THE TRANSITION TO DIGITAL TERRESTRIAL TELEVISION: A COMPARISON OF THE EUROPEAN UNION AND THE UNITED STATES

By

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To Betty and Gary McAuliffe
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The transition from analog to digital television is viewed as a method for sustaining national economies through new communications technology markets. Converting analog to digital transmissions also provides consumers with better picture and sound quality. Most transitions, such as the VCR to the DVD player, have been industry and consumer led; even the transition from black and white television to color television was largely consumer and industry led. However, governments around the world require the transition from analog to digital television transmission. Many of the governments requiring this transition are categorized as free market economies, like the United States and the European Union. This study examines the digital television transition in the US and the EU through a comparative case study to determine differences in their approaches to the introduction of digital television, and report best practices for government introductions of communication based technologies.

The EU and US are analyzed in terms of their respective histories, governance, institutional organization and legislative process. The comparison of the EU and the US focuses on specific policy variables such as overriding media and telecommunications legislation, spectrum policy, and digital television policy. In terms of digital television implementation, EU and US cases are compared across transition periods, subsidies, and consumer education plans.
The purpose of this research is to describe the DTV approaches and report the relative successes and failures of each transition process. The account of successes and failures will help other governments intending to transition at a later date streamline their own process, be a useful reference point if governments should choose to introduce another communications technology, and serve as a basis for future evaluative research.
CHAPTER 1
INTRODUCTION

The process of upgrading television picture quality through digital technologies has been in the works for well over a decade in the US and the EU, but only since 2007 has the general public really become aware of the impending digital changes. During the conduct of this research, the US postponed the switchover twice and finally shut off analog broadcasts in June 2009. Meanwhile the EU has progressed significantly in transitioning all of its member nations to digital distribution; the first to switchover being Luxembourg followed closely by the Netherlands in 2006. The switch to digital opens the way for enhancements to traditional television and a burgeoning industry of innovative services, including enhanced wireless capabilities, faster cell phone networks and mobile television capabilities.

While these new services are a boon to consumers and to the media and electronics industry, the transition was actually initiated by government actors. This study compares the EU and the US’s transition process, because both political entities chose to intervene in liberal markets to influence consumer adoption of new technologies to pursue the goal of being the most competitive market for knowledge based and technology products in the world. However, though they have very similar media goals, their political structure and their implementation of the transition differs significantly. By comparing the two different political systems and implementation processes, best practices can be gleaned for countries, which have not yet set a course for digital television. In addition, best practices can be applied to the introduction of future technologies.

The Rationale behind Intervention

The EU and the US are both free-market, capitalist economies, and generally in these types of systems, governments do not interfere in the consumer or industry adaptation and the use of
new technologies or products. However, in the uptake of digital broadcast television, both political entities have found it necessary to intervene through regulation and consumer incentives. Governing bodies intervened in this transition because they view digital distribution as a positive development for industry, consumers and government, but do not believe that the switch to digital television would happen without government intervention. This is because broadcasters, operators and hardware manufacturers will not convert while there is insufficient consumer demand, and consumers will not convert if there is little content or perceived value. In this situation, government is the catalyst for a new technological era of media, because consumers and industry are already significantly invested, established and therefore resistant to change.

Another factor behind government involvement in the digital television transition is desirability of additional spectrum space for technological innovation that could revitalize economies. Through digital television, broadcasters can enhance their services and open up new revenue streams by offering high definition programs or multicasting. Multicasting allows the broadcaster to send multiple channels to consumer television sets in the same amount of spectrum required for one analog channel. In addition, once analog television broadcasts have been terminated, there will be a considerable amount of spectrum available that was previously unusable because of interference concerns. This new space, often referred to as the digital dividend, might be used to expand or create new opportunities for communication services. One new technology believed by industry and government to have great potential in the digital dividend is mobile television. While there has been marked uncertainty about technological standards and business models, mobile television remains appealing to consumers and business interests.
Analog versus Digital Television

To begin to understand why government, industry and consumers might be interested in digital television, one must first understand the difference between digital television and its predecessor, analog television. Since the 1940s, television broadcasts were analog, meaning the entire picture was broadcast over the air in each frame. Through enhanced compression capabilities, DTV offers three main improvements over the US analog National Television Standards Committee (NTSC) system and the European analog standards SECAM and PAL: (1) higher resolution, (2) wider pictures, and (3) compact-disc quality sound (Dupagne, 1999).

In terms of resolution, to transmit an analog signal, a video camera takes pictures of a scene at about 30 frames per second. The camera then converts the picture into rows of individual pixels with a specified color and intensity; the rows of pixels are synchronized and produce a final signal, known as a composite video signal. The number of pixels displayed on the screen determines the detail, or resolution, of the picture.

The composite analog signal interlaces the lines of pixels, meaning that the television picture is updated in halves. Half of the lines contained in the picture are displayed every 60th of a second, and the other half of the picture is displayed in the following 60th of a second, so every 30th of a second the audience sees a new picture (Brain, 2001; FCC, 1996).

Different analog standards were employed around the world. The US and Japan used the 525 line NTSC standard established in 1941, which displays 525 interlaced lines of resolution at a rate of 30 frames per second, while Western Europe used two incompatible standards, SECAM and PAL. Both systems display 625 interlaced lines of resolution at a rate of 25 frames per second. France and the Soviet bloc used SECAM, while the rest of Western Europe used PAL, which was developed in Germany in the 1960s. Both the US and European standards projected a picture on a square screen (Hart, 1994; Huff, 2001). Broadcasters in the US and Europe were
given 6-megahertz (MHz) or 8 MHz, respectively, for broadcasting these programs (Brinkley, 1997).

Table 1-1. Comparison of analog and digital television transmission capabilities

<table>
<thead>
<tr>
<th></th>
<th>Analog transmission</th>
<th>Digital Transmission</th>
</tr>
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<tbody>
<tr>
<td>Transmission</td>
<td>Full picture delivered in rows of individual pixels</td>
<td>Picture compress into bits, 1s and 0s</td>
</tr>
<tr>
<td>US Standard</td>
<td><strong>US NTSC standard</strong>: 525 interlaced lines of resolution at a rate of 30 frames per second</td>
<td><strong>US ATSC standard uses MPEG-2 compression</strong></td>
</tr>
<tr>
<td>European Standard</td>
<td><strong>European PAL and SECAM standards</strong>: 625 interlaced lines of resolution at a rate of 25 frames per second</td>
<td><strong>European DVB standard uses MPEG-2 compression</strong></td>
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<tr>
<td>Picture definition</td>
<td>Allows standard definition picture quality</td>
<td>Allows standard definition formats: 480i and 480p, equivalent to the look of analog pictures with an aspect ratio of 3:4</td>
</tr>
<tr>
<td></td>
<td>Uses all of the US 6MHz of frequency space. Uses all of the European 8MHz of space</td>
<td>One standard definition program uses a fraction of the 6Mhz or 8MHz of frequency space</td>
</tr>
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</table>

Digital Television Advantages for Broadcasters
- Ability to offer more programs
- Value added services like data casting, interactive programming and High Definition pictures
- Decreased transmission costs over time

Digital Television Advantages for Audiences
- Clearer and crisper pictures
- Better sound
- Larger pictures
- More programming channels for music, data, and television
By contrast, instead of sending lines of a picture, like analog, digital images are compressed into bits, typically with the MPEG-2 compression standard for audio and video. The 1995 MPEG-2 compression standard encodes moving pictures and sound into bits that support interlacing and high definition television signals. For this reason the MPEG-2 standard is used for over-the-air digital television in the ATSC and DVB standards (ATSC, 2007; Brinkley, 1997; Huff, 2001; Watkinson, 2001).¹

In terms of picture resolution, digital TV standards allow several different formats: 480i (interlaced), 480p (progressive), 720p, 1080i and 1080p. Both 480i and 480p provide a resolution similar to analog pictures, while the 720p, 1080i and 1080p provide high definition pictures. Whereas interlaced pictures update half of the picture every 60th of a second, the progressive format updates the entire picture every 60th of a second. High definition (HD) formats also have a different aspect ratio, allowing for a wide screen picture and a more rectangular shaped television set (Brain, 2001).² Analog TV is 4 units wide by 3 units high, with an aspect ratio of 4:3 and projects a square picture onto a square screen. HDTV is 16 units wide by 9 units high, with an aspect ratio of 16:9 and projects a rectangular picture on a rectangular screen.

Even with all of the added information, digital compression does not require any additional frequency space for broadcasting. In fact, within 6MHz of frequency, or channel space, a US broadcaster has 19.39 megabits-per-second. With analog transmission, broadcasters only had the capacity to send one program at a time; however, digital compression reduces the amount of space a program uses, so broadcasters can offer more options to audiences. One of the major

¹ The MPEG-4 standard advances television compression to be closer to that of computer graphics and some EU countries are considering upgrading to this technology.

² Analog TV is 4 units wide by 3 units high, an aspect ratio of 4:3, while HDTV is 16 units wide by 9 units high, an aspect ratio of 16:9.
advantages of the digital signal is that broadcasters can create sub-channels within the 19.39 Mbps stream and multicast several standard definition programs or transmit a high definition program (Brain, 2001).

With analog transmission, the sound is sent through a separate signal; however, with digital, the sound is sent at the same time as the picture. While, MPEG-2 is currently the most popular compression standard, MPEG-1 was developed in 1993 as the first compression standard for audio and video and was designed to encode audio and video to the bit-rate required for compact discs. In addition, the MPEG-4 compression standard is also available. MPEG-4 brings television compression closer to the quality of computer graphics. Some EU countries are considering upgrading to this technology.

**The Invention of DTV**

The invention of digital television actually evolved out of an international race to create a worldwide standard for High Definition television. High definition television was first demonstrated in the US in 1981, and was developed by Japanese engineer Masao Sugimoto, who worked for the NHK broadcasting company (Brinkley, 1997; Davies, 1996; Hart, 1994). This system, known as Muse in the US, for multiple sub-nyquist sampling encoding system, was still analog, but used 1,125 lines projected on to a wide screen television set (Brinkley, 1997). While Muse was still an analog system, the picture appeared clearer and more lifelike than conventional television pictures. At the time, digital transmission capabilities were unavailable, so high definition television meant broadcasting a picture with at least twice the number of lines of resolution as the NTSC 525 line standard (Brinkley, 1997; Davies, 1996; Hart, 1994).

At first, High Definition was thought to be a novelty, but NHK announced plans to propose the Muse system as the world standard for television broadcasts before the International Telecommunications Union (ITU) (Brinkley, 1997; Davies, 1996; Hart, 1994). The US and
European nations were soon to follow. During the international standards competitions, one of the American competitors, Woo Paik of General Instrument, developed a fully digital method for transmitting HDTV (Brinkley, 1997).

In tracing the development of digital television, many studies found that government involvement was a key aspect in both the EU and the US introduction of digital television (Brinkley, 1997; Davies, 1996; Hart, 1994; Huff, 2001). During the transition from black-and-white to color TV, the industry was vertically integrated; content producers, broadcasters, equipment makers, etc. may have all been under the same company roof. However, with less vertical integration, the transition to digital TV requires coordination among a complex network of related industries (Bar, Borrus, & Steinberg, 1995).

Technical standards are necessary for achieving coordination in the markets. The governance of industry standards comes in three different methods. Policymakers can allow markets to set standards, which has usually occurred within the computer industry. Policymakers can decide to impose standards, which was typical in the old US telecommunications regime and is still common practice in the EU. Regulators can endorse standards created through private industry collaboration (David & Shurmer, 1996).

In the development and introduction of digital TV, both American and European regulators have delegated the development of standards for digital TV to industry consortia, though EU regulators have been more proactive in digital television standard development and in mandating the chosen standard. In the US, the government held a standards competition and offered industry no financial support. On the other hand, in what was to become the EU, European nations financially sponsored research and advances in television standards creation.
The American Path to DTV

To maintain competitiveness and prevent a Japanese takeover of the consumer electronics industry, the US advanced an industry competition and the European nations sponsored a government-industry consortium, which resulted in the current US ATSC and European DVB standards for digital television transmission.

The FCC, under the direction of Chairman Larry Patrick, created the Advisory Committee on Advanced Television Services and named Richard Wiley head of the committee (Brinkley, 1987; Hart, 1994; Huff, 2001). The first formal policy statement on HDTV came from the FCC in 1988 stating it would evaluate proposals from national and international companies on an HDTV standard. However, the US government would not provide assistance for research and development, and the HDTV transmission system had to be compatible with conventional television sets (Brinkley, 1997; Davies, 1996; Hart, 1994; Huff, 2001).

As proposals came in, Muse was still the only system capable of high definition pictures; the rest of the contenders were merely enhanced definition (ACTV). Proponents of ACTV said that while not high definition, it was a step in the right direction. Sarnoff Labs’ ACTV design was favored by many business interests because it did not require broadcasters to update equipment, but it required consumers to purchase new TVs, and with HD coming in the future, another round of TV purchases would be required along with broadcaster system updates (Brinkley, 1997).

The major problem for the original Muse system was that, as an analog signal with a widescreen picture and twice the resolution as the conventional broadcasting systems of the time, the signal was larger than the 6MHz or 8MHz allotted to American and European broadcasters. The Japanese system was originally intended for satellite transmission, because there was more spectrum available to transmit the picture than in terrestrial bands. In order for the Muse system
to use terrestrial transmission, one channel and some of an additional channel would be necessary to broadcast the picture terrestrially (Brinkley, 1997). To comply with FCC requirements, NHK developed a modified version to fit in within the 6MHz parameters known as Narrow Muse (Brinkley, 1997; Hart, 1994; Huff, 2001).

At the time, nearly everyone believed that digital transmission of broadcast TV signals was impossible. However, General Instrument Corporation submitted a fully digital method for transmitting HDTV developed by Woo Paik (Brinkley, 1997). As a result, in 1990, FCC Chairman Al Sikes introduced new rules into the HDTV standard competition. Only true HDTV entries that were at least partly digital would be considered for the US standard. In addition, these entries had to allow for simulcasting. Simulcasting is the use of one TV channel (6Mhz) for HD broadcasts and the use of another channel for conventional NTSC standard definition television broadcasts with the same programming during the transition period (Flaherty, 1995).

The new digital requirements resulted in four viable designs: General Instrument (digital HDTV simulcast system); Sarnoff, Thompson, NBC, and Philips (digital HDTV simulcast system); Zenith and AT&T (HDTV simulcast analog/ digital hybrid system); and MIT and General Instrument (HDTV simulcast analog/ digital hybrid system). The digital requirements and poor performances knocked the original frontrunners, NHK’s Narrow-Muse\(^3\) (HDTV analog simulcast system) and Sarnoff Labs’ ACTV (enhanced definition analog system), out of consideration (Brinkley, 1997; Flaherty, 1995; Huff, 2001). The four remaining systems were tested again in 1992. Again all systems needed improvements and all competitors said the needed improvements would be made (Flaherty, 1995).

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\(^3\) Japan went on to implement the original Muse system for satellite broadcasting and in 2003 it was replaced by ISDB (Integrated Services Digital Broadcasting) standard for digital broadcasting.
In 1993, when the Advisory Committee on Advanced Television Services, still headed by Wiley, called for another round of testing, General Instrument proposed an alliance among the remaining competitors to develop the design together and split profits and royalties evenly. All parties including the FCC eventually agreed, and the Grand Alliance was formed in 1993 (Scully, 1993). The Grand Alliance HDTV system agreed to include progressive and interlace scanning capabilities, Video Compression based on MPEG-2, packetization of data in transmission, and Dolby AC-3 5.1 channel sound (Brinkley, 1997; Huff, 2001). In 1995, the ATSC incorporated the Grand Alliance System and published Standard A/53. The FCC adopted standard A/53, for the transmission of digital television, in 1996 (FCC, 1996).

The European Path to DTV

In 1986, when Japan proposed its system as an international standard at the International Radio Consultative Committee (CCIR), European officials expressed concern for their own consumer electronic industry falling to Japanese and US companies, delayed the CCIR decision and called for more studies in order to find a European alternative (Hart, 1994). In 1989, the European Council passed two Decisions (89/337 and 89/630 concerning high definition television) stating that member states would adopt a common standard for HDTV and that European development of a standard was crucial to European economic competition. Europe responded to Japan’s initiative by investing around $2 billion into a Europe-wide government-industry consortium to develop a competing HD standard. The consortium included Europe’s top consumer electronics companies Phillips, Thomson, and Nokia.

The consortium developed HD-MAC (high definition multiplexed analog components), which is an analog signal using 1250 lines, but requires 36MHz to transmit the signal. Because the number of broadcast frequencies are so limited and the HDMAC broadcast signal is so large, it was more suitable for cable or satellite networks than for terrestrial broadcasting. Even so, the
HD-MAC system was proposed as the analog standard for European broadcast HDTV, with transmissions to begin in 1995. The EU hoped that a European standard could protect its consumer electronics industry from Japanese and US competitors (Davies, 1996; Hart, 1994). When Paik’s digital discovery came about, so much time and money had been invested that the HD-MAC consortium of government, industry and engineers had little interest in starting over and continued working on the HD-MAC system.

The first major broadcast test of HD-MAC was at the 1992 Winter Olympic Games; it had negligible success. Due to scarce bandwidth and uncertain performance in the broadcast arena, it was only usable in standard resolution by cable and satellite operators (Brinkley, 1997; Huff 2001). Originally, government officials thought digital technologies for broadcasting were 15-20 years in the future, but officials realized in late 1992, that digital technologies could be only five years away. At this time, ministers denied an additional $39 million in funding for HD-MAC development, and began discussing opening up funding for a digital HD standard (Lineback & De Bony, 1992).

After the unsuccessful 1992 trials and the realization that digital technologies were closer than expected, Europe abandoned the HD-MAC format in 1995 to focus on a digital system (Brinkley, 1997; Huff 2001). The Council passed Decision 93/424/EEC on an action plan for the introduction of advanced television services, which appropriated funding for research and development and promoted the creation of programming capable of HD quality. The 1993 Decision was updated in 1995, by Directive 95/47/EC, which included more specifics about the new digital European standard development and member state participation (European Union Directive, 1995). Since then, the EU focused its efforts on the Digital Video Broadcasting system, DVB, as a set of open standards for digital television.
The US and EU approaches took about 15 years to establish a digital television broadcast standard. However, the US preference for industry competition produced a usable, competitive High Definition standard faster than the EU’s singular approach.

**American and European Television Markets**

In 2009, the United States terminated over-the-air analog broadcasts in favor of over-the-air digital broadcasts. The European Union, as a whole, will switchover to digital broadcasting by 2015, and individual member states will establish their own deadlines.\(^4\) Government control of the choice to provide content in digital format in both areas is restricted to broadcasters who use frequencies licensed by the government. In both Europe and the United States, broadcasts of this nature can be received free of charge through antenna reception; this is known as terrestrial transmission or broadcasting. In the United States, one can receive the four major commercial broadcast networks, ABC, CBS, NBC and FOX, the one national public broadcasting station, PBS, and any local broadcasters free of charge via antenna reception. Free-to-Air broadcasts from terrestrial and satellite sources have traditionally been more popular than the pay TV model in European countries. The deadline to provide content via digital methods does not apply to cable or satellite operators. Once the switchover occurs, antenna reception will be digital terrestrial television (DTT), rather than analog terrestrial television.

In the EU, terrestrial transmission is still the most popular method for receiving television programming. As late as 2003, 46% of the European population still relied on analog television broadcasts as their primary mode of reception. That number has been slowly changing with consumers migrating to new free services from digital terrestrial and satellite providers, or choosing a multichannel subscription based service from satellite, cable and IPTV providers.

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\(^4\) The date of 2012 has been recalled, however countries with dates proposed after 2012 are working to meet the 2012 deadline (COCOM07-06 REV1).
Also, once consumers begin receiving free digital terrestrial television they can choose to add more channels through subscription packages.

For example, in the UK viewing options for consumers include paid subscriptions to cable or satellite, and free-to-air terrestrial television and satellite broadcasts. Currently, terrestrial analog services are available to 98.5% of the population, digital satellite is available to 98%, digital terrestrial services are available to 73%, and cable service is available to 49% of consumers. Of the 25.5 million TV households in the UK, 38% subscribe to digital terrestrial service, 34% to pay Satellite, 13% to analog terrestrial, 13% to cable and 3% to free satellite (Ofcom, 2008).

In the U.S., TV viewing is quite the opposite. The majority of consumers receive television via cable transmission (60%), while 20% rely on satellite transmissions, and 19% rely on terrestrial television (GAO, 2006). Multi-channel television, via cable and to a lesser extent satellite, is very popular and is the typical method of television reception. Free-to-air TV as the primary reception method has waned considerably since the introduction of unique cable TV programming in 1972 and later the satellite television option in 1994 (GAO, 2006).

Table 1-2 describes the television market in selected EU member states and the US to give a clear picture of the availability of different platforms to consumers; coverage numbers for analog, digital and cable platforms were provided where available. It also shows the total number of television households in each state and the percentage of those households that subscribe to either digital terrestrial, analog terrestrial, cable or satellite programming; some countries did not distinguish between analog and digital terrestrial and only provided numbers for total terrestrial viewers.
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<th>Country</th>
<th>Signal Availability</th>
<th>TV Households (in millions)</th>
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<th>ATT</th>
<th>Cable</th>
<th>Satellite</th>
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<tr>
<td>Austria</td>
<td>ATT: 99% DTT: 90%</td>
<td>3.4</td>
<td>10%</td>
<td>2%</td>
<td>39%</td>
<td>49%</td>
</tr>
<tr>
<td></td>
<td>Cable: 58%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Czech Republic</td>
<td>DTT: 42%</td>
<td>3.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cable: 37%</td>
<td></td>
<td>51%</td>
<td>28%</td>
<td>21%</td>
<td></td>
</tr>
<tr>
<td>Estonia</td>
<td>DTT: 93%</td>
<td>0.6</td>
<td></td>
<td></td>
<td>45%</td>
<td>5%</td>
</tr>
<tr>
<td>Finland</td>
<td>ATT: N/A DTT: 99.9%</td>
<td>2.3</td>
<td></td>
<td></td>
<td>N/A</td>
<td>8%</td>
</tr>
<tr>
<td></td>
<td>Cable: 90%</td>
<td></td>
<td>47%</td>
<td>N/A</td>
<td>45%</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>DTT: 89%</td>
<td>26.3</td>
<td>41%</td>
<td>30%</td>
<td>13%</td>
<td>15%</td>
</tr>
<tr>
<td>Germany</td>
<td>ATT: N/A DTT: 99%</td>
<td>36.9</td>
<td>5%</td>
<td>N/A</td>
<td>60%</td>
<td>35%</td>
</tr>
<tr>
<td></td>
<td>Cable: 22%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>DTT: 56%</td>
<td>3.9</td>
<td></td>
<td></td>
<td>30%</td>
<td>16%</td>
</tr>
<tr>
<td></td>
<td>Cable: 77%</td>
<td></td>
<td>54%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>ATT: 99% DTT: 70%</td>
<td>23.2</td>
<td>37%</td>
<td>34%</td>
<td>1%</td>
<td>26%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percentages are estimates as there is some overlap in subscribership and IPTV was not included.
<table>
<thead>
<tr>
<th>Country</th>
<th>Signal Availability</th>
<th>TV Households (in millions)</th>
<th>DTT</th>
<th>ATT</th>
<th>Cable</th>
<th>Satellite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands</td>
<td>Cable: 98%</td>
<td>7.0</td>
<td>.02%</td>
<td>N/A</td>
<td>92%</td>
<td>.07%</td>
</tr>
<tr>
<td>Norway</td>
<td>DTT: 70% Cable: 60%</td>
<td>2.1</td>
<td>15%</td>
<td>50%</td>
<td>35%</td>
<td></td>
</tr>
<tr>
<td>Poland</td>
<td>Cable: 43%</td>
<td>13.4</td>
<td>N/A</td>
<td>10%</td>
<td>60%</td>
<td>30%</td>
</tr>
<tr>
<td>Romania^6</td>
<td>DTT: 0%</td>
<td>7.6</td>
<td>18%</td>
<td>49%</td>
<td>27%</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>Cable: 59%</td>
<td>16.0</td>
<td>32%</td>
<td>39%</td>
<td>13%</td>
<td>16%</td>
</tr>
<tr>
<td>Sweden (2008)</td>
<td>ATT: N/A DTT: 99%</td>
<td>4.4</td>
<td>25%</td>
<td>N/A</td>
<td>50%</td>
<td>15%</td>
</tr>
<tr>
<td>UK (2008)</td>
<td>ATT: 98.5% DTT: 73%</td>
<td>25.5</td>
<td>38%</td>
<td>13%</td>
<td>13%</td>
<td>37%</td>
</tr>
<tr>
<td>US 2008</td>
<td>DTT: 98% ATT: 98%</td>
<td>114.5</td>
<td>1%</td>
<td>19%</td>
<td>60%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Sources: DVB worldwide 2008 data, OECD 2009 data

Table 1-3 shows the number of analog free to air channels before the introduction of digital television and the number of free to air channels available after the introduction of the digital terrestrial platform. Also, some countries chose to add subscription-based services on the digital

^6 Six percent are unable to receive television at all.
terrestrial platform as well. Table 1-3 also shows the number of channels available by subscription.

<table>
<thead>
<tr>
<th>Country</th>
<th># of national Free-to-air analog channels</th>
<th># of digital channels</th>
<th>Additional Digital terrestrial pay channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>3</td>
<td>6</td>
<td>-*</td>
</tr>
<tr>
<td>Belgium (Flemish)</td>
<td>4</td>
<td>11</td>
<td>-</td>
</tr>
<tr>
<td>Belgium (French)</td>
<td>2</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>4</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Estonia</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Finland</td>
<td>5</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td>France</td>
<td>7</td>
<td>18</td>
<td>11</td>
</tr>
<tr>
<td>Germany</td>
<td>0</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>Hungary</td>
<td>3</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Italy</td>
<td>9</td>
<td>30</td>
<td>11</td>
</tr>
<tr>
<td>Netherlands</td>
<td>3</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Poland</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Spain</td>
<td>5</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>UK</td>
<td>5</td>
<td>&gt;30</td>
<td>12</td>
</tr>
<tr>
<td>US</td>
<td>9</td>
<td>&gt;15</td>
<td>0</td>
</tr>
</tbody>
</table>

Sources: DVB worldwide, OECD 2009
* Dashes represent unknown values.

The number of channels received by television households in the EU has traditionally been low, ranging between 6 and 20 via the most popular method, terrestrial. In addition, public service broadcasters, rather than commercial broadcasters, play a major role in the television market. To fund the public service broadcasters most European nations employ a television license fee. For example in Germany, public broadcasters are financed through a mandatory television and radio license fee of 192 Euro ($236.19) per household per year, totaling about 6 Billion Euro ($7.38 billion) per year. In the UK, viewers must pay a license fee of £135.50 for a color television license, or £45.50 for a black and white television license, regardless of television service subscription.
Though the number of U.S. broadcast television channels is low, between 4-10 regionally, the typical number of channels received by American viewers exceeds 25 because the majority of Americans subscribe to multichannel TV (80%). There is no license fee for having a television set, but there are of course subscription costs, ranging anywhere from $25 to $100 per month depending on the number of channels selected in the subscription package.

The Players

In both the EU and the US, there are key players from public and private sectors that helped develop and influence the DTV development and policy. While these key players will be discussed in more detail in chapters 2 and 3, here I will provide a brief overview. In the EU, the major governing body overseeing and implementing legislation is the European Commission. European Commissioners are each assigned a policy area with a support staff known as Directorates-General (DGs). The DGs actually formulate and draft legislative proposals, which must be accepted by the Commission before being sent to the European Parliament for consideration (Europa, n.d.). During much of the first decade of the century, the DG of Information and Technology was Commissioner Viviane Reding, who oversaw much of the transition to digital television. With the installation of a new cabinet in 2010, Neelie Kroes now holds the position.

For the development of a European digital television standard, the European Commission endorsed the Digital Video Broadcasting group (DVB). The DVB is a consortium of European equipment manufacturers, broadcasters, programmers, application developers, and representatives of national regulatory bodies, which was established in 1993 (Galpernin, 2002). The DVB standard is the basis for all digital transmissions in the European Union.

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7 There are four national networks, at least one public service network, and a varying number of local broadcasts available via broadcast.
In addition to the government industry consortium, Europe puts a great deal of emphasis on corporations considered “national champions.” These companies are often the premier company in their industry and bring in direct foreign investment, jobs, and prestige to a particular country, and by extension, Europe as a whole. Sometimes the government holds a stake in the company as well (CEPS, 2006). Philips, Thomson, and Siemens have been major players in the development of digital television standards both in Europe and in the United States.

Often policies developed by the EU in the DTV arena take into account how well it will protect a particular company from economic losses, increase its gains, or acquire prestige for the particular country and the EU as a whole. For example, French national champions Canal+ and TPS, in which the French government and its public service broadcasters hold a 25% stake through France Telecom and France Television, were both effectively protected from new market entrants by delays in the introduction of a DTT licensing plan and the inclusion of Directive 95/47/EC (Galperin, 2002). Public service broadcasters and telecommunications operators were also delegated a significant amount of responsibility during the transition, such as the United Kingdom’s British Broadcasting Corporation (BBC) and Germany’s Deutsche Telecom.

In the US, when Congress passes legislation, it often assigns duties of implementations to an associated federal agency. The Federal Communications Commission (FCC) was tapped to handle the implementation of the digital television transition. The FCC enlisted major corporations to compete to develop the best possible television standard with the players being the American Broadcasting Company (ABC), the Colombia Broadcasting System (CBS), David Sarnoff Research Center, and Zenith. The Advanced Television System Committee (ATSC) was
also established to approve and provide consultation on Digital Television standards. Other organizations providing consultative and administrative roles included the National Association of Broadcasters (NAB), the Electronic Industries Association (EIA), the National Cable Television Association (NCTA), and the National Telecommunication and Information Administration (NTIA). The NTIA handled consumer subsidies in the form of converter box coupons. The coupons were good for the purchase of a converter box that can down convert digital signals for analog television sets.

Left entirely to businesses and consumers to decide when digital television would become mainstream, it is likely digital television would either have fallen to the wayside like other failed technologies such as Beta Max, Laser Disc and HD-DVD. Consumers do not see a reason to change if the product they are already using is acceptable and the other alternatives are significantly more expensive, but not significantly better in quality. Meanwhile businesses are reluctant to attempt to change the entire landscape of their business, if success is not guaranteed. Governments saw great potential for new business and increased revenue in transitioning from analog to digital television, which quickly became a race among developed countries in standards and implementation.
CHAPTER 2
LITERATURE REVIEW

Government involvement in telecommunications technologies, such as Internet services, cable television services, cellular networks, and radio, is not uncommon. Public control of utilities, which includes telephone communications and to some extent radio and television broadcasting, was common until the 1934 Communications Act in the United States. Privatization of telecommunication services became an international trend beginning in the late 1980s. Even with an increasing tendency towards privatization, EU member states employ more public control than the United States by implementing legislation to ensure there is no single dominant market player, and that regulations are technology neutral. In both the EU and the US, standards for all devices, radio signals, analog television sets, color television and cellular transmission must be approved by the appropriate government regulatory agency. This involvement typically regulates the industry or products; however, the consumers decide which hardware or complementary software they would like to purchase.

The transition to DTV is different. Consumers relying on free-to-air (FTA) television have no real choice. They must choose between multichannel television subscriptions, purchasing a converter box or new television set, or no television at all. A government-sponsored obstacle is being placed in front of broadcast television, which, due to its ubiquitous, informative and entertaining nature, is considered a public good. Until the advent of DTV, governments of free market liberal economies typically have not intervened in the market to such an extent, as to require citizens to purchase a certain product.

A review of the basic regulatory philosophies of the EU and US and their respective media policy goals show how the telecommunications industry has typically been regulated and where changes are beginning to occur. The public good and public interest aspects of broadcast
television explains why television is regulated as such, and typical consumer adoption theories and practices show where the introduction of DTV deviates from past introductions and adoptions of new technologies. Because of the public good and public interest aspects of digital television and the need to coerce consumers into DTV adoption, consumer subsidies were approved to help meet specific transition deadlines. The full consumer switchover to DTV contributes to EU and US initiatives to increase their international competitiveness in technology and knowledge-based products.

**Basic Regulatory Philosophies in the European Union and the United States**

Market regulation is typically justified as the correction of a ‘market failure,’ such as a monopoly, a negative externality, or a public good. The United States often employs boards or commissions to regulate particular policy areas – 1934 Communications Act, regulating telephone, telegraph and radio transmissions, also set up a corresponding regulatory body, the Federal Communications Commission. The American theory behind market regulation is that markets should only be interfered with in specific cases of market failure; otherwise, markets perform best in normal circumstances. Therefore, industry ownership and operation is primarily through private citizens (Majone, 1996). However, this sort of regulation has only recently come into fashion in Europe.

Citizens of Europe have historically been critical of market economies and their ability to survive under crises, like the Great Depression and World War Two; therefore, European governments tended to choose nationalization of industry over American-style market regulation to correct and prevent market failures (Majone, 1996). There has also been a tradition of “state dirigisme and bureaucratic centralization” in European responses to market failures (Majone, 1996 p. 10). However, since the 1980s, European nations, while still holding on to some traditions, are moving towards deregulation and away from nationalization (Majone, 1996).
EU Regulatory Philosophy: Dirigisme and Deregulation

In the EU, while developing policies and regulations, including broadcasting and audiovisual media policy, there has been a growing tension between cultural and economic orientations toward policy. These approaches have been referred to as the dirigiste vision, focused on public service and cultural policy and the deregulatory vision, driving at market liberalization (Collins, 1994; Naranen, 2004; Wheeler, 2004). In the dirigiste vision, there are assumed obligations for the legal and legislative system to guarantee “institutional arrangements for services essential to citizenship and broad citizen participation,” which suggest that governments should intervene in private business affairs on behalf of what is “good” for the citizenry (Venturelli, 2002, p. 77). The dirigiste vision competes directly with the deregulatory vision, which drives at creating a single market of free flowing goods among European nations through less government involvement.

The deregulatory vision appears similar to the US liberal market model; however, there are significant differences. The EU relies on public law, which favors the general rather than the private interest. Thereby, contract law is employed as a facet, but not a controlling factor as in the US (Majone, 1996; Venturelli, 2002). However, to encourage growth within the television and audiovisual markets the deregulatory principles of liberalization and harmonization guide EU policies regarding competition and concentration. The Commission believed that this would enhance media corporations’ competitiveness and ability to establish a global presence (Wheeler, 2004). However, the EU prioritizes differently by promoting transnational networks in data, communication, and content distribution under government guidance, rather than lowering public interest and ownership restrictions as in the US (Venturelli, 2002).
US Regulatory Philosophy: Libertarian, Public Interest and the Liberal Market

The US regulatory direction originates in three models that are sometimes contradictory and sometimes complementary. The first is the libertarian model based on the conception of "society without the state" where information networks are open, non-proprietary, and state intervention is highly restrained (Venturelli, 2002). The evolution of this idea comes from the American historical experience of the perpetual ‘new frontier.’ Whether it is the exploration of new land, space, industrial development or digital technology, the “new frontier” frame "pervades the American cultural understanding of the nature and promise of new technology” (Higgins, 1995; Venturelli, 2002, p. 71).

Second, the public interest model claims protection of individual rights through government protection against unaccountable marketplace structures. Most of these laws address the tension between individual and industry rights. This model is based in the tension or balance between interests of consumers and the interests of the industry, and the belief that governments can encourage perfect markets through rational regulation (Venturelli, 1998).

The third model is the liberal market model emphasizing "contractual rights and proprietary freedoms for market participants" (Venturelli, 2002, p. 72). A unique feature of US regulation is that there is no distinction between the rights of individuals and the rights of entities. From this viewpoint, rather than the government encouraging an effective market through regulation, the government should take a minimal role in the transactions between producers, distributors, and consumers. Governments should guarantee contractual and property rights, but mostly encourage and allow self-regulation to take place (Venturelli, 1998)

EU Media Policy Goals

Though the EU and the US use different methods for regulating the media industry, their regulations strive to achieve similar goals. The priorities of the Commission’s Information
Society and Media Directorate General are to foster innovation and competition, and establish a regulatory environment favorable to developing information, communication and audio-visual technologies. EU media policies focus on four objectives: media pluralism, social and cultural protections, universal standards, and an effective market (EC, 2005a). According to communication from the task force, the idea of media pluralism is broader than media ownership concerns. The principles behind media pluralism incorporate transparency as a method of showing media independence, and access to multiple information sources in order for the population to form opinions without excessive influence from a dominant source.

The European Commission makes provisions for social solidarity in the forms of cultural and multilingual content. These goals receive support from the EU Media Programme, which provides EU member nations with training for the promotion of culture and locally produced content. For example, to prevent the inundation of foreign content, a quota system outlined in the Audiovisual Media Services Directive (AMSD), ensures that native language productions and European productions still receive airtime (European Union Directive, 1997; European Union Directive, 2007). Universal standards suggest neutrality across platforms and open standards in the application-programming interface (API). Applying universal standards allows for the functioning of an effective internal market (EC, 2002).

**US Media Policy Goals**

The Communications Act of 1934 established the FCC and stated that its policy goal is “to make available, so far as possible, to all the people of the United States a rapid, efficient, nationwide and worldwide wire and radio communications service” (47 U.S.C. §1). The 1934 Act grants the FCC the authority to grant spectrum licenses under the considerations of public interest, convenience and necessity. In addition, the amending Communications Act of 1996 obliges the FCC to pursue the public interest through its regulation of broadcast media.
The FCC has enjoyed wide latitude in determining what serves the public interest. In its interpretation of the public interest, the FCC balances its concerns for efficiency, antitrust, and media effects in the political, cultural, and social realms, through three policy objectives: diversity, localism and competition (Alexander & Brown, 2007). The policy objectives are sometimes at odds with one another and add complexity to regulation of the media market.

There are multiple interpretations of diversity. Diversity of programming choice should allow viewers varied program and information choices that reflect the varied preferences of the audience. Source diversity encompasses the availability of varied content and genres from producers, and ownership of media businesses by minorities and females (Levy, 2008). Diversity of viewpoint refers to the availability of political perspective. The number of independent media outlet owners in a market is outlet diversity; it is generally thought that the degree of outlet diversity influences both source and viewpoint diversity. Because outlet diversity is easily measured, it is a prime focus for regulatory action, such as ownership restrictions. While all of these forms of diversity are considered important, outlet diversity is, by far, the most commonly applied method for ensuring diversity in the media market (Levy, 2008).

The localism principle is meant to ensure that broadcasters distribute programming with the needs and tastes of a specific local geographical community in mind (Levy, 2008). The public interest is a primary concern for the FCC, as outlined in Title III of the Communications Act. It explicitly requires the Commission to “make such distribution of licenses, frequencies, hours of operation, and of power among the several States and communities as to provide a fair, efficient, and equitable distribution of radio service to each of the same” (47 U.S.C. § 307). Therefore, broadcasters, who are considered temporary trustees of the public’s airwaves, must in turn use the medium to serve the public interests as well. The FCC has consistently interpreted
part of serving the public interest to mean that broadcast licensees must air programming responsive to the needs and interests of the local communities where they are licensed to operate (FCC, 2004).

Traditionally, competition refers to economic competition and is generally discussed in terms of advertisers, because in the United States broadcast television is advertiser supported; viewers do not pay for programming. The FCC also looks to efficient competition as a method for limiting government involvement in the marketplace. The 1996 Communications Act favors competition and demonstrates the belief that when competition develops efficiently, many regulations can be eliminated. The FCC should determine whether “regulations are no longer in the public interest because competition between providers renders the regulation no longer meaningful” and to repeal or modify rules that are “no longer in the public interest” (FCC, 2002a). However, this does not translate into deregulation for deregulation’s sake. As stated previously, the FCC should determine whether regulations have become no longer necessary as the result of competition, and these regulations should thereby be modified or eliminated (FCC, 2002a).

Broadcast Television’s Market Failure

The EU and the US recognize that broadcast television is a public good, and the goals of the EU and the US are to create an efficient telecommunications market that serves the public interest before, during and after the digital transition. Public goods are goods that multiple consumers can enjoy simultaneously, like national defense, parks, and lighthouses (Priest, 1985). These types of goods are non-rivalrous and non-excludable. Non-rivalrous means that consumption of the good by an individual does not diminish the availability of the good for consumption by others. Non-excludable means that anyone can benefit from its use and no one person can effectively be excluded from using the good. (Olson Jr., 1965; Musgrave, 1969). For
example, if I drink my milkshake, you cannot drink it because it is gone; however, if I view a television program it does not mean that you cannot view it because I have already seen it, but you could view it on the same television set or on another device.

Public-goods can be provided by government or contracted out to private industry, because “consumers cannot be excluded from enjoying the benefits of a public good the use of taxpayer money can often be justified” (Priest, 1985 p. 11). Some public-goods, like national defense, are both provided and managed by national governments. However, in most countries, basic communication services are governed by regulatory frameworks, controlled by regulatory authorities, and, in the US and the EU, at least partially provided by private firms (Majone, 1996; Picot & Wernick, 2007).

In the US and EU the broadcast television model is typically split between a dual system of public and private broadcasting with the US having more emphasis on private broadcasting, and EU countries typically on public broadcasting. This is because in the US, plurality or diversity of viewpoints and outlets is thought to be best achieved through self-regulation and competition law, while in the EU a plurality of viewpoints and outlets is thought to be best achieved through regulation. Both polities use regulation to achieve public interest, cultural and social responsibility objectives.

In most countries, state-run agencies or public utilities organized the provision of telecommunication services such as the telegraph, telephone, radio and broadcast television until the final decades of the 20th century, when governments began to lean increasingly toward deregulation, especially in the United States. One of the reasons for high levels of state regulation was to guarantee features of telecommunications that contribute considerably to the public interest. Even after the privatization, liberalization and introduction of competition,
regulatory agencies remain responsible for guaranteeing certain public-good aspects, such as safety, security, the prevention of radio communication interference, and universal service requirements (Picot & Wernick, 2007; Venturelli, 2002). Universal service requirements provide a baseline for acceptable services that should be available to every person residing in a country; this concept is provided for in the US Communications Act of 1996 and the EU’s Telecommunications Directive 2002/22/EC.

The public good nature of television and public interest goals and standards that both the EU and the US have entrenched in their respective regulatory frameworks requires support of access to television and supporting consumers through the transition. Once the two polities found that voluntary conversions were stagnant, they increased their education efforts, began to offer subsidies and, if necessary, postponed switch-off deadlines.

**Consumer DTV Adoption**

Technological products have two sides, hardware and software. The utility for the consumer of a product such as a computer, television or phone relies on the availability of complementary products, such as programming, software, or other products. An indirect network externality results when demand for a hardware product is mediated by the availability of complementary software products, thus resulting in interdependence between interrelated industries (Gupta, Jain & Sawhney; 2001). Digital television transmission is only as valuable to consumers as the content available, and only as valuable to hardware manufacturers and content producers as the number of interested consumers. However, without enough consumers or enough content, neither broadcasters nor consumers were willing to participate in the DTV transition.

To boost the transition and encourage consumer adoption, former FCC Chairman Michael Powell proposed a voluntary plan to key industry players that would increase the amount of
attractive content available to consumers through digital transmission and make that content available to cable subscribers as well. As a result of the positive industry response to the voluntary plan, the FCC adopted a *Second Report and Order* and *Second Memorandum Opinion and Order* requiring nearly all television sets to have DTV tuners by 2007 (FCC, 2002b; FCC, 2002c).

However, there remained relatively low demand for DTV, as the majority of consumers were unaware of the utility of DTV or the impending conversion (GAO, 2002; GAO 2004). Typical early adopters of DTV or those with a higher awareness and understanding of DTV, were more likely to be male, of a higher socioeconomic status, tech-savvy, college-educated and frequent Internet users (Atkin, Neuendorf, Jeffres & Skalski, 2003; Chan-Olmsted & Chang, 2006; GAO, 2002). A 2003 study found that the two factors touted as major benefits to consumers, increased picture and sound clarity, were attractive to consumers. These features were not influential enough to spur a significant number of consumers to switch to digital television, however, especially while DTV sets were averaging about $5,000 (Atkin, Neuendorf, Jeffres & Skalski, 2003).

Typically, the adoption of new media can be examined through the lenses of demographics (Atkin & LaRose, 1994; Dutton et al., 1987a, 1987b; Krugman, 1985), personality traits (Ostlund, 1974) and diffusion theory (Rogers & Shoemaker, 1971). These lenses for studying and predicting new media adoption are useful for determining the characteristics of a person who is likely to adopt a new technology and how quickly they might adopt that technology, but are not useful for determining the best practices for encouraging reluctant consumers to adopt new technologies. DTV adoption is not voluntarily, as is the usual case, but instead a government policy.
According to Mackay’s (2007) research in the United Kingdom:

The ideal remains voluntary conversion to digital, but there is acceptance by the government that some form of coercion or compulsion will be necessary. The switch from 405 lines to 625 lines took over 21 years (625 was introduced in 1964, 405 was switched off in 1985) despite very strong incentives (receiving BBC2, which increased the number of channels by 50%, and colour) . . . Similarly, in 1987, over 20 years after the introduction of colour television in the UK, there were still 2.4 million monochrome licenses, 11% of TV households (NERA/DCMS 1998). With digital, it is generally acknowledged that the numbers involved will be reduced once a switch-off date is announced.

Perceived attributes and utility of DTV will be helpful in convincing consumers, but other policy approaches must be utilized as well. Berlin, Germany was able to complete its transition ahead of schedule. Through a GAO (2004) legislative analysis of Berlin’s strategy, three policy approaches toward consumers were very important: an extensive consumer education effort, providing subsidies to low-income households, and setting a near-term date for analog shutoff.

Though we cannot know how the transition to DTV would have progressed without government involvement, many scholars agree that government guidance was the most effective way to coordinate the transition for consumers (Adda & Ottavianni, 2005; Iosifidis, 2006; Klein, Karger, & Sinclair, 2004; Tadayoni & Skouby, 1999; Trinidad, Leiva, Starks & Tambini, 2006). Reduced equipment prices and increased programming availability could have prompted consumers to voluntarily switch (Adda & Ottavianni, 2005; Atkin, Neuendorf, Jeffres & Skalski, 2003), however, it would have taken longer and adoption levels would plateau without a firm switchover deadline (Adda & Ottavianni, 2005; Trinidad, Leiva, Starks & Tambini; 2006). Through consumer surveys and interviews, Klein, Karger, and Sinclair (2004) determined that without a timeline, consumer adoption of the digital platform would plateau between 70 and 80%. Establishing a firm switchover date was determined to be the most effective method for encouraging consumers to adopt digital television (GAO, 2004; Klein, Karger & Sinclair, 2004;
Tadayoni & Skouby, 1999). In fact, Adda and Ottavianni found that “there are almost no [consumers], who prefer analogue to no television and no television to digital television” (p. 39).

Once involved, governments identified specific challenges on the consumer side for achieving a full transfer to digital television reception (Iosifidis, 2006). As television is considered a public good, governments needed to ensure that everyone currently receiving analog television would be able to receive digital television; ensure that the switch would be affordable for the majority; and ensure that a high percentage of consumers could access digital equipment before the switch. For example, the British and French governments established the threshold at 95% of citizens with access to digital television before a switch could take place (CSA, 2007; DCMS, 2004), while the US accessibility was set at 85% (Balanced Budget Act 1997).

In discussion leading up to the defunct 2006 switch-off date, US congressmen found that because the DTV transition represented a “government driven policy, not a market driven phenomenon” the government must ensure the success of the transition and that consumers will not lose broadcast service (House Committee on Energy and Commerce, 2005, p. 2-3). Considering the number of analog television sets and the fact that some of the most economically challenged Americans rely on analog, citizen subsidies were suggested as an important method for supporting the transition (House Committee on Energy and Commerce, 2005).

In the EU, subsidies are only acceptable if they meet certain requirements including overcoming market failures and enhancing social cohesion (State Aid Action plan, Article 87(1)). Encouraging the digital television transition fit these requirements and governments of EU member states have offered subsidies to their citizens to aid in the transition to digital (Digital UK & Ofcom, 2008; Mabb, 2008; Matteucci, 2008; Miniszterelnoki Hivatal, 2007).
Though there are many studies on awareness and the diffusion of digital television on the consumer side, few articles discuss the specific effect of direct government involvement in the diffusion of digital television. The aim of this thesis is to describe and compare EU policies toward the digital television transition with the approach taken by the United States. This thesis asks:

RQ1: (a) What needs to be accomplished for the digital transition to take place, and (b) how has the digital transition progressed in the EU and US comparatively?

RQ2: What policy lessons from the digital television transition can be applied to the introduction or expansion of new communication technologies?

The following chapter describes the method used to approach this research through a comparative case study. Chapter four describes the governance and history of both the EU and the US. Chapter five discusses the media and digital television legislative framework, while chapter five presents the case study data on digital television implementation from the US and exemplary EU member states. Finally, this research synthesizes the case study information to make determinations on best practices, success, failures and experiences that can be applied to future technological transitions mandated by governing entities.
CHAPTER 3
METHOD

This is a comparative, qualitative case study exploring the various facets of EU and US digital television and mobile television policy. Case studies contribute to the knowledge of a group, organization, social, or political phenomenon by providing a detailed contextual analysis of a limited number of events or conditions and their relationships. Case studies focus attention on one or a few instances of a particular social phenomenon, and therefore provide more depth than other quantitative methods. Researchers have used case studies over a variety of disciplines and diverse topics such as programs, projects, and initiatives in education, business management, social problems and technology development. Social scientists, in particular, use this qualitative research method to examine contemporary real-life situations, and case studies have been one of the most common methods of conducting research for use in public policy and public administration (Babbie, 2007; Yin 2003a; Yin, 2003b).

Three types of case studies include: evaluative, explanatory and descriptive. Evaluative case studies are generally used to document and analyze an implementation process after the fact (Yin 2003a; Yin 2003b). The comparison of the digital television transition in the EU and the US cannot be evaluated as of yet because the transition is still in progress and there has not been enough time to test or evaluate anticipated results in terms of economic growth, competitive advances or consumer satisfaction. Any predictions will be preliminary and can be evaluated through further research once the transition has been completed in all EU member states.

This case study research is descriptive and explanatory in nature. A descriptive case study presents a complete description of a phenomenon within its context, while an explanatory approach presents data, describes causal relationships and describes how events happened (Yin, 2003a; Yin 2003b).
This case study selected the EU and the US as the primary units of analysis because they are large western polities at the same level of economic competitiveness on the world stage and both pursuing a government led transition to digital television. However, while both entities are pursuing the same goal, they are taking different implementation approaches and their governments are structured very differently – in fact, some scholars argue that the EU is a completely new political governance system. The purpose of this research is to describe the DTV approaches and report the relative successes and failures of each transition process. The account of successes and failures will help other governments intending to transition at a later date streamline their own process, be a useful reference point if governments should choose to introduce another technology, and serve as a basis for future evaluative research.

The variables of interest, which reveal the various similarities and differences between the EU and the US, in terms of foundation and organization, are exposed through an examination of their respective histories, governance, institutional organizations and legislative process. In addition, when examining the digital television transition policy, the comparison of the EU and the US focuses on specific policy variables such as, overriding media and telecommunications legislation, spectrum policy, and digital television policy.

In addition, due to the complex organization of the European Union, when describing the actual implementation of the transition process, the US must be compared with individual EU member states. The EU and US governing processes diverge significantly when it comes to the implementation of digital television policy. The US uses one rulemaking body, the Federal Communications Commission (FCC) to handle the transition in the US, while each EU member state uses its own rulemaking body designated to handle communications matters. Therefore, in the actual implementation of the transition there are a number of different methods, all of which
are reported to and checked by the EU through the European Commission. Thus, at the implementation level, the EU cannot be taken as a single unit and compared with the US. Instead, this research examines the transition process of selected EU member states and compares them with the US to search for patterns and best practices.

Table 3-1. Variables comparing the European Union and the United States as single political entities

<table>
<thead>
<tr>
<th>Government Organization Variables: Comparing the EU and the US as single political entities</th>
<th>History</th>
<th>Media Policy Variables: Contrasting differences in media and telecommunications legislation</th>
<th>US: Communications Act of 1996</th>
</tr>
</thead>
<tbody>
<tr>
<td>History Governance Institutional Organization Legislative Process</td>
<td></td>
<td></td>
<td>EU: Audiovisual Media Services Directive</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Spectrum Policy</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Digital Television Policy</td>
</tr>
</tbody>
</table>

In order to describe accurately, successes and the EU outlook, this research selected cases that were exemplary of the EU 27. These cases were selected based on their size, population, and length of EU membership. These variables may result in different approaches to the transition that could be applicable to other countries regardless of political system. Length of membership in the EU, is characteristic of this particular political system, and may contribute to the cohesiveness of the transition and the speed at which EU legislation is adopted into national legislation. These countries also had the most information available on their transition in terms of the process, evaluation and legislation. For some aspects of this research such as projected digital switch-off date, data from additional EU countries were included; however, the aforementioned countries were examined in the most depth.
Once these countries were selected, different variables needed to be included to describe the implementation process comparatively. From the experiences of countries thus far, we can determine how their transition is progressing, if it is likely they will meet their switch-off date, and which processes are proving most productive toward an efficient switch. Additionally, while examining EU member states we can see in even more depth how the EU and national member state governments work together.

The EU member states and the US will be compared across transition periods, subsidies, and consumer education plans. These variables were chosen based on the preexisting literature and government reports that determine these were some of the most important methods for encouraging consumers to adopt digital television on a government timeline. Because one of the driving factors for the switch was the introduction of new technologies to spur economic and competitive growth, this research will also look at policy devoted to and expectations for new technology to be deployed on the released spectrum.

Table 3-3. National digital television implementation variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cases Examined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transition Periods</td>
<td>US, Germany, UK, France, Italy, Netherlands, Belgium, Austria, Finland, Hungary, Czech Republic, Spain, Poland,</td>
</tr>
<tr>
<td>Subsidies</td>
<td>US, Germany, UK, France, Italy, Hungary</td>
</tr>
<tr>
<td>Education Plans</td>
<td>US, Germany, UK, France, Hungary</td>
</tr>
<tr>
<td>New Services</td>
<td>US, Germany, UK, France</td>
</tr>
</tbody>
</table>
This case study uses policy statements, speeches of intent from lawmakers, and laws enacted by both the EU and the US to interpret and compare the intent and procedure outlined for the digital television transition. Primary directives from the EU include: the Lisbon Strategy, Directive on Advanced Television Standards, the Audiovisual Media Services Directive, and the Legal Framework for Mobile Television. In the U.S., the primary laws passed by Congress included: the Digital Television and Public Safety Act (included as Title III of the Deficit Reduction Act of 2005) and the DTV Delay Act.

Individual member state governments primarily direct implementation and rulemaking for the transition to digital television in the EU. Member state switchover plans⁸ were studied to compare differences in implementation from state to state across the four categories. As the rulemaking body for laws affecting media, the FCC detailed and implemented the process of the switchover. This process was detailed in the FCC’s 700 MHz Second Report and Order, the Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993 and the Implementation of the DTV Delay Act. Data on the progress in terms of signal coverage, subscribers, channel availability and subsidy allocation in EU member states and the US was gathered from OECD, the NTIA, the DVB Project, and member state switchover plans.

In the context of previous literature and the continuing progress in technology development and introduction, lessons from this case study will advance knowledge on government policy toward technology introduction. The steps taken to introduce digital television by the government are the most invasive on the consumer side as of yet, more so than

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the standards development and regulatory approaches toward telephone, radio, television, color television, Internet or cellular phone service.
CHAPTER 4
EU AND US GOVERNANCE

Introduction

A context is necessary to understand the comparative approaches of the US and the EU towards implementing digital television. This chapter describes the history, government structure, and legislative process of the EU and the US, and closes with a comparison of the two political entities. This discussion provides an in depth case analysis to demonstrate how the two political entities arrived at their respective political structures and how they arrived at communications policy directions and legislation.

European Union

From a desire for peace among European nations, the idea of a united Europe has been presented since the 1940s by political thinkers such as Altiero Spinelli, Ernesto Rossi and Winston Churchill. After two large-scale wars, World War One and World War Two, originated in and were fought primarily on European soil, European nations searched for a lasting and prosperous peace. Dismantling and stripping belligerent countries, such as Germany, of their wealth after WWI proved unsuccessful and fueled resentments that led to WWII. Therefore, after WWII, the Allies preferred a process of integration and economic stabilization rather than heavy reparations and dismantling of industrial centers (Rich, 2003).9

History

However, concrete steps toward economic and political cooperation did not come until 1951, when French foreign minister Robert Schuman, German chancellor Konrad Adenauer, and French civil servant Jean Monnet, initiated the European Coal and Steel Community (ECSC)

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9 The Soviets preferred higher levels of reparations and controlled productivity in the industrial sectors, which caused a rift among the allied powers. For more information on diplomacy after WWII please see Norman Rich’s Great Power Diplomacy Since 1914, pages 276 – 321.
(Nelsen & Stubb, 2003). Germany and France were epic rivals and their borders were central battle lines and points of contention in both World Wars and previous wars between the two countries. Through transferring the control of essential materials for war preparations, like coal and steel, to a common international authority, Germany and France would be so economically and industrially intertwined that war between the two would be virtually impossible. Six countries joined the ECSC, France, Germany, Italy, Belgium, the Netherlands, and Luxembourg. For Monnet and Schuman, the ECSC was to be the first step toward bringing other European economic and political processes under a single authority (Nelsen & Stubb, 2003; Rich, 2003; Treaty Establishing the European Coal and Steel Community, 1951).

Following the formation of the ECSC, in 1957 the six participating member states created the European Economic Community (EEC) and the European Atomic Energy Community (EURATOM) through the Treaties of Rome (Europa, n.d.a.; Treaty Establishing the European Atomic Energy Community, 1957; Treaty Establishing the European Economic Community, 1957). The EEC Treaty committed the six countries to a 12 year time-line for achieving three goals aimed at developing a common market: create a free trade area, create a common external tariff, and reduce barriers to the movement of capital, labor, and services (Buonanno, Dowley, and Nugent, 2008; McCormick, 2002; Treaty Establishing the European Economic Community, 1957). The EEC Treaty created institutions such as the European Commission, the Council of Ministers and the European Court of Justice. The EEC also developed a timeline for the initiation of a directly elected European Parliament laying the foundation for a mixture of intergovernmental and supranational institutions, which are still existent in the EU (Buonanno, Dowley, & Nugent, 2008; Treaty Establishing the European Economic Community, 1957).
These treaties, specifically the EEC, and the resulting economic benefits, demonstrated that a unified Europe was possible (McCormick, 2002).

The European Union, as we know it today, is an economic and political union of 27 member states, operating in a single market through a standardized system of laws to allow the free movement of people, goods, services and capital (Council of the European Union, n.d.b; Europa, 2008a; Europa, 2008b; Europa, n.d.b). In order to join the EU, countries must meet the 1993 Copenhagen criteria, requiring a stable democracy, respect for human rights, a functioning free market economy, and acceptance of previously established EU law (Buonanno, Dowley & Nugent; 2008). Today the EU’s focus has evolved from preventing wars on European soil to economic goals, such as being an internationally competitive large-scale market. The digital television transition was initialed at the EU level to hasten the growth of European technology and knowledge-based markets.

**Governance**

The EU is neither a federation like the United States nor an organization for cooperation like the United Nations. The EU is not a parliamentary democracy, as is typical of many European nations, nor does it function under a separation of powers characteristic of American federalism. Within the EU, member states pool their sovereignty to gain strength and influence on the world stage. The governing bodies of the EU fall under two categories: supranational and intergovernmental.

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11 Candidate countries include Croatia, the Former Yugoslav Republic of Macedonia, Iceland and Turkey, with potential candidates being Albania, Bosnia and Herzegovina, Montenegro and Serbia.
A supranational organization is an international organization, or union, whereby member states transcend national boundaries or interests to share in the decision-making and vote on issues pertaining to the region. These representatives work to integrate European Community interests into the decision-making process and represent the entire European Community, particularly when it comes to a committee policy area that they represent. In supranational organizations, member states relinquish a portion of control over internal policy developments to the supranational body vote. This vote has authority over the state government, which may obligate a member state to accept policies counter to national preferences. Therefore, these sorts of organizations involve some loss of national sovereignty and work more toward integration of governments than government cooperation (Nugent, 2006; Trondal, 2003). Though it is difficult for any of the EU institutions to be solely supranational or solely intergovernmental, the European Commission and the European Court of Justice are the clearest examples of supranational institutions within the European Union, while the Council of Ministers is the clearest example of an intergovernmental institution.

Intergovernmental institutions are composed of national politicians and civil servants from different nations, selected or elected to represent their own national interests and integrate those interests into the Community decision-making process. For example, the Council of Ministers depends on agreement between the member states whose representatives are the key actors at these meetings. Policies developed in intergovernmental institutions allow nations to cooperate on matters of common interest under conditions they can control. In these instances, member states can decide the extent and nature of cooperation, thereby protecting their national sovereignty (Nugent, 2006; Trondal, 2003).
Majone (2002) argues that the supranational and intergovernmental institutions of the EU reflect a mixed polity based on the institutional balance of powers represented in the European Commission, the European Parliament and the European Council. Rather than matching up clearly to the executive or legislative branches of the United States, these institutions represent particular interests. The European Parliament represents the interests of the citizens of the European Community, the European Council represents the interests of national leaders, and the European Commission represents the interests of the European Community and Community leaders.

**Institutional Organization**

The Maastricht Treaty set out three pillars of responsibility within the EU. The first pillar includes the original EEC policies included in the TEU, which are based largely in economic principles and competition. A primary concern for the first pillar is in creating and maintaining the foundation and functioning of the Single European Market. Here, the supranational institutions of the European Commission, the European Parliament and the European Court of Justice have the most influence. The second pillar deals with Common Foreign and Security Policy, while the third consists of Police and Judicial Co-operation in Criminal Matters. The second and third pillars come primarily under the guidance of the intergovernmental institutions, such as the Council of Ministers and the European Council through unanimous agreement (Buonanno, Dowley & Nugent; 2008).

The European Parliament (EP) represents the 492 million European citizens through direct election and shares power with the Council of Ministers. As of 2008, the Parliament was composed of 785 members, but in the term beginning in 2009, the number of seats was set at 732. Members of the European Parliament (MEPs) hold five-year terms. Representation from each member state is based on population, and rather than representing national parties, MEPs
represent European party interests. MEPs elect the EP President for two and a half year terms from among themselves. The EP passes laws, supervises other EU institutions, and shares authority over the budget with the Council (Europa, n.d.c).

The Council of the European Union, also known as the Council of Ministers, is the primary decision making body of the EU and must approve all legislation proposed by the Commission. Ministers or officials from national government departments meet to debate specific subjects, and often act on their own initiative in intergovernmental matters such as foreign policy. The Council Presidency rotates every six months to a different member state, whose representative chairs all meetings. There are nine different council configurations depending on the topic or issue being discussed.12 As chair, the President of the Council maintains considerable control over meeting agendas and the policy direction of the council during the term. For a policy to pass through the Council of Ministers, there are three methods of voting: unanimity, qualified majority, and simple majority. Decisions regarding CFSP and JHA necessitate a unanimous vote. Decisions concerning legislative decision-making within the first pillar employ qualified majority voting, which requires 255 votes to pass, and procedural matters use the simple majority voting method (Europa, n.d.d).

The European Commission, as a supranational institution, is independent of national governments and is supposed to act solely in the interest of the EU, while the Council of Ministers is intergovernmental and tends to reflect national interests. The Commission president is appointed every five years, and requires Parliamentary approval. Then, the Commission president, in coordination with other member state governments, chooses the other 26

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12 General Affairs and External Relations; Economic and Financial Affairs; Justice and Home Affairs; Employment, Social Policy, Health and Consumer Affairs; Competitiveness; Transport, Telecommunications and Energy; Agriculture and Fisheries; Environment; and Education, Youth and Culture.
Commissioners, who also require Parliament’s approval. The Commission is the only EU institution responsible for initiating legislation; however, Parliament may veto policies put forth by the Commission. Once EU legislation is adopted by the Parliament and the Council of Ministers, the Commission is responsible for implementation in all member states within any set time limits (Europa, n.d.e).

Commissioners are responsible for different EU policy areas organized into Directorates-General (DG). Viviane Reding, currently the Commissioner, and Fabio Colasanti, currently the Director-General for information society and media are responsible for overseeing the progress of the digital television transition and setting the direction for European mobile television. The heads and the staff of directorates general are responsible for researching and developing legislation and policy for their respective areas. Once a policy is developed, the responsible Commissioner presents the legislation to the Commission and then Parliament for review.

While DGs do a significant amount of legislative research and there are national committees set up to advise the EU institutions, these are not comparable to the agencies set up by the US Congress, like the FCC. The US sets up agencies that are responsible for implementation, whereas the EU Commission is responsible for implementation of legislation passed. Majone (2002) argues that the allowance of agencies would streamline the effectiveness and coordination efforts of the EU especially in the telecommunications sector. However, the institutional balance of power prevents this sort of delegation. The lack of administrative ability between the supranational level of EU institutions and national governments creates a vacuum, which takes for granted reliable national cooperation. Therefore, with differing levels of resources and expertise, EU legislations often lack uniform application (Majone, 2002).
EU Legislation

The EU evolved from a system of treaties meant to bring European nations into closer economic association and promote peace throughout Europe. The Treaties of the EU outline the primary EU law, institutional structure, legislative procedure, and, in a sense, act as its constitution. Treaties give the European Parliament, Commission, and Council the ability to make secondary legislation for integrated policy areas. Secondary legislations have differing levels of authority and come in a number of different forms: regulations, directives, decisions, recommendations and opinions. Other documents published by the EU, including communications, are particularly helpful in understanding the policy-making process.

**Regulations and Decisions:** Once a regulation is adopted by the EU, all aspects of the regulation have immediate binding legal force, and it is immediately included in the national laws of every member state (European Commission, 2008a). Regulations concern specific and technical adjustments to existing EU law, and are usually outlined by the Commission (Nugent, 2006). Regulations are intended to eliminate discrepancies among national laws and bring national laws in line with one another to foster a common market and European objectives. Decisions pertain to specific policy areas and tend to be administrative rather than legislative; they may deal with the functioning of a particular organization or protocols for handling situations. Therefore, decisions may address any or all member states, certain undertakings, or individuals (Nugent, 2006).

**Directives:** are mandatory only in the end result. They require member states to implement the legislation in the manner seen fit for a particular state, and only become effective once the state enters it as law through national legislation. For example, the transition to digital television is required by all member states, however each member state follows its own method and time frame to achieve the transition. Therefore, directives allow a measure of choice in
translation to national law and are only binding in the end result. However, the European Court of Justice is able to fine states that fail or refuse to implement a directive (European Commission, 2008b; Nugent, 2006). The DTV transition was enacted as a Directive, which has implications that will be revealed through the case studies for the implementation of the transition.

**Communications:** are not legislation. Communications are documents released by the Commission typically, while new legislation is being debated to express the position of the Commission as it pertains to a particular policy issue. Communications also include the perspectives of other institutions involved in the decision-making process and the Commission’s reaction to those views (Nugent, 2006). As the Commission is the initiator and a significant proponent of the EU legislative process, Communications provide guidance as to the reasoning for EU policy. Most of the instructions and requests to member states concerning the DTV transition were issued as Communications.

With three different power-balancing institutions, different levels of force of regulation and different methods of voting, all of which are constantly evolving, it is difficult to follow the path of EU legislation. There are different procedures for passing different types of legislation, Co-Decision is the most common method for passing legislation and was the decision procedure for the Digital Television Directive. In the co-decision procedure, the European Commission introduces legislation, the Council of Ministers, representing the states, and the European Parliament, representing European interests, must agree on the final version of the legislation. Before the co-decision procedure was introduced via the Treaty on the European Union, the Council could unanimously adopt legislation without the approval of the European Parliament (cooperation procedure). The co-decision process gives both institutions equal influence on the...
outcome of legislation. If the two do not agree, they must meet in conciliation committee to resolve points of contention; otherwise, the legislation will not be enacted. Once enacted, legislation goes back to the Commission for implementation. The diagram at the end of the chapter illustrates the co-decision procedure.

While the initial aim of European cooperation through the treaty system was to create a more peaceful and safe environment, the focus quickly moved toward economic concerns, primarily creating a functioning internal market. Currently, the EU presents itself as a new type of political structure bridging the gaps between diverse national societies through a combination of intergovernmental and supranational organizations. The channels for legislative development, implementation and the varying degrees of legislative force at the EU level are very different from the organization and legislative structure of the United States. For example, the EU draws authority from a treaty system, while the US draws authority from a constitution. The following sections give a brief synopsis of US history, governmental structure, and legislative process to offer the reader a comparison between the two political entities. A basic understanding of the development of the political entities and their governing and legislative processes will further inform the discussion of more specific policies, such as the transition to digital television.

United States

Americans first adopted a confederal system under the Articles of the Confederation. Confederations are typically agreements among sovereign states to act together in matters relating to outside countries. The central government usually handles matters of defense, foreign affairs and common currency. This is not similar to how the EU functions. The EU central government powers are very limited regarding external relations and defense; member states

13 For more information on decision procedures please see: http://eur-lex.europa.eu/en/droit_communaute/droit_communaute.htm
retain the power to declare war and to handle foreign relations.\textsuperscript{14} In addition, only sixteen of the twenty-seven member states share the Euro as their common currency. Therefore, even though the states hold the majority of power, the EU central government does not fulfill the typical roles of a confederal government. In the US confederal government, the individual states retained the majority of power including taxation, but only the central government had the power to declare war, negotiate diplomatic agreements, and resolve issues regarding western territories. However, the Confederation did not give the central government enough power to be effective, so state representatives decided a new system was necessary.

\textbf{History}

The current United States Constitution, replacing the Articles of the Confederation, established a federal system. The United States’ federal system established an elected government and, relative to the traditional monarchies of the 1700s, a weak executive. A federation is comprised of partially self-governing states or regions united under a central or federal government. Usually, certain powers and self-governing abilities of the federal states are constitutionally protected. These powers may not be exercised by the central government nor can the central government alter those powers by unilateral decision. Though the EU may be taking steps toward becoming a federation, many member states are unwilling to give up their sovereignty, especially in matters of international relations and defense, to a centralized EU government, so it currently functions under a hybrid intergovernmental and supranational structure.

\textsuperscript{14} With the ratification of the Lisbon treaty at the end of 2009, EU member states still have foreign ministers and represent themselves internationally; however, the EU now has a foreign minister as well to represent EU interests internationally.
United States Government Organization

The United States federal government has three branches, the legislative, executive and judicial, whose powers and duties are outlined in the United States Constitution. Through a system of checks and balances, each branch has some authority to act independently and a degree of authority over the other branches. All powers not given expressly to the national government by the Constitution belong to state governments. In this way, government power is not concentrated in one person, institution or group of people.

The executive branch is composed of the president, vice president, and department heads, also referred to as cabinet members. The president and vice president are elected together for a term of four years and the president is limited to serving two terms, for a possible total of eight years. The president acts as Head of State and Commander in Chief of the U.S. military, performs administrative tasks, and can propose legislation to Congress. As one of the checks and balances, the President must sign all legislation that passes through Congress. If the president disagrees with legislation, he can veto it, and the legislation dies unless a two-thirds majority of Congress overrides the veto (US Government and Printing Office, 2002).

Article I of the Constitution establishes a bicameral Congress as the legislative or law-making branch of government. The public elects both congressional houses, the House of Representatives and the Senate, through popular vote. Congress’s primary responsibility is to write and pass bills. Identical copies of bills must pass through both the House and Senate before they are sent to the president (US Constitution).

Representation in the House of Representatives is based on a state’s population. Currently there are 430 voting members and 5 non-voting members representing the territories of the United States who face re-election every two years. Special duties afforded exclusively to the House include: developing laws that require taxation and deciding if a government official
should be put on trial before the Senate (US Constitution; US Government and Printing Office, 1999).

In the Senate, two Senators represent each state, regardless of population, with a total of 100 voting members. (US Constitution; US Government and Printing Office, 2007). Senators are elected for six-year terms. One third of the Senators come up for re-election every two years; therefore, there is never an entirely new Senate. Special duties afforded to the Senate include confirming or disapproving treaties drafted by the president, confirming or disapproving presidential appointments, and holding trial for government officials accused of committing a crime against the country (US Government and Printing Office, 2003).

Article III of the Constitution outlines the judicial branch naming the Supreme Court as the highest court in the United States. Lower federal courts were not created by the Constitution but by Congress, which established them under their powers granted by the Constitution. The Courts present a check and balance over the legislative branch by interpreting the meanings of laws, how they are applied, and whether they are in violation of the Constitution through judicial review (US Constitution; US Government and Printing Office, 2000).

Through the legislative process, Congress has the power to create government agencies responsible for administration of a particular law in terms of implementation, enforcement, and coordination with states. While these agencies do have some autonomy, they must always report to Congress. Government agencies allow Congress to focus on the legislative process, creating, researching and debating bills in their various committees and personal offices. For example, as part of the Communications Act of 1934, Congress established the Federal Communications Commission (FCC).
As a government agency, the FCC regulates non-federal government use of the radio spectrum, which includes radio and television signals, and all interstate telecommunications, such as wire satellite and cable communications in the 50 states and its territories. The FCC also regulates international communications originating or terminating in the United States. The president appoints five commissioners to the FCC for five-year terms, and chooses one commissioner to serve as the chair. The Senate must approve the commissioner appointments. Up to three commissioners can be from the same political party, and none of the commissioners can have a financial interest in any commission-related business (FCC, 2009e). Without agencies such as the FCC, the institutions of the EU are responsible for all aspects of legislation – research, creation, debate, implementation, enforcement and coordination with national governments. However, there are no agencies given power through EU Legislation to facilitate the implementation of new laws as there are in the United States (Committee of the Regions, 2007; Majone, 2002).

**Legislation**

Legislation begins in Congress. Only members of the House or Senate can introduce legislation for consideration. There are four types of legislation that can be introduced: Simple Resolutions, Concurrent Resolutions, Joint Resolutions and Bills. Simple resolutions affect the rules and operation of the body in which it was introduced, either the House or the Senate, not both. Concurrent Resolutions affect the rules and operation of both houses. Neither is submitted to the president for approval (Office of Public Records, n.d.).

Joint Resolutions and Bills are nearly interchangeable; however, Joint Resolutions may include a preamble describing the purpose or anticipated effects of the resolution. Bills and resolutions typically follow the same legislative procedure except when a Joint Resolution proposes an amendment to the Constitution. Once approved by two-thirds of both
Congressional Houses, a resolution to amend the Constitution is not sent to the president for approval, instead, it is submitted to the state legislatures for ratification. Upon ratification, the Constitution is amended (Office of Public Records, n.d.).

A Bill is the most common type of legislation in Congress. After introduction by a House or Senate member, a bill or joint resolution is referred to the appropriate House or Senate committee for consideration. The committee may pass a bill on to the floor for consideration, reject a bill by not acting on it, or refer a bill to the subcommittee for additional study and public hearings. After additional research and public testimony the subcommittee may decide not to report the bill back – in effect the bill dies in subcommittee – or the subcommittee may make changes to the bill and report it back to the full committee. The full committee goes through additional deliberations, public hearings, and recommendations and then puts the bill to a vote. If the bill passes it is reported, with all research and hearing testimony, to the House or Senate floor for additional debate. If the full chamber of either the House or the Senate approves the bill, it is referred to the opposite chamber for debate (Lexis-Nexis Congressional, n.d.).

Once both houses approve an identical form of the bill, the bill is sent to the president for approval. The President can choose to sign the bill into law or veto the bill. A vetoed bill returns to Congress. Congress can choose to let the bill die, make amendments to achieve presidential approval, or override the presidential veto through a two-thirds vote by a quorum of House and Senate members (Lexis-Nexis Congressional, n.d.). All bills that become law have the same level of force. Though the law may include a grace period for implementation, the grace period is often specified in the law and the law is effective immediately in all states. This level of legal continuity and certainty is what the EU is trying to achieve. The legal certainty facilitates a market of scale for consumer goods, and significant bargaining power.
Summary

The nations of Europe have been defining and redefining their boundaries and relations to one another for centuries, but have not represented a single political entity until the formation of the EU through a system of treaties. The US, while much newer in historical terms than the whole of Europe and its nations, is an older political entity, with 220 years since the ratification of the constitution, making it the world’s longest surviving written government charter. It is hard to say specifically when the EU began; since the first Economic Community composed of five member nations 52 years ago, or the signing of the Maastricht Treaty 16 years ago. It could even be argued that the EU has no definable inception date since it has no official constitution. A constitution was proposed in 2007, but was not ratified by all member states and underwent revisions to become the Lisbon Treaty instead of a formal constitution. The Lisbon Treaty was ratified by all member states in October 2009. Even though the political status of the EU may be difficult to define, it is a political and economic force on the world stage.

The United States united under a common distrust of power concentrated in one individual and the common belief that the government exists to serve the citizens, which is asserted in the initial phrase of the constitution: “We the People,” and derives its legitimacy from citizen support. The idea for the EU originated in a union to encourage peace and prevent wars among European nations. Ostensibly, the way to promote peace was through economic integration beginning with the European Coal and Steel Community. In present matters, where war among European nations is unlikely, economic competitiveness becomes a major legitimizing factor, especially pertaining to digital and mobile television. Arguably, the EU claims legitimacy based on economic competition with foreign nations like Russia, China, Japan and the US.

15 The Lisbon treaty has come into effect since the completion of this research; however, it is unlikely result in any changes in policies discussed in this research.
While the US strives to increase and maintain its current position of power in economic and knowledge-based resources, the EU strives to become more powerful. The driver behind the DTV transition is to achieve a single European market for media and new technology services, rather than a fragmented market of uncoordinated nations with different technical standards and different regulations. Within a single rather than fragmented EU market, products can be developed and sold to a larger number of consumers, rather than developing the same basic product with minor differences to account for national incongruities. EU member states can realize economies of scale, and thereby become more attractive to industry. Through a large-scale market, the EU will be more competitive worldwide in terms of production and consumption. The single market goal, for technology, media and knowledge-based services is expressed in the Lisbon Strategy, which is the springboard and basis for many technology-based regulations.

The major differences between the EU and the US are the separation of powers versus balance of powers, supranational and intergovernmental institutions versus federal institutions, and the degrees of regulatory force. Within the separation of powers there is a clear definition of which branch controls the legislative the executive and the judicial areas of law. Both houses of Congress must agree to pass a law and the president must sign it into law. In the EU, functioning under institutional balance, the Commission, the Parliament and the Council of Ministers all share in some aspects of passing regulations depending on the interests affected by the particular regulation. Depending on the interest area there are different methods of voting, which include co-decision, qualified majority, and simple majority.
Table 4-1. Differences between EU and US governance

<table>
<thead>
<tr>
<th></th>
<th>EU</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Executive and Legislative Institutions</strong></td>
<td>Parliament, Commission, Council, Parliamentary Committees, Directorates General, Committee of the Regions, etc.</td>
<td>Congress: The House and The Senate Executive, Congressional Committees and Subcommittees, Federal Agencies (FCC), State Governments</td>
</tr>
<tr>
<td><strong>Institutional theory</strong></td>
<td>Balance of Powers</td>
<td>Separation of powers</td>
</tr>
<tr>
<td><strong>Institutional Organization</strong></td>
<td>Supranational &amp; Intergovernmental</td>
<td>Federal</td>
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<tr>
<td><strong>Legislation</strong></td>
<td>Regulations, Directives, Decisions, Communications</td>
<td>Laws</td>
</tr>
</tbody>
</table>

The supranational institutions and intergovernmental institutions of the EU are natural phenomena of bringing together sovereign nations unwilling to give up full sovereignty to another power. These nations have their own cultures, national industries, and traditional governance structures to protect. The US developed a federal system with states represented at the national level in Congress by equal number and by population density.

The degree of regulatory force is also an interesting difference; in the US, laws are enacted, implemented and applied to all states in the same manner, with some exceptions. In the EU, decisions are only binding in outcome, so methods of implementation and periods of implementation may vary. Also, member states could choose not to implement an EU
legislation. While typically this is not an option for states, since government agencies are implementing the policies or there are methods of economic coercion that can be employed.16

While some national governments are able to employ EU Directives more efficiently and effectively through greater resources and experience some national lack the same access to resources and struggle to implement EU legislations especially in terms of telecommunications, health and financial reforms. In addition, some member states may choose not to implement an EU legislation because they do not believe it supports national interests. In the interest of harmonization, which behooves a functioning internal market and a competitive world economy, the use of administrative agencies with the power to create laws and implementation processes would help the EU achieve its goal of internal harmonization. The next chapter discusses the basic EU and US media policies and includes a discussion of the political entities’ legislative efforts surrounding digital television.

CHAPTER 5
EU AND US MEDIA POLICY

Introduction

As digital video technologies and the industries surrounding them develop, policy makers must decide what role they will play in the developing markets, how new firms will be regulated, and how standards will be set. What is interesting about the broadcast digital conversion is that, generally, free market economies depend on consumer adoption patterns or market determinants; however governments across the globe are requiring private companies to go digital (Klein, Karger, & Sinclair, 2004). While the previously mentioned advantages of digital television are notably attractive, broadcasters, operators and hardware manufacturers will not convert while there is insufficient consumer demand, and consumers will not convert if there is little content or perceived value. This deadlock was the primary legitimizing factor for government involvement in the DTV transition.

Policy concerns in both the EU and the US also give governments grounds for intervention. Over the air television broadcasts are considered a public good and a necessity for citizen participation as the primary source of information and entertainment. In the transition, some entity must assume the role of protecting the public and ensuring that large segments of the population are not cut off from television broadcasts due to economic circumstances or other unpredicted effects. The governments appear to be in the best position to encourage market growth while mitigating social effects.

EU: Audiovisual Media Services Directive

As technologies converge, the EU has taken the stance that, because the boundaries between technologies are converging, regulation ought to converge as well. This means that the same regulatory framework should apply to all electronic media including broadcast, cable,
satellite, mobile and Internet television. The primary legislation for media corporations is the Audiovisual Media Services Directive (AVMSD) of 2007, which operationalizes the EU stance that contemporary rules ought to be market-oriented, flexible, and neutral among delivery platforms to account for converging digital technologies, and to allow a standardized basis for competition with consistent and clear regulations (European Union Directive, 2007). As the primary legislation for media services, the AVMSD amends the previous media regulatory framework, the Television Without Frontiers Directive (TWF).

Arguably, the AVMSD maintained some form of layered regulations by imposing lighter regulations on on-demand services. Meanwhile, heavier regulations have still been imposed on other media industries, like telecom operators and broadcasters, while Internet services experience less regulatory interference. However, the AVMSD notes that industries will continue to converge. Therefore, member states should strive for technically neutral regulations and balance between competition provision and specific regulation (European Union Directive, 2007). ¹⁷

**EU: Spectrum Policy**

EU spectrum policy focuses on coordinating spectrum use, harmonizing regulations, and creating flexibility in spectrum regulations across member state borders. Spectrum coordination in European countries is more complex than in the US. Governments must ensure that there is no internal overlap of spectrum usage. In addition, European countries must also coordinate with the governments of bordering countries where frequencies may in some cases cross over national borders or, in other cases, eclipse the whole country. The US must also deal with international spectrum overlap at its borders with Canada and Mexico, but European countries more often deal

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¹⁷ See Michalis 1999 for a more in depth discussion on layered regulation versus converged regulation.
with high levels of internal spectrum overlap where three or more countries may need to negotiate rather than just two. For example, Germany must coordinate its spectrum use to avoid interference with eight other countries: the Netherlands, Denmark, Belgium, France, Switzerland, Austria, the Czech Republic, and Poland.

Allocation of radio spectrum is under the regulatory authority of member states, however EU law and international spectrum agreements limit their regulatory scope. National governments and their agencies determine partitioning and the length of licenses for spectrum blocks. Therefore, partitioning and technical specifications, such as which kinds of devices can operate in a particular spectrum block, may vary among member states. In order to allow services to cross member state borders, the Radio Spectrum Decision implemented in 2002, drives at the coordination, harmonization and liberalization of spectrum uses (European Union Decision, 2002). Coordination in this context means equivalent spectrum bands in different countries allow the same types of devices to operate, examples include: mobile devices, public safety, or television signals. Harmonization means that eliminating interference due to frequency allocation and use in other countries. Liberalization means removing restrictions for the types of services that can be used on a frequency (Niepold, 2005).

To support a fully functioning internal market, more than 27 national regulatory bodies must coordinate and collaborate with EU spectrum bodies, such as the Radio Spectrum Policy Group (RSPG), the European Conference of Postal and Telecommunications Administrations (CEPT), and the Radio Spectrum Committee (RSC), and global radio spectrum bodies, like the ITU. At one point, the EU attempted to singularly represent all of the member states at European and international spectrum group meeting, but member states were not ready to relinquish national authority over spectrum management to a supranational body.
The EU believes that flexible regulations across member state borders are important for allowing innovative information technologies to achieve their full potential in the EU marketplace. Flexible regulations will allow the information technology market to function efficiently across borders. According to the EU, current service use and usage conditions are narrowly defined and rigid, which does not allow license holders to introduce new technologies that were not available at the time of licensure (EC, 2007b; EC, 2007c).

For example:

- Existing and new operators wish to implement different technologies (UMTS, WiMAX etc.) via the 2.6 GHz band from 2008 for wireless access to the Internet.
- Existing second generation (2G) mobile operators want to enhance their current use of the 900 MHz GSM band to deploy new services using 3G mobile technologies.
- Existing and new operators want to use the 470-862 MHz band currently used for broadcasting, where the move from analog to digital broadcasting will provide a ‘digital dividend’, for new services such as mobile TV and extending wireless electronic communication services into rural areas (EC, 2007c).

The EU is working on a policy to solve these issues and decrease regulatory barriers to the quickly evolving communications technology sector. The policy under development is known as the Wireless Access Policy for Electronic Communications Services (WAPECS) and entails identifying specific spectrum bands where regulatory restrictions can be lifted to introduce competition, including competition between different radio infrastructures (EC, 2007c; Niepold, 2005).

**EU: Digital Television Policy**

Digital television policies are developed with the Lisbon Strategy in mind. The Lisbon Strategy expresses the European Union’s plan “to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion” (EU, 2002). The Strategy, originally developed in 2000,
is revisited every year to evaluate member states’ progress and to update the Lisbon Strategy based on the current economic conditions. The EU sees the implementation of digital television as being an integral part of a knowledge-based economy (EC, 2005b).

As a method for pursuing the Lisbon Strategy, the eEurope 2005 Action Plan’s primary function was to encourage private investment, enhance the job market, increase productivity and allow everyone the opportunity to participate in the global information society based on a broadband infrastructure (EC, 2002). The Lisbon Strategy was updated to focus specifically on growth and jobs within the information and communication technology sector. Hence, the eEurope 2005 was updated by the i2010 A European Information Society for Growth and Employment. This document furthers the previous plan’s objective by incorporating an integrated approach to information and communication technologies and audiovisual policies (EC, 2005a). European Union policies directed toward media development demonstrate that the EU views media, new technologies, and their applications as mechanisms for driving the economic and civilization progress of European Nations. As implied by the wealth of documentation and focus on a digital information strategy, the switch to digital television transmission via terrestrial networks is an integral part of the EU competitive strategy.

In 1995, the European Parliament and Council enacted Directive 95/47/EC on the use of standards for the transmission of television signals, which is the foundation for recent developments in the digital television transition. The Directive gave guidelines and standards requirements to be implemented across all platforms regardless of transmission. The Directive officially set in motion the move to digital television by requiring member states “to promote the accelerated development of advanced television services including wide-screen television

\[\text{18 The EU’s preference for converged legislation is visible as far back as 1995. After the failure of the HD-MAC standard on terrestrial platforms, the EC produced the 1995 Directive on Advanced Television Services.}\]
services, high definition television services, and television services using fully digital transmission systems” (European Union Directive, 1995).

The Directive also required the Commission to submit a report to the European Parliament every two years on the implementation of the Directive in member states and on the status of the market for digital television services. In 2003, the commission requested that member states submit their plans for the transition to digital television in the interest of transparency and coordination (EC, 2003).

The 2005 Communication from the Commission on accelerating the transition from analog to digital broadcasting, referred to as COM2005, reiterates the desire for a coordinated switch-off time-line. Commissioners determined, from the published timelines, that most members would be far along in the switchover process by 2010 and the whole of Europe would finalize the process by 2012 (EC, 2005c). COM2005 was updated by COM2007, which again published the progress and expected timelines for each member state. Due to the progress of member states, COM2007 recalled the deadline of 2012 and did not issue a new deadline. It appears, however, that most members will still be well along by 2010 and finished with switch-off by 2012, with a few states switching-off by 2015 (EC, 2007a).

COM2005 emphasizes the importance of technical neutrality maintained by the AVMSD, meaning, “regulation should neither impose nor discriminate in favor of the use of a particular type of technology.” However, differentiated treatment may be justified to the commission by member states, especially if a technology enables more efficient spectrum use. However, the Commission must review any advantages, which often manifest in subsidies. COM2005 also expresses that member state plans for the newly vacated frequencies resulting from the transition
should consider the possibility of future innovations in service, and allow for flexible use of allocated spectrum.

**US: Spectrum Policy**

To use a television channel, or mobile phone frequency, US operators must acquire a license. Until 1997, the FCC used comparative hearings to award licenses, but following congressional instruction, commercial television licenses have been awarded through auctions. Applicants apply for a channel and if there are no challengers, the license is awarded for free; however, if another applicant expresses interest in the channel, the license is auctioned. Applicants must meet some minimal eligibility requirements in terms of financial capability, adherence to transmission rules, and, in the case of broadcasters, not exceed media ownership rules (Levy, 2008; McMillan, 1994). The FCC awarded a digital TV (DTV) channel to each holder of an analog TV station license for simulcast purposes without an auction, to aid in the switch-off. The channel that is returned at the end of the transition was auctioned for mobile, wireless Internet, and public safety services.

Portions of spectrum are available exclusively for terrestrial television use and assigned a channel number, transmitter location, limits on transmitter height and geographical reach for each station signal. These specifications help limit interference by other channels that might otherwise transmit on the same or adjacent channels (Levy, 2008). As noted earlier, ownership regulations have been important for the FCC to achieve its policy goals. There are rules applying to local and national markets. The FCC limits the number of television or radio stations than one entity can own, and limits cross-ownership, or owning both television and radio stations, as well (FCC, 2008a; Levy, 2008).¹⁹

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¹⁹ For an in depth discussion of ownership limits and rules see the FCC’s Review of the Broadcast Ownership Rules, 2008 or Levy, 2008.
US: Digital Television Policy

The US first established a 2006 switch-off date for analog television signals in the Balanced Budget Act of 1997. This Act established that 85% of households must be able to receive digital television before the termination of analog signals. However, consumer awareness of the switch was very low and the industry lacked technical capabilities. Therefore, the Digital Television Transition and Public Safety Act was signed into law in 2006, and established a new transition deadline of February 17, 2009 for broadcasters to cease analog television transmissions and transition to digital technology. Congress gave the FCC authority to terminate analog licenses for full-power television stations and reclaim the spectrum for public safety and commercial wireless broadband services. The NTIA was given the responsibility of managing the converter box coupon subsidies for consumers. After analog switch-off, all digital television transmissions are required to be in the spectrum currently occupied by TV channels 2 through 51, while television channels 52 through 69 in the 700 MHz band of spectrum were opened for wireless communications (DTV Act, 2006).

The DTV Act (2006) established two specific statutory deadlines for the commercial auction of the recovered spectrum space: (1) the auction was to begin no later than Jan. 28, 2008, and (2) the auction proceeds were to be deposited in the Digital Television Transition and Public Safety Fund by June 30, 2008. The legislation appropriated more than $1 billion to assist public safety agencies to develop and deploy interoperable emergency communications systems, and up to $1.5 billion to help analog television owners purchase digital-to-analog converter boxes so they could continue to watch TV after the Feb. 17, 2009, deadline. However, the DTV transition date was delayed again from February 17, 2009 to June 12, 2009 in the Digital
Television Delay Act (2009) to account for consumers unable to receive converter box coupons in time for the February date.²⁰

Comparison of Regulatory Frameworks

As communications technologies like telephone, radio, television broadcasting, cable television, and Internet emerged, each was regulated individually. There were distinct barriers between the various business models associated with each platform; however, these barriers have increasingly fallen away as technologies and business models blended together. There has been some debate as to whether converged technologies require converged regulations, or if platform based regulatory layering will remain effective.

In terms of telecommunications policy regulations, the EU and the US take different approaches. The EU is moving toward converged regulation, or one regulatory framework for all telecommunications and media services, while the US continues to use layered regulations – different regulations for different services based on platform. The EU’s Framework Directive 2002/21 establishes a European market and competition regulation for telecommunications services (Articles 14-16). The EU took on the stance that because boundaries between telecommunication technologies are converging, regulation ought to converge as well (Picot & Wernick, 2007). Therefore, the underlying philosophy of telecom regulation is that no distinction should be made between differing technology platforms. This means that the same regulatory framework should apply to all electronic media including broadcast, cable, satellite, mobile and Internet television.

The 2007 Audiovisual Media Services Directive (AVMSD) operationalizes the EU stance that contemporary rules ought to be market-oriented, flexible, and neutral among delivery

²⁰ This change will be discussed in more detail in the US Case Study in the following chapter.
platforms to account for converging digital technologies, and to allow a standardized basis for
competition with consistent and clear regulations (European Union Directive, 2007). The
AVMSD will apply the same regulations to all audio-visual media service providers. Member
states have yet to fully implement the requirements of the AVMSD; they have until the end of
2009 to comply.

The US has made no move to change regulations already in place to account for changing
communications markets, and some scholars agree that technological convergence does not
necessitate regulatory convergence. Michalis (1999) argues that layered regulation, where each
industry is individually regulated, could be more effective because regulations at every level of
the media industry must function effectively for convergence to work. In the future, a
comparison of how these different approaches to media regulation will be interesting and provide
further guidance on the regulation and introduction of new information technologies.

From the discussion of converged regulation, spectrum policy and digital television policy,
it is clear that the EU takes a more proactive approach to regulation, while the US takes an active
approach. Rather than waiting to see how events will transpire, EU regulators become involved
early in the standardization and development process. However, it is understandable as the EU
has much more work to do to bring 27 countries under the same regulatory umbrella, than the
US, which already functions primarily under he same regulatory regime. In terms of spectrum
policy and new services, the EU has already taken steps to encourage wireless broadband, and
has supported DVB-H as the standard for mobile television in 2008 (Europa, 2007c; Reding,
2008). Meanwhile, the US has made no broad move in terms of wireless broadband and was still
experimenting with multiple standards for mobile television until the end of 2009.
As digital television policy in the EU was enacted as a Directive, member states handle implementation. Therefore, EU DTV policy provides general transition parameters and reasoning as to why all member states should implement DTV. EU policy also includes provisions for tracking member state progress and ensuring the implementation process is in line with all EU law. US policy provides specific guidelines and procedures, such as establishing a transition deadline, coordinating all spectrum assignments, and redistributing returned spectrum space to other interests. The US also has the capability to create and utilize specialized rule making administrations; therefore, policy delegated most administrative responsibilities to the FCC and the NTIA.

The EU and the US are both mandating the introduction of digital television, and they are taking similar yet divergent paths to reach the end goal of digital terrestrial television transmissions. The previous chapters provided the background for developing policies and how government and industry have advanced the transition. The following chapter gives details on the switchover process throughout the EU and the US. These details serve as a basis for comparing the two political entities, and answers the questions of how the digital transition progressed in the EU and US comparatively, and what policy lessons from the digital television transition can be applied to the introduction or expansion of new technologies.
To take the EU as a single unit and compare it to the US is difficult because of the different political structures. The EU is a mixture of supranational and intergovernmental institutions and member state governments where regulations and laws do not necessarily move from EU institutions down to member states. Member states often have a strong influence on policy development and implementation. In the US, federal laws and their implementation originate from a centralized power.

As a result of these different political structures, the EU provides the parameters for switchover, and each member state works out the details. On the other hand, the US took a nationwide approach to the switchover, and the federal government managed all aspects of the digital television transition through the FCC. To compare the EU’s process of transitioning to the US transition process, it is practical to compare the US process with that of individual member states, as their governments are in charge of the implementation process.

This chapter first describes selected EU member state and US reasons for participating in the digital switchover. Then selected EU member states and the US are analyzed across four different categories: (1) transition periods, (2) subsidies, (3) consumer education, and (4) new services. Not every EU member state is included for analysis in these categories, but evidence from exemplary nations is used to describe the process. This analysis will compare how the respective policies approached the digital terrestrial television transition, and how these policies may be applied to mobile television.

**Reasons for Transition**

Outside of increased quality and choice, the primary reason for the digital transition in the United States is to reclaim spectrum and auction the newly available space to other industry
participants. Forcing consumers to choose between a pay platform and no TV at all was not an option in the US. Even though the majority of the US population uses subscription-based TV, 19% of the population, about 58 million people, still rely on terrestrial transmission only (GAO, 2006). Therefore, due to the large number of analog terrestrial transmission reliant consumers in the US, and the fact that there are no other free methods for receiving television, such as the satellite platforms offered in many EU member states, the US decided to not discontinue over-the-air transmissions. In addition, the broadcast media goals of diversity, localism, and competition provide the basis for the importance of broadcast television, which cannot necessarily be replaced by cable or satellite television. The transition to digital terrestrial television is not cost-prohibitive to many television consumers. A basic cable subscription averages about $30/month, with a start-up fee of about $40-50; satellite averages about $30-40/month with an initial fee of about $100, and a digital terrestrial set-top box costs about $60, with a monthly fee of $0.

In the EU, the overriding goal is to become the most competitive knowledge-based economy (EU, 2002). Even though member states are required to switch to digital terrestrial, according to Directive 95/47/EC, they have their own reasons as well. Countries like the UK, France, Finland, Italy, Hungary, and Poland, cite increased picture and sound quality for consumers, economic benefits for government and business, and increased frequency space for new technologies (AGCOM, 2004; Ofcom, 2004; Official Journal of Hungary, 2007; Regeringskansliet, 2005).

In the UK, regulators believe that consumers will greatly benefit from the switch to digital television. Consumers will find higher quality television services, choices and opportunities once the transition is completed, and broadcasters will see a decrease in costs. Thereby, the UK’s
government is committed to providing affordable, universal access to free digital public service broadcasting. By turning off the analog signal, the UK government anticipates the economy will benefit by £1.1 to £2.2 billion in net present value terms, nearly one third of the spectrum will become available for new services and DTT signal coverage will extend to the 25% of households unable to receive DTT due to spectrum limitations (Digital UK, 2005).

Some countries have additional reasons for complying with the digital terrestrial transition. Austrian plans for switchover centered on the fact that as a small country it is dependent on and affected by larger neighboring countries, Germany in particular. Therefore, it is important for it to participate in the EU economy and monitor what other EU member states are doing in the DTT switch process. DTT allows Austria to provide more media variety, and preserve its regional, cultural, and economic identity (KommAustria, 2003). Hungary and Finland also felt that the ability to add additional channels through digitalization would help preserve their cultural identity and language (Niemela et al, 2003; Official Journal of Hungary, 2007)

Many countries focused on the ability to introduce new technologies and services, like mobile television, through the digital dividend. However, Germany’s intention to transmit digital terrestrial television was not to create a digital dividend, but to make the terrestrial platform more competitive with cable and satellite. There was no expectation of a digital dividend because Germany originally allotted a very small amount of space for broadcast transmissions, and broadcasters were expected to still use all of the allotted space for multiplexing, or the ability to provide additional channels (Mabb, 2008). If broadcasters did not use multiplexing, then the frequency space would be returned. In some cases, such as Berlin, a digital dividend resulted, and these frequencies were allocated for mobile broadcasting via the
DVB-H standard. In other cases, such as Brandenburg, broadcast frequencies were deployed for broadband use (Mabb, 2008).

Table 6-1. Reasons for participating in the digital television transition

<table>
<thead>
<tr>
<th></th>
<th>Economic Advantages</th>
<th>New Communications technology prospects</th>
<th>Consumer Quality</th>
<th>Preserve national culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>XX*</td>
<td>X</td>
<td>X</td>
<td>-</td>
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<tr>
<td>Germany</td>
<td>-</td>
<td>X</td>
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</tbody>
</table>

*XX-most important factor, X- contributing factor,

**EU and US Transition Periods**

The EU as a whole takes a regional or state-by-state approach to the switch-off, where each country, or region, switches over on different timelines appropriate for that particular region’s characteristics. Within each member state, a different method and timeline for transition is taking place. The most popular method is the regional approach; followed by the island approach, then the snap or big-bang switchover, and some member states are creating their own methods. Most member states require a certain level of digital coverage and penetration before analog transmissions can be terminated. For example, Poland requires 95% national coverage and 90% penetration, while France requires 85% coverage before switch-off can begin.

**Regional Approach**

In the regional approach, member states shut down analog service in one area of the country to focus all resources in that area, problem shoot and then continue the process in another region. Analog transmissions are switched off region by region until the entire country
moves over to digital. This method had been popular with larger countries that have a high percentage of terrestrial-reliant viewers like the UK, Italy and France.

Italy has had significant difficulty in developing an effective switchover strategy and meeting its analog switch-off deadlines. It is the most terrestrial country in the EU, with 84.2% analog terrestrial users at the end of 2003 (EC, 2003). DTT launched in Italy in 2003, and the original switch-off date was 2006. However, at the end of 2005 the plan was deferred to 2008 due to subsidy failure and lack of programming, coverage and consumer take up. The switch-off date was changed again to 2012 in 2006 and a regional approach was introduced. The first region slated for switch-off was the island of Sardinia, scheduled for March 2008; however, this deadline was also postponed in the face of broadcaster conflicts and spectrum allocation difficulties (Matteucci, 2009).

France also follows a regional approach. However, due to spectrum overlap issues near its northern and eastern borders, a significant number of people would not be able to receive digital free-to-air TV during the simulcast period. To solve this issue, France incorporated satellite transmissions. In border areas where it was not possible to have a terrestrial simulcast period, satellite systems simulcast the free to air DTT programs in order to cover 100% of the population. Without satellite help, only 80-85% of the population would be able to receive digital terrestrial programming options during the simulcast period (Besson, 2008; Matteucci, 2009)

**Island Approach**

The island approach is similar to the regional approach; however, efforts focus on the most populous cities first. These populous areas switch-off first under the reasoning that digital coverage and switch-off will absorb the more rural areas by the end of the transition. Any remaining areas not covered after the major cities switchover will be taken care of then. This
approach developed under the reasoning that rural regions are less wealthy and they are more likely to experience the digital cliff. 21 Therefore, individuals need more time to prepare to buy converter boxes, and industry needs time to figure out whether these areas will need additional transmission or transponder sites. This approach was initiated by Germany and has been most popular with smaller or moderately sized countries, like Austria and Poland, experiencing spectrum overlap from other countries.

The German digital television initiative set 2010 as the goal for switch-off; however, German state communication authorities, or Landers, were able to complete the digital terrestrial transition in 2008. By the end of 2008, more than 90% of the country (74 million people) was able to receive digital television (Briel, 2008b). With 16 million DVB-T converter boxes sold nationwide, about 11% (4.1 million households) use the digital terrestrial service. There are some analog transmissions still being used to fill in gaps in rural areas, but these will shut off in 2009 (Mann-Raudies & Painter, 2008).

The Snap or Big Bang Approach

The Snap or Big-Bang approach is when the entire country switches over at once. Finland and the Netherlands used this approach. Finland and the Netherlands were able to take this approach because the countries are relatively small and most of the residents subscribe to pay TV services, particularly cable, on their primary television set. This meant there were fewer people to move to the digital terrestrial platform (EC, 2007a).

The U.S. also used the snap approach. The first proposed date for the shut-off of analog signals was 2006, and broadcasters were supposed to start simulcasting programs in digital and

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21 Analog signals fade out slowly, so even if viewers are not in the prime viewing area of a signal they can still pick up a fuzzy picture. When digital signals begin to travel out of range, instead of going fuzzy, the signal goes black. Therefore, viewers may not receive some channels that were previously available to them. This drop off is known as the digital cliff.
analog by May 2002 for commercial broadcasters and May 2003 for public broadcasters (Balanced Budget Act, 1997). However, consumers were unaware of and technically unprepared for the process, and industry did not have all the necessary equipment to broadcast digital signals. In 2002, the GAO conducted a survey on consumer awareness of the digital television transition and found that 83% of respondents had never heard of the transition or were only somewhat aware (GAO, 2002). As a result, the switch-off date changed to February 17, 2009 (Deficit Reduction Act, 2005).

By February 2009, all major broadcast stations in the US were ready for the transition and accommodations had been made for low power local stations (GAO, 2008). In addition, most consumers were aware that the transition was taking place and many had purchased digital capable televisions. Nielsen reported on February 5th, that only 5.1% of households, or 5.8 million households were unready for the transition, and a February 18th report said that the number decreased to 4.4% or 5 million households (Nielsen, 2009a; Nielsen 2009b). However, the converter-box coupon program ran out of money, and many people requiring a converter box in order to receive digital signals on their old television sets were still on a waiting list. As a result, Congress delayed the switch-off to June 12, 2009 (DTV Delay Act, 2009). Even though the switch was delayed, some stations still were allowed to turn off their analog signals. The FCC announced that, of the nation's 1,726 full-power television stations, 641 stations (36%) terminated their analog signals on February 17, 2009 (FCC, 2009d). As a result, 158 stations around the US terminated analog broadcasts on varying dates, while the remaining 927 stations continued analog broadcasts until June 12 (FCC, 2009c).\(^{22}\)

\(^{22}\) The FCC also made provisions for stations to terminate analog signals between April 16th and June 12. All stations had to submit a binding date for switch-off on March 17th, and must air viewer notifications for at least 30 days before terminating analog broadcasts on their chosen date. In addition, affiliates of the major networks, ABC, CBS, Fox and NBC, wanting to terminate analog service before June 12 needed to ensure that 90% of their analog...
This put the US in an unintended three-phase transmission, which is confusing for consumers because they might have been split between analog and digital channels for a few months. However, the phasing allowed consumers more time to purchase the necessary equipment. In addition, if consumers were in an area where a station switched off earlier, they could test their equipment and learn how to use it, before the rest of the stations switched off. However, after all of the delays and switchover confusion, some people may have expected the government to push the deadline back again. Regardless of how many times the date might have been delayed, there will always be people who wait until the last possible minute to adapt. With each extension, broadcasters needed to expend more money to continue simulcasting and corporations who bought new frequencies had to wait longer to launch or test new services.

**Other Approaches**

Some countries, such as Spain, the Czech Republic and Hungary, set up different methods for switching over. DTT in Spain had some initial troubles, but is now moving along with the rest of the EU and aims for a switch-off date of 2010. DTT first launched in Spain through a pay platform call Quiero; however, the pay terrestrial platform failed due to lack of customers. In 2005, the government re-allocated the spectrum previously licensed to Quiero in order to re-launch DTT on a free-to-air platform and gave other companies the opportunity to add pay terrestrial platforms (Roel, 2008).

Spain will switchover in three phases, following the initial tests in 2008, and will finalize the process in April 2010. The switch-off plan divides Spain into three groups based on population. The first group will be areas with less than 500,000 inhabitants; the second group

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viewers would continue to receive analog service, simulcast services, or “nightlight” service from at least one major network affiliate until June 12. However, if more than 10% will lose analog services completely, affiliates must provide consumers with walk-in help centers, referral telephone numbers and DTV education and outreach (FCC, 2009g).
will be areas having between 500,000 and 700,000 inhabitants; and the last group contains areas with over 700,000 inhabitants. This approach is opposite of the island approach, which takes on more populated areas first. Twice broadcasters requested that the government postpone the switch-off date; however, both times the government reaffirmed the 2010 date. The first group transitioned on June 30, 2009. This group includes 5 million people across 1,286 towns (Del Valle, 2007).

Some countries have found it best to switchover certain channels in order to increase digital coverage throughout the country and encourage consumers to purchase converter boxes. For example, through its regional approach the Czech Republic terminated analog broadcasting of the public broadcaster ČT2 in some regions. The switch-off date was originally set for 2010. However, the transmission company Radiokomunikacie indicated that a later switch-off date of 2014 may be more plausible, and the Czech Telecom Office (CTU) compromised with a date of 2012, as originally requested by the EU (Dziadul, 2007a; Dziadul, 2007b).

Hungary also decided it may be best to switch-off some channels nationwide before others are switched to increase coverage. The country expects to switchover in 2011, granted that necessary equipment and all public channels are available to 94% of households. Digital terrestrial coverage is a major concern for Hungary because it is a small country and has considerable spectrum overlap with other countries, a number of which are not members of the EU. Hungary’s ability to terminate analog transmissions depends a great deal on these other countries, which is why they are combining the regional approach with a channel approach. Currently, digital television is only available to 56% of the country; however, in those areas there are three free-to-air HD channels and 15% of the population has access to two mobile television networks (Fenech, 2009; Miniszterelnoki Hivatal, 2007)
Table 6-2 shows the switch-off date and the method used by countries that have already completed the switchover. High levels of cable penetration, nearing 40%, and low levels of dependency on aerial-based TV reception characterize early switchover nations. As with the use of analog television, the rate of consumer use of DTT in these countries, with the exception of Finland, remains fairly low. Additionally, due to the low number of users, the requirement for frequency planning was not as intensive internally nor was there the same level of need for transmitter build out as in more terrestrially based countries (Digital UK & Ofcom, 2008; EPRA, 2008).

Table 6-3 shows the anticipated switchover date for nations, which have not yet completed the process. Many of these are larger countries with populations reliant on terrestrial transmission, like the UK, France, Spain and Italy, or more recent additions to the EU such as Hungary, Poland, Czech Republic or Bulgaria.

**European Union Digital Television Subsidies**

The EU exercises its authority over member states by putting certain requirements on government aid in Article 87(1) of the EC Treaty, which is in place to encourage competition. This section of the EC Treaty, referred to as The State Aid Action Plan, sets certain guidelines for member state aid that applies to digital television subsidies. State aid, as such, should be used to overcome market failures and/or ensure social cohesion. A situation that includes broadcasters not wanting to simulcast in digital because it is expensive and consumers not wanting to convert because there is little content could be considered a market failure. The need for universal television coverage and access to national television programming would be considered matters of social cohesion. However, once something is considered a market failure or a matter of social cohesion, member states still need to demonstrate that the proposed state aid
is the appropriate method for addressing the issue, is the minimum necessary, and will not
unduly distort competition

<table>
<thead>
<tr>
<th>Completed</th>
<th>Regulatory agency</th>
<th>Launch Date</th>
<th>Switch-off Date</th>
<th>How</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td></td>
<td>April 2006</td>
<td>Nov. 2, 2009</td>
<td>Snap</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>Luxembourg Telecommunications Institute (ILR)</td>
<td>Sept. 1, 2006</td>
<td></td>
<td>First country to complete the move to digital broadcasting, with consumers able to access 6 free-to-air television program services (DVB) [EC, Communications Committee COCOM07 (2007).]</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Netherlands Posts and Telecommunications Authority (OPTA)</td>
<td>Dec. 11, 2006</td>
<td></td>
<td>'Big bang' switchover from analog to digital terrestrial television in one night. Only PSBs concerned, no commercial broadcasters were operational in analog terrestrial TV.</td>
</tr>
<tr>
<td>Finland</td>
<td>FICORA</td>
<td>2001</td>
<td>Sept. 1, 2007</td>
<td>Analog terrestrial transmissions stopped nationwide at 4am, September 1, 2007. Five analog networks were switched off and replaces with seven new programming services. (DVB) [EC, Communications Committee COCOM07 (2007).]</td>
</tr>
<tr>
<td>Sweden</td>
<td>Riksdag (Swedish parliament) government appointed Digital TV Commission in charge of planning, technical development, and public information</td>
<td>1999</td>
<td>Oct. 15, 2007</td>
<td>Switch-off of the analog terrestrial network progressed region–by–region. It began in Gotland on September 15, 2005, and was and was too be completed in February 2008. However, Sweden was able to switch-off analog transmission ahead of schedule on October 15, 2007. The last analog transmitters in Scania and Blekinge were shut down. (DVB) [EC, Communications Committee COCOM07 (2007).]</td>
</tr>
</tbody>
</table>
Table 6-2. Continued

<table>
<thead>
<tr>
<th>Completed</th>
<th>Regulatory agency</th>
<th>Launch Date</th>
<th>Switch-off Date</th>
<th>How</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>Regulatory Authority for Telecommunications and Posts (RegTP) 15 different local regulatory authorities known as Landers.</td>
<td>Nov. 25, 2008</td>
<td>Began the transition on November 1, 2002 in Berlin and completed Berlin’s transition on August 4, 2003. Germany then used an island approach, focusing on major cities first, and used simulcasting of analog and digital programming. Switchover was completed on November 25, 2008.</td>
<td></td>
</tr>
<tr>
<td>US</td>
<td>Federal Communications Commission (FCC)</td>
<td>2006 Feb. 17, 2009 &amp; June 12, 2009</td>
<td>The switch-off date set for February 17, 2009, was pushed back to June 12, 2009 due to consumer unreadiness. 641 stations switched anyway on February 17, while the remainder terminated analog broadcasting on June 12, 2009. At noon September 8, 2008, major television stations in the Wilmington, North Carolina turned off analog; Hawaii followed on January 15, 2009. Final LPTV switchover dates have not yet been determined.</td>
<td></td>
</tr>
</tbody>
</table>

Sources: DVB 2009, OECD 2009
<table>
<thead>
<tr>
<th>In Process</th>
<th>Regulatory Authority</th>
<th>Launch Date</th>
<th>Anticipated Switch-off Date</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>Kommunikation-behorde Austria (KommAustria)</td>
<td>October 2006</td>
<td>End of 2010</td>
<td>Island switch-off in regional capitols progressing from west to east. Began analog switch-off on March 5, 2007 in Bregenz. Snap</td>
</tr>
<tr>
<td>Belgium</td>
<td>Flemmish Community: Vlaamse Regulator voor de Media</td>
<td>Completed Nov. 3, 2008</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Council for Electronic Media (CEM)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyprus</td>
<td>Cyprus Radio Television Authority (CRTA)</td>
<td>Not launched</td>
<td>2011</td>
<td>Simulcast period before full snap switchover</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>Czech Telecommunications Office (CTO)</td>
<td>2007</td>
<td>Nov. 11, 2011 and June 30, 2012</td>
<td>Started the switch-off in September 2007 and the majority should finish by November 2011; however, some regions will switch in June 2012. Analog broadcasting of channel ČT2 has been terminated in most areas. A switchover pilot took place on the island of Ruhnu on March 31, 2008. The rest of the Country will have a simulcast period followed by a snap switchover.</td>
</tr>
<tr>
<td>Estonia</td>
<td>Majandus- ja Kommunikatsioon nimisteeeriumi (MKM) (Ministry of economic affairs and communications)</td>
<td>2006</td>
<td>July 1, 2010</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>In Process</th>
<th>Regulatory Authority</th>
<th>Launch Date</th>
<th>Anticipated Switch-off Date</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greece</td>
<td>National Telecommunications Commission (EET)</td>
<td>Trials 2006 Full launch 2008</td>
<td>2015</td>
<td>DTT initially available to 50% of the population around Athens, 60-65% of the population should be covered by 2010. Gradual switch-off of the analog transmitters covering the whole country. Some channels will switch before others. At least 94% of the population must be reached by free-to-air public service programs before switch-off.</td>
</tr>
<tr>
<td>Hungary</td>
<td>National Communications Authority (NHH)</td>
<td>2008 Dec. 31, 2011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td>Commission for Communications Regulation (ComReg)</td>
<td>2010</td>
<td>2012</td>
<td>Public service broadcaster, RTÉ, plans to make digital television available to most of the population by 2010, and the switch-off is planned to be complete by 2012.</td>
</tr>
<tr>
<td>Italy</td>
<td>AGCOM; Italia Digitale</td>
<td>2003</td>
<td>2012</td>
<td>First regions Sardegna and Valle D'Aosta were switched off respectively in March 2008 and in October 2008.</td>
</tr>
<tr>
<td>Norway</td>
<td>Medietilsynet</td>
<td>2005</td>
<td>Nov. 2009</td>
<td>The switch-off of the analog transmissions started in the Rogaland region in March 2008 and will the progress region-by-region until the last region, Finnmark, terminates analog broadcasts in December 2009.</td>
</tr>
<tr>
<td>In Process</td>
<td>Regulatory Authority</td>
<td>Launch Date</td>
<td>Anticipated Switch-off Date</td>
<td>Method</td>
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<tr>
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<td>--------</td>
</tr>
<tr>
<td>Poland</td>
<td>President of the Office of Electronic Communications; National Broadcasting Council</td>
<td>2009</td>
<td>Dec. 2012 or 2014</td>
<td>Moving region by region. Switch-off may be later than planned.</td>
</tr>
<tr>
<td>Portugal</td>
<td>ICP-ANACOM; ERC</td>
<td>2008</td>
<td>No set date</td>
<td>Began process in April 2008</td>
</tr>
<tr>
<td>Romania</td>
<td>Ministry of Communications</td>
<td>Trials since 2005 Full launch expected 2010</td>
<td>2012</td>
<td>60% of the population covered by 2010 and 90% covered by 2011</td>
</tr>
<tr>
<td>Spain</td>
<td>Spain Telecommunicati-on Market Commission (CMT)</td>
<td>2000 Initial launch Re-launch 2005</td>
<td>April 3, 2010</td>
<td>An Initial test phase in 2008. Then following a three phase regional switch-off. Switch-off regions were determined based on population, with less populace areas switching off first.</td>
</tr>
<tr>
<td>UK</td>
<td>Ofcom Digital UK</td>
<td>October 2007</td>
<td>2012</td>
<td>The UK carried out a trial in Wales in March 2005 and began the actual switchover process in Whitehaven and Cumbria in October 2007. From there the UK is switching off region by region and should finish in 2012. <a href="http://www.digitaluk.co.uk/when_do_i_switch">http://www.digitaluk.co.uk/when_do_i_switch</a></td>
</tr>
</tbody>
</table>

Sources: DVB 2009, OECD 2009

(Article 87(1); EC, 2005d; EC, 2005e; Schoser & Santamato, 2006). In the EU’s first major decision on state aid, regarding Berlin, it clarified some of the instances when state aid is or is not appropriate for the transition to digital television.
Germany

The case of Berlin is a good example of how the EU exercises its power over member states in the transition. The communication regulatory agency, Mabb, of Berlin-Brandenburg planned a subsidy worth about €4 million disbursed over a five year period to commercial broadcasters to aid in the transition (Mabb, 2008). In exchange for the support, broadcasters were required to broadcast digitally for a five-year period. The subsidy encouraged broadcasters to participate, and was intended to financially protect the broadcast industry and consumer investments for at least five years in case digital terrestrial was not viable (Mabb, 2008).

The Commission determined in 2005, that these subsidies violated EC Treaty state aid rules (Article 87(1)) (Europa, 2005). In 2007, the European Commission denied a similar plan set out by Germany’s North Rhine-Westphalia region, which planned a €6.8 million subsidy over a five year period (Europa, 2007a). Both subsidies were in violation because they were not based on any specific costs, were decided after switchover had been agreed, various amounts of funding were given without justification, and the subsidies disregarded technological neutrality by favoring digital terrestrial television over other platforms, like cable and satellite. Broadcasters were required to repay any aid already received (Europa, 2005; Europa, 2007a). While North Rhine-Westphalia had not paid out any subsidies before the ruling, Berlin had, and reclaimed about €2.2 million.

Mabb (2008) claims that its approach was appropriate at the time, especially because there was no prior experience to follow. In addition, switchover would have been impossible without the five-year contract because one broadcaster tried to defect after two months. However, in its decision based on the Berlin case, the EC gave specific indications of acceptable subsidies for the digital transition, which included (Europa, 2005):
- Funding for the roll-out of a transmission network in areas where otherwise there would be insufficient TV coverage

- Financial compensation to public service broadcasters for the cost of broadcasting via all transmission platforms in order to reach the entire population, provided this forms part of the public service mandate.

- Subsidies to individuals for the purchase of set-top boxes for any platform to prevent the exclusion of low-income households from access to TV reception

- Grants to companies to develop innovative digital services

- Subsidies to broadcasters to compensate for additional transmission costs when broadcasting analog and digital TV in parallel (simulcasting)

Thereafter, subsidies to broadcasters were non-existent or extremely limited in Germany. For example, Bavaria gave broadcasters aid amounts below €200,000, which are not considered state aid by the Commission (Europa, 2005).

The Berlin Lander also provided subsidies for consumers. These subsidies for converter boxes were allotted only for low-income households relying on terrestrial television. These households could apply through the Social Welfare Office. Qualifying homes received their set top boxes free of charge either through participating retailers or by mail. At the time of the transition in Berlin, set top boxes cost 129 euro ($158.70). The Social Welfare office provided 25% of funding for this program, while Mabb supplied 75%. About 6,000 households required support, totaling €732,000 (Mabb, 2008). However, as the transition continued, the price for set-top boxes decreased and other regional authorities did not provide subsidies for consumer set-top boxes. The European Commission did not challenge these subsidies. While, Germany stated that the subsidies used were necessary to initiate the transition, since there was no prior experience to draw upon, after the EU’s intrusion Germany dramatically reduced the amounts of its subsidies. As consumer digital equipment decline in price German regions chose not to use subsidies.
Italy

The Italian government put forth two state aid programs, which provided subsidies to consumers for the purchase of a digital terrestrial converter box. All Italian consumers were eligible for the initial subsidy program, which was available from February through October 2004 and from December 2004 through November 2005. In 2004 and 2005, Italy provided grants to consumers totaling over €200 million for the purchase or rental of interactive digital decoders for receiving digital terrestrial signals over the air or retransmitted through cable networks. These subsidies provided about €150, or half the cost of a decoder box, which at the time were priced around €350. These subsidies were for boxes able to convert and receive terrestrial and cable signals, and were required to meet technical guidelines for interactivity and interoperability, or the EU supported MHP standard (Roel, 2008).

The Italian government also supplied decoder subsidies to the early switch-off regions of Sardinia and Aosta Valley in 2006. Italian subsidies for digital decoders granted in 2006 were approved by the European Commission because the subsidies are available for all decoders regardless of transmission platform, terrestrial, cable and satellite, and are “therefore technology-neutral and proportionate to the objectives of promoting the transition to digital TV and interoperability” (Europa, 2007b). However, the subsidies granted by the Italian government in 2004 and 2005 were determined to be non-technology neutral and to cause competition distortion by excluding satellite technology. The Commission decided that these subsidies provided incumbent terrestrial and cable operators an unfair advantage by allowing them to develop their Pay TV services. In addition, the EC decided that broadcasters who benefited from the subsidies the most should repay the aid provided (Europa, 2007b).

The primary problem with Italian switchover was providing subsides too soon before the transition. Costs were still high and people who would have bought digital equipment without
help used government support. The first subsidies were for €150 and converter equipment was still very expensive at €350. The EU’s subsequent rejection of the subsidies caused further problems for Italian regulators. These early miscalculations in the transition planning have significantly contributed to Italian delays and difficulties in progressing with the transition.

**England**

In England, analog broadcasters, Channel 3, Channel 4, Channel 5 and Public Teletext paid for Digital Replacement Licenses (DRLs) issued by the UK communications regulator, Ofcom in 2004. Ofcom priced the licenses significantly lower, by about €34 million, because once digital terrestrial television is introduced, spectrum space will increase, and more businesses will be able to purchase licenses. Therefore, under the principal of supply and demand, license value will decrease because license availability will increase and spectrum scarcity will decrease. Due to these market considerations, the Commission did not see England’s plan as distorting competition, but as accurately reflecting the market. In addition, the licenses require these broadcasters to terminate analog transmissions by 2012, and adapt all of England’s 1154 transmission sites to support digital broadcasting technologies. Broadcasters are expected to spend about 500 million pounds out-of-pocket to update these sites (Ofcom, 2004).

Another British subsidy program, the Digital Help Scheme, provides assistance with obtaining, installing and using digital TV equipment that meets the Core Receiver Requirements for people over 75, disabled people and the blind. Free assistance for the least expensive conversion option is available to eligible persons requiring income support. However, a person can choose a more expensive option and pay the difference. Eligible people not meeting the income requirements for free assistance can still request assistance for a reduced fee of 40
pounds. The Digital Help Scheme has been allotted 603 million pounds to be disbursed from 2007 through 2013 (DCMS, 2008).

**France**

Initially, France set aside a budget of €30 million to help the transition in the border regions where analog television would end without a simulcast phase and only digital terrestrial television would be available. Subsidies were available for households not already subscribing to a digital platform for the reception technology of their choice, be it a terrestrial converter box or decoders for satellite or cable television in addition to subsidies for services like antennas, installation or subscription fees. The Commission found this aid compatible with all Article 87 requirements because it positively impacts users and the transition to digital terrestrial television, and it has limited effects on competition and trade, and because it is technically neutral (European Commission, 2006a).

Later the French government increased its support for digital television technologies and set aside €140 million to be spent through 2011 for low-income households. The program assigned a personalized subsidy, proportional to the household’s income and based on the region’s cheapest platform available (EC, 2006b; Matteucci, 2008). France is able to track which consumers have only terrestrial television and their associated income through the national television license fee program. The television licensure makes it easy for France, and other

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23 Tracker surveys from the UK’s first test regions in Whitehaven and the Border regions found that people living alone who felt they would need outside help to switch their equipment to digital was an additional group that would require government assistance. According to the survey, this group composes 5% of the UK’s population, are more likely to be female (77%), older (47% are 75+), disabled (47%) and on lower incomes (28%). TV is very important for this audience, with 1 in 3 (30%) heavy viewers, which is almost double the UK average (Digital UK & Ofcom, 2008). In light of these findings, an additional, 2.9 million pounds was set aside for the Digital Outreach plan to assist older people who are under 75, those with sensory, mobility or dexterity impairments, people with learning difficulties and those who are socially isolated (Tryhorn, 2008).
European nations using the same system, to put reception and income requirements on consumer subsidies.

England and France both chose to put age and income requirements on their transition subsidies for consumers. While the UK and French switchover plans are markedly similar, the UK’s transition has been much more successful thus far than the progress in France. French difficulties could be related to the region requiring satellite support until switchover and spectrum negotiations are completed, or be related to the economic slump of 2009.

**Hungary**

Hungary expects HUF 3.1 Billion ($151 million) will be needed from the government per year in order for the transition to move smoothly and finish by the 2012 deadline. Money is allotted to help public service broadcaster transition, development of innovative digital applications, provide consumer information, subsidies for set top boxes, coordination and monitoring of the switchover. The largest amount of funding is dedicated to facilitating the digital switchover for public service broadcasters by subsidies for consumer set top boxes. An additional 800 million HUF from the Broadcasting Fund is available for platform neutral network development subsidies (Miniszterelnoki Hivatal, 2007). Hungary’s progress is in line with EU guidelines thus far, but its plan for subsidies is not entirely clear and it may be over spending on consumer subsidies.

**United States Digital Television Subsidies**

The digital television and Public Safety Act of 2005, did not create any subsidies for full-power broadcast stations, but created two programs, the Conversion Program and the Upgrade Program, to help low-power, class A, and translator television stations (hereafter referred to as low power stations) through the transition. The Conversion Program provided grants to low-power stations for purchasing digital-to-analog converter devices to down-convert incoming
digital signals from their corresponding full-power television stations and continue to send analog broadcasts (Federal Register, 2007). The Upgrade Program reimburses low-power stations for equipment allowing stations to broadcast in digital (Federal Register, 2008).

A major portion of government funding was subsidizing consumer purchases of digital converter boxes. Digital converter boxes allow those who do not own digital ready televisions and depend on terrestrial signals to still receive television broadcasts. The NTIA was delegated to disburse $40 coupons for the purchase of digital converter boxes to people requesting them. Up to two coupons were available per household (Deficit Reduction Act, 2005). Congress originally allotted $990 million for this program.

As of November 2008, the NTIA reported that 62% of over-the-air households requested DTV-analog converter-box subsidy coupons, with 35 million coupons distributed to 19 million households and 14.5 million coupons redeemed (NTIA, 2008). However, in January of 2009, funding for those requesting coupons ran out and there were 4.2 million requests from 2.3 million households on the waiting list (NTIA, 2009). Due to consumer need, Congress passed the DTV Delay Act, which not only postponed the transition to June 14, 2009, but also added an additional $660 million in funding to the converter-box program (DTV Delay Act, 2009).

The NTIA decided not to make the converter box program based on income or other factors because it was a one-time program and it would not be effective to implement eligibility requirements and verification systems, like the ones used with other federal assistance programs.

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24 Eligible stations include those broadcasting exclusively in analog and retransmitting a corresponding digital signal, but have not already purchased a digital-analog conversion device (DACD). The average cost of a DACD is $1,000 (Federal Register, 2007). Since there are about 8,000 stations in this category, $8 million was originally available; however, the NTIA determined only $3.5 million would be necessary for supporting eligible stations (Federal Register, 2008).

25 Eligible stations are those not retransmitting the digital signal of a corresponding full power station, or stations receiving signals via satellite or from another analog transmitter. Sixty-five million dollars were reserved for this program (Federal Register, 2008).
such as Food Stamps. The NTIA also said it was unable to limit coupon requests to just those relying on analog transmissions, because it had no real way of verifying that information. However, consumers visiting DTT transition websites are directed to an information section, which explains who will and who will not need coupons (NTIA, 2006).

The US program is unique because it did not make subsidies based on income and subsidies were only available for terrestrial equipment. While the subsidy program did need additional funding and subsequently caused a delay in analog signal termination, it appears to have been a reasonable expenditure. In addition, the program was initiated at the proper time – close to the switchover deadline and when converter box prices had dropped significantly.

European Union Consumer Education Plans

As digital switchover approached, it became apparent that many consumers were unaware of the change, or of what they would need to do to accommodate it. Therefore, EU countries and the US engaged in various public education programs. As websites were the most popular method for informing consumers about the digital television transition, next to broadcast commercials, Appendix A contains screenshots of the websites used by the US, the UK and France.

UK

The UK has done extensive research on consumer awareness and the effectiveness of the switch-offs that have already happened in Whitehaven and Cumbria. Ofcom has been publishing Digital Television Updates since 2003 and consumer UK Switchover Tracker Surveys since 2006 (Digital UK & Ofcom, 2006; Ofcom, 2003). The most recent Tracker Survey, published in 2008, found that 90% awareness in the general population of the switchover, 70% understood what they needed to do for the switchover, and 86% of households had a DTV capable TV set. The general education plan is allotted 200 million pounds to fund informational efforts, including
a direct mail leaflet sent out between 18 months and a year prior to the switchover in each region, and TV and radio advertising. Another important aspect of the UK’s information plan is the digital tick logo, which is placed on products and services that will continue to work after the switchover. Retailers and manufacturers must apply for a license to use the logo and to receive informational material to distribute in individual retail locations. The website Digital UK provides a centralized location for consumers to get information on the digital switchover.

** Hungary **

Hungary has left the majority of informational efforts up to broadcasters themselves. The Communications Ministry said that consumers should have precise information concerning the digital broadcasting services available to them, programs and other services offered, technical requirements for reception, and the associated costs. While the promotion of digital services should be handled by service providers, the state institutional system can provide a complementary, coordinative, and partnership role and the government may finance one quarter of the cost. In its 2007 digital switchover strategy, about 400 million HUF per year were allotted for consumer education (Miniszterelnoki Hivatal, 2007).

** Germany **

In Germany, methods of consumer education varied depending on Lander decisions. In Berlin, a communication strategy was developed jointly with the Berlin Lander, Mabb, and broadcasters. Communications provided consumers with information on various television options, notified consumers of the coming transition, but did not specifically promote the use of digital terrestrial television. The information via the broadcast stations was the primary method of communication, including advertisements and tickers. A leaflet was mailed out to residents, but Mabb would not suggest this strategy to other regions, due to the high cost. Communication efforts in Berlin totaled €1.1 million (Mabb, 2003).
Though the Landers stressed the importance of consumer participation in the switchover and they found education campaigns to be highly important, it seems there was little research on consumer awareness of the switch and its effectiveness. However, out of about 160,000 households with only terrestrial reception and about 90,000 households using terrestrial reception on a second or third television in Berlin, the digital help hotline handled 22,000 calls, and was able to solve all but 600 problems over the phone. From the low number of helpline calls it appears that consumers were well informed and prepared for the transition (Mabb, 2003).

**France**

The French government has set aside €320 million to fund consumer information in the digital switchover in addition to funds appropriated for subsidies. Internet websites, a call center and other means of communication will receive €120 million. A further €15 million is available to fund national and regional television advertising campaigns. France, like the UK, placed an additional focus on the elderly (70+), the disabled and the indigent by appropriating €183 million for communications specifically targeted to these households to help them in the transition to digital television (Besson, 2008).

From this sampling of EU countries, we can see that, initially, the most popular methods for informing consumers are television commercials and tickers for general awareness, while websites provide detailed consumer information (See Appendix A). The logo for digital ready equipment and consumer informational materials available to be displayed in retail locations gained popularity with regulators as the transition progressed versus other communications methods. In addition, while the leaflet or printed materials may be a primary strategy in Britain, from Germany’s account, this strategy is inefficient for the cost and may not be a good option for smaller European member states.
United States Consumer Education

The US government supported consumers in the transition through a public relations campaign including public meetings, websites, and public service announcements. Broadcasters were given three options for educating consumers on the DTV transition. The different options contained a mix of public service announcements (PSAs), scrolling tickers, informational programs, countdown clocks, and reporting methods. Stations did not receive funding for the campaign, but funded the programs on their own.

The FCC also maintained a web site to provide consumers information on the transition. It provided DTV news, explanations of terms and fact sheets, regulatory information, and other consumer services such as digital and high definition television programming lists and a consumer guide for purchasing a digital television set. Part of the NTIA’s budget for the converter box coupon program was allotted for educating consumers. The NTIA was given up to $5 million for consumer education (Deficit Reduction Act, 2005).

The FCC set up a call center in January 2009, to field up to 2 million calls the week of the transition and 400,000 calls the day after the transition. The $12 million in funding for the call center “came from the $20 million Congress appropriated in September to fund digital outreach efforts” (Eggerton, 2009a). The FCC has been criticized for its lack of call center planning; the center only had four weeks to prepare for the February 17 transition date. However, because the full transition date was moved to June 12, and a limited number of stations terminated analog transmissions, the call center only handled about 150,000 calls. All but 17 US television markets still had some full power analog broadcasts; therefore, the February transition had significant effects on only 15% of the TV viewing population, mostly in smaller markets. With 85% of the television viewing audience due to switch on June 12, the call centers prepared for between 500,000 and 3 million calls. It was possible that the call center could receive calls in excess of 3
million, since Nielsen reported that 4.5 million were not yet ready for the transition (Eggerton, 2009b). In the days surrounding the transition, from June 6 through June 14, the FCC call center received over 900,000 calls and the FCC’s DTV website received over 3.5 million page views (FCC, 2009e).

However, because most low-power stations will not switch-off within the same time frame as their full-power counterparts, viewers may receive terrestrial programming in analog and digital after the final transition. Potentially, millions of viewers can receive low-power analog transmissions. In order for these viewers to access both analog and digital television signals after the transition, viewers must purchase a converter box that allows both analog and digital signal reception, or purchase a splitter cable running from the box to the TV. Considering the large number of low power stations, about 8,000, this is very important information for consumers to know. However, most consumers do not know how to tell the difference between a low-power station and a full-power station on their screens. Information about these types of converter boxes and the low-power issue is not readily available or easy to find on DTV websites or commercial warnings, where most consumers are getting their information about DTV.

Problems with reception and signal loss for certain stations have been reported especially in urban markets, such as Chicago, Philadelphia and New York. Many problems were addressed through digital converter box rescanning and antenna placement, but digital signals are either perfect quality or non-existent. Some stations are moving to different channels in order to reach digital viewing audiences comparable to their previous analog audiences, and the FCC has shown flexibility in dealing with DTV issues. Digital television signals are more susceptible to interference and blockage from terrain, foliage, weather and buildings than analog signals. Solutions are often hard to identify but can include: stations changing their channel location,
additional transmitter build out, or consumers purchasing outdoor antennas or pay TV subscriptions (FCC, 2009e; Grotticelli, 2008)

**New Services: European Union**

New services in the digital dividend are expected to bring large sums of revenue to the European economy. While there are many possibilities for new and enhanced services, this section puts more emphasis on mobile television than other innovations. Mobile TV revenues are expected to reach €7.8 billion worldwide, while using the vacated spectrum for wireless broadband is valued at €150 - €200 billion in commerce (Europa, 2008c; Europa, 2009). As part of encouraging the entrance of mobile television, in December of 2008 the European Commission published the *Legal Framework for Mobile TV Networks and Services: Best practice for authorisation – The EU model*. The framework provides member states with guidance on the best way to get innovative services on track at the European level. The Commission establishes that a coherent, stable, and favorable regulatory environment is necessary to encourage businesses to develop. It claims that without a consistent regulatory environment across member states, business will be less likely to enter the new services market, due to uncertain returns on investment or lack of scale economies (EC, 2008c).

The Commission’s guidelines say that “straightforward, transparent and non-discriminatory” procedures for awarding licenses will enhance investor confidence and avoid launch delays. The process should be open to all industry players; service providers and content providers are encouraged to work together. License conditions should include a minimum requirement for indoor coverage capabilities and transmission quality levels should be part of the license award conditions. The Commission also suggests that licenses include a return clause; whereby, a mobile TV license will be reclaimed by state regulators if services do not begin within a reasonable time (EC, 2008c).
The Commission expects players in the DVB-H market, industry and government, to ensure compatibility of services across borders. The Commission suggests that industry choose non-proprietary technologies available to all consumers without the requirement for additional plug-ins for accessing mobile TV content (Europa, 2008c; EC, 2008c). The Commission issued these guidelines to help member states initiate a competitive European mobile market and prevent stalls in market development and the entrance of the most efficient and popular services.

Information Society Commissioner, Vivian Reding, reiterated the importance of a coordinated effort in using the digital dividend in the EU: "Co-ordinated European action on the digital dividend is indispensable, to harness the potential economic and social value and creating economies of scale for equipment and service providers. We also need to avoid a situation where decisions by one EU country negatively influence the use of digital dividend in others. This is why radio spectrum policy in Europe requires close cooperation between national regulators and the European Commission (Europa, 2009). The following section provides an account of how some European member states are preparing to use the digital dividend and what has happened thus far.

France

France is setting the tone for harmonized European decisions regarding the digital dividend through regulation outlined in France Numerique 2012. The majority of the realized digital dividend, totaling 800MHz will be allocated to audiovisual services, such as digital terrestrial television and mobile television; however, 72MHZ will be set-aside for electronic communications, such as mobile broadband (Besson, 2008). The French plan shows initiative to create European harmonization by following suggestions from supranational and intergovernmental European bodies, such as the European Parliament and the 2007 World Radiocommunications Conference (WRC-07). Parliament had suggested that some digital
dividend be allotted for electronic communications services and the allocated 72MHz lies within the sub-band suggests by the WRC-07 (European Parliament, 2008; World Radiocommunications Conference, 2007).

The French decision to go with a shared spectrum plan was based on European suggestions and research suggesting that allocation for mobile broadband could bring the economy an additional €25 billion between 2012 and 2014 over audiovisual services alone (Analysys Mason & Hogan & Hartson, 2008). The plan will allow 95% digital terrestrial coverage, 80% mobile TV coverage, and 99% high-speed fixed/mobile broadband coverage by 2012. France Numerique 2012 also includes plans for 40 high definition terrestrial channels to be available and possibly 32 mobile TV channels (Besson, 2008).

France wanted to launch dedicated mobile TV networks using the DVB-H standard by 2007 or before the 2008 Beijing summer Olympics, however due to broadcaster concerns the launch was delayed. In 2007, 1.2 million consumers could receive mobile television over 3G networks, surpassing Italy, the country first to market and typical mobile TV innovation and subscription leader in Europe. This demonstrates a consumer demand and a market for mobile TV in France; however, these 3G networks may become overloaded in the near future with increased subscriptions. The DVB-H launch would alleviate network strains, but it has been postponed until at least 2010, primarily because broadcasters are concerned about the business plan and expect mobile operators to pay them a fee per subscriber. Also, handsets capable of receiving free-to-air television via the DVB-T standard have already entered the market, which may cause a problem for subscription based mobile TV on the DVB-H standard as it did in Germany (Briel, 2007; Briel, 2008c; Lebailly, 2009; Screen Digest, 2007)
Germany

Although Germany did not expect to have available frequency space for new spectrum-based services, some services are already available. Frequencies became available because some broadcasters chose not to multicast, thereby creating available frequencies for new technologies. As a result, 30% of the population can receive DVB-T transmission via their mobile devices. Other applications may also benefit from the availability of frequencies such as wireless broadband through USB sticks or PC cards for laptops (Mann-Raudies & Painter, 2008).

The introduction of mobile TV in Germany and its setbacks are an important case for other countries to observe when introducing new spectrum technologies. The Mobile 3.0 company received licenses to broadcast mobile TV via the DVB-H platform as an encrypted pay service. The services were launched in Hamburg, Munich, Frankfurt, and Hanover to test the viability of the service and consumer response. However, the most popular carriers, including Vodafone, decided not to carry DVB-H compatible sets. They instead decided to support the DVB-T standard in handheld devices, allowing their consumers to receive television broadcasts free of charge (Oryl, 2008). Due to the lack of DVB-H compatible handsets, Mobile 3.0’s test of DVB-H was unsuccessful, and the company returned the license to the government (Briel, 2008a). This does not mean that a pay mobile TV model is not possible. If another DVB-H license gets issued and more cell phone providers develop handsets capable of receiving the signal, then consumers may find pay mobile TV attractive. Germany also decided to allot space in the digital dividend for wireless broadband between the 790 and 862MHz bands, which should be fully available by the end of 2010 (Telecompaper, 2009).

United Kingdom

In the UK, a total of 128MHz will be open for new services, which is expected to bring the economy between 5-10 billion pounds. Ofcom notes that wireless broadband, mobile TV, digital
radio and public safety constitute some of the possible uses. According to Ofcom, the UK’s primary objective is not the realization of government revenue, but to increase societal value through a market lead approach. For this reason, spectrum blocks are not reserved for any specific use, which should allow for future changes in technology and changing consumer preferences (Austin, 2009).

In 2005, a partnership of UK companies launched a mobile television trial consisting of 400 people in Oxford using the DVB-H standard. As of 2005, mobile television was available in the UK via 3G networks and had gained some popularity. However, mobile TV is having little success in the UK. In fact, adoption rates among mobile phone users fell from 4% in 2007 to 2.75% in 2008 (DmEurope, 2009)

**New Services: United States**

The FCC implemented a more flexible and market oriented model for spectrum allocation and assignment for mobile service licenses compared to its previous policies. Originally, spectrum policy only allowed two entrants per local market and only permitted analog services on cellular spectrum licenses. The current policy allows market forces to determine the number of entrants per local market; many local US markets have five or more cellular service providers. In addition, licensees experience increased flexibility to decide which services and technology to deploy, such as the ability to implement new generations of wireless technology that allow high speed Internet access or mobile TV without requiring government approval or reconditioning of license terms (FCC, 2009g).

The switchover to digital television leaves a significant amount of space in the 700MHz band for new licensees. The Digital Television and Public Safety Act (2005) required the auction of the available spectrum no later than 2008. The FCC divided the new space for auction
into four blocks, the A-block, B-Block, C-Block and D-Block. The A- and B-Blocks have traditional guidelines for usage. The C- and D-Blocks, however, contain additional requirements.

The C-Block contains openness requirements, which require the licensees of this spectrum to allow customers, device manufactures, third-party application developers, and others to use the devices and applications of their choice. C-Block licensees are also barred from blocking or degrading users’ ability to download and use third party applications (FCC, 2007). The D-Block requires the network operator to trade access to their spectrum during non-peak usage times with first responders and allows first responders to preempt commercial network use on the D-Block during an emergency. During the traded and preemptive times, the commercial network operator would have access to the public-safety-grade broadband network (Albanesius, 2007; FCC, 2007). In addition, the D-Block licensee would pay the costs of reconfiguring the public safety spectrum (FCC, 2007).

The US auctions of the 700MHz band, which ran from January 2008 through March 2008, proved very successful, raising more than $19 billion (FCC, 2008b). The 700 MHz band auction gave additional spectrum access to new entrants, rural, regional, and existing nationwide wireless providers, which will enable them to deploy the next generation of wireless networks, 3G and 4G. While nationwide carriers, Verizon and AT&T won the largest chunk of the bids; other notable licensees include regional providers Cox Wireless of Cox Communications and Frontier Wireless owned by Dish Network, and new entrant QUALCOMM (FCC, 2008b; Gardiner, 2008). Though Google and other Internet based companies were expected to put in major bids, they did not, and Verizon won seven out of twelve licenses available in the C-Block. However, the FCC openness regulations ensure that compatible devices, such as Google phones and applications will be able to work on any network that Verizon deploys in the C-Block (Gardiner,
On the other hand, the D-Block did not receive a winning bid; the reserve was set at $1.3 billion. Currently, regulators and possible D-Block bidders are working out an acceptable plan. Carriers in the US have considerable control over the handset models that are available to customers, so they can avoid competition from other devices that could receive free TV (Oryl, 2008). Unlike Europe, there is currently no free-to-air mobile TV standard, so cell phone companies do not have to worry about free-to-air competition just yet. The Open Mobile Video Coalition (OMVC) in conjunction with the ATSC developed a free-to-air standard, ATSC-M/H, which was passed on October 16, 2009 as standard A/153. This free to air mobile television standard may be a source of competition in the future, but, due to its late market entry, it may not have much chance in the cell phone market. Proponents of the ATSC-M/H standard are looking toward other mobile video devices such as automobile systems and laptops as a market for free-to-air television (ATSC, 2009a; ATSC, 2009b; Grotticelli, 2008; Taaffe, 2009).

The US is typically considered a laggard when it comes to mobile television viewing, as only 8.8 million American watched mobile TV in 2008; however, that number increased 52% in 2009 to 13.4 million American viewers (Nielsen, 2009c). The multiple standards available in the US may have enhanced competition on the hardware side, but hindered the consumer market from developing as rapidly as the mobile TV markets in Korea, Japan and Italy (Lennighan, 2008). However, the US industry recently narrowed the field by choosing two standards for 3G television; Qualcomm’s MediaFLO on AT&T and Verizon networks, and MobiTV on Sprint and Nextel.

Summary

Given the case study examination of the digital television transition implementation based on the transition periods and timeline, subsides, consumer education, and new service entry, data gained from EU and US media policies and the implementation of the transition are now
analyzed to make suggestions for best practices for introducing digital television. The discussion of best practices for the digital television transition can be extrapolated to other emerging technologies in the media field.
CHAPTER 7
DISCUSSION AND CONCLUSION

The international race for a viable high definition television standard resulted in the invention of digital television transmission. Through digital transmissions, broadcasters can use the same amount of spectrum space to transmit multiple standard definition programs, data streams or high definition programming. In addition, as there are fewer limits on the number of spectrum users and the space available to them, new technologies can enter the market and other technologies, such as cell phones, can enhance their current capabilities.

Improved picture and sound quality make digital television attractive to consumers; the economic benefits of the transition to national business and trade in information technologies and knowledge-based industries factored into government decisions to pursue the digital television transition. An overriding goal from each political entity is to remain and become more competitive economically through emerging technologies that utilize spectrum. As digital signals take up less spectrum space, governments saw the economic potential in new technologies, businesses and auctions. However, broadcasters did not want to air digital programming if consumers could not receive it, and consumers did not want to buy digital equipment if there was no programming.

In 2004, Klein, Karger and Sinclair’s consumer sample did not think changing to digital television was necessary or important, did not believe that digital television would offer anything better than analog television, and thought the equipment would be expensive and difficult to use. Following this analysis, it is clear that due to marked uncertainty, high costs, and the inconvenience of transitioning, consumers and businesses in the EU and the US would not have

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26 Though the US uses an auction process, many countries, like the UK, use other processes of assigning frequencies, like beauty contest or administrative hearings that do not bring the government any revenue.
participated on their own. To break the deadlock, the US and the EU intervened and required the transition to take place. Given the perceived benefits of digital television, direct government involvement was the most efficient method for bringing about the digital television transition.

The EU and the US are excellent cases to compare when discussing the digital television transition because of their similarities and their differences. Both the EU and the US are liberal market economies. Normally governments practicing liberal market principles do not mandate that consumers adopt or purchase certain goods. However, both the EU and the US have required citizens to either purchase converter boxes, or throw away their perfectly good television sets and buy brand new more expensive television sets on the pretense of increased sound and picture quality and national economic advantage. The EU and the US objectives are the same: (1) switch-off digital television, (2) introduce new technologies, and (3) become more competitive in the international market.

However, there are two major differences. While both are liberal market economies, they have drastically different political structures. The EU is a conglomerate of sovereign nations pooling their sovereignty and attempting to realize economies of scale. Governing takes place in supranational, intergovernmental and member state governments. On the other hand, the US is a single nation under one federal government already functioning in a large-scale economy. As a result of different political structures, legislation is enacted differently. In the US, all laws have the same level of regulatory force. In the EU, different levels of force are attached to different enacted legislations. For example, regulations are binding in all aspects immediately, but directives are binding in the end result only. Directives, while allowing for structural, economic, and cultural differences among member states, result in varying methods and time frames for national implementation of Community law.
In addition to different governance structures and legislative introduction, their approaches to the digital television transition are very different. The US coordinated its switch centrally and switched all television sets over at once. While the EU’s supranational governing bodies mandated that the transition take place, member state governments are in charge of the transition. Consequently, the EU will switch-off regionally. Therefore, we have two cases with similar goals, but different methods for reaching these goals.

Even though the government organization and legislative processes are different, and the EU and its member nations, have traditionally been perceived as using more regulation or government control in private industry than the US, their media policy goals are similar. The EU’s concept of pluralism, which limits media concentration, encourages transparency and promotes media independence, is akin to the US concept of diversity, which limits ownership concentration and promotes multiple viewpoints. By extension, the EU’s focus on media independence and the US’s comparable promotion of multiple viewpoints, both encourage the free movement of political ideas. The EU’s cultural goals, requiring the availability of national language content, are similar to the US localism principle, requiring the availability of issues pertinent to a particular state or city via local television news and programming. In addition, the EU’s desire for an effective internal market is similar to the US media competition provisions.

Conversely, the EU’s pursuit of universal standards interferes in the commercial market for media hardware more so than the US. The US tends to remain hands off, as with mobile television, or in a supervisory position, as with digital television standards. The US rarely mandates any commercial adoption, with the exception of the digital television transition. However, the EU’s involvement in technical standards for products while establishing the internal market does make sense. For example, the electrical plugs for appliances used in many
member states have different standards, requirements, and shapes from state to state. It is impossible to create an internal market of scale, acting as a single unit, if there are different technical and manufacturing requirements for different regions. Having a single standard creates a larger market, which is more attractive for commerce.

Another emerging factor that distinguishes media regulation in the EU from the US is the EU’s move toward converged regulations for the media industry and media products. The US takes a layered approach, and has made no move to bring all electronic media under one regulatory regime. There are different regulations for broadcasters, cable operators, and other telecommunication services. On the other hand, the EU pursues converged regulation through the AVMSD, which will apply the same regulations to all audio-visual media service providers. Converged regulation is intended to bring broadcasters, on-demand viewing, IPTV, and mobile TV under the same regulatory umbrella. Member states have yet to fully implement the requirements of the AVMSD, and have until the end of 2009 to comply. In the future, a comparison of how these different approaches to media regulation will be interesting and provide further guidance on the regulation and introduction of new information technologies.

This case study examined the EU and the US across four different variables: political structure, policy development, media policies, and implementation. Since the EU is composed of sovereign nations that enacted the transition law according to their national needs and are handling their own transition process, the implementation variable was approached at the member state level and broken into an additional four variables. The implementation variables included: transition method, subsidy allotment, consumer education, and emerging technologies.

From the information provided in the previous chapters, this discussion will answer the initial two research questions:
RQ1: (a) What needs to be accomplished for the digital transition to take place, and (b) how has the digital transition progressed in the EU and US comparatively?

RQ2: What policy lessons from the digital television transition can be applied to the introduction or expansion of new communication technologies?

The following sections provide answers to the research questions based on the data gained from the case studies. The first part of research question one explains that government involvement is necessary due to the public nature of broadcast television, to encourage broadcasters and consumers to participate, and provide consumer support. The second part of research question one examines and evaluates the digital television strategies based on the implementation variables. Then research question two examines the different policy approaches of the US and the EU for suggestions on future technology introductions. Finally, the chapter notes limitations and opportunities for future research, which is followed by a summary of the primary findings of this study.

Research Question 1A: What Needs to be Accomplished for the Digital Transition to Take Place?

(1) Due to public interest concerns, media policy goals supporting those concerns, and consumer-broadcaster deadlock, government intervention is important for the transition to take place: It was appropriate for both governments to intervene in the process. Governments of the US and EU control spectrum usage through licenses because there is a limited number of frequencies available and too many unfettered broadcasters will cause signal interference. Therefore, governments manage the broadcast spectrum on behalf of their citizens, and the transition to digital television is a public policy issue. The digital transition, by decreasing the limitations on the number of spectrum licensees and enhancing broadcasters’ ability to provide new viewing options, promotes the policy goals of media pluralism and social/cultural protections in the EU, and localism and diversity in the US.
In managing the spectrum on behalf of their citizens, governments must protect the public good aspect of free-to-air television by ensuring that after the transition, large segments of the population are not excluded from basic television information and entertainment provided. Analog free-to-air television has been considered a non-rivalrous and non-excludable public good; anyone with television access could view the programming, and one person’s viewing of the program does not prevent others from viewing it as well. Realizing the need to protect the public good nature of free-to-air television, both political entities found that consumers needed support during the transition to digital broadcast television.

**Broadcaster Participation**

Content must be available for consumers before they will invest in new hardware; therefore broadcaster support is essential. While the EU is transitioning all of its platforms to digital transmission, national broadcasters are the most important industry participants in the transition. National broadcast channels are available free to air and on most platforms besides broadcast. They are also typically the most popular channels. The BBC is one of the major coordinators and influencers in the digital television transition in England, while the US, Spain, and France have relied heavily on programming in informational efforts of their national broadcast channels.

**Consumer Information and Timetables**

The government is best suited to organize a nationwide communication effort and set a timetable for competing broadcasters. In concert with the introduction of broadcast programming, it is important to inform consumers of the availability of this programming, how to receive it and its benefits. Without adequate consumer information it does not matter how ready broadcasters are to switch; without consumer participation the switch cannot be successful. Awareness of the technology, while a simple idea, is incredibly important. The US’s first
attempt at switchover in 2006 was postponed partially due to broadcaster unreadiness, but primarily because the majority of consumers were unaware of digital television availability, or even that analog signals would be turned off. Through public information campaigns, websites and call centers, governments can inform and prepare consumers for the transition. Along with the availability and awareness of content, consumers must be aware of when their region will switch-off analog signals. A published timetable of exactly when the switchover will occur will influence additional consumers to purchase the necessary equipment to receive digital television.

**Consumer Subsidies**

In such a large-scale transition, there must be some sort of support incentive for democratic citizens to acquiesce to a government mandate for consumer purchases. In most regions, subsidies have been necessary for the digital television transition to take place without violating public interest concerns. Without subsidies, governments violate the public interest and public good aspects of broadcast television. Most governments chose to implement an equipment subsidy for consumer; however, most European governments put demographic restrictions on subsidies while the US did not. Subsidies will be discussed in more detail in answering the second part of RQ1.

**Research Question 1B: How has the Transition Progressed in the EU and the US Comparatively?**

While the EU and the US have similar policy goals regarding digital television, their implementation approaches have been different. The EU has followed a regional implementation plan, focused more on consumer concerns, and been more proactive with the introduction of new technologies from a regulatory perspective. The US has followed a snap implementation plan and focused more on quick technology introduction, but has been more reactive in terms of new technology regulation. We can also see from the case study discussions,
that education and subsidy provisions were approached in similar manners; however, transition periods and new technology introduction were approached differently. Major contributing factors to differences in the implementation and administration of the transition in the EU and the US are: governance structure and legislative force, transition periods, consumer education, subsidies, and approaches to new technology introduction.

**Legislative Process**

(2) The different political structures were a factor in the actual implementation of the digital television transition: The different political structures contributed to differences in the transition implementation. Since the transition was introduced as a Directive, the EU provided parameters for switchover and each member state managed the transition implementation. Therefore, the EU had no choice but to take a regional approach. On the other hand, the US Digital Television Act was implemented federally; the federal government managed all aspects of the digital television transition through the FCC. The NTIA also contributed to the transition program management by tracking the number of transition-ready households and distributing converter box coupons for consumers. The US could have chosen to take a regional approach, but instead it chose a snap approach to the switchover.

In addition, the EU institutions do not have the authority to create administrative rulemaking bodies like the FCC to coordinate the procedure among all member states and EU institutions. While the US, through the FCC, instructed all broadcasters as to how the transition would proceed, the EU set a transition deadline for all member states and required them to submit their transition plans to the Commission. The Commission would assess member state progress every two years. Therefore, each member state planned its own transition timeline, consumer education program and consumer subsidy.
**Transition Periods**

Both the US and the EU have had to change their final deadlines for switch-off. The US originally planned for 2006, but moved the date back to February 2009 and changed the date again to June 2009. The EU originally published a 2012 deadline, and expected the transition to be well on its way by 2010. However, some nations are predicting later switchover dates, France 2013 and Poland 2015, and the EU recalled the deadline of 2012. Shifting switch-off deadlines is not unusual. Many nations delayed their originally scheduled switch-off time, but even with delays most member states predict a switchover date by 2012. At this point, Germany has been the only country able to eclipse its own predicted deadline of 2010 with an earlier switch-off in 2008.

*(3a) While gross population and terrain are contributing factors for switch-off plans, the percentage of terrestrial reliant consumers was the deciding factor in whether a regional or snap transition would take place:* The snap approach taken by the US was effective for moving the transition along quickly, and was more supportive of industry interest. The EU’s regional approach was more supportive of high levels of terrestrial viewership and regional concerns, such as landscape interference.

Between the US’ original shut off date in February 2009 and the extended date in June 2009, many broadcasters chose to turn off their analog broadcasts. In a sense, the US phased out analog broadcasting over a three-month period based on how many people in those areas were prepared for the transition, and completed the process in June. The switch, however, occurred at essentially the same time, so the US is still characterized as using the snap approach.

Most nations using the snap approach have a small to moderately sized territory, small to moderately sized populations, have a small percentage of terrestrial reliant consumers, and a small total number of terrestrial reliant consumers, like Netherlands, Demark and Finland.
However, the US has a large territory, a large population and a low percentage of consumers relying on terrestrial television, only 15 - 19%, translates to a much larger number of people affected by the transition. The correlating factor among snap transition countries is the low number of terrestrial viewers. In addition to having fewer terrestrial viewers, the US also put more emphasis on industry interests and economic concerns associated with the transition, while most European member states took a consumer-centric approach to the switch.

Considering the economic priorities and the low number of terrestrial-only viewers, the snap approach was appropriate for the US.

Television in European nations has largely been terrestrial, with a few outlier nations relying more heavily on multi-channel TV services. Rather than use an EU agency to coordinate the switch-off, the EU Directive instructed member states to handle the implementation of the transition. Member states chose deadlines reflecting their populations’ needs and primarily taking a regional approach. The regional approach is usually taken by nations with a high number of terrestrial viewers and sizable territory.

Although EU member states are small compared to the United States and could therefore be candidates for a snap switchover, most took a regional approach within their country due to the high numbers of terrestrial reliant television viewers. The regional approach allowed organizations in charge of the implementation to target their resources – economic, educational, labor, etc. – to assess which processes were effective before moving on to the next locality designated for switch-off.

(3b) The regional approach used in the European member states does a better job of accounting for regional differences and government support levels than the unilateral US approach: The regional process allows targeted education on the transition process, an available
support staff for technical assistance, the possibility of shorter multicast periods, time to evaluate
digital signal strength, and accurately assess the need for transmitter build out. It is excellent for
preparing consumers, and making sure that they do not lose access to channels received before
the switchover. While this makes for a smooth transition on the consumer side, it is not as
supportive to industry participants. The vacated frequencies for upgrading cellular and wireless
broadband services or introducing new services like mobile television, take longer to become
available. Further, in order to realize a common market using these emerging services, all
member states must complete the switch.

On the other hand, the snap approach is excellent for industry. Though broadcasters in
the US already experienced a lengthy simulcast period, some of them simulcasting since 2006,
the 2009 switchover allows broadcasters to introduce multicasting capabilities and high
definition programming in an effort to attract more consumers. Also, cellular, wireless and other
emerging technologies gain access to wireless spectrum sooner. This could provide the US with
a competitive edge in the emerging technologies market worldwide, but it is too soon to tell.

The snap approach, however, is not as consumer friendly. Analog signals get fuzzy when
a television set is out of range, but often the programming remains viewable. Digital signals are
either perfect or nonexistent. When experiencing signal interference, the picture becomes
pixilated, freezes, or goes black; this signal drop-off is known as the digital cliff. Many US
consumers, especially in urban areas, experience difficulties as the FCC coordinates with stations
to solve these issues. This research indicates that the snap approach is excellent for introducing
new technologies and being economically competitive, where as the regional approach is
excellent for consumer satisfaction and managing transition resources.
Table 7-1. Comparison of the regional and snap approaches: Characterizations, advantages and disadvantages.

<table>
<thead>
<tr>
<th>Region</th>
<th>Regional Approach</th>
<th>Snap Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typically Characterized by</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Large percentage of terrestrial television viewers</td>
<td>• Low percentage of terrestrial viewers</td>
</tr>
<tr>
<td></td>
<td>• Large territory</td>
<td>• Smaller territory</td>
</tr>
<tr>
<td></td>
<td>• Examples: UK, Spain, France</td>
<td>• Examples: US, Netherlands, Denmark</td>
</tr>
<tr>
<td>Advantages</td>
<td>• Targeted consumer education</td>
<td>• Broadcasters have immediate capability to multicast, provide High Definition programming, create new programming, attract new consumers</td>
</tr>
<tr>
<td></td>
<td>• Available support staff</td>
<td>• New technologies and economic benefits realized sooner</td>
</tr>
<tr>
<td></td>
<td>• Shorter multicast period for broadcasters</td>
<td>o Enhanced cellular and wireless networks</td>
</tr>
<tr>
<td></td>
<td>• Time for evaluation</td>
<td>• Possible competitive edge in worldwide market for media services</td>
</tr>
<tr>
<td></td>
<td>• Time for transmitter build out</td>
<td></td>
</tr>
<tr>
<td>Disadvantages</td>
<td>• Longer wait for new spectrum space</td>
<td>• Not as consumer friendly</td>
</tr>
<tr>
<td></td>
<td>• Longer wait for new services</td>
<td>• Digital cliff</td>
</tr>
<tr>
<td></td>
<td>• Longer wait for realization of the European Single Market in media services</td>
<td>• Consumer signal loss dealt with after the fact</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Possible over loaded consumer assistance staff</td>
</tr>
</tbody>
</table>

**Consumer Education**

EU member state governments and the US federal government used similar consumer education plans to further the transition and to provide adequate information on how and why the transition was taking place. Websites and television commercials were by far the most popular method for information dissemination. Mailed leaflets, though popular in Britain, are seldom used in other nations due primarily to high cost. Digital-ready logos on consumer electronics
were also a popular method for protecting consumers from buying products that would be obsolete after the transition. Digital ready logos are an excellent tactic to prevent unknowing consumers from being taken advantage of by retailers and distributors trying to unload outdated merchandise.

(4) The sooner consumers receive a concentrated communication effort, the more likely it is that transition deadlines will be met: Analog shut off was delayed in most countries because consumers were unprepared. Consumers were typically unprepared because they were unaware of the transition or did not believe analog switch-off would actually happen. Governments did not typically put a strong effort behind consumer education until the failure of their first switch-off deadline. Had governments approached consumer education seriously, like Germany and England, they may not have had to postpone the switch-off, like the US, Spain, Italy, and France.

Through its regional switch-off plan, the UK had time to evaluate each switchover and correct problems before continuing to the next region. They found the consumer education was necessary for a smooth transition and have increased education efforts since the first switchover. Tracker surveys have been showing increased consumer awareness and readiness for the switchover since 2003, proportional to education efforts. US consumer education did not really begin until 2007, after the 2006 deadline for analog switch-off was postponed until 2009.

Subsidies

Subsidies have been important for completing the digital television transition and protecting the public interest in most countries. Converter box subsidies have been the most popular method for subsidizing consumers; however, some countries chose to subsidize installation, outdoor antennas, and subscriptions to pay television services. The EU is encouraging all media platforms to switch to digital distribution and is using its technology
neutral guidelines to further this goal. Divergently, the US is only promoting the transition to
digital on broadcast channels. Many questions about cable distribution of digital multicasts from
broadcasters have been put off, and cable companies are currently allowing consumers to switch
at their own speed.

The effects of converged legislation and the idea of technical neutrality versus US layered
regulation when dealing with media platforms are most clearly demonstrated in how subsidies
can be administered. Communications from the European Commission evaluating member state
subsidies against community law state that a subsidy granted only for terrestrial set top boxes
would give broadcasters an unfair advantage over cable and satellite because it is not a
technically neutral subsidy. However, US layered regulations allow more flexibility or more
favoritism depending on point of view. Layered regulations do not require laws to apply to each
platform identically, but take other circumstances into account. All cable and satellite companies
are private businesses, while non-public terrestrial broadcasters are considered public trustees.
US subsidies for digital converter boxes were only available for terrestrial television.

In addition, the disbursement of subsidies provides an example of how the EU exerts
control over member states, and encourages harmony among national laws to create a European
common market. The EU’s ruling prevented member states from subsidizing broadcasters, as
Germany attempted to do. England did not subsidize broadcasters, but reasoned that with more
broadcast licenses available, the future cost of terrestrial licenses would decrease. Therefore the
British government lowered the price for terrestrial licenses to broadcasters to reflect future
decrease in market value. The US chose not to provide commercial broadcasters with subsidies
for their transition. The US government reasoned that broadcasters were provided a second
frequency for simulcasting and the benefits of digital distribution, enhanced picture and sound quality and the ability to multicast, would provide broadcasters with new revenue sources.

(5) While subsidies were allotted based on different characteristics, subsidies were determined necessary based on public interest concerns: Consumer subsidies in Germany were for low-income households with terrestrial only television; however, as set top box prices decreased, Landers were less likely to offer consumer subsidies. In Italy, there were two different subsidy programs. The first provided subsidies to all consumers regardless of income for converter boxes receiving digital signals via terrestrial or retransmitted through cable, and was not approved by the EU. It excluded satellite television. The second converter box subsidy program was available to the first switch-off region for all platforms.

England’s converter box subsidy program focused on the elderly (75+) and disabled persons. Low-income persons with disabilities or 75 and older can receive free assistance for a converter box and installation for the least expensive conversion option in their region, cable, satellite or terrestrial. Those who are disabled or 75 and older who are not low-income can receive the same assistance at a discounted rate of 40 pounds.

France set up two subsidy programs. The first was for regions where there would be no simulcast period before switching to digital and provided subsidies to all households, regardless of income, who did not already have a digital subscription. These subsidies were for equipment and subscription fees for the distribution medium of choice. The second subsidy program applied to low-income households in the rest of France, where a personalized subsidy proportional to individual income would be available for the least expensive digital transmission method. Hungary has also vowed to support consumers through a set top box subsidy, but no detailed plans had been published during this research.
The US does not require that aid be platform neutral or regard subsidies for terrestrial television as unfair competition. In addition, the only platform required to be all digital is terrestrial; therefore, converter box coupons are only good for terrestrial reception. The US offered $40 converter box coupons to all American citizens; there were no income restrictions or analog terrestrial only household restrictions. It was determined that placing these requirements on the subsidies would be costly and in effective; there is no real method of tracking analog terrestrial-only homes and these types of restrictions would hinder the process.

**Research Question 2: What Policy Lessons from the Digital Television Transition can be Applied to the Introduction or Expansion of New Communications Technologies?**

There are major differences between the introduction of new technologies such as wireless broadband or mobile television and digital terrestrial television, namely that they are not as ubiquitous as free-to-air television. For the purposes for this study, emerging technologies include mobile TV, increased wireless broadband coverage, enhanced cell phone networks, and future innovations. Outside of making the transition to digital television broadcasting, the EU and US diverge on the introduction of other emerging consumer technologies. Mobile television will serve as the primary example for the discussion on new technology introduction. Since the completion of this study, mobile television has somewhat fallen out of favor with the EU; nonetheless, mobile television provides a good example for different approaches taken toward introducing a new technology without mandating its use.

The EU has taken a proactive role by releasing a framework for mobile television and instating a mobile television standard (EC, 2008c). US federal authorities remain uninvolved in the introduction of mobile television, even in terms of instating a national standard. While the US has acknowledged the importance of emerging technologies associated with frequency availability, the government has not taken any steps to promote any of those technologies. Any
steps toward creating a mobile television standard have been pursued by independent voluntary organizations like the OMVC and the ATSC. However, the EU, through the Communications and Information Technology Directorate and its legislative resources, in addition to entering the DVB-H mobile TV standard into the official journal, promoted a framework for the mobile television business model.

Regardless of approach, there have been difficulties in introducing mobile television in both the EU and the US. In the EU, both the DVB-T and the DVB-H standards are capable of carrying television signals. In the German introduction of subscription-based DVB-H broadcast networks, the DVB-T free-to-air standard cannibalized business models based on paid subscriptions through the DVB-H standard.

In the US, there is not currently a strong choice for mobile broadcasting, so US industries continue to offer mobile TV content on 3G networks rather than mobile broadcast networks. However, with increased data consumption on smart phones, 3G networks often become overloaded and slow. Broadcasting is a separate network for delivering content, and the use of mobile broadcast standards could alleviate the overload of 3G networks by intense mobile data consumption. However, cell phone and wireless companies in the future may choose to enhance 3G networks to 4G, utilize broadcast networks, use a combined approach, or find an entirely new solution.

While access to broadcast television is considered a public good and a near necessity to participate in society, and though wireless broadband may one day equal the importance of

27 On October 16, 2009 the Advanced Television Systems Committee (ATSC) announced the approval of A/153 ATSC Mobile DTV Standard, which provides broadcasters with technical specifications for delivering new services to mobile and handheld devices carried through currentDTV transmissions (ATSC, 2009)
28 DVB-H, Digital Video Broadcast – Handheld is the encrypted mobile television standard able to broadcast to mobile devices
29 Digital Video Broadcast – Terrestrial is the broadcasting method for sending programming to stationary television sets; however, mobile devices with the proper receiving equipment can receive these signals as well.
broadcast television, currently access to mobile television and other emerging technologies is not a societal necessity. US broadcast media policy goals do not apply to cable or satellite operators, and do not apply to mobile operators. However, with the implementation of AVMSD the same media goals and laws could apply to all European programming services including mobile television. While the possibility of new business models on vacated spectrum is a boon to the economy, the success or failure is not necessarily a government concern in the US. However, in concordance with the EU’s Lisbon Strategy, to create a common market and become the most competitive knowledge based economy, it is logical that there would be some form of intervention in the mobile television market and other communications markets.

**Limitations and Future Research**

Most of this research took place between September 2008 and September 2009. It provides a sketch of the different methods used by the EU and the US for requiring customers to adopt a new technology and pinpoints emerging factors in EU and US media regulation. As a comparative case study, this analysis is not generalizable because there is no way to establish that the data are representative of other or larger populations. In dealing with complex political systems, data is highly idiosyncratic and cannot easily be applied to other situations. However, this research provides an excellent reference for the introduction of other technologies, serves as a first step in later evaluative research once the transition is completed, and pinpoints trends in EU and US government influence of media technology diffusion. In addition, though this case study cannot evaluate which approach is better because the transition is ongoing in the EU, it can comment on experiences from the cases.

**Early Indications of Effective Practices**

A strong communication effort early in the transition has shown to be effective, and subsidies have also been effective, as long as the market price has decreased enough for
subsidies to be viable. For example, subsidies should not be introduced while the market prices are still very high and people who would adopt on their own, or early adopters, have not had a chance to purchase equipment. Italy made this mistake, and it has been the primary reason for numerous extensions to their switch-off deadline. Also, the more often switch-offs are postponed the harder it is to get consumers to prepare, because they are expecting another extension. Much of Germany’s success can be attributed to a clearly communicated and established switchover timeline. A cost-effectiveness comparison of communication methods could be very helpful for determining which mass marketing efforts would be effective should a similar transition present itself in the future.

The regional switch-off method has been a better approach to serving consumer needs. If a clear regional switch-off table is published and followed, the regional switchover can also be helpful to broadcasters by reducing their simulcast period. For example, through the regional process the UK has been able to determine where to allocate resources so that each regional experience is better than the one before it. They have also been able to determine which demographics will require the most support.

The snap approach may require longer simulcast periods if the transition is not completed by the expected date; postponement of analog switch-off has been typical. However, longer simulcast periods are better for getting consumers to switch on their own without subsidies. The snap approach serves industry the best because it opens up new spectrum to business interests all at once; regional switch-offs require some business interests to wait for access to the new spectrum. An earlier switchover by the US gives it the first to market advantage in new spectrum based services over the EU and may give the US the advantage economically. However, because the transition is ongoing in the EU and the US recently completed its
transition, it is too soon to evaluate which approach is most effective. After 2012, this research can serve as a starting point for evaluating which constituencies were served best by different transition strategies, and whether or not being first to market was a clear advantage.

Once complete data are available on the extent of subsidies used in the EU, and the number of consumers without access to television after the switchover in political entity, effectiveness of the two plans can be evaluated more concretely. It is likely that the US subsidy allotment plan, though available to all citizens regardless of qualifying factors like income or age, costs less overall than the combined total of EU member state subsidy plans, including the cost for administration and verification. However, with a higher total percentage of terrestrial viewers in the EU, proportionally the EU may have spent less. In addition, because the snap switchover is less accountable to consumer needs, the US will most likely report a higher number of citizens without access to the same broadcast channels post switch-off. However, these are theories to test through future research.

To reach the same goal, the EU and the US are taking different paths. One very interesting difference is the EU’s choice for converged regulations while the US continues to use layered regulations. As the converged regulations of the AVMSD have not been fully implemented throughout the EU, this research cannot evaluate the effects of converged versus layered regulations. In the future, these different paths could result in major differences between EU and US media regulation. It further demonstrates the EU’s proactive approach to regulation and the US’s laissez-faire approach. Future research will be able to compare the effects of converged audiovisual regulations in the EU with the layered regulations present in the US.

In terms of new services, when these research questions were developed, mobile television was the center of attention, especially due to consumer, not necessarily commercial, successes in
Asia. The EU officially promoted the DVB-H a standard in July 2007 (Europa, 2007c). An independent coalition of US industry representative developed a mobile television broadcast standard for the US, which was published in October 2009 (ATSC, 2009b). However, it remains to be seen whether “first to a single standard” or “first to transition digital television” will be the more effective strategy in introducing mobile television. As there is a clear difference to the EU and US’s approaches to mobile television, it will be interesting to see which method is more successful for viable business models, economic growth and market adoption. Recently, however, attention to mobile television has subsided considerably. The EU scaled back its mobile television initiatives and statements regarding its development, and increasingly focused on wireless broadband networks.

With the focus now resting predominantly on wireless broadband, it will be interesting to compare the level of, and types of government involvement in, wireless broadband and the digital television transition. In the future, there could be a transition from private wired and wireless networks to public wireless networks, and the methods for transitioning to digital television may be more applicable to this transition, especially if the government becomes involved.

Conclusion

In conclusion, this thesis set out to answer two questions:

RQ1: (a) What needs to be accomplished for the digital transition to take place and (b) how has the digital transition progressed comparatively in the EU and US?

RQ2: What policy lessons from the digital television transition can be applied to the introduction or expansion of new communications technologies?

In regards to RQ1, we have shown that (1) Due to public interest concerns, media policy goals supporting those concerns, and consumer-broadcaster deadlock, government intervention is important for the transition to take place. (2) The different political structures were a primary
factor in the actual implementation of the digital television transition. (3a) While gross
population and terrain are contributing factors for switch-off plans, the percentage of terrestrial
reliant consumers was the deciding factor in whether a regional or snap transition would take
place. (3b) The regional approach used in the European member states does a better job of
accounting for regional differences and government support levels than the unilateral US
approach. (4) The sooner consumers receive a concentrated communication effort, the more
likely it is that transition deadlines will be met. (5) While subsidies were allotted based on
different characteristics, subsidies were determined necessary based on public interest concerns.

As for RQ2, this research suggests that in the introduction and expansion of new
technologies, it appears that a single technological standard is most beneficial to hardware and
application manufacturers for creating certainty and market growth, which is, in turn, beneficial
to consumers interested in purchasing the products. Through the international competition for a
digital television standard, it appears that standards competitions are essential to developing the
best possible basis for technologies, but the longer these competitions drag on, the less beneficial
the competitions become. However, even though the US has been more “hands off” than the
EU in the standards setting procedure, the US’s first to market advantage, the US unified
spectrum allocation, and coordination for new services may prove to be more competitive for the
introduction of emerging services than the individual member state approach of the EU.

In addition, should another government led transition take place, common market
standards, targeted consumer subsidies, and clearly published timelines or strategies are
beneficial. Also, unless there is a very small percentage of consumers to transition, a regional
process is the best strategy for decreasing industry costs, targeting consumer aid, and targeting
government and industry resources.
# APPENDIX

## DIGITAL TELEVISION TRANSITION HELP WEBSITES

Table A-1. US digital transition help website

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### Got Digital?

As of June 12, full-power television stations nationwide have been broadcasting exclusively in a digital format. If you’re still using an analog TV set, you have to connect it to a digital-to-analog converter box to watch digital programming. If you have not yet done so, you can still make the switch now.

### Top FAQs

- Can I Still Use My Old Analog TV Set? How?
- Can I Use My UHF/VHF Antenna to Receive DTV?
- Does the DTV Transition Affect TV Sets That Are Connected to Cable Services?
- How Do I Improve DTV Signal Strength?
- Can DTV Reception be Affected by Moving Vehicles and Weather?
- How do I connect my portable, battery-powered analog TV to a battery-powered digital-to-analog converter box?

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## DIGITAL TELEVISION GOVERNMENT WEBSITES

<table>
<thead>
<tr>
<th>DTV.gov Home</th>
<th>EN ESPAÑOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learn About DTV</td>
<td>Get Ready</td>
</tr>
<tr>
<td>What is DTV?</td>
<td>Will You be Affected?</td>
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<td>Audio &amp; Video</td>
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<td>FAQs</td>
<td>Install Converter Box</td>
</tr>
<tr>
<td>Glossary</td>
<td>Fix Reception Problems</td>
</tr>
</tbody>
</table>

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Table A-2. Hungarian digital transition help website

www.mindigtv.hu

Keresés

OK

(Mi szükséges hozzá?)

A MinDig TV szolgáltatás vételéhez szükséges eszközök:

Antenna és kábelezés

A szolgáltatáshoz a jelenleg az analóg műsorok vételéhez használható legtöbb tetoantenna megfelelő, melyek alkalmazásak az UHF frekvenciaturmány vételére. Ha az analóg műsorok vételéhez szélessávú antennát használtak (ilyenek a széles körben elterjedt lepieantennák és az ún. logper antennák), akkor ezek minden bizonyt a digitális vételére is alkalmaznak lesznek. Ha az analóg antenna keskenysávú volt (ilyenek például a Yagi antennák), akkor új, szélessávú antenna felszerelésére lehet szükség. Akkor is indokolt lehet új antenna felszerelése, ha a vételi hely a digitális műsort sugárzó adótornyot távol esik, vagy tereptakarásban (pl. völgyben, épület árnyékában) van. Ilyenkor nagy nyereségű vevőantenna és antennerősítő használata segíthet. Antennaszervelők, szerveses szakemberek mérőeszközökkel meg tudják mérem, hogy megfelelő-e a jelszint.

A zavartalan vétel jó állapotú tetoantenna és koaxiális kábel esetén biztosítható. Szobaantennát vételre akkor van jó esély, ha elég közel lakunk az adóhöz. Az analóg vételi frekvenciákra hangsúl antennerősítők a digitális vételének nem alkalmazhatók, így kell hangsúló ezeket a digitális adás frekvenciájára. A digitális vételnél szűkebb az átmenet a jó minőségű kép és a teljes vételképtelenség között, mint az analógáknál, ezért fontos hogy a kultéri eszközök jó állapotban legyenek. Bizonyos településeken az átmeneti időszakban az analóg tévéjelet és a digitális adást eltérő adótorony sugározza, ilyenkor a tetőantennát el kell forgatni, vagy új antennafelszerelésre van szükség. Az adóhálózat összes adóantennája visszteses polarizációra van tervezve, ezért a jó vételhez vevőáldalon is visszteses polarizációjú vevőantennát kell biztosítani.

Televíziókészülékek és dekóder


Matricarendszer

http://www.mindigtv.hu/Mi_szukseges_hozza.aspx

Page 1 of 5
Table A-3. UK digital television transition help website

Digital UK is the not-for-profit company leading the UK’s switchover to digital TV

Latest news
Switchover is underway for viewers in west and central Wales, making Freeview channels available across these areas for the first time.

When your home switches to digital will depend on where you live in the UK. All households with a Freeview TV or box will need to re-tune at both stages of switchover and from time to time to keep receiving channels and services

- Find out when you switch
- Connections and retuning

All households with a Freeview TV or box will need to re-tune at both stages of switchover and from time to time to keep receiving channels and services

- Re-tuning your Freeview TV or box
- Watch our re-tuning video
- Visit the TV re-tune website

http://www.digitaluk.co.uk/
Table A-4. French digital television transition help website

The France goes to all digital TV between 2009 and 2011. Information on how this passage is available on this site: 0 070 818 818

Switching to digital | The national plan | Regions | Act | News | Documentation | Questions and answers | Area press

De quoi s’agit-il?

Quand?

March 09, Lower Normandy, will move to all digital TV! Everything you need to know what will happen, what to do, how, grants, special event....

The Ak Beirut can still offer full packages and support in place...

"Estimate your DTT reception!"

Upcoming dates for transition to all digital TV:
- March 09 - Only Lower Normandy
- May 16 - Pays de la Loire
- All dates

Press info:
Official launch of the TV going all digital is the Pays-
de-la-Loire.

© 2009, France Digital TV | All Digital | Terms | Imprint | Credits | Home

http://translate.googleusercontent.com/translate_c?hl=en&prev=/m/translate&previus_url=https://www.terrestiredemission.com/...
LIST OF REFERENCES


Communications Act of 1934, 47 U.S.C §1 (1934)

Communications Act of 1934, 47 U.S.C. § 37 (1934)


EC (2005c). *Communication from the Commission to the Council, The European Parliament, The European Economic and Social Committee and the Committee of the Regions on accelerating the transition from analogue to digital broadcasting.* COM(2005) 204 final


EC (2007a). *Communications committee working document: Information from Member States regarding roll out of digital terrestrial TV and switch-off of analogue terrestrial TV.* COCOM07-06 REV1


GAO (2004). Telecommunications: German DTV transition differs from U.S. transition in many respects, but certain key challenges are similar. Washington DC: GAO


Mabb (2008). *Germany’s digital dividend, transmission of television and Internet via broadcast spectrum: The first analogue-digital switchover of terrestrial television transmission – five years on*. Berlin: Mabb


Treaty of Nice amending the TEU, the Treaties establishing the European Communities and certain related acts, 26 February 2001 O.J. (C 80) 1. Entered into force 1 February 2003.


Tryhorn, C. (February 18, 2008). 2.9m earmarked to aid digital TV switch. Guardian.co.uk. Available at http://www.guardian.co.uk/media/2008/feb/18/digitaltvradio.television


U.S. Constitution, Art.I, § 2, cl. 3.


U.S. Constitution, Art.III, § 1, cl. 1.


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During her undergraduate studies, McAuliffe studied for a semester in Riva San Vitale, Switzerland. During her master’s research, she worked for a radio station in Budapest, Hungary. These experiences spurred her interest in the differences between the European Union and the United States in communication technologies regulation. She currently works as an account executive for five different radio stations with Asterisk Communications, and plans to pursue a career in communications policy research.