
- Many DVB-T deployments in the past started with MPEG2 video coding. However over the last years more efficient video coding technologies like MPEG4 Part 10/H.264 have been deployed as well.
 - Statistical multiplexing and transrating technology can be used to increase network capacity but such technology could increase network and operation complexity.
31. Initial investigations by TRA into DVB-T settings aspects have identified:
- A suggested parameter setting for the nation-wide SFN could be modulation 64 QAM, carrier type 8k, FEC 2/3 and guard time 1/4. This would provide a multiplex capacity of 19.91 Mb/s and maximum use of multiple transmit location coverage given the irregular structure of the broadcasting locations.
In Europe many countries opted for the 64 QAM, 8k, FEC 2/3 configuration but often a shorter guard time, and as consequence a higher multiplex capacity, was achieved by careful planning. Given the irregular structure of the current broadcasting locations, the mountainous terrain and the need to achieve maximum coverage in a SFN in which effective reception of multiple transmitter locations will be highly likely it seems acceptable to use guard time 1/4 for the first 2

multiplexes. This could be reviewed in the future based on actual experience in the field.

Question 6

Do you agree with the proposed initial DVB-T configuration? Please provide your recommendations with respect to the optimum trade-offs.

Question 7

Should Lebanon start with MPEG4/H.264 video coding to assure a more future proof implementation or would a start with legacy MPEG2 coding be preferred?

32. Initial investigations by TRA into updates of the DVB-T standard have identified:
- DVB-T2 is supposed to increase capacity by about 30% . However mass market deployment is likely to take a few years and in general this is considered to happen post Analogue Switch-Off. The DVB forum does not recommend waiting for DVB-T2 for initial deployments.
 - After Analogue Switch-Off many frequencies will become available allowing for more TV channels, HDTV and further refarming of the UHF band.

Question 8

Do you agree with the focus on DVB-T for the initial launch and only subsequently considering DVB-T2?

12. Network Infrastructure

33. Since DVB-T makes use of multiplexes consisting of multiple television programmes only a single broadcast infrastructure would be required. There is no need for individual TV transmitters for each TV station anymore.
34. A separate entity would be required to implement and maintain this broadcast infrastructure for all television stations.
35. This entity providing and maintaining the broadcast infrastructure could for example be:
- A joint venture between the different broadcasters
 - A fully independent entity
 - An association of all broadcasters owning the entity that provides the broadcast infrastructure
 - A National Broadband Network operator can manage such network, or services to the broadcasters can be submitted through this network.

Note: A similar broadcast facility entity might also facilitate future FM broadcasting infrastructure.

Question 9

How should the broadcast infrastructure entity be structured?

36. Since the transmitters would all be part of one and the same broadcast infrastructure a joint transmission infrastructure from the television studios to all broadcast locations seems practical.

Question 10

Should each broadcaster provides its own transmission to the broadcast locations or would it be preferred to work towards a joint transmission solution to reduce overall costs?

How about relying on a 3rd party operator to provide service between studios and transmission sites (National Broadband Network,..)?

Consumer aspects

37. Consumers will benefit from the introduction of digital TV because of better quality, more choice and more services. Indirectly consumers will benefit from the “Digital Dividend” since the released spectrum can be used for more broadcasting and/or other services like mobile and broadband.
38. In the initial phase of simulcasting the full potential cannot yet be realised but it allows consumers to migrate gradually. However the actual Analogue Switch-Off can cause inconvenience to consumers:
- All consumers should have upgraded their receive equipment (like a DVB-T set-top box) to prevent loss of service.
 - Although in general better coverage can be achieved with the digital TV service there could always be some particular locations which could have reduced or no digital service (for example due to interference from abroad on a particular frequency).
39. TRA is proposing to complete a good digital TV coverage of Lebanon before Analogue Switch-Off to minimise any coverage issues. A period of simulcast of Digital and Analogue TV is therefore required. Assuming DVB-T deployment starting in 2009 the period of simulcast could be between 1 and 6 years given Lebanon’s commitment to the Geneva 2006 Agreement for Analogue Switch-Off no later than mid-2015. The simulcast period should be long enough to minimise any consumer inconvenience but also the Analogue Switch-Off should not be postponed unnecessarily long since only after Analogue Switch-Off there will be sufficient spectrum available to offer many more and new services.

Question 11

How long should the period of Analogue and Digital TV simulcast be? Please explain your rationale behind the proposed duration.

40. Digital receive equipment, like a DVB-T set-top box or a TV set with a build-in DVB-T receiver, should be available in the market enabling consumers to obtain them. A coordinated action will be required to inform

Question 12

What is your preference for middleware (MHP, MHEG, etc.)?

the TV hardware distribution channels and the consumers to facilitate timely distribution of the digital receive equipment.

Question 13

What type of set-top box is more convenient to the market? A very basic Free to Air set-top box equipped with certain middleware or a set-top box including Conditional Access (CA) capabilities to facilitate other future (paid & Interactive) services?

41. In some countries a subsidy has been provided to the poorest and/or remaining market segment to accelerate the deployment of digital set-top boxes and to minimise any loss of TV service for the consumers.

Question 14

How do you anticipate the introduction of DVB-T receivers/set-top boxes in Lebanon and what specific actions are necessary to reach > 99% of the consumers.

Question 15

Would any "social" programme be required to subsidise DVB-T receivers/set-top boxes for particular groups? If yes, what type of programme do you foresee and how should this be funded?

42. Electronic Programme Guides (EPGs). EPGs are screen-based menus of channels and/or programmes which allow viewers of multi-channel television services to click through to the channel of their choice using their remote control. An integrated EPG covering all TV programmes on the Digital TV platform would be desirable from a consumer perspective. The EPG provider should allow fair and equal access to the EPG and its capabilities to offer additional services. Technological developments might enable additional functionalities through the EPG. TRA considers it likely that EPG regulation will be required and might need to change over time.

New Entrants

Question 16

How should the initial EPG be provided and what regulation do you believe to be necessary?

Question 17

Do you intend to provide your own EPG or do you think that it is better to be outsourced?

Question 18

Do you plan to introduce interactive services and if yes what are the services you plan to offer?

43. The TRA wishes to ensure that there continue to be opportunities for new broadcasters and new services to enter the market. The current broadcasters did require a spectrum license but this is not necessarily the case once a DVB-T broadcast infrastructure has been established. This can be achieved:
- Introducing new digital TV licences specifically for new entrants allowing access to the available DVB-T multiplex capacity.
 - Introducing a spectrum license for one (or more) broadcast infrastructure providers to operate ‘public’ shared multiplexes open to use by new entrants under defined conditions.

Essentially the spectrum license and the license for a broadcaster are no longer an integral package given the potential split between a broadcast operator/infrastructure and the actual broadcaster.

44. Creating a new broadcast licence enabling access to the DVB-T multiplexes allows a new broadcast station access to the market without the necessity to acquire, own or manage a spectrum licence. Should more new entrants join the market, it is a simple matter to create the licences for further multiplexes. Initially the capacity of the 2 multiplexes will be a limitation but as soon as Analogue Switch-Off starts more spectrum will be available for additional multiplexes.
45. The entity providing and operating the broadcast infrastructure should be obliged to provide fair and equal access to the multiplexes for licensed new broadcasters.

Question 19

How would fair access to the digital multiplexes be secured for new entrants?

Post Analogue Switch-Off issues

46. After the Analogue Switch-Off the available spectrum requirements will be reviewed. The “Digital Dividend” can be used for more broadcasting services like additional channels, HDTV and mobile TV and/or other services like mobile and broadband (in line with the WRC 2007 plan).

Question 20

What Post Analogue Switch-Off capacity requirement for TV channels do you anticipate for the overall Lebanese market as well as for your particular company?

Please express this in terms of SDTV and HDTV channels as well as required bitrates given the preferred choice of video codecs.

Question 21

Is there a specific requirement for programmes which are really just regional in nature? This would imply the spectrum inefficient use of MFN. If yes, please describe and outline how this could be done spectrum efficiently.

47. The TV services could be divided in Free to Air TV as well as Pay-TV.

Question 22

Do you have a requirement for a Pay-TV offering? If yes, please describe your needs.

48. DVB-T can provide digital TV service to mobile users. However there is a separate standard specifically addressing Mobile TV, DVB-H. DVB-H is being introduced in many countries and often partly integrated with the DVB-T infrastructure.

Question 23

Do you have see feasibility for Mobile TV and DVB-H? If yes, please describe your approach.

49. The TRA is responsible for efficient use of the spectrum, maintain effective competition and to maximise the overall value of spectrum for the Lebanese society. Therefore the desired outcomes from the digital transition process are:

- Competition between a sufficient range of digital broadcasters is sustained
- New broadcasters and new services can enter the market
- Spectrum is used efficiently, implying that multiplexes maximise the capacity in line with technology capabilities and multiplex capacity is efficiently utilised.
- TRA retains the ability to plan the efficient use of the present UHF-TV band, including allocation of unused spectrum for other uses.

Submission

The TRA requests submissions to be provided as soon as possible. The closing time for submissions is 5.00pm, _____ ____ December 2008. This will enable the TRA to analyse the views provided and undertake any specific discussions deemed necessary.

The TRA requests that submissions are provided electronically to BRTVconsultation@tra.gov.lb in either word or PDF format. Any questions about this paper or the process should also be directed to this e-mail address.

The TRA's preferred format is:

- Respondent's name
- Organisation
- Nature of organisation's interest (like 'Broadcaster')
- Email address or other address for written communications
- Response to Question 1
- Response to Question 2
- etc.
- Any other matters that you believe the TRA should consider in reviewing the present digital conversion policies.

The TRA intends to publish all submissions on the TRA web site. If a respondent considers that there are grounds for the TRA to withhold key information in a submission for publication then this information should be clearly marked and the relevant reason stated so that the TRA can handle the submission appropriately.

XL Annex “Analogue to Digital Migration Worldwide Status”

Created by the DVB Project Office	Last Update: 03/06/2008	TV Penetration		DTT Services				
Country	Population (Source - Wikipedia 11/07)	TV Households	Total Digital Households	DTT Standard	DVB-T Service Launched?	Service Launch	Business Model	ASO Date
Albania	3,190,000	500,000		DVB-T	Yes	2003	PayTV	
Algeria	33,858,000	3,600,000		GE'06 signatory				
Andorra	81,200			DVB-T	Yes	2005		2007
Angola	17,024,000			GE'06 signatory				
Armenia	3,002,000			GE'06 signatory				
Australia	21,129,222	7,600,000	4,000,000	DVB-T	Yes	2001	FTA	2013
Austria	8,316,487	3,300,000		DVB-T	Yes	2006	FTA	2010
Azerbaijan	8,467,000			DVB-T		2004 (Test)		
Bahrain	753,000			GE'06 signatory				
Belarus	9,714,000	3,500,000		DVB-T		2004 (Test)		
Belgium	10,457,000	4,100,000		DVB-T	Yes	2002	FTA	2012
Bosnia and Herzegovina	3,935,000	500,000		DVB-T				
Botswana	1,882,000			GE'06 signatory				
Brunei	390,000			DVB-T		Aug-2008		
Bulgaria	7,639,000	2,700,000		DVB-T				2012
Burkina Faso	14,784,000			GE'06 signatory				
Burundi	8,508,000			GE'06 signatory				
Cambodia	14,444,000			DVB-T				
Cameroon	18,549,000			GE'06 signatory				
Cape Verde	530,000			DVB-T				
Central African Republic	4,343,000			GE'06 signatory				
Chad	10,781,000			GE'06 signatory				
Côte d'Ivoire	19,262,000			GE'06 signatory				
Croatia	4,555,000	1,500,000		DVB-T	Yes	2007	FTA	2010
Cyprus	855,000	200,000		DVB-T				
Czech Republic	10,325,900	3,700,000		DVB-T	Yes	2005	FTA	2010
Dem. Rep. of Congo	62,636,000			GE'06 signatory				
Denmark	5,457,415	2,400,000		DVB-T	Yes	2006	FTA	2009
Djibouti	833,000			GE'06 signatory				
Egypt	75,498,000	12,800,000		GE'06 signatory				
Eritrea	4,851,000			GE'06 signatory				
Estonia	1,342,409	600,000		DVB-T	Yes	2006	PayTV + FTA	June, 2010
Ethiopia	77,127,000			GE'06 signatory				
Faroe Islands	48,455	15,000		DVB-T	Yes	2002	FTA	
Finland	5,297,300	2,300,000	975,000	DVB-T	Yes	2001	FTA + PayTV	2007
France	64,102,140	24,700,000	17,600,000	DVB-T	Yes	2005	FTA + PayTV	2011
Gabon	1,331,000			GE'06 signatory				
Gambia	1,709,000			GE'06 signatory				
Georgia	4,395,000			DVB-T				
Germany	82,314,900	35,020,000		DVB-T	Yes	2002	FTA	2009
Ghana	23,478,000			GE'06 signatory				
Greece	11,147,000	3,600,000		DVB-T	Yes	2006	FTA	2012

Created by the DVB Project Office	Last Update: 03/06/2008	TV Penetration		DTT Services				
Country	Population (Source - Wikipedia 11/07)	TV Households	Total Digital Households	DTT Standard	DVB-T Service Launched?	Service Launch	Business Model	ASO Date
Greenland	58,000			DVB-T				
Hong Kong	7,206,000			DMB-T/H				
Hungary	10,030,000	3,900,000		DVB-T				2012
Iceland	312,851	100,000		DVB-T				
India	1,169,016,000	70,000,000		DVB-T				
Indonesia	231,627,000			DVB-T				
Iran	71,208,000			DVB-T				
Ireland	4,301,000	1,500,000		DVB-T		2008	FTA	2012 target
Israel	7,197,200	1,800,000		DVB-T		Dec-2008	FTA	
Italy	59,206,382	23,300,000	9,400,000	DVB-T	Yes	2003	FTA + PayTV	2012
Jordan	5,924,000	200,000		GE'06 signatory				
Kazakhstan	15,422,000			GE'06 signatory				
Kenya	37,538,000			DVB-T				
Kuwait	2,851,000			GE'06 signatory				
Kyrgyzstan	5,317,000			GE'06 signatory				
Laos	5,859,000			DVB-T				
Latvia	2,277,000	803,000		DVB-T				
Lebanon	4,099,000	600,000		GE'06 signatory				
Lesotho	2,008,000			GE'06 signatory				
Liberia	3,750,000			GE'06 signatory				
Libya	6,160,000	600,000		GE'06 signatory				
Lithuania	3,372,400	1,300,000		DVB-T	Yes	2006	FTA	2012
Luxembourg	467,000	200,000		DVB-T	Yes	2006	FTA	2006
Madagascar	19,683,000			GE'06 signatory				
Malawi	13,925,000			GE'06 signatory				
Malaysia	27,377,000			DVB-T				
Mali	12,337,000			GE'06 signatory				
Malta	407,000	200,000		DVB-T	Yes	2005		2010
Mauritania	3,124,000			GE'06 signatory				
Mauritius	1,262,000	350,000		DVB-T	Yes	2005	FTA	2011
Moldova	3,794,000	1,200,000		DVB-T				
Montenegro	598,000			DVB-T		2008 - start of pilot project		2012
Morocco	31,224,000	3,000,000		DVB-T				
Mozambique	21,397,000			GE'06 signatory				
Myanmar	48,798,000			DVB-T				
Namibia	2,074,000			DVB-T	Yes	2005	PayTV	2005
Netherlands	16,387,773	7,026,000	2,600,000	DVB-T	Yes	2003	FTA + PayTV	2007
New Zealand	4,239,600	1,500,000	700,000	DVB-T		4/2/2008	FTA	

Created by the DVB Project Office		Last Update: 03/06/2008		TV Penetration		DTT Services		
Country	Population (Source - Wikipedia 11/07)	TV Households	Total Digital Households	DTT Standard	DVB-T Service Launched?	Service Launch	Business Model	ASO Date
Niger	14,226,000			GE'06 signatory				
Nigeria	148,093,000			GE'06 signatory				
Norway	4,722,676	2,000,000		DVB-T	Yes	2007	FTA + PayTV	2009
Oman	2,595,000			GE'06 signatory				
People's Republic of China	1,321,847,351	380,000,000		DMB-T/H				
Poland	38,125,479	13,400,000		DVB-T	Yes	2007 (soft launch)	FTA	2014
Portugal	10,623,000	3,500,000		DVB-T		2008	FTA	2012
Republic of Macedonia	2,038,000	500,000		DVB-T				
Republic of the Congo	3,768,000			GE'06 signatory				
Romania	21,438,000	6,800,000		DVB-T				
Russia	142,499,000	52,500,000		DVB-T		Various trials on air since 2005	FTA and PayTV	
Rwanda	9,725,000			GE'06 signatory				
Saudi Arabia	24,735,000			DVB-T	Yes	2006	FTA	
Senegal	12,379,000			GE'06 signatory				
Serbia	9,858,000	2,300,000		DVB-T				
Singapore	4,436,000	796,000		DVB-T	Yes	2001 (mobile)	FTA	
Slovakia	5,390,000	1,900,000		DVB-T				
Slovenia	2,020,000	700,000		DVB-T	Yes	2007	FTA	End 2010
Somalia	8,699,000			GE'06 signatory				
South Africa	48,577,000	7,000,000		DVB-T				
Spain	45,116,894	15,600,000	7,200,000	DVB-T	Yes	2000	FTA	3rd April 2010.
Sri Lanka	19,299,000			DVB-T				
Sudan	38,560,000			GE'06 signatory				
Swaziland	1,141,000			GE'06 signatory				
Sweden	9,150,000	4,100,000		DVB-T	Yes	1999	PayTV + FTA	Oct-2007
Switzerland	7,508,700	2,700,000		DVB-T				
Syria	19,929,000			GE'06 signatory				
Taiwan	22,925,000	5,210,000		DVB-T	Yes	2004	FTA	2010
Tanzania	40,454,000			GE'06 signatory				
Thailand	62,828,706			DVB-T				
Togo	6,585,000			GE'06 signatory				
Tunisia	10,327,000	2,000,000		DVB-T	Yes	Pilots since 2001		
Turkey	74,877,000	17,000,000		DVB-T				
Uganda	30,884,000			GE'06 signatory				
Ukraine	46,205,000	7,900,000		DVB-T	Yes	2006		2014/15
United Arab Emirates	4,380,000			GE'06 signatory				
United Kingdom	60,587,300	25,400,000	21,400,000	DVB-T	Yes	1998	FTA + PayTV	2012
Uruguay	3,340,000			DVB-T				
Uzbekistan	27,372,000			GE'06 signatory				
Vietnam	87,375,000			DVB-T				
Yemen	22,389,000			GE'06 signatory				
Zambia	11,922,000			GE'06 signatory				
Zimbabwe	13,349,000			GE'06 signatory				

781,520,000 63,875,000

Source: <http://www.dvb.org>