

Canadian Radio-television and Telecommunications
Commission

Digital transition models

October 2009



Contents

1	Executive Summary	1
2	Purpose of the Study.....	3
3	Scope of Work and Approach	5
4	Digital Television and Transition	6
4.1	What is Digital Television?	6
4.2	Strategies for Switching Off Analogue Services	6
4.3	Digital Transition in the UK and the US	7
4.4	Digital Transition in the United Kingdom.....	7
4.5	United States.....	7
4.6	The Digital Dividend.....	8
4.7	DTV in Canada.....	8
5	Canadian OTA Households in Mandated and Non-Mandated Markets	10
5.1	Estimation of OTA Households.....	10
5.2	Relevant Additional Factors	11
6	Consumer Service Offerings and Pricing.....	12
6.1	Service Offering and Pricing in the US	14
7	Service Provider business models in the UK.....	15
7.1	Freeview Business Model	15
7.2	Freesat Business Model	16
8	Financing the Transition.....	18
8.1	Financing of Consumer Equipment.....	18
8.2	Other Countries.....	21
9	Success Rates and Lessons Learned	22
9.1	Success Rates	22
9.2	Lessons Learned.....	23

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Appendices

- A. Overview of Digital Transition in other Countries
- B. Overview of Digital Transition in the UK by Region
- C. Calculation of Canadian Households by Market Type
- D. Consumer awareness plan in the UK

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1 Executive Summary

Digital transition in Canada

The television broadcasting landscape is shifting significantly in Canada as a result of the transition to digital television transmission, i.e., transmission of audio or video programs using digital technology. This applies to Over-the-Air Broadcasts (OTA) as well as cable and satellite broadcasting. Like numerous other countries, Canada is transitioning to digital television with an OTA analogue shut-off date of August 31, 2011. This timeframe is consistent, as many other countries have identified the period 2010–2012 as being the targeted switchover period for OTA broadcasts.

The CRTC has established a baseline group of markets which the Commission has mandated to convert to digital OTA broadcasts by August 2011¹. Hence, the majority of the Canadian households will have access to digital OTA signals by the mandated transition date of 2011. However, the transition can have far-reaching implications for OTA signal reception by some Canadians that rely solely on free television over-the-air (using an antenna), and are potentially losing reception as the broadcasters will cease analogue broadcasting. This study estimates that approximately 1.24 million households rely on free over-the-air (“OTA”) television as their primary or only means of TV reception, of which approximately 590 thousand households are situated outside the proposed mandatory markets and about 635 thousand within². These estimates are equal to 13% of the households in the non-mandated markets, and approximately 7.5 percent of the households in the proposed mandated markets.

Practices in other jurisdictions

Two of the countries that are ahead of Canada and all other countries in the OTA digital transition are the United States (“US”) and the United Kingdom (“UK”). The United States switched off the analogue signals in June of this year in the entire country, while in the UK the switch off commenced in 2008, and is gradually being rolled out across the country before it is completed in 2012. Moreover, the UK has multiple years of experience with OTA digital television because of the existence of free services designed in the first instance as digital offerings, namely by the Freeview service.

Freeview is a digital TV and radio platform that offers free OTA television and radio channels as well as pay services. Freeview was created in 2002 and is currently owned by BBC, BSkyB, Crown Castle International (now Arqiva), ITV plc and Channel 4. The consortium was created to provide consumer and retailer support for the digital terrestrial television (DTT) platform, as well as to avoid the need to have each broadcaster invest in its own transmission equipment. The Freeview model has been emulated in countries such as Australia, New Zealand, France and Italy.

Recently, the Freeview digital model has been converted to DTH service by Freesat, which is a digital satellite service provider; Freesat is a not-for-profit company owned by the UK’s two most popular broadcasters BBC and ITV. It was set up to ensure that everyone can access the best of free digital TV, no matter where they live in the UK.

Financing consumer equipment

To promote digital OTA television in the United States, a federally-sponsored DTV Converter Box Coupon Program was established with the aim of helping US consumers through the conversion.

¹ See section 2 and Appendix D for the criteria and list of the proposed mandated markets.

² The number of 590,000 households that rely on OTA television in the non-mandated markets would likely be reduced by mapping the actual distribution contours of Canada’s OTA broadcasters within the mandated digital conversion markets as some of those signals would reach the non-mandated markets. Additionally, uptake of an OTA replacement service would also be impacted by the number of households who *choose* not to watch local television and instead acquire reception through the black or grey market DTH satellite.

Through this federally-sponsored program, every US household was eligible to receive two coupons, worth \$40 each, toward the purchase of eligible digital-to-analogue converter boxes. The program was funded from the US\$20 billion in proceeds from the DTV spectrum auction which auctioned off the spectrum vacated by OTA analogue broadcasters.

A similar universal “coupon-like” program in the UK does not exist, but elderly and disabled people do get help by way of a scheme that will provide equipment and installation help to convert one TV set. This program is administered by the BBC on behalf of the Department for Culture, Media and Sport (DCMS), and is funded by an increase in the TV licence fee that all TV receiving households pay annually.

Success rates and lessons learned

Although there have been some documented problems with the digital transition in the US (e.g. loss of channels and difficulties with installing antennas), the National Association of Broadcasters (NAB) believes that the transition has been an overwhelming success. Less than one percent of homes in the US could not receive a digital signal per end of August 2009, compared to almost seven percent in December 2008.

A recent study showed an issue with the coupon program in the US, it reported that the program seems to have reduced price competition for the converter boxes (see section 9.2.1). Consumers pay \$0 with the coupon for any box priced \$40 or less, so they are less price sensitive, and retailers have little incentive to reduce the price of the box below \$40. An analysis of converter box prices at retailers around the US suggests that the coupon program has increased the price of converter boxes by \$21 - \$34. The coupon program has evidently been most beneficial for retailers or manufacturers.

The UK’s digital transition strategy has been particularly successful as well. The UK has chosen a phased approach, with different regions switching off the analogue signal at different times. This approach was adopted mainly as a result of technical challenges involved with the digital transition. From the third quarter of 2004, to the first quarter of 2009, the digital penetration rate increased from 56% to 90%, which represents an increase of nearly 9 million households.

Some overall success factors for the digital transitions in the US and the UK can be identified:

- TV households were made well aware of the switchover and understood what was going to happen, when and how to prepare, via an effective communication campaign;
- technical support was provided for individual households;
- financial support was made available to the TV households (e.g. subsidizing digital receivers) and the broadcasting industry;
- Digital Terrestrial Television (DTT) receivers were available to the market on time;
- support for the transition was coordinated with standards set for TV set manufacturers – in the US digital tuners were mandated for all new TV set sales; and
- a forum was created in the UK (Digital UK), and placed in charge of orchestrating the switchover; Digital UK involved all relevant stakeholders, including broadcasters, cable and satellite distributors, manufacturers of professional and consumer equipment, retailers and installers, and governments and regulators.

2 Purpose of the Study

The television broadcasting landscape will be shifting significantly in Canada as a result of the advent of over-the-air (OTA) digital television. Since June 12, 2009, all full-power analogue OTA television stations in the United States have stopped broadcasting, and are broadcasting in digital format only. The UK is switching to digital television over a five year period, between 2008 and 2012. Canada's over-the-air (OTA) analogue shutoff date is set for August 31, 2011.

Consumers in TV households receive television signals from either free OTA analogue or digital broadcasters, or from subscription services delivered by broadcasting distribution undertakings (via digital cable, satellite or broadband). Broadcasting OTA digitally is more efficient and can deliver superior quality and services than broadcasting in analogue format. For the consumer, picture quality and sound are enhanced. In North America, the main feature of OTA digital television is that it is being used primarily as a platform for high definition television (HDTV) whose standards are based on digital formats. Picture quality is noticeably higher in HD digital transmission in North America compared to the previous analogue standard (NTSC) and the HD screen is configured to deliver signals in wide aspect ratio. It is also better than other standards used in most of the rest of the world, such as the PAL standard, although the HD difference is arguably less noticeable than the difference between NTSC and HDTV.

Digital OTA (or DTV meaning "digital television") has also enabled broadcasters to offer more programming options for consumers through standard definition multiple broadcast streams (multicasting). The multiple channels route has been the preferred option in the UK and elsewhere, while in North America digital OTA is seen as the means to transition to HD broadcasts. The comparative spectral efficiency of digital signals has also been a key motivator for change. The transition to digital also releases valuable VHF and UHF spectrum used in analogue transmission for re-use, as wireless services such as mobile data and voice services as well as for emergency applications. Freed-up spectrum can be auctioned by countries to operators that are planning to offer new services, and the proceeds have been cast as a "digital dividend" by many jurisdictions.

As set out in Broadcasting Regulatory Policy 2009-406, The Commission established a baseline group of markets mandated to convert to digital. These have been established on the basis that for any market containing at least two television stations, the stations will be required to convert to digital OTA transmission³. These markets include the national capital and all provincial and territorial capital cities, and in combination with other parameters such as the designation of all markets with population of 300,000 or more, and the 360 kilometre spectrum management coordination zone (with the US). It is anticipated that the majority of households will have access to digital signals by the mandated transition date of 2011⁴.

However, a number of Canadian households, who rely only on existing free analogue television over-the-air, will potentially be losing reception after the broadcasters cease analogue broadcasting. Those households will only be able to receive signals via broadcast distributors like satellite and cable networks. To date, the business model for both satellite and cable services in Canada is that of paid subscription services.

Hence, the transition to DTV is a complex issue with far-reaching implications. The Canadian Radio-television and Telecommunications Commission ("CRTC") commissioned this report to assess a range of environmental factors, distribution and operational options as well as measure the potential impacts to the industry and the consumers. The results of this study are intended to assist the CRTC to develop a "go forward" solution for the possible replacement of analogue OTA

³ CRTC Broadcasting Notice of Consultation, paragraph 41. <http://www.crtc.gc.ca/ENG/archive/2009/2009-411.htm>

⁴ Access to domestic TV signals is defined as a single television set per household, thus avoiding the multiple set issue considered in the FCC incentive scheme.

service with digital service – a solution that is workable for consumers and for the broadcasting industry.

The purpose of this study, then, is to assist the CRTC with qualitative and quantitative data and help with the building of the OTA model in advance of hearings scheduled for November 16, 2009, specifically Broadcast Notice of Consultation 2009-411, *Policy proceeding on a group-based approach to the licensing of television services and on certain issues relating to conventional television including on Possible Digital Transition Models*.

3 Scope of Work and Approach

The approach to this study consisted of the following two lines of research and analysis.

1. Literature study to report on practices from selected markets that have completed a DTV transition

The literature study encompasses consideration of practices in other countries in digital transmission and the applicability of those practices in a Canadian context. In particular, we have placed emphasis on the United Kingdom and the United States. The UK has early experience with DTV, at first failing then succeeding in a DTV model with its “Freeview” terrestrial digital service. Recently, the “Freesat” service was established as a digital satellite television provider serving the UK, and offers a satellite alternative to the terrestrial Freeview service. The US very recently made the transition to digital, and in many respects is comparable to Canada. Where appropriate, the study team researched the experience of other countries.

We have researched publicly available information on service offerings, pricing, financing of consumer equipment, public funding contribution, degree of success, the FCC coupon incentive in the US, and the business models used by Freeview and Freesat in the UK.

2. Calculation of the possible number of TV households reliant on OTA service that will be affected by the digital transition and the CRTC’s policy on mandated markets

The second part of this engagement is estimating the number of Canadian households by market type (i.e., mandated markets and non-mandated markets), and by category of delivery technology (OTA vs via a distributor) to identify the number of people that can potentially lose reception of all television signals after the analogue switch-off (i.e., the number of OTA households in non-mandated markets).

The number of OTA households outside the mandated markets has been calculated by using the following data:

- Total number of households in Canada;
- Signal reception breakdown in Canada (cable, satellite and OTA);
- Cable households per region and market type (mandated vs. non mandated);
- Satellite households per region and market type; and
- Non-television households.

The number of OTA households affected per region and market type is then calculated by the following formula:

$$\# \text{ OTA households affected} = \# \text{ Total households} - (\# \text{ Cable households} + \# \text{ Satellite households}) - \# \text{ Non television households.}$$

The number of OTA households in this formula includes the households that do not own a television set. Additionally, the number of OTA households only takes into account the primary television set of the households. Households that use OTA for only a second or third television are not part of the number of OTA households but will also be impacted.

Additionally, we have made a list of the stations that are currently serving those markets based on their locations.

4 Digital Television and Transition

4.1 What is Digital Television?

DTV broadcasting is the transmission of audio or video programs using digital technology. Digital transmission technology uses discrete bits to represent information instead of a continuous wave, currently defined for analogue technologies⁵. Digital technology is a far more efficient use of radio spectrum than analogue broadcasting, and enables a larger number of channels and supplementary data services to be broadcast⁶.

DTV allows for clearer, crisper picture quality along with the ability for homes to utilize high-definition television receivers and displays⁷. It offers new ways to enjoy TV service: potentially a greater choice of TV channels; new features such as on-screen listings, improved sound quality, interactivity, audio description and subtitling for people with visual and audio impairments; access to HDTV, and optional additional premium channels. In Canada, DTV's primary use is the broadcasting and delivery of HDTV signals.

There are a number of different ways to receive DTV. One of the simplest means of receiving DTV is using an antenna, also known as an aerial (or rabbit ears). Typically, this method of receiving digital TV off-air is known as Digital Terrestrial Television (DTT). However, any DTT service is limited as to the number of channels that can fit within the terrestrial spectrum – more than analogue, but less than by cable or satellite distribution. The other ways to receive DTV are through cable, satellite, and broadband – all of which provide more bandwidth and thus depth in number of TV stations and related services.

For an individual terrestrial TV station, the digital TV switchover (DSO) is the process of turning off the analogue TV signal and replacing it with a digital signal. In addition to the improved TV experience for the consumer described above, a major driver for the switch from analogue to digital TV is to free up frequencies for advanced commercial wireless services for consumers, and for public safety communications (such as police, fire, and emergency rescue).

Numerous countries have already either completed their transition to digital television or are currently making this transition. Luxembourg was the first country to complete the move to digital broadcasting on September 1, 2006. Shortly after that, the Netherlands moved to digital broadcasting late in 2006 followed by Finland, Andorra, and Sweden in 2007, Belgium (Flanders), Switzerland and Germany in 2008, and the United States in 2009. Countries that are currently making the transition are Australia, Brazil, Canada, France, Italy, and as discussed above, the UK, amongst others. Appendix A gives an overview of the timeframe of the digital transition in other countries.

The facility with which the DSO can be achieved depends not only on the size of the area and number of transmitters to be converted, but also on the number of viewers who rely on the analogue signal as their primary or only means of TV reception. In parts of Europe for example, (especially for highly dense areas), most TV viewers subscribe to cable television service. As a result, only a small number of households need the new OTA reception equipment (an aerial) necessary for digital OTA reception.

Some of these countries, such as Australia, New Zealand, France and Italy, have largely emulated the Freeview model from the UK, which is described in section 4.3 below.

4.2 Strategies for Switching Off Analogue Services

The digital switchover took place region-by-region in a number of European countries based on a timetable set by their government detailing when analogue transmitters would be shut off

⁵ <http://www.crtc.gc.ca/multites/mtwdk.exe?k=glossary-glossaire&l=60&w=35&n=1&s=5&t=2>

⁶ [http://archive.cabinetoffice.gov.uk/e-envoy/reports-anrep1-top/\\$file/080.htm](http://archive.cabinetoffice.gov.uk/e-envoy/reports-anrep1-top/$file/080.htm)

⁷ <http://hubpages.com/hub/broadcast-signal-overviews>

throughout the country. This approach was adopted in Austria, Czech Republic, France, Germany, Italy, Sweden, Switzerland and the United Kingdom.

Other countries have chosen an overnight approach to digital switchover, where analogue services are ended simultaneously across a whole country. This overnight approach allows all viewers to benefit from the advantages of digital switchover at the same time, be treated equally, and given the same access to services. This approach has been adopted in Finland, the Netherlands, Andorra and the US.

4.3 Digital Transition in the UK and the US

This report focuses on the digital transition models of the United Kingdom and the United States since they are further along in the transition in many respects. In order to fully understand the practices in both countries and the applicability of those practices to the Canadian context, a brief description is outlined below of the digital transition in both countries.

4.4 Digital Transition in the United Kingdom

DTV was introduced in the United Kingdom in 1998. Digital terrestrial television was introduced on November 15, 1998 and digital satellite television on October 1, 1998.

The UK government has mandated broadcasters to switch off the existing analogue TV signal for each transmitter group within each TV region, staged over a five year period between 2008 and 2012. The switchover map in Appendix B provides an overview of the transition by region. Once completed, almost everyone will be able to receive digital TV through an aerial (namely, the Freeview)⁸ service. Appendix C shows a map of the existing Freeview coverage in the UK.

The transition from analogue to digital TV in the UK is managed by Digital UK, an independent, not-for-profit organization specifically created to lead this process. Digital UK communicates the DSO to the public, works with the industry to build support for the switchover program, and coordinates engineering work across the UK broadcast network. Digital UK is responsible for providing impartial information on what people need to do to prepare for the switch to digital, and when they need to do it.

Digital UK was set up in 2005 by the UK's public service broadcasters (BBC, ITV, Channel 4, five, S4C and Teletext), and multiplex operators or transmission companies SDN⁹ and Arqiva¹⁰ at the request of the government. It is jointly funded and owned by the founders. Digital UK works closely with the Department for Culture, Media and Sport (DCMS) and the Department for Business, Innovation and Skills (BIS), as well as the regulator Office of Communications (Ofcom).

Most of Digital UK's budget is funded by the license fee¹¹, and the company is formally a subsidiary of the BBC.

4.5 United States

The United States very recently completed the official transition to digital television. Under the Digital Transition and Public Safety Act of 2005, full-power broadcasting of analogue television in the United States was planned to cease after February 17, 2009. To help US consumers through the conversion, the Act established a federally-sponsored DTV Converter Box Coupon Program.

⁸ See <http://www.ukfree.tv/maps.php>.

⁹ SDN (S4C Digital Networks) operates Multiplex A, one of the six groups of channels on digital terrestrial television in the United Kingdom. The company has been owned by ITV plc since 2005.

¹⁰ Arqiva provides infrastructure and broadcast transmission facilities in the United Kingdom. The present company was formed by National Grid Wireless (originally the UK subsidiary of Crown Castle) combining with Arqiva (formerly NTL Broadcast) in September 2008.

¹¹ In the United Kingdom one must have a television license to receive live any television broadcast, from any source. This license fee is set annually by the Department for Culture, Media and Sport (DCMS) and collected by the BBC.

However, just before the planned transition date, the DTV Delay Act changed the mandatory analogue cut-off date to June 12, 2009, although stations were permitted to cease analogue transmissions before the new mandatory cut-off date. The reason of the extension was that millions of households were not ready yet for the transition. On the original cut-off date of February 17, 2009, 641 stations representing 36% of US full-power broadcasters were transmitting exclusively in digital.

Analogue broadcasting did not cease entirely following the June 12 deadline: under the provisions of the Short-term Analogue Flash and Emergency Readiness Act, approximately 120 full-power stations will briefly maintain analogue "nightlight" service, which was projected to end no later than July 12, 2009¹². In addition, low power television stations will be permitted to continue analogue broadcasts for several more years.

4.6 The Digital Dividend

The Digital Dividend – the spectrum that will be freed-up through digital television switchover – is some of the most valuable spectra to be released in most countries. For example, the Federal Communications Commission (FCC) in the US completed the auction of the spectrum in March 2008 and collected US\$20 billion¹³ (CAD\$22 billion), primarily from wireless operators intending to extend or establish mobile wireless services.

The UK regulator Ofcom estimated that the allocation of the digital dividend would provide between £5 billion (CAD\$9 billion)¹⁴ and £15 billion (CAD\$26 billion)¹⁵ over 20 years for the UK economy alone¹⁶. The European Commission (EC) estimated that a coordinated approach would increase the potential impact of the digital dividend by an additional €20 to €50 billion (CAD\$32 to CAD\$79 billion¹⁷) between now and 2015¹⁸.

The UK has recently auctioned the first (small) part of its digital dividend in Greater Manchester & Cardiff, and is making further plans to do so as the switch-off of the analogue signal continues. Italy has also announced an auction for its frequencies vacated during the analogue switch off¹⁹. In Germany, the telecom regulator FNA will likely auction the digital dividend as well, although already it is determined that the digital dividend will be used for mobile services (as a result of the approval by the Germany's Federal Council of proposals to use digital dividend for mobile broadband services). The same is true for Spain, where Spain's industry ministry has recently announced it will reserve the spectrum in the 790-862MHz bands for mobile operators²⁰.

The 2008 wireless spectrum auction in Canada generated \$4.4 billion. While there is another auction to be organized for the broadcast spectrum, it is unclear what the demand will be for new spectrum fairly soon after the last auction, which brought in more than double what experts were projecting. There may be less room for the broadcast digital dividend in Canada.

4.7 DTV in Canada

The CRTC has scheduled the switchover from analogue to digital TV to happen on August 31, 2011, just over two years after the US transition.

¹² FCC list of "nightlight" stations - http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-291375A1.pdf

¹³ Using an exchange rate of 1US\$ = 1.08389 CAD for 1 October 2009.

¹⁴ Using an exchange rate of 1£ = 1.7497 CAD for 22 September 2009.

¹⁵ Idem

¹⁶ See Ofcom: <http://www.ofcom.org.uk/consult/condocs/ddr/statement/>

¹⁷ Using an exchange rate of 1€ = 1.584 CAD for 22 September 2009.

¹⁸ See "How to transform the "digital dividend" into consumer benefits and up to €50 billion in economic growth for Europe?", 10 July 2009. <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/09/1112>

¹⁹ See <http://www.broadbandtvnews.com/2008/12/11/auction-planned-for-italian-digital-dividend/>.

²⁰

http://www.mobileeurope.co.uk/news_analysis/114845/Spain_to_reserve_digital_dividend_spectrum_for_mobile.html

In major markets, most TV stations are broadcasting in digital format obviously well before the mandated date. DTV in Canada is viewed as a means to provide high-definition television service for over-the-air television, and these HD signals are picked up for distribution by cable and DTH operators to their subscribers. Several pay and specialty TV channels also transmit in HDTV. Hence, the service level expectations of many Canadians are for HDTV, not for a digital equivalent to the NTSC analogue standard.

Industry Canada requires that television sets entering Canada have digital (ATSC²¹) tuners²². Moreover, since television equipment is effectively manufactured for both the Canadian and US markets, television sets sold in Canada will include a digital tuner to fulfill the US requirement. Industry Canada also regulates the import of OTA set-top boxes for the conversion of off-air digital signals for analogue sets. Unlike the US, Canadian authorities have not yet made any decision whether to use the funding from the forthcoming auction of the analogue UHF/VHF spectrum to subsidize the cost of set-top converter boxes for consumers.

²¹ ATSC is a set of standards developed by the Advanced Television Systems Committee for digital television transmission that replaces much of the analogue NTSC television system.

²² See <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf01229.html>.

5 Canadian OTA Households in Mandated and Non-Mandated Markets

5.1 Estimation of OTA Households

In this section, we estimate the number of households in Canada which are outside of the mandated digital conversion markets and which rely on OTA transmission to receive TV services.

Since there is no count of OTA only households in the mandated and non-mandated markets, the project team formulated a procedure to develop estimates of TV households in these market segments. We estimated the number of cable²³ households and satellite households in the mandated and non-mandated markets based on available penetration and subscriber data²⁴. We then subtracted these figures from the number of total households in Canada. Lastly, we corrected for non-television households by subtracting these numbers from estimated OTA household numbers. A detailed description of the calculations and methodology can be found in Appendix C.

The estimate is subject to a few limitations. Although the limitations are mentioned in Appendix C, two important limitations are:

- Populations and household counts for the mandated conversion markets are based on metropolitan (primarily Census Metropolitan Area (CMA)) boundaries, and therefore do not account entirely for broadcast distribution contours which may reach households outside of the CMA;
- Each household can only be defined as receiving television signals in one way (cable, satellite or OTA), and therefore households receiving cable or satellite signals on the primary set, but OTA signals on second and thirds sets, etc. are not part of the OTA household count.

The results of the estimating process are:

- About 63% of the total number of Canadian households resides in the mandated markets. This number is based on a methodology that estimates the number of households within the Canadian CMA regions, and results in an estimated percentage of households in the "mandated CMA regions" using publically available data sources from reliable sources. This methodology was outlined in our proposal to the CRTC which led to this report. Other reasonable methodologies to estimate (i) the percentage of Canadian households, (ii) the percentage of Canadian households with one or multiple televisions or (iii) percentage of the Canadian population that is covered by the mandated markets can result in different estimated numbers. At this point, there is no single agreed methodology among the stakeholders given the complexity of this study while using high level estimates.
- The total of OTA dependent households in Canada is about 1.24 million, representing some 9.9 percent of the total households in Canada.

²³ Television via broadband (Telco TV and IPTV) is assumed to be part of the cable market.

²⁴ See "CRTC Communications Monitoring Report", August 2009 and "Canadian Digital TV Market Monitor, Volume 2" for national estimates for Canadian cable and satellite households. Statistics Canada provides data for regional and market-type cable penetration percentages (see Appendix C).

- Although more households in Canada are residing in mandated markets, there are almost as many OTA-reliant households in the non-mandated areas as there are in the mandated areas.
 - Some 590,000 households *outside* of the mandated digital conversion markets rely on OTA signals as their principal source for television programming; and
 - Some 635,000 households *within* the mandated digital conversion markets rely on OTA signals as their principal source for television programming.

There are actually more OTA dependent households within the mandated digital conversion markets than outside. This is because the absolute number of households inside the mandated markets is much higher than the non-mandated markets. Therefore, the OTA dependent households represent a larger proportion of households in non-mandated markets compared to mandated markets.

- 7.5 percent of all households in the mandated digital conversion markets rely on OTA signals.
- 13% of all households in the non-mandated digital conversion markets rely on OTA signals.

In terms of impact on Canada's digital conversion policy, there are an estimated 590,000 households that would potentially need a cable- or satellite-based replacement for OTA signals - should the broadcasters outside of the mandated digital conversion markets not convert to digital terrestrial distribution.

5.2 Relevant Additional Factors

In the previous section, we estimated that about 590,000 households could potentially lose television reception.

This number would likely be reduced by mapping the actual distribution contours of Canada's OTA broadcasters within the mandated digital conversion markets. Some of those signals would reach the non-mandated markets. Additionally, uptake of an OTA replacement service would also be impacted by the number of households who *choose* not to watch local television, and instead acquire reception through the black or grey market DTH service. Estimates of the grey and black markets are as high as one million TV households, but many of those households would be inside the mandated areas. There is no way of assessing how the grey/black market splits in terms of how many are in the mandated vs. non-mandated areas.

Thus, the estimate of 590,000 households in the non-mandated markets would represent the upper boundary for those dependent on OTA transmission. From that figure, one would need to subtract those who can receive signals from the mandated areas, or who are "lost" to the grey/black market. Estimating that final tally is beyond the scope of this report.

6 Consumer Service Offerings and Pricing

The cost to switch from analogue to digital TV for the end user varies depending on the digital choices the consumer makes. The elements to consider are:

- The number of TVs in the consumer's home that the consumer will convert.
- Whether the consumer purchases a TV with a digital tuner installed, and has an antenna suitable for digital signals.
- Whether the consumer chooses to pay an upfront cost for a digital cable or satellite receiver with a monthly fee dependent on the channel package purchased, or pay a higher monthly fee for renting the receiver and subscribing to the selected programming package service.
- For the cable and satellite options described above, whether the consumer chooses to buy from the service provider:
 - a standard digital box with or without a recording capability (PVR);
 - an HD digital box with or without a recording capability (PVR); and
 - a television with integrated digital cable tuner (not applicable in Canada as cable signals are encrypted).
- If the consumer chooses to subscribe to additional channels (e.g. movies and sports), channels in HDTV, or services (e.g. broadband, telephone).
- Installation fees for new equipment, if not self-installed.

The following sections describe the major service offerings and pricing for digital television in the UK and the US. These offerings take into account the kinds of choices facing consumers

Service Offerings and Pricing in the UK

Table 1 presents the major service offerings and pricing available to British consumers.

British consumers can choose to receive TV programs from a selection of service providers using four service transmission methods: digital over the air, digital satellite, digital cable and broadband.

Overall, the UK digital TV service offers can be grouped into two options: (i) the "one-off payment" option, and (ii) the subscription option. Their availability varies depending on where the consumer lives.

Table 1: Major service offerings and pricing available to British consumers

Transmission technology	Payment options	Provider	Service description	One-off payment Equipment	One-off payment Installation	Monthly subscription	Channels	Additional extras
Digital Terrestrial/ OTA	One-off payment	Freeview	Freeview is a free digital service via aerial.	Digital box: \$45 (£25) Digital TV from \$267 (£150) Aerial upgrade: \$142-\$380 (£80 - £213)	Self installation	None	Up to 48 digital TV channels	Freeview+ digital TV recorder from \$143 (£79.99)
Digital Satellite	One-off payment	Freesat from Sky	Freesat is a free digital service via satellite	\$267 (£150) including minidish, viewing card, standard Sky box and installation	Included	None	Over 230 digital TV channels	
Digital Satellite	One-off payment	Freesat	Freesat is a free digital service via satellite	Digital box: \$89 (£50) HD digital box from \$214 (£120)	\$143 (£80) (if home does not already have a working satellite dish)	None	More than 100 digital TV channels, including entertainment, movies, news, lifestyle and subscription-free HD from the BBC and ITV	Subscription-free HD Freesat+ HD digital TV recorder
Digital Terrestrial/ OTA	Monthly subscription	Sky	Freeview is a subscription digital service via aerial.	None	\$53 (£30)	\$30-\$84 (£17 - £47) monthly depending on package	Over 160 digital TV channels + over 200 free-to-air channels	Sky+ \$268 (£150), Sky+ HD \$268 (£150), Sky Broadband, Sky talk.
Digital Terrestrial/ OTA	Monthly subscription	Top up TV	Freeview free OTA channels plus benefits of tape-free recording with being able to pause and rewind live TV.	Top Up TV recorder (Freeview+ box) from \$143 (£80)	Self installation	None	Up to 48 Freeview channels plus TV favorites, sport and films. Plus benefits of tape-free recording with being able to pause and rewind live TV.	Optional upgrade to Top Up TV Anytime or Setanta sports \$12 - \$20 (£7 - £11) per month depending on viewing packages
Digital Cable	Monthly subscription	Virgin Media	Virgin TV is delivered down fibre optic cable, no need for a dish or TV aerial.	None	\$53 (£30)	Basic package free or up to \$37 (£20.50) when you take a Virgin phone line	Up to 160 digital TV channels, plus access to on demand TV, films and music videos	Virgin broadband, Virgin phone V+ box for recording costs \$268 (£150) and \$9 (£5) per month for service
Broadband	Monthly subscription	Tiscali	Tiscali TV is a unique mix of the best digital TV channels and on demand entertainment, movies & music.	None	\$99 (£177)	Tiscali TV, Broadband, inclusive of calls and line rental from \$29 (£15.99)	More than 130 digital channels	Tiscali+ digital recorder \$89 (£50), inclusive international calls. Access to Setanta, Sky Sports and Sky movies at an additional cost.
Broadband	Monthly subscription	BT Vision	BT Vision offers a range of on demand films, TV shows, sport and music videos, as well as interactive services, Freeview television channels and digital radio stations.	None	\$53 (£30)	BT Total Broadband subscription from \$13 (£7.34) for the first 3 months, \$26 (£14.68) thereafter, then pay per view or subscription from \$12 (£6.85) per month	Up to 48 digital TV channels + on demand TV, films and sport	Free 80 hour digital television recorder (Vision+ box) when you take any TV pack for 12 months. Plus free Setanta Sports with some packages.
Exchange rate used: 1 British Pound = 1.78358 Canadian Dollar								

In addition, all viewers of broadcast television in the UK must purchase the annual television license irrespective of the method of reception (laptop, PC, mobile phone, digital box, DVD recorder or a TV set)²⁵.

6.1 Service Offering and Pricing in the US

Broadcasters in the US make their services available digitally to consumers through four routes: free over-the-air via digital terrestrial, subscription-only via satellite, cable and IPTV²⁶. The coverage of cable service providers leaves out some low density areas, but satellite coverage is essentially national.

The number of channels accessible and monthly subscription prices vary, depending on the household's geographical location and the take-up of TV channel packages, premium services (such as pay-TV), video on demand (VOD), HDTV services, personal video recorder (PVR), and other options. Generally monthly subscriptions fees start at around US\$30 and many subscribers exceed US\$100/month.

The US does not have a free digital satellite service provider like Freesat in the UK.

In the US, most services which are not transmitted over-the-air services require a monthly subscription as part of a package or standalone basis. Even those which are free require a subscriber to pay a monthly charge to access services which are offered as part of the basic package.

²⁵ <http://www.tvlicensing.co.uk/information/index.jsp#link1>

²⁶ Internet Protocol Television (IPTV) is a system through which digital television service is delivered using a broadband connection over Internet Protocol. IPTV can also be delivered using a cable or satellite.

7 Service Provider business models in the UK

7.1 Freeview Business Model

7.1.1 Introduction of Digital Terrestrial Television (DTT) in the UK

Digital terrestrial television (DTT) was introduced in the UK in 1998. Several TV channels as well as radio and data services are compressed and multiplexed (put into a single bit stream) into a digital signal. Since the spectrum used by digital transmission is more bandwidth efficient than analogue, more services can be made available to viewers in digital than when transmitted in analogue format. Multiplexed bandwidth is licensed by the British regulator Ofcom, or granted by the government²⁷.

There are six television multiplex allocations in the UK: Multiplex 1, 2, A, B, C, and D. Three multiplex bandwidth slots were auctioned off to a consortium of Carlton Television, Granada Television and British Sky Broadcasting (BSkyB) as British Digital Broadcasting (BDB). The brand ONdigital was chosen for the launch of the new DTT service. Shortly after the win, however, the Independent Television Commission (ITC)²⁸ requested BSkyB to withdraw from the consortium on competition grounds, which effectively placed Sky in direct competition with the newly launched service. The new digital service was launched on November 15, 1998, with a line-up of 18 TV channels.

The launch did not achieve expectations and the service did not meet break-even requirements. Aggressive marketing by BSkyB for its own digital service, Sky Digital, blunted take-up for the ONdigital service. Amongst other challenges, ONdigital had a far weaker than expected broadcast power in many areas, a complex pricing structure, a poor quality subscriber management system, a paper magazine, TV guide only, (whereas BSkyB had provided an electronic programme guide (EPG)), insufficient technical customer services, and substantial signal piracy.

In the face of a rising churn rate, Carlton and Granada rebranded ONdigital as ITV Digital on July 11, 2001. They also purchased the TV rights to the Football League in a very expensive deal and launched the ITV Sports Channel. A massive rebranding campaign was launched, but these changes failed to revive the DTT service provider, and it went bankrupt.

7.1.2 Launch of Freeview

On October 30, 2002, DTV services formed a new consortium – made of the BBC, BSkyB and Crown Castle International (now Arqiva) – and was granted ITV Digital's old broadcasting license. This new consortium launched the Freeview service, joined in 2005 by ITV plc and Channel 4.

The BBC holds the license for one of the six television multiplexes. Crown Castle holds the licenses for two of them, and brought to the consortium many years of technical expertise in broadcast transmission experience²⁹.

The consortium was created to provide consumer and retailer support for the DTT platform, as well as to avoid the need to have each broadcaster invest in its own transmission equipment. This cooperative structure allows competing broadcasters to share the infrastructure and broadcast transmission facilities, which are provisioned and operated by the independent third party, Arqiva.

²⁷ <http://www.ofcom.org.uk/consult/condocs/paytv/>

²⁸ The ITC licensed and regulated commercial television services in the United Kingdom between 1 January 1991 and 28 December 2003. Most powers of the ITC are now exercised by the Ofcom, making some powers – and the ITC itself – defunct.

²⁹ http://www.bbc.co.uk/pressoffice/pressreleases/stories/2002/08_august/19/freeview.shtml

Freeview's initial service offering included 30 free-to-air TV channels and 20 free-to-air radio channels with several interactive channels, but no subscription or premium services. However, premium services followed in 2004 when "Top Up TV" began broadcasting eleven pay-TV channels in timeshared broadcast slots.

As of March 2009, 37.7% of first sets (primary means of viewing television) in the UK used Freeview. Furthermore 9.7 million of the 22.8 million digital UK homes were "Freeview only"³⁰.

The Freeview model has been copied in a number of countries including Australia, New Zealand, France and Italy.

Since Freeview is a digital TV and radio platform and not a broadcaster per se, each participant broadcaster makes a choice to exhibit its signals on Freeview satellite and/or Freeview|HD and/or Sky. All traditional free-to-air broadcasters (channels) have been invited to join Freeview.

Currently, Freeview is being updated to allow for HDTV. This means that in some instances new converter boxes are required as specific older models will no longer work. Consumers also need to "retune" their television sets.

7.1.3 Freeview revenue model

DTV services Ltd. (trading as Freeview), is a not-for-profit joint venture and equally controlled by the five shareholders: BBC Free to View Limited (20%), British Sky Broadcasting Limited (20%), Arqiva Services Limited (20%), Channel Four Television Corporation (20%), and SDN Limited (20%). The revenue generated by Freeview is the cost contributions of the five shareholders required to offset cost of sales and administration expenses.

The BBC is mainly funded by an annual television licence fee (76% of total revenue) collected from all United Kingdom households using equipment able to record or receive live television broadcasts. The BBC's revenue also comes from commercial businesses advertising (16% of total revenue), government grants (6% of total revenue), and other income (1% of total revenue) such as providing content to overseas broadcasters and concert ticket sales.

For the other partners in Freeview, except for Arqiva Services Limited and SDN Limited, free OTA or "free to air" (FTA) television is dependent on advertising revenue, and therefore depends on delivering audiences. As a result of increasing competition from pay TV, audience share for FTA channels is declining, which translates into less revenue, and therefore less money to purchase quality programming. The result is that pay-TV operators can outbid FTA Broadcasters for first-run programmes and grow their subscription base. If this cycle continues, FTA television will struggle to survive and the result may be that consumers will have to pay to watch quality television, as in the case of New Zealand for example.

7.2 Freesat Business Model

Prior to digital switchover, Freeview was accessible to only 73% of the population³¹. After analogue TV services are replaced in the planned digital switchover, this number will increase to 98.5% for the public service channels and 90% for the full Freeview service. In order to provide a larger number of channels, a digital satellite alternative was felt necessary.

Freesat is a digital satellite service provider, a not-for-profit company owned by the UK's two most popular broadcasters BBC and ITV (both are public service broadcasters). It was set up to ensure that everyone can access the best of free digital TV, no matter where they live in the UK.

The company launched a universally available free-to-view satellite offering on May 6, 2008, incorporating 86 free to view television, radio and interactive channels. The number of channels

³⁰ "The Communications Market: Digital Progress Report Digital TV, Q1 2009" (PDF). Ofcom. 29 June 2009. http://www.ofcom.org.uk/research/tv/reports/dtv/dtu_2009_01/q12009.pdf.

³¹ "Whats Freesat - free digital TV for everyone". Freesat UK. 2009-07-31. <http://www.freesat.co.uk/index.php?page=features.Main&PHPSESSID=6etlvjgg31l9scqhtfqr6j0242>

available on the platform has since risen to 140. The Freesat proposition includes a user friendly Electronic Program Guide (EPG).

The technical arrangement for the Freesat service involves accessing a signal from two sources: Freesat "Home" transponder, or multiplex, managed by a third party (Arqiva), and broadcasters' signal from their own transponders. Freesat broadcasts its own EPG data from the Home transponder which coexists with Sky's EPG data but which is completely separate.

Freesat has experienced early success and strong growth since its launch, with manufacturing partners selling over 200,000 set-top boxes in the first eight months. Recently, Freesat had increased its cumulative sales by 50% from 400,000 in May 2009, to 600,000 in August 2009.³²

Freesat revenue consists of registration fees invoiced to broadcasters who are interested in joining the company's satellite offering, as well as annual subscription fees invoiced to broadcasters.

There is another free satellite service offered in the UK by Sky called Freesat from Sky (FSFS). This is a free-to-air satellite service with a one-off payment and is barely promoted. Sky's advantage in offering this service is in the potential to "up sell". The main differences in Freesat from Sky vs. Freesat from ITV/BBC include:

- Freesat UK Ltd. has HD; Freesat from Sky does not; Freesat includes ITV HD which is not available on the Sky subscription HD service.
- Consumers can get PVR technology (Freesat+) without subscription. Sky viewers cannot.
- Consumers can buy HD-Ready TVs with Freesat built in. FSFS consumers cannot.
- Freesat is guaranteed subscription free in perpetuity, whereas Sky has not guaranteed the availability of Freesat from Sky.
- FSFS viewers will not be able to get IP services in future, whereas Freesat viewers will.

³² <http://www.guardian.co.uk/media/2009/sep/16/freesat-summer-sales>

8 Financing the Transition

8.1 Financing of Consumer Equipment

Analogue TV viewers have three options to continue receiving television services following the switchover to DTV:

- Purchase an over-the-air digital converter box (essentially a stand alone ATSC digital tuner) for the existing analogue TV set. Digital signals can be received on analogue antennas in favourable reception zones, but they need to be converted by the tuner to a format that is suitable for display on the television set. The number of TV stations received and service reliability are enhanced by the installation of an appropriate antenna optimized to receive digital signals. This option will only be available in the “mandated markets”, where the digital signal will be broadcasted (unless the signal spills over into the non-mandated markets).
- Purchase a TV set with a built-in ATSC digital tuner, and reception would be available from the analogue or digital antenna, provided the signals were not encrypted.
- Subscribe to digital cable, DTH satellite (whose service is only available in digital), or broadband service (all digital as well); if the broadcast distribution undertaking (cable, satellite, or broadband provider) offers the local broadcast stations they will be available to consumers. Each of these distribution platforms requires digital decoders to work in a standard TV receiver/display set.

All of the above options impose costs on the consumer to continue receiving (digital) television signals. In some countries, the government supports the consumer in buying the required consumer equipment. The US and UK practices are described below.

8.1.1 United States

The “Digital Transition and Public Safety Act of 2005” established a federally-sponsored DTV Converter Box Coupon Program to help US consumers through the conversion. Coupons were made available to buy the required equipment through this program. The specification was developed by the National Telecommunications and Information Administration (NTIA), with input from the broadcast and consumer electronics industries, as well as public interest groups. The program is paid from funds obtained through the 2008 DTV spectrum auction.

This program allowed every US household to receive two coupons, worth \$40 each, toward the purchase of eligible digital-to-analogue converter boxes. These coupons were only to be used for eligible converter boxes sold at participating consumer electronic retailers, and the coupons had to be used at the time of the purchase. Consumer education plans for the subsidy program were targeted to low-income, elderly, disabled, inner city, immigrants, and rural Americans, because these groups mainly watch analogue antenna TV more than any other audience segment.

Costs

Initially, US\$890 million was earmarked to fulfill the requests for the coupons (22,250,000 coupons). After it appeared that this amount was not sufficient (based on the number of coupon requests), an additional US\$450 million was made available for coupons, for a final total of US\$1.34 billion (33,500,000 coupons). This amount is still far short of the estimated 114 million households (228 million redeemable coupons) in the United States, but it was never intended to entice those already hooked up to cable or DTH³³. Nevertheless, not every household took advantage of the offer, part of it because half of all households in the United States already had

³³ See http://www.dtv.gov/dtv_stats.htm?l=EN. These are February 2009 estimates.

at least one digital capable TV as of December 2007³⁴. The NTIA was authorized to spend US\$1.5 billion for the program including US\$160 million for administration.

As US economic conditions continued to worsen, the demand for inexpensive converters had increased, instead of replacing existing televisions or switching to more expensive cable and satellite television subscriptions, NTIA's TV Converter Box Coupon Program reached its US\$1.34 billion ceiling on January 4, 2009, approximately six weeks before the expected end of US full-power analogue broadcast TV. Any additional consumers requesting coupons were placed on a waiting list, eligible on a first-come-first-served basis as funds from expired coupons become available. However, another US\$650 million in funding was added of which US\$490 million was destined for coupons³⁵. As a result, a total of US\$2.15 billion has been made available by the American government for the conversion of which US\$1.83 billion for converter boxes by way of issuing coupons. With the total funding of \$1.83 billion almost 46 million coupons could be redeemed.

As of September 9, 2009, approximately 34,761,546 coupons had been redeemed. This number is over one million more coupons more than the 33.5 million coupons that could have been covered by the original funding for the program (US\$1.34 billion). The total funds committed were just over US\$1.482 billion which left about US\$348 million in funds still available³⁶.

8.1.2 United Kingdom

As mentioned earlier, Digital UK is responsible for leading the UK's switchover from analogue to digital TV. It was set up and owned by the UK's public service broadcasters (BBC, ITV, Channel 4, five, S4C and Teletext), and commercial multiplex operators SDN and Arqiva. Digital UK is required to coordinate the switchover and ensure that the public is kept informed about how to make the transition to digital and what progress is being made. The British Government has given Ofcom and Digital UK jointly the task of coordinating the analogue television broadcasting switch-off.

Unlike the US, there is no government "coupon-like" program in the UK providing funds to all households to help finance the transition to DTV. However, more households in the UK already have the required equipment (set top boxes), for receiving digital television, because they have been provided or subsidized by some of the providers of digital television in the past (details explained below). People that are switching over to digital television and want to receive free-to-view digital television in the UK have the option to choose between Freesat and Freeview.

Freesat, the free-to-air satellite service (the joint venture between BBC and ITV plc), uses the same type of satellite receive dish as the main subscription satellite provider in the UK, BSkyB. BSkyB installed digital set top boxes to all subscribers to its service without charge between 1998 and 2001 (it offered analogue signals by satellite only until 1998, digital and analogue 'simulcasting' from 1998-2001 and in 2001 the analogue signal was switched off).

Freeview, the successor to the pay operator ITV Digital that went bankrupt in 2002, subsidized digital setup boxes between 1998 and 2002 and is now subscription free.

Despite the lack of a "coupon-like" program in the UK, the elderly and disabled people are supported by government to convert one TV set³⁷. This aid is comprised of the provision of easy-to-use equipment for one TV set, help with installation of the equipment (possibly including a TV aerial or satellite dish), and a demonstration of how to use the equipment, plus access to help.

³⁴ See the press release "More than half of the U.S. households own a digital television" by the Consumer Electronics Association (http://www.ce.org/Press/CurrentNews/press_release_detail.asp?id=11425).

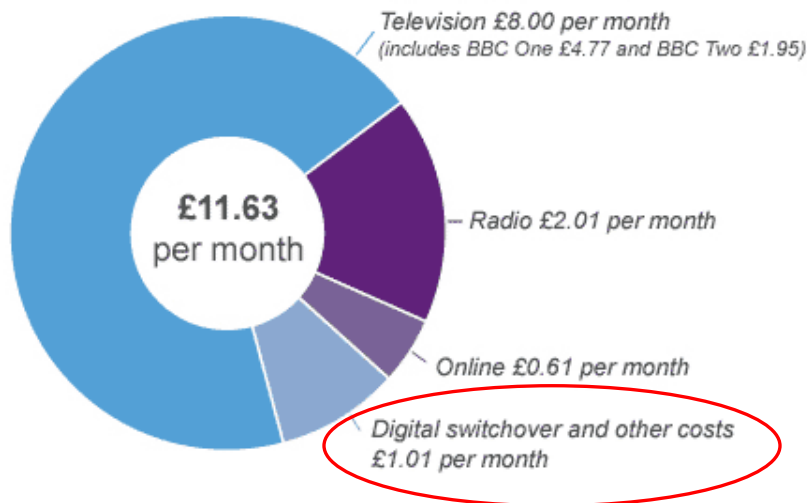
³⁵ The balance was mainly destined for education and outreach, including grants to organizations for programs to educate vulnerable populations, including senior citizens, minority communities, people with disabilities, low-income individuals, and people living in rural areas.

³⁶ See for data on coupons redeemed and available funding the weekly status update reports from the NTIA <http://www.ntia.doc.gov/dtvcoupon/reports.html>.

³⁷ See <http://www.switchhelp.co.uk>.

Eligible consumers will be contacted personally by the Switchover Help Scheme numerous times to ask if they want help³⁸. The scheme is aimed to ensure that up to 7 million households meeting its eligibility criteria will continue to be able to receive television broadcasts after analogue transmissions have been switched off.

It is estimated that the cost will be £603 million in nominal terms over the lifetime of the licence fee settlement (from 2007/8 to 2012/13). The scheme is administered by the BBC on behalf of the Department for Culture, Media and Sport (DCMS) and funded by an increase in the TV licence fee which is paid by all TV owners in the UK³⁹. The following diagram shows the allocation of the monthly license fees collected in the UK.



Source <http://www.bbc.co.uk/info/licencefee/>

³⁸ The Digital TV Help Scheme is eligible to people aged 75 years and over, and help may be available to people in the following categories:

- Those receiving attendance allowance
- Those receiving constant attendance allowance
- Those receiving disability living allowance
- Those receiving mobility supplement
- Those that have lived in a care home for over 6 months
- Registered blind or partially sighted people

For people who are eligible for the scheme and get any of the following, the help will be free: pension credit, income support or income-based jobseekers allowance. Others eligible for the scheme will be asked to contribute £40.

³⁹ See the official agreement for the implementation of the scheme.

http://www.digitaltelevision.gov.uk/pdf_documents/publications/2007/digitalhelpschemeagreement_Cm7118_5.pdf.

8.2 Other Countries

Countries are making different efforts to ensure sufficient resources are available to support communication and marketing activities related to DSO.

In France, the government launched its DSO campaign on September 20, 2005, with the aim of making the French population aware of the coming end to analogue TV broadcasting. One of the main targets of the campaign is the 22% of the population that are thought to be unaware of the consequential loss of analogue TV services as a result of the switchover. The total costs of the publicity campaign are reported to be €20 million, with the total bill for all related activities amounting to €355 million. These additional activities include a subsidy for equipment purchase for low-income families, free technical assistance in the home for the elderly and handicapped, as well as a rebate for people who have to pay out for satellite delivered services if DTT reception is not possible at their home⁴⁰.

A different approach has been used in Italy, where all households, regardless of their income, have benefited from government subsidies to purchase digital receivers⁴¹.

Viewers are not the only beneficiaries of government support. Broadcasters and network operators have benefited from grants, temporary suspensions of frequency usage fees, increases in viewer television license fees and interest-free loans. This support has permitted broadcasters to fund the launch of DTT platforms, provide new content, and offset the cost of simultaneously transmitting analogue and digital services. Some of this aid has also enabled broadcasters to finance viewer aid schemes, as is the case in the UK.

In Germany, national regulators provided commercial broadcasters with a subsidy to encourage their participation on the DTT platform, although the European Commission has declared such aid contrary to its rules governing state aid. The commission has been vigilant in ensuring that its rules governing competition and platform neutrality are observed. Only subsidies that can be used across all television platforms are permitted.

⁴⁰ See http://www.dvb.org/about_dvb/dvb_worldwide/france/

⁴¹ See http://broadcastengineering.com/hdtv/analog_switchoff_digital_1208/.

9 Success Rates and Lessons Learned

9.1 Success Rates

9.1.1 United States

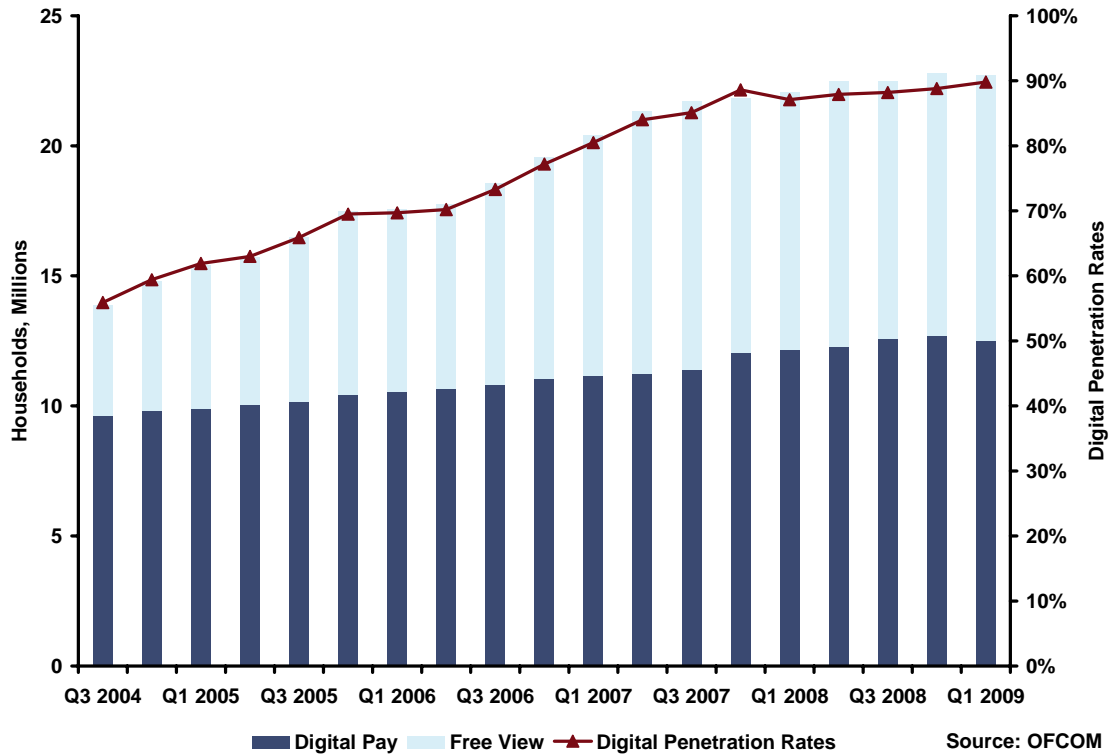
Although there have been some documented problems with the digital transition in the US (e.g. loss of channels and difficulties with installing antennas), the National Association of Broadcasters believe that the transition has been an overwhelming success. Soon after the latest deadline they stated, “America is the first large country in the world to complete the transition to all-digital broadcasting, and our early reports show that the transition has been a success”. Independent research completed by Nielsen Company shows that 99.4% of homes in the US can receive a digital signal (August 30, 2009), which implies that 710,000 (0.6 percent) of homes could not receive a digital signal. These results look particularly favourable when compared against the number of homes that could not receive digital signals in December of the past year – 6.8 percent or roughly eight million homes.

9.1.2 United Kingdom

Consumers have responded with enthusiasm to the increased choice of content and services from the launch of digital television services by BSkyB in 1998. Competition between the satellite services from BSkyB, cable services from NTL and Telewest (now Virgin Media), and terrestrial services drove take-up to 50% of UK households in five years. While this growth shows the success of digital TV, it really spoke to a pent-up demand for multi-channel services in the UK. Other countries in Europe and North America had far greater success in cable penetration to provide TV households with multi-channel options. The folding of ITV Digital in the UK demonstrated the need for access to a critical mass of quality TV channels, as shown by the subsequent success of the launch of an expanded range of free-to-view services on the terrestrial platform. Freeview made digital television attractive to a new segment of households⁴².

As the following diagram illustrates, the UK’s digital transition strategy has been particularly successful. The digital penetration rate increased from 56% to 90%, which represents an increase of nearly 9 million households from the third quarter of 2004 to the first quarter of 2009. The diagram also shows that an increasing share of households in the UK transitioned to a non-subscription service (i.e. free-to-view). Indeed, the percentage of digital households that obtained TV reception from free-to-view services, which includes free-to-view DTT and free-to-view digital satellite increased from 31% to 45%, and now totals nearly six million households. Therefore, of the nine million new digital households, roughly two-thirds transitioned to a free-to-view service.

⁴² <http://writetoreply.org/digitalbritain/2009/01/29/section-23-digital-broadcasting-networks-television/>



9.2 Lessons Learned

We have identified some overall success factors for the digital transitions in the US and the UK:

- Through effective communications campaigns, broadcasters and authorities involved in the transition ensured that TV viewers were well briefed, and made fully aware of the impending transition;
- TV households were provided installation instruction and technical support;
- Financial support was made available to TV households (e.g. subsidizing digital receivers) and the industry;
- Transition authorities ensured that DTT receivers were available on the market on time;
- Other support policies were put in place, for example in the US including digital tuners in new TV sets was made mandatory; and
- Industry-wide forums (such as Digital UK) were established and put in charge of orchestrating the switchover with all parties involved in the broadcast industry:
 - Public Service Broadcasters;
 - Private and commercial broadcasters;
 - Cable and satellite distributors;
 - Manufacturers of professional and consumer equipment;
 - Retailers and installers; and
 - Governments and regulators.

9.2.1 United States

A few lessons emerged from the US digital switchover in particular. Based on these lessons, the following are suggested as guideposts for organizing a transition:

- Consumers should be encouraged to make the switch as early as possible.
- TV stations should perform soft tests early and often by turning off the analogue signal from time to time and replacing it with a screen that said “if you can see this you aren’t ready for the digital transition”. Stations in the pilot market of Wilmington in the States ran the test twice but claimed it was not enough.
- Consumers must be informed that they may need to upgrade their antenna as well as get a digital converter box. Most of the complaints in pilot areas were due to antenna related issues.
- Early communication with the consumer is key to transition success, via public service announcements, offering town-hall meetings and covering the story in local newscasts.⁴³
- Expect several unique coverage issues appeared across the country, where reception will not be as good as analogue. In the US, some of the unique coverage circumstances are cited below:
 - the lack of one single point of sufficient height from which to cover the entire region of downtown Manhattan, New York, without severe multipath interference issues, as a result of the destruction of the World Trade Center facilities in the September 11 attacks.
 - the change in antenna locations of some digital transmitters in New Orleans, Louisiana and portions of Mississippi, due to damage done during Hurricane Katrina and Hurricane Rita in 2005.
 - the unique multipath interference problems encountered in Denver, Colorado, largely due to its mountainous location.

On May 1, 2009, Nielsen Media Research reported that 3.1percent of Americans were still completely unprepared for the transition. On June 11, 2009, one day before the analogue shutoff, the National Association of Broadcasters reported that 1.75 million Americans were still not ready. The total number of help-line calls the week following the transition was nearly 900,000. The FCC reported that about 4,000 staffers handled the calls. Approximately 28% of the calls concerned the operation of digital converter boxes that many viewers of over-the-air broadcasts needed to connect to their TV sets, while 26% reported not being able to receive specific stations, and 23% with broader reception issues. A key issue involved antennas. Viewers need combination UHF/VHF antennas to get all digital stations⁴⁴.

Another lesson learned involved the US coupon-program. This program was introduced to reduce the cost to households of the digital transition by allowing them to spend \$40 less on a converter box than they otherwise would. A recent analysis suggests, however, that the coupon program has created a floor on the price of these converter boxes⁴⁵. Retailers have little incentive to reduce unit prices below \$40 because consumers pay \$0 with the coupon for any box priced \$40 or less. An analysis of converter box prices at retailers around the country suggests that the coupon program has increased the price of converter boxes by \$21 - \$34.

⁴³ Albiniack, Paige. "[Lessons From Wilmington](#)". *Television Broadcast* (New Bay media): p.8.

http://www.nxtbook.com/nxtbooks/newbay/tvb_200809/index.php?startid=8. Retrieved 2008-09-28.

⁴⁴ <http://broadcastengineering.com/news/dtv-transition-not-smooth-markets-0622/>

⁴⁵ See “The DTV Coupon Program: A Boon to Retailers, Not Consumers”, Technology Policy Institute, September 15, 2008. http://www.techpolicyinstitute.org/files/the_dtv_coupon_program.pdf

In other words, the coupon program has reduced price competition. The majority of the benefits of the coupon program accrue to retailers who accept the coupons, and a smaller share of the benefits accrues to consumers. This result does not necessarily mean that the program is wasteful. Raising awareness of the transition from analogue to digital for TV households equipped to receive analogue only transmission is valuable. Accordingly, the program was positive in that it helped accomplish the goal of raising awareness. In addition, some price competition remains because not all retailers accept the coupon, and therefore consumers do see some of the benefit.

9.2.2 United Kingdom

Lessons learned from the UK involve the phased approach, in this approach different regions switch off the analogue signal at different times. This approach was adopted primarily as a result of technical issues as the technical work involved with the digital transition is very significant.

The UK is served by around 1,150 transmitter towers, of which 80 already broadcast low-powered DTT. Those sites vary in size from 300 meters high to the equivalent of a telegraph pole. The switchover task involves increasing the power of DTT at the current digital sites and its introduction at the other 1,070 masts. Certain sites require brand new towers to handle the high power requirements. Others need to be strengthened or extended before the new equipment can be installed.

The availability of trained transmitter engineers and technicians presents a great challenge for the timely completion of the transition. Another major challenge is presented by the weather. Indeed structural work or installation on the taller towers cannot be planned on other than in the period April to October. If there is a bad summer the plan can be significantly affected. Digital UK scheduled a contingency of two summers where there is significant work to be undertaken at height.

These challenges help to explain why the engineering program for switchover was scheduled over a seven year period.

Appendix A

Overview of Digital Transition in Other Countries

Country	DTT launch date	Completion of Digital Switchover
United Kingdom	1998	2012
Sweden	1999	Completed (2007)
Spain	2000/2005	2010
Finland	2001	Completed (2007)
Switzerland	2001	Completed (2008)
Germany	2002	Completed (2008)
Belgium	2002	2011
The Netherlands	2003	Completed (2006)
Italy	2004	2012
France	2005	2011
Czech Republic	2005	2011
Denmark	2006	2009
Slovenia	2006	2011
Austria	2006	2010
Estonia	2006	2012
Norway	2007	2009
Lithuania	2008	2012
Hungary	2008	2011
Portugal	2009	2012
Slovakia	2009	2012
Ireland	2009	2012
Russia	2009	2015
Poland	2009	2014
Latvia	*	2012
Canada	*	2011
United States	*	2009
Mexico	2002	2022
Australia	2004	2013
Brazil	*	2013
Chile	*	2017
Columbia	*	2020
Hong Kong	*	2012
New Zealand	2007	2013/ 2015

* undetermined

Appendix B

Overview of Digital Transition in the UK by Region



Grey = completed

Dark Pink = Scheduled

Light Pink = not scheduled

Source: http://www.digitaluk.co.uk/when_do_i_switch

Region		Date of Conversion
Anglia		2011
Border (including Isle of Man)		Complete
Central		2011
Channel Islands		Q4 2010
Granada		Q4 2009
London		2012
Meridian		2012
STV Central		
	Torosay	Q4 2010
	Darvel	Q2 2011
	Rosneath VP	Q2 2011
	Black Hill	Q2 2011
	Craigkelly	Q2 2011
STV North		
	Bressay	Q2 2010
	Keelylang Hill	Q2 2010
	Rumster Forest	Q2 2010
	Eitshal	Q3 2010
	Skriaig	Q3 2010
	Angus	Q3 2010
	Durris	Q3 2010
	Knockmore	Q3 2010
	Rosemarkie	Q4 2010
Tyne Tees		2012
Ulster		2012
Wales		
	Kilvey Hill	Complete
	Preseli	Complete
	Carmel	Complete
	Llanddona	Q4 2009
	Moel y Parc	Q4 2009
	Long Mountain	Q4 2009
	Blaenplwyf	Q1 2010
	Wenvoe	Q1 2010
West		Q1 2010
West Country		Complete
Yorkshire		2011

Appendix C

Calculation of Canadian Households by Market Type

In this section we estimate the number of OTA households in Canada outside of the mandated digital conversion markets⁴⁶. Since exact data about OTA households in the mandated and non-mandated markets is not available, this number is being deducted from data for total households, cable households and satellite households. The OTA households are then the outcome of the following formula:

OTA households = # Total households – (# Cable households + # Satellite households) – Non-television households⁴⁷

The estimate is subject to the following limitations:

- Populations and households counts for the mandated conversion markets are based on metropolitan (primarily Census Metropolitan Area (CMA)) boundaries, and therefore do not account entirely for broadcast distribution contours which may reach households outside of the CMA;
- Each household can only be defined as receiving television signals in one way (cable, satellite or OTA), and therefore households receiving cable or satellite signals on the primary set, but OTA signals on second and thirds sets, etc. are not part of the OTA household count;
- Availability of data for Canadian households (private dwellings) at a national and municipal level⁴⁸;
- National estimates for Canadian cable and satellite households⁴⁹;
- Availability of data for regional⁵⁰ and market-type⁵¹ cable penetration percentages; and
- Television via broadband (Telco TV and IPTV) is assumed to be part of the cable market.

The “Mandatory Markets for Digital Television Conversion,” as specified in the Appendix to Broadcasting Regulatory Policy CRTC 2009-406, include:

British Columbia: Vancouver, Victoria
Alberta: Calgary, Edmonton, Lethbridge
Saskatchewan: Regina, Saskatoon
Manitoba: Winnipeg
Ontario: Greater Toronto Area*, London, Windsor, Kitchener

⁴⁶ The “Mandatory Markets for Digital Television Conversion,” as specified in the Appendix to Broadcasting Regulatory Policy CRTC 2009-406.

⁴⁷ Television via broadband (Telco TV and IPTV) is assumed to be part of the cable market.

⁴⁸ Statistics Canada, 2006 Census, <http://www12.statcan.gc.ca/census-recensement/2006/dp-pd/hlt/97-550/Index.cfm?Page=INDX&LANG=Eng>.

⁴⁹ CRTC Communications Monitoring Report, August 2009 and Canadian Digital TV Market Monitor, Volume 2.

⁵⁰ Statistics Canada, Cable and Satellite Television Industry, 2007.

⁵¹ Statistics Canada, Cable, satellite and multipoint distribution systems, 2006.

Quebec: Montréal, Québec, Trois-Rivières, Sherbrooke, Rivière-du-Loup, Saguenay
New Brunswick: Saint John, Moncton, Fredericton
Nova Scotia: Halifax
Prince Edward Island: Charlottetown
Newfoundland and Labrador: St. John's
Yukon: Whitehorse
Northwest Territories: Yellowknife
Nunavut: Iqaluit
National Capital Region: Ottawa-Gatineau

**Barrie and Hamilton are included in the Toronto market since their stations compete in the Toronto market.*

All other markets are defined as “non-mandated” for the purpose of this study.

In the following we will calculate:

- The number of Canadian households by market type (i.e. mandated markets and non-mandated markets);
- Signal reception breakdown in Canada (cable, satellite and OTA) – based on the total number of Canadian households;
- Cable households per region;
- Cable households per market type;
- Satellite households per region and market type; and
- OTA households per region and market type.

Canadian Households by Market Type

Total Canadian households outside of the mandated digital transition markets were estimated by subtracting the number of households within the mandated digital transition markets from the total number of households in Canada. This calculation is displayed in the following table.

Figure 1: Canadian Households by Market⁵²

Market	Census Market Designation	Households	% of National Households
Vancouver	CMA	817,033	6.57%
Victoria	CMA	145,388	1.17%
Calgary	CMA	415,592	3.34%
Edmonton	CMA	405,311	3.26%
Lethbridge	CA ⁵³	37,166	0.30%
Regina	CMA	80,323	0.65%
Saskatoon	CMA	95,257	0.77%
Winnipeg	CMA	281,745	2.27%
Greater Toronto Area	CMA	1,801,071	14.48%
Barrie	CMA	63,877	0.51%
Hamilton	CMA	266,377	2.14%
London	CMA	184,946	1.49%
Windsor	CMA	125,848	1.01%
Kitchener	CMA	169,063	1.36%
Ottawa	CMA	333,109	2.68%

⁵² Source: Statistics Canada, 2006 Census.

⁵³ Census Agglomeration.

Market	Census Market Designation	Households	% of National Households
Montreal	CMA	1,593,502	12.81%
Quebec	CMA	316,533	2.55%
Trois-Rivières	CMA	63,893	0.51%
Sherbrooke	CMA	82,747	0.67%
Rivières -du-Loup	CA	10,584	0.09%
Saguenay	CMA	64,315	0.52%
Gatineau	CMA	115,922	0.93%
Saint John	CMA	49,105	0.39%
Moncton	CMA	51,593	0.41%
Fredericton	CA	34,889	0.28%
Halifax	CMA	155,134	1.25%
Charlottetown	CA	23,377	0.19%
Saint John's	CMA	70,663	0.57%
Whitehorse	CA	9,332	0.08%
Yellowknife	CA	6,616	0.05%
Iqaluit	CSD ⁵⁴	2,074	0.02%
Canada	n/a	12,435,520	100%
Mandated Conversion Markets	n/a	7,872,385	63.31%
Non-Mandated Conversion Markets	n/a	4,563,135	36.69%

As illustrated in the above figure, there are an estimated:

- 12,435,520 households in Canada.
- 7,872,385 households (or 63%) located within the mandated digital conversion markets.
- 4,563,135 households (or 37%) located outside of the mandated digital conversion markets.

Households were additionally consolidated by province and region (below) to conform with available cable penetration data⁵⁵.

Figure 2: Canadian Households by Province and Region

Region/Province	Households	% of National Households
Western Canada	3,734,833	30.03%
British Columbia	1,642,715	13.21%
Alberta	1,256,192	10.10%
Saskatchewan	387,160	3.11%
Manitoba	448,766	3.61%
Western Canada Mandated Conversion Markets	2,277,815	18.32%
Western Canada Non-Mandated Conversion Markets	1,457,018	11.72%
Ontario	4,554,251	36.62%
Ontario Mandated Conversion Markets	2,944,291	23.68%
Ontario Non-Mandated Conversion Markets	1,609,960	12.95%
Quebec	3,188,713	25.64%
Quebec Mandated Conversion Markets	2,247,496	18.07%
Quebec Non-Mandated Conversion Markets	941,217	7.57%

⁵⁴ Census Subdivision.

⁵⁵ Numbers do not always add to 100% due to rounding.

Region/Province	Households	% of National Households
Atlantic Canada	923,029	7.42%
New Brunswick	295,871	2.38%
Nova Scotia	376,829	3.03%
Prince Edward Island	53,084	0.43%
Newfoundland and Labrador	197,245	1.59%
Atlantic Canada Mandated Conversion Markets	384,761	3.09%
Atlantic Canada Non-Mandated Conversion Markets	538,268	4.33%
Territories	34,694	0.28%
Yukon	12,615	0.10%
Northwest Territories	14,224	0.11%
Nunavut	7,855	0.06%
Territories Mandated Conversion Markets	18,022	0.14%
Territories Non-Mandated Conversion Markets	16,672	0.13%

Signal Reception Breakdown by Market Type

An estimated 90% of Canadian households, or approximately 11.1⁵⁶ million households, subscribe to a BDU (Broadcast Distribution Undertaking) service. The breakdown of those BDU households is as follows:

- Cable⁵⁷: 8,339,000
- DTH: 2,744,976⁵⁸
- Total: 11,083,976

The above BDU subscriber counts provided a national 'ceiling' that guided the overall analysis. Subtracting this number from the estimated 12,435,520 households in Canada (Figure 1) provides the estimated national OTA household count:

- OTA: 1,351,544

Cable Households by Region

While publications such as the *Communications Monitoring Report* and the *Canadian Digital TV Market Monitor* provide national cable subscription numbers, they do not breakdown these numbers by province, region or market type. The *Statistics Canada Cable and Satellite Television Industry* report, on the other hand, provides cable subscription estimates by region, but these numbers are somewhat dated. The most recent edition of this document provides 2007 figures.

We used the estimated growth rate for the cable market share to add to the average estimated cable penetration rate for each region in order to estimate the current regional cable subscribers. Therefore, each region's 5-year (2003-2007) average share of national cable was adjusted based on the 4-year (2004-2007), average growth rate of each region's share of national cable subscribers. The adjusted national cable subscriber market share for each region was then applied to the total number of national cable subscribers to arrive at regional subscriber estimates. The calculations are illustrated in the following table.

⁵⁶ Source: Communications Monitoring Report, 2009

⁵⁷ Including Telco TV and IPTV.

⁵⁸ Source: Canadian Digital TV Market Monitor

Figure 3: Estimated Cable Subscribers by Region⁵⁹

Region	5-Year Avg. Cable Subscriber Market Share	4-Year Avg. Cable Share Growth Rate	Adjusted Cable Subscriber Market Share	Estimated Cable Households per region
Western Canada	30.75%	0.0369%	30.79%	2,567,221
Ontario	37.75%	-0.3223%	37.42%	3,120,859
Quebec	24.35%	0.4222%	24.77%	2,065,853
Atlantic Canada	6.97%	-0.1384%	6.83%	569,316
Territories	0.19%	0.0015%	0.19%	15,687

Cable Households by Market Type

The next hurdle is to estimate the cable market penetration per market type (mandated and non-mandated markets) within the regions.

Statistics Canada estimated that in 2005 the cable penetration rate for large-size communities (CMAs) was 65.0%, and the cable penetration rate for small and medium-size communities (all communities outside of a CMA) was 57.5%⁶⁰. The cable penetration rate in the large-size communities and small and medium-size communities can serve as a nice proxy for the cable penetration rates in respectively the mandated and non-mandated markets. The CRTC's preliminary list of mandated digital conversion markets includes 23 of the 33 CMAs⁶¹ in Canada, making Statistics Canada's large-size community penetration rate directly applicable. The small and medium-size community penetration rate is similarly applicable to the non-mandated markets. Although these penetration rates provide a good starting point for estimating current cable penetration rates per market type, both (2005) penetration rates needed to be adjusted with the penetration *growth* rates to align with current subscriber numbers.

Both penetration rates had experienced year-over-year declines from 2003 to 2005. This would have been largely due to competition from then new DTH satellite services – basic cable service clients declined each year, and cable lost nearly 450,000 customers, between 2000 and 2003.⁶² However, national cable subscribers increased again from roughly 7.8 million in 2006 to about 8.3 million (a growth of 6.4%) by the end of 2008. As a result, it can safely be assumed that penetration rates increased in all markets as well⁶³ (national cable penetration increased from 62.8% to 63% between 2006 and 2007, the first year of growth since at least 2003).⁶⁴

For each region (using the regional cable subscriber estimates at Figure 3 as a ceiling), an *equal* penetration growth factor was calculated to be applied to both the 2005 large-size community, and small and medium-size community cable penetration rates, which resulted in adjusted cable penetration rates.

For clarity reasons, an example is provided for the Quebec calculated growth factor:

- (i) (Mandated hh's in QC)(0.65 + X) + (Non-mandated hh's in QC)(0.575 + X) = Total cable subs in QC
- (ii) (2,247,496) x (0.65 + X) + (941,217)(0.575 + X) = 2,065,853
- (iii) 1,460,872 + 2,247,496X + 541,200 + 941,217X = 2,065,853
- (iv) 2,002,072 + 3,188,713X = 2,065,853

⁵⁹ Source: Statistics Canada, Cable and Satellite Television Industry, 2007.

⁶⁰ Source: Statistics Canada, Cable, satellite and multipoint distribution systems, 2006.

⁶¹ CMAs outside of the mandated digital conversion markets: Kingston, Peterborough, Oshawa, St. Catharines-Niagara, Brantford, Guelph, Sudbury, Thunder Bay, Kelowna and Abbotsford.

⁶² Ibid. Page 2.

⁶³ In other words, the increase in cable households is not (only) a result of a growing number of households).

⁶⁴ Source: Statistics Canada, Cable and Satellite Television Industry, 2007.

(v) $X = (2,065,853 - 2,002,072) / 3,188,713$

(vi) $X = 0.02 = 2\%$

These adjusted penetration rates were then applied to current household numbers for the mandated and non-mandated conversion markets – the large-size community penetration rate was applied to the 10 CMAs outside of the mandated conversion markets (Ontario and Western Canada) – arriving at the estimated number of cable households inside and outside of the mandated conversion markets for each region. The calculations are illustrated in the table below.

Figure 4: Cable Households by Region and Market Type

Region	Calculated Growth Factor	Penetration Rate	Adjusted Penetration Rates	Households	Estimated Cable Households
Western Canada Mandated	6.42%	65%	71.42%	2,277,815	1,626,733
Western Canada Non-Mandated CMA's		57.5%	71.42%	122,873	87,751
Western Canada Non-Mandated small markets		57.5%	63.92%	1,334,145	852,737
Ontario Mandated	4.28%	65%	69.28%	2,944,291	2,039,669
Ontario Non-Mandated CMA's		57.5%	69.28%	1,155,083	800,188
CMA's non-Mandated		57.5%	61.78%	454,877	281,002
Quebec Mandated	2.00%	65%	67.00%	2,247,496	1,505,827
Quebec Non-Mandated		57.5%	59.5%	941,217	560,026
Atlantic Canada Mandated	1.05%	65%	66.05%	384,761	254,145
Atlantic Canada Non-Mandated		57.5%	58.55%	538,268	315,170
Territories Mandated	-16.18%	65%	48.82%	18,022	8,798
Territories Non-Mandated		57.5%	41.32%	16,672	6,889

DTH Satellite Households by Region and Market Type

Unlike for cable, there is no publicly available data indicating DTH subscriber levels by region or market type. DTH service is also available to virtually every home in Canada, so there is no way to narrow estimated distribution patterns based on the service footprint. Therefore, dispersion of DTH subscribers was estimated using a straight line calculation applying each region and market type's percentage of national households directly to the accepted estimate of national DTH subscribers (2,744,976⁶⁵). Calculations are illustrated in the table below.

⁶⁵ Source: Canadian Digital TV Market Monitor, as already mentioned before.

Figure 5: DTH Satellite Households by Region and Market Type

Region	% of National Households	Estimated DTH Households
Western Canada Mandated Conversion Markets	18.32%	502,797
Western Canada Non-Mandated Conversion Markets	11.72%	321,617
Ontario Mandated Conversion Markets	23.68%	649,913
Ontario Non-Mandated Conversion Markets	12.95%	355,377
Quebec Mandated Conversion Markets	18.07%	496,105
Quebec Non-Mandated Conversion Markets	7.57%	207,761
Atlantic Canada Mandated Conversion Markets	3.09%	84,931
Atlantic Canada Non-Mandated Conversion Markets	4.33%	118,816
Territories Mandated Conversion Markets	0.14%	3,978
Territories Non-Mandated Conversion Markets	0.13%	3,680

OTA Households by Region and Market Type

OTA households by region and market type were estimated by subtracting the cable and DTH estimates from the total household figures. Calculations are illustrated in the table below.

Figure 6: OTA Households by Region and Market Type

Region	Households	Estimated Cable Households	Estimated DTH Households	Estimated OTA Households
Western Canada Mandated	2,277,815	1,626,733	502,797	148,285
Western Canada Non-Mandated	1,457,018	940,488	321,617	194,912
Ontario Mandated	2,944,291	2,039,669	649,913	254,709
Ontario Non-Mandated	1,609,960	1,081,190	355,377	173,393
Quebec Mandated	2,247,496	1,505,827	496,105	245,564
Quebec Non-Mandated	941,217	560,026	207,761	173,430
Atlantic Canada Mandated Conversion Markets	384,761	254,145	84,931	45,685
Atlantic Canada Non-Mandated	538,268	315,170	118,816	104,282
Territories Mandated	18,022	8,798	3,978	5,246
Territories Non-Mandated	16,672	6,889	3,680	6,103
Canada Mandated	7,872,385	5,435,171	1,737,725	699,489
Canada Non-Mandated	4,563,135	2,903,764	1,007,251	652,120

However, these estimated numbers of OTA households in mandated and non-mandated markets are calculations before correcting for non-television households. As mentioned earlier, a small part of total Canadian households do not own a television.

According to ITU World Telecommunication, 99% of the households in Canada own a television⁶⁶. This means that with 12,435,520 households in Canada, approximately 124,355 households (one percent) do not own a television. This number should be subtracted from the number of OTA households by market type (assuming that all households with a cable or satellite subscription own a television). Since we don't know what part of the non-television households

⁶⁶ See the "Core indicators on access to, and use of, ICT by households and individuals, latest available data" of ITU World Telecommunication/ICT Indicators Database.

actually lives in mandated or non-mandated markets, we assume an equitable distribution across both markets.

Approximately 51.7% of the OTA households (699,489 households), are located in the mandated markets and 48.2% (652,120 households), are residing in the non-mandated markets. This means that with a similar distribution about 64,357 households within the mandated markets do not own a television. The same is true for approximately 59,998 households in the non-mandated markets.

This results in an estimate of the OTA households after correcting for households that do not own a television:

Canada Mandated: 699,489 – 64,357 = **635,133**

Canada non-mandated: 652,120 – 59,998 = **592,122**

Broadcasters Outside the Mandated Digital Conversion Markets

The following figure lists the OTA broadcasters and rebroadcast stations⁶⁷ that currently serve the areas outside of the mandated digital conversion markets. In total, 49 stations located outside of the mandated digital conversion markets were identified.

Figure 7: OTA Broadcasters Outside the Mandated Digital Conversion Markets

#	Corporation	Location	Call Sign
Western Canada			
1	CTV Limited	Brandon	CKX-TV
2	Rogers Broadcasting Limited	Portage La Prairie	CHMI-TV
3	CTV Television Inc.	Yorkton	CICC-TV
4	CTV Television Inc.	Prince Albert	CIPA-TV
5	Newcap Inc.	Lloydminster	CITL-TV
6	Jim Pattison Broadcast Group Limited Partnership	Medicine Hat	CHAT-TV
7	Canwest Media Inc.	Red Deer	CHCA-TV
8	Newcap Inc.	Lloydminster	CKSA-TV
9	Canwest Media Inc.	Red Deer	CITV-TV-1
10	Open Learning Agency	Burnaby	CKNO-TV
11	Canwest Media Inc.	Kelowna	CHBC-TV
12	Jim Pattison Broadcast Group Limited Partnership	Kamloops	CFJC-TV
13	Astral Media Radio G.P.	Terrace	CFTK-TV
14	Astral Media Radio G.P.	Dawson Creek	CJDC-TV
15	Jim Pattison Broadcast Group Limited Partnership	Prince George	CKPG-TV
16	The Valemount Entertainment Society	Valemount	CHVC-TV
17	Chetwynd Communications Society	Chetwynd	CHET-TV
18	Neepawa Access Community T.V. (ACTV) Inc.	Neepawa	CH5248
19	The B.C. Conference of the Mennonite Brethren Church	Abbotsford	CFEG-TV
20	Christian Channel Inc.	Fraser Valley	CHNU-TV
Ontario			
21	591987 B.C. Ltd.	Oshawa	CHEX-TV-2
22	591987 B.C. Ltd.	Peterborough	CHEX-TV
23	CTV Television Inc.	Oil Springs	CKCO-TV-3
24	Canwest Media Inc.	Paris	CIII-TV
25	CTV Limited	Wheatley	CHWI-TV

⁶⁷ Call signs followed by TV-(any number) indicate a rebroadcast station.

#	Corporation	Location	Call Sign
26	Thunder Bay Electronics Limited	Thunder Bay	CHFD-TV
27	CTV Limited	Pembroke	CHRO-TV
28	CTV Television Inc.	North Bay	CKNY-TV
29	Thunder Bay Electronics Limited	Thunder Bay	CKPR-TV
30	CTV Television Inc.	Sudbury	CICI-TV
31	CTV Television Inc.	Timmins	CITO-TV
32	591987 B.C. Ltd.	Kingston	CKWS-TV
33	CTV Television Inc.	Sault Ste. Marie	CHBX-TV
34	Shaw Cablesystems Limited	Kenora	CJBN-TV
35	Ear Falls T.V. Committee	Ear Falls	CIER-TV
36	Southshore Broadcasting Inc.	Leamington	CFTV-TV
Quebec			
37	Groupe TVA inc.	Rimouski	CFER-TV
38	CHAU-TV Communications ltée	Carleton	CHAU-TV
39	Groupe TVA inc.	Chicoutimi	CJPM-TV
40	RNC MÉDIA inc.	Rouyn	CKRN-TV
41	TQS inc.	Jonquière	CKTV-TV
42	RNC MÉDIA inc.	Rouyn-Noranda	CFEM-TV
43	RNC MÉDIA inc.	Val d'Or	CFVS-TV
Atlantic Canada			
44	CTV Television Inc.	Sydney	CJCB-TV
45	Acadian Communication Limited	Cheticamp	CHNE-TV
46	Telile: Isle Madame Community Television Association	Isle Madame & Areas of NS	CIMC-TV
47	St. Andrews Community Channel Inc.	St. Andrews	CHCT-TV
48	CBC/Radio-Canada	Sydney	CBIT 5
Territories			
49	CBC/Radio-Canada	Yellowknife	CFYK-TV 8

Appendix D

Consumer awareness plan in the UK

Consumer awareness plan in UK						
	3-Years	2-Years	1-Year	<12 months	1 month	Switchover
National Launch of <i>SwitchCo</i>	"Get ready!"	"How to get ready!"	"Are you ready?"	Countdown: 'Switchover is happening!'	Countdown: 'Switchover is here!'	Switchover to 100% digital