



Testimony

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TELECOMMUNICATIONS

German DTV Transition Differs from U.S. Transition in Many Respects, but Certain Key Challenges Are Similar

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Highlights of [GAO-04-926T](#), a testimony before the Subcommittee on Telecommunications and the Internet, Committee on Energy and Commerce, House of Representatives

Why GAO Did This Study

In Berlin, Germany, the transition from analog to digital television (DTV), the DTV transition, culminated in the shutoff of analog television signals in August 2003. As GAO previously reported, the December 2006 deadline for the culmination of the DTV transition in the United States seems unlikely to be met. Failure to meet this deadline will delay the return of valuable spectrum for public safety and other commercial purposes. Thus, the rapid completion of the DTV transition in Berlin has sparked interest among policymakers and industry participants in the United States.

At the request of this subcommittee, GAO examined (1) the structure and regulation of the German television market, (2) how the Berlin DTV transition was achieved, and (3) whether there are critical components of how the DTV transition was achieved in Berlin and other areas of Germany that have relevance to the ongoing DTV transition in the United States.

www.gao.gov/cgi-bin/getrpt?GAO-04-926T.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Mark L. Goldstein at (202) 512-2834 or goldsteinm@gao.gov.

TELECOMMUNICATIONS

German DTV Transition Differs from U.S. Transition in Many Respects, but Certain Key Challenges Are Similar

What GAO Found

The German television market is characterized by a central role of public broadcasting and is regulated largely at the state level. Although the federal government establishes general objectives for the telecommunications sector and manages allocations of the German radiofrequency spectrum, 15 media authorities organize and regulate broadcasting services within their areas of authority. The two public broadcasters are largely financed through a mandatory radio and television license fee of 16 Euro (\$19.68) per household, per month, or about 6 billion Euro (\$7.38 billion) in aggregate per year. Today, only 5 to 7 percent of German households rely on terrestrial television. Most households receive television through cable service, which typically costs less than 15 Euro (\$18.45) per month, or satellite service, which is free once the household installs the necessary satellite equipment.

Berlin officials and industry participants engaged in extensive planning for the rapid DTV transition in the Berlin test market. In Germany, government officials and industry participants are implementing the DTV transition largely for the purpose of improving the viability of terrestrial television; officials do not expect to recapture radio spectrum after the transition. Several elements of the DTV transition apply throughout Germany. For example, Germany is implementing the transition within specified “islands,” which are typically larger metropolitan areas, because officials thought that a nationwide DTV transition would be too big to manage at one time. Also, the German DTV transition focuses exclusively on terrestrial television, not cable and satellite television. The Media Authority in Berlin specified other components of the DTV transition for the Berlin area, including a short (10 month) simulcast period, financial and nonfinancial support provided to private broadcasters, subsidies provided to low-income households, and an extensive consumer education effort.

Certain aspects of the DTV transition in Berlin and other regions of Germany are relevant to the ongoing transition in the United States because, even though the television market and the transition are structured differently in the two countries, government officials face similar key challenges. We found that much of the focus of government officials leading up to and during the brief simulcast in Berlin was on ensuring households who rely on terrestrial television received the necessary consumer equipment. In the United States, most television stations are providing a digital signal—that is, the United States is in the simulcast phase. Thus, the challenge facing the Congress and the Federal Communications Commission, as was the case in Berlin, is encouraging households to purchase set-top boxes or digital televisions. The key components of the Berlin DTV transition that enabled the rapid deployment of set-top boxes included (1) implementing an extensive consumer education effort; (2) providing subsidies to low-income households for set-top boxes; and (3) setting a relatively near-term, date certain that all stakeholders understood would be the shutoff date for analog television.

Mr. Chairman and Members of the Subcommittee:

I am pleased to be here today to report on our ongoing work on the transition from analog to digital television, commonly referred to as the digital television (DTV) transition. The DTV transition offers the promise of more programming options, interactive services, and high-definition television (HDTV). To facilitate the transition, the Congress and the Federal Communications Commission (FCC) temporarily provided television stations nationwide with additional spectrum to simultaneously broadcast both an analog and a digital signal. This simulcast is mandated to end in December 2006, or when 85 percent of American households can receive digital broadcast signals, whichever is later. At that time, television stations will return valuable radio spectrum for public safety and other commercial services; however, as we reported in 2002, that deadline seems unlikely to be met.¹

In Berlin, Germany, a DTV transition—referred to in that country as the DVB-T switchover—culminated in the shutoff of analog broadcast television signals in August 2003. The rapid completion of the DTV transition in Berlin has sparked interest among policymakers and industry participants in the United States. At the request of this subcommittee, we have examined (1) the structure and regulation of the German television market, (2) how the Berlin DTV transition was achieved, and (3) whether there are critical components of how the DTV transition was achieved in Berlin and other areas of Germany that have relevance to the ongoing DTV transition in the United States. In addition to information provided in this testimony, we are conducting additional work on the ongoing DTV transition in the United States and will provide a more detailed study for this committee in early 2005.

To address these issues, we conducted a site visit in Germany and interviewed a variety of government, industry, and consumer representatives. In particular, we met with

- two federal government agencies with responsibilities related to the DTV transition;

¹See U.S. General Accounting Office, *Telecommunications: Additional Federal Efforts Could Help Advance Digital Television Transition*, [GAO-03-7](#) (Washington, D.C.: Nov. 8, 2002).

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- two Media Authorities that are overseeing the DTV transition in their respective areas;
 - the Berlin Social Welfare Office, which assisted in providing subsidies for set-top boxes during the transition;
 - the two major public broadcasting station groups;
 - the two primary commercial station groups;
 - a cable television provider and a cable television association;
 - Deutsche Telekom, which is a primary owner of broadcast towers throughout Germany;
 - an official who works for association of electrical and electronic equipment manufacturers and is also the director of Deutsche TV-Plattform, an organization of government and industry participants in the DTV transition; and
 - a German association of consumer groups.

In addition to the meetings we conducted in Germany, we spoke by telephone with a German expert on digital television issues and representatives of a European satellite provider. We also met with officials at the German Embassy in Washington, D.C. The information that we gathered was sufficiently reliable for the purposes of our review. We conducted our work from April 2004 to June 2004 in accordance with generally accepted government auditing standards.

We provided a draft of this testimony to FCC and the Department of State (State) for their review and comment. Staff from FCC and State provided technical comments that we incorporated as appropriate.

My statement will make the following points:

- The German television market is characterized by a central role of public broadcasting and is regulated largely at the state level. Although the federal government establishes general objectives for the telecommunications sector and manages allocations of the German radiofrequency spectrum, 15 media authorities organize and regulate broadcasting services within their areas of authority. Broadcasting in Germany is commonly characterized as a “dual system” in which public and private broadcasting coexist, with each market segment consisting of

two dominant broadcasting entities. The two public broadcasters are largely financed through a mandatory radio and television license fee of 16 Euro (\$19.68)² per household per month, which amounts to about 6 billion Euro (\$7.38 billion) per year. Although terrestrial broadcasting—the transmission of television signals from towers to homes through the radiofrequency spectrum—was once the only means by which German households received television program signals, today only 5 to 7 percent of German households rely exclusively on terrestrial broadcasting. The remaining households obtain either cable service—which typically costs less than 15 Euro (\$18.45) per month—or satellite service, which is free once the household has installed the satellite receiving dish and receivers.

- Berlin officials and industry participants engaged in extensive planning for the rapid DTV transition in the Berlin test market. In particular, digital terrestrial transmissions were initiated in November 2002 and all analog signals were shut off in August 2003. In Germany, government officials and industry participants are implementing the DTV transition largely for the purposes of improving the viability of terrestrial television. Government officials do not expect spectrum to be returned after the transition. Several elements of the DTV transition were decided by federal authorities and will thus apply throughout Germany. For example, Germany is implementing the transition within specified “islands,” with each island defined as a specific metropolitan area. Additionally, the DTV transition focused exclusively on terrestrial television, and households that rely on cable and satellite service did not need to purchase equipment to continue to receive television service. The Media Authority in Berlin specified other components of the transition, such as the short simulcast period, the financial and nonfinancial support provided to private broadcasters, the subsidies provided to certain low-income households, and an extensive consumer education effort. While the Berlin DTV transition is generally viewed as successful, it is unclear whether a full DTV transition will occur throughout Germany.
- Certain aspects of the DTV transition in Berlin and other regions of Germany are relevant to the ongoing transition in the United States because, even though the television market and the transition are structured differently in the two countries, government officials in both countries face similar key challenges for completing the transition. In particular, we found that much of the focus of government officials leading up to and during the brief simulcast in Berlin was on ensuring that

²Throughout this testimony, we use the July 13, 2004, exchange rate of 1.2302 to convert Euros into U.S. dollars.

terrestrial households received the necessary consumer equipment to support the switchover to digital. In the United States, most broadcast television stations are now providing a digital signal—that is, we are already within the simulcast phase. The concern today in the Congress and at FCC is how to coax consumers to purchase set-top boxes or digital televisions—the same objective of Berlin officials. The key components of the Berlin transition that enabled a rapid deployment of set-top boxes to terrestrial consumers and thereby enabled the switchover to DTV were (1) an extensive public information campaign; (2) subsidies for needy households to defray the set-top box costs; and (3) the setting of a near-term, date certain for the cessation of analog broadcasts that all stakeholders understood must be met.

Background

Terrestrial television service—also known as over-the-air broadcast television—is transmitted from television towers through the radiofrequency spectrum to rooftop antennas or antennas attached directly to television sets inside of homes. With traditional analog technology, pictures and sounds are converted into “waveform” electrical signals for transmission, while digital technology converts these pictures and sounds into a stream of digits consisting of zeros and ones. Digital transmission of television signals provides several advantages compared with analog transmission, by enabling better quality picture and sound reception as well as other new services. In addition, digital transmission uses the radiofrequency spectrum more efficiently than analog transmission. This increased efficiency makes multicasting, where several digital television signals are transmitted in the same amount of spectrum as one analog television signal, and HDTV services possible. But, to implement digital transmission, upgrades to transmission facilities, such as television towers, are necessary, and consumers must purchase a digital television or a set-top box that will convert digital signals into an analog form for viewing on existing analog televisions.

Both the United States and Germany have programs in place to complete the transition from analog to digital television. In the United States, the Congress and FCC provided television stations with additional spectrum to transmit both an analog and digital signal, and set a deadline for the shutoff of the analog signal at the end of 2006, or when 85 percent of households can receive the digital signal, whichever is later. In Germany, the federal government set a deadline of 2010 for the shutoff of analog signals and did not provide spectrum for an extended simulcast period. Each Media Authority (there are a total of 15 throughout Germany) decides on the specific timing of the terrestrial transition. The city of

Berlin, Germany, and its surrounding metropolitan area initiated digital terrestrial transmissions in November 2002 and shut-off all analog signals in August 2003.

German Television Market Is Characterized by Central Role of Public Broadcasting and Is Regulated Largely at the State Level

We were told that regulation of the German television market is primarily the responsibility of state government, with the federal government exercising only limited authority to regulate this market. Television broadcasting in Germany is commonly characterized as a “dual system” in which public and private broadcasting coexist, with each market segment consisting of two dominant broadcasting entities. Both segments are subject to the broadcasting laws passed by the respective German states. Although terrestrial broadcasting was once the only means by which German households received television program signals, today only 5 to 7 percent of these households rely on terrestrial broadcasting, with the remainder using cable or satellite service for the reception of television signals.

Federal and State Government Agencies Have Important Roles in Television Regulation

The federal government exercises important but limited authority in regulating television broadcasting, leaving the state (called *Länder*) governments with the primary responsibility for broadcasting regulation. At the federal government level, the Ministry of Economics and Labour is responsible for establishing and advancing general objectives in the telecommunications sector, such as the promotion of new technologies and innovation, and ensuring competition among providers of telecommunications services. In the context of the DTV transition, the Ministry led the effort in Germany to develop and recommend a strategy for the transition from analog to digital radio and television broadcasting. A separate federal entity, the Regulatory Authority for Telecommunications and Posts (RegTP), established in 1998, is responsible for technical aspects in the provision of telecommunications services, including management of Germany’s radiofrequency spectrum allocations, the development of standards for the distribution and use of telecommunications systems, and testing of electronics equipment. RegTP is playing a key role in the DTV transition in Germany by establishing procedures for and assigning frequency allocations to roll out digital video broadcasting service.

Federal and state government officials told us that the authority to directly organize and regulate broadcasting services rests with each of the regional governments as part of their jurisdiction over educational and cultural matters. In each of the German states, a “Media Authority” serves as the

primary regulatory authority over radio and television broadcasting services.³ Charged with implementation of their respective state-enacted broadcasting laws, the 15 Media Authorities are independent agencies and are not considered to be part of the state government administrations. Among the most important functions of the Media Authorities is the establishment of procedures for assigning broadcast frequencies allocated by RegTP to public and private broadcasters.⁴ The Media Authorities also have a significant role in overseeing the transition to digital television.

Broadcasting laws and regulations in Germany are affected to some extent by actions of the European Union (EU). Although Germany and other EU-member states manage their own broadcasting policies, rules and guidelines are set at the EU level on matters that involve common interests, such as open borders, fair competition, and a commitment to public broadcasting. In the EU's Action Plan to stimulate advanced services, applications, and content, EU member states are encouraged to have a strategy for the DTV transition with an assessment of market conditions, a date for the switchoff of analog terrestrial broadcasting, and a platform-neutral approach that takes into account the competing cable, satellite, and terrestrial delivery platforms.

German Television Market Dominated by Two Public Stations Groups and Two Commercial Stations Groups

Terrestrial, or over-the-air, television in German is commonly characterized as a "dual system" in which public and private broadcasting coexist, with each market segment consisting of two dominant broadcasting entities. Public broadcasting corporations are the creation of the states, but operate largely as self-regulated entities. At the regional level, the German states have formed regional public broadcasters that operate their own television channels with regional-specific programming. The regional public broadcasters also formed a national network in 1950 known as ARD. ARD provides a nationwide broadcast channel (Channel 1), with some of its programming supplied by these regional broadcasters. A second nationwide public broadcasting channel, ZDF, was formed directly by the German states in 1961 as an independent, nonprofit

³The states of Berlin and Brandenburg have jointly formed a single media authority.

⁴Because broadcasting frequencies do not respect state jurisdictional boundaries, an "Interstate Agreement on Broadcasting" was entered into by the states to harmonize disparate provisions of state broadcasting laws. The treaty addresses matters related to the protection of children, advertising content and sponsorship, and specific aspects of public broadcasting and private broadcasting.

corporation. In addition to their own channels, ARD and ZDF jointly operate four additional public television channels that are broadcast in various parts of Germany. We were told that approximately 40 percent of television viewing in Germany is of the various public channels provided by ARD and ZDF.

The public broadcasters are given one frequency each by the Media Authorities for the terrestrial broadcast of their programming channel. Their primary source of revenue derives from a compulsory monthly fee paid by owners of radios and television sets.⁵ The amount of the fee is set jointly by the states, based on a recommendation of an independent panel, and is set at 16 Euro (\$19.68) per month for each household.⁶ We were told that this amounts to about 6 billion Euro (\$7.38 billion) annually. ARD receives slightly less than two-thirds of the fee revenues and allocates shares among its regional broadcasters, while ZDF receives about one-third of the total fee revenues. Two percent of the total fee revenue is distributed to the 15 Media Authorities. ARD and ZDF generate additional revenues from limited on-air advertisements. However, they are restricted to a maximum of 20 minutes of advertising per day before 8:00 p.m. and are precluded from any advertising on Sundays and holidays.

The introduction of private television broadcasting in Germany is a relatively recent development. In the early 1980s, additional spectrum frequencies were made available for the opening of private television broadcasting. Today, two broadcasting groups—RTL Group and ProSiebenSat.1 Media—dominate this segment of the television broadcasting market, each operating multiple channels. Unlike their public broadcasting counterparts, private broadcasters must obtain licenses from relevant Media Authorities. Because frequencies are limited, not all private broadcasters operate nationally, and with the growth of cable and satellite systems, some have chosen not to renew terrestrial licenses in all locations. In particular, private broadcasters often do not provide terrestrial service in rural areas. Private broadcasters generate all of their revenues from advertising and receive no payments from the fees paid by owners of radios and television sets.

⁵The fee may be waived for welfare recipients and low-income households. Collected by a special agency known as GEZ (Gebuhreneinzugszentrale), the fee is based upon a treaty entered into by the German states.

⁶We were told that the 16 Euro (\$19.68) fee is in some cases assessed for a second or third television set in a home if an adult child in the home owns the television.

German Television Is Available on Three Platforms: Terrestrial, Cable, and Satellite

Although terrestrial broadcasting as described above was once the only means by which German households could receive television program signals, there are currently three methods for television delivery—terrestrial broadcasting, cable television service, and satellite service. Terrestrial broadcasting, in fact, is now the method least relied upon by German television households for receiving program signals—only about 5 to 7 percent of German households rely exclusively on terrestrial television. Some German households that receive their primary television signals by satellite or cable may have a second or third set in the household that is used only for terrestrial reception. Households relying on analog terrestrial broadcasting receive between 3 to 12 channels, with an average of 5 to 6 channels. The primary transmitter networks that transmit television broadcast signals from various towers throughout the country are owned and operated by Deutsche Telekom. Broadcast stations pay Deutsche Telekom to transmit their terrestrial signals. ARD also owns a network of terrestrial broadcast towers for its own operations.

Introduced in the early 1980s, cable television service is now the dominant method for the delivery of television programming in Germany: about 60 percent of the households subscribe to a cable system. Like terrestrial broadcasting in Germany, the 15 Media Authorities regulate cable television service in their respective areas. The state media laws set forth the must-carry requirements in each region, which specify the broadcast stations that cable providers are required to carry on their systems.⁷ We were told that these regulations vary considerably by region, with some areas requiring cable systems to carry nearly all public and private stations, and other areas imposing significantly fewer must-carry responsibilities on cable systems. To be carried by a cable operator, however, public and private broadcasters must pay a carriage fee to the cable operator, which is negotiated directly between the parties. Typical cable systems in Germany were constructed for the provision of analog service, provide about 30 to 33 channels of analog programming, and cost

⁷These must-carry requirements can apply to stations that are broadcast terrestrially and stations that are not broadcast terrestrially.

subscribers less than 15 Euro (\$18.45) per month. It is often the case that this fee is included in the household's rent.⁸

The third method of distribution of television programming is through satellite service, which today is received by an estimated 35 percent of German television households. According to RegTP, to provide satellite television service in Germany, a license to use the necessary spectrum is required by the agency. Also, any broadcast station that wants to be carried on a satellite system must obtain authorization to do so from one of the Media Authorities. The predominant provider of satellite television service in Germany is ASTRA, a Luxembourg-based company that provides satellite service throughout Europe. In order for a broadcast channel—whether a public station or a private station—to be carried by a satellite provider, a contractual agreement is reached between the broadcaster and the satellite provider that gives the right to the satellite provider to rebroadcast the signal, but requires the broadcast station to pay a fee for that carriage. For viewers, satellite service is available free of charge; however, viewers must purchase the equipment needed in order to receive programming. In addition, they must be able to situate the satellite dish toward the southern sky to receive the transmission signal from the geostationary satellite. The costs for a satellite dish and related equipment are estimated at less than 200 Euro (\$246.04). Satellite television service provides viewers in Germany with approximately 125 channels, about 60 of which are in German.

⁸The ownership of German cable systems is somewhat more complex than in the United States. While in the United States, there is only one entity that distributes programming from the cable headend to customers, more than one entity may own portions of the cable infrastructure in Germany. That is, one cable company may own the infrastructure and transmit signals from the headend into neighborhoods, but another may own the distribution network within an apartment building—in which a much higher percentage of Germans live compared with the United States. Although there is only a limited number of companies in Germany that own the portion of the cable infrastructure from the headend into neighborhoods, we were told there are thousands of entities that own facilities that reach individual households.

Berlin Officials and Industry Participants Engaged in Extensive Planning for the Rapid DTV Transition in the Berlin Test Market

In Germany, government officials and industry participants are implementing the DTV transition to improve the viability of terrestrial television in the face of a low and declining share of households that rely solely on terrestrial television. Several elements of the DTV transition will apply throughout Germany, including an island based approach, where the DTV transition will occur separately in different metropolitan areas, and the adoption of standard-definition digital television.⁹ In Berlin, extensive planning facilitated the rapid DTV transition. Important elements of the Berlin DTV transition included a short simulcast period, financial and nonfinancial support provided to private broadcasters, subsidies provided to eligible low-income households for set-top boxes, and an extensive consumer education effort. While the Berlin DTV transition is generally viewed as successful, it is unclear whether a full DTV transition will occur throughout Germany.

German DTV Transition Was Largely Designed to Preserve Terrestrial Television

A primary rationale for the German DTV transition was to preserve terrestrial television in the face of a low and declining share of households that rely solely on this method of television reception. As mentioned previously, fewer than 10 percent of German households rely solely on terrestrial television, and the share has been rapidly declining in recent years. Since broadcasters reach over 90 percent of German households through cable and satellite service, concerns arose about the continued costs associated with the transmission of terrestrial television relative to the number of viewers. By increasing the number of television channels delivered terrestrially, the DTV transition was seen as a means to improve the viability of terrestrial television. Because there was concern that terrestrial viewership would continue to decline, German regulators decided that any DTV transition would need to occur relatively quickly.

Some industry participants in Germany suggested that a switch-off of terrestrial television might be the better course. These parties argued that terrestrial television is costly and that German households have both cable and satellite as alternatives. Further, cable service is offered at reasonably low prices and satellite service is completely free of charge once the

⁹As mentioned previously, DTV functions through the transmission of pictures and sounds in streams of digits consisting of zeros and ones, which reduces interference, improves picture and sound quality, and makes new services possible. HDTV is a type of DTV that provides significantly enhanced picture and sound quality, with up to 1,080 lines of resolution compared with 480 in analog television. We refer to standard-definition digital television to identify digital television that is not of the high-definition variety.

satellite dish and receiver have been installed. Ultimately, however, German regulators decided to proceed with a DTV transition.

The transition provided benefits for both consumers and broadcasters. For consumers, the presence of digital terrestrial television ensures that consumers maintain a choice of three mechanisms to receive television service. We were told that this choice is important in cities such as Berlin, where many people cannot receive satellite service and, without terrestrial television, would be dependent on cable service. Further, one consumer group noted that digital terrestrial television allows consumers to avoid paying a fee for cable service while receiving a similar number of channels as they would with cable service. For broadcasters, the presence of terrestrial television provides a third mechanism for the transmission of their signals. We were told that this helps keep the fees that broadcasters must pay to cable companies to carry their signals lower than would be the case if broadcasters were reliant solely on cable and satellite for the transmission of their signals.

Certain Decisions about the DTV Transition Will Apply Throughout Germany

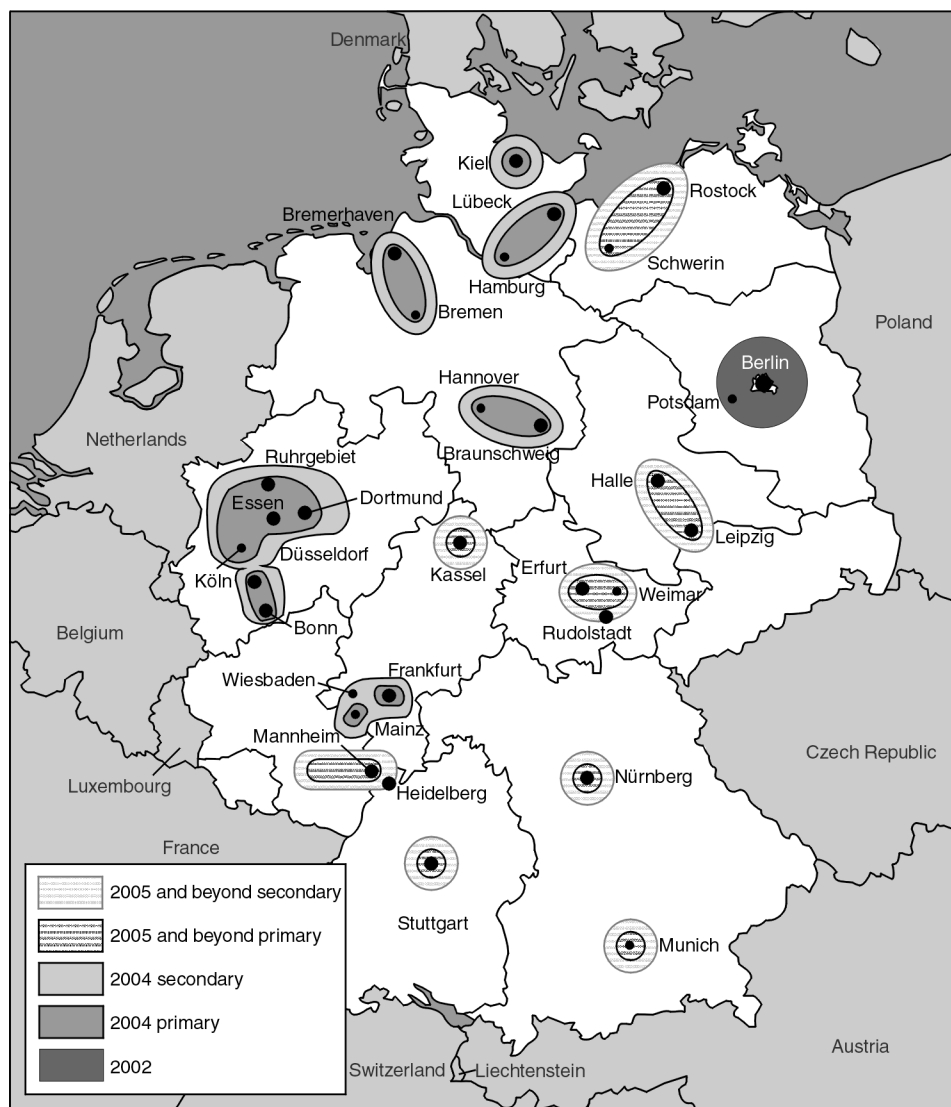
In Germany, the Digital Broadcasting Initiative (the Initiative) establishes a nationwide framework for digital broadcasting. The federal government established the Initiative in 1997, and the federal Ministry of Economics and Labour and the Länder (or states) chair and deputy chair, respectively, the Initiative. Other members of the Initiative include representatives of the federal and state governments; public and private broadcasters; content providers; cable, satellite, and terrestrial operators; equipment manufacturers; and consumer groups. The Initiative develops strategies for digital broadcasting, including terrestrial television and radio, cable, and satellite service. The Initiative set a deadline for the DTV transition of 2010; this date is a strategy or recommendation, and not set forth in German law.

The Initiative developed different strategies for television and radio, cable, and satellite service, and the DTV transition occurring throughout Germany at this time only focuses on terrestrial television. Thus, only households that rely solely on terrestrial television—about 160,000 in Berlin—were required to purchase equipment in order to be able to continue to receive terrestrial television service on their existing analog televisions. Households that rely on cable or satellite service were unaffected by the DTV transition because cable and satellite providers converted the signals to ensure that households receiving their service could continue to view the signals without any additional equipment. Although, households that

receive cable or satellite service would require equipment for televisions in their homes that are not connected to the cable or satellite service.

The Initiative determined that the German DTV transition would occur through an island-based approach, in which each island will transition independently to digital terrestrial television. Each island is a major metropolitan area, such as Berlin or Munich. Figure 1 illustrates the various islands in Germany and the actual or planned year for the DTV transition. We were told that Germany adopted this approach because the DTV transition could not be achieved throughout the entire country simultaneously; officials thought that a nationwide DTV transition would be too big to manage at one time. Additionally, by adopting the island approach, German officials gained experience with the DTV transition, and thereby were able to assess whether the public would accept terrestrial digital television. Several officials told us that the islands will eventually grow together, and the DTV transition will encompass the entire country. However, we were also told that had the Berlin DTV transition not been a success, the transition in other areas may have been reevaluated and may not have gone forward.

Figure 1: Actual and Planned Start Date for German DTV Islands



Source: GAO analysis based on 1992 MAGELLAN GeographixSMS Santa Barbara, CA; DVB-T-Projekte/IDR-BNA.

Note: Primary refers to areas with reception via room antenna, and secondary refers to areas with reception via outside antenna.

In addition to the island-based approach, Germany decided to adopt standard-definition digital television, instead of high-definition digital television.¹⁰ The government and industry officials with whom we spoke cited several advantages of standard-definition digital versus high-definition digital for Germany.¹¹ First, the equipment that consumers must purchase for standard-definition digital is generally less expensive than the equipment necessary for high-definition digital.¹² Second, with high-definition digital, broadcasters must install more costly equipment and incur higher transmission costs than would be the case with standard-definition digital. Finally, German officials believe that terrestrial television with a standard-definition digital signal is more competitive with cable and satellite than it would be with a high-definition digital signal. These officials noted that the increase in competitiveness of terrestrial television derives from its mobility and the increased channels available with standard definition digital. In particular, officials we spoke with noted that standard-definition digital technology allows multiple channels to be shown with the same amount of spectrum that was previously used to transmit one analog terrestrial channel. Thus, terrestrial television in Berlin now offers nearly as many channels to viewers as they receive on their cable systems. This greater number of channels combined with the mobility of terrestrial television—a feature not available with cable or satellite that enables consumers to take their television to their boats and garden homes—was seen as a factor that would make terrestrial television more attractive relative to cable or satellite service.¹³

Finally, German officials did not plan for the return of spectrum following the DTV transition. Germany has allocated a limited amount of spectrum for terrestrial television, and all the analog frequencies have been dedicated to digital television. As previously mentioned, broadcasters

¹⁰The digital standard that Germany adopted supports both standard-definition and high-definition digital television. However, Germany decided to implement standard-definition digital television.

¹¹The advantages of high-definition digital primarily relate to the picture quality. High-definition digital provides roughly twice as many lines of resolution, creating a television picture that is much sharper than analog television. Further, high-definition digital is in wide-screen format, with display screen ratios similar to a movie theater.

¹²Consumer groups generally opposed the introduction of high-definition television because of these higher costs and the fact that high-definition digital only provides benefits with large-screen televisions.

¹³The German digital standard also permits indoor reception. Thus, households in the central areas of the islands do not need to modify or install a rooftop antenna.

intend to use the spectrum for multiplexing—providing four digital channels in the same amount of spectrum that they previously provided one analog channel. However, if all multiplexes are not used, some spectrum could be returned to the government. But, it is not clear that this spectrum could or would be assigned to a different use, such as mobile telephone or Internet access.

mabb and Industry Participants Engaged in Extensive Planning for the Berlin DTV Transition

mabb, the Media Authority that regulates radio and television in the states of Berlin and Brandenburg, made several key decisions about how the DTV transition would occur in the area under its authority.

When to undertake the DTV transition. Each of the 15 Media Authorities throughout Germany made decisions about when to undertake the DTV transition within their region. Berlin was the first of Germany's islands to undertake the DTV transition.¹⁴ We were told that Berlin had several characteristics that made it favorable to serve as a test market for the DTV transition. First, the percent of households that rely solely on terrestrial television is relatively low in Berlin. Since the DTV transition in Germany requires only equipment modifications for terrestrial televisions, the number of households affected was relatively small—only about 160,000 households—and the transition more manageable. Second, Berlin had more spectrum dedicated to television because spectrum that had been used by both East and West Berlin was all still allocated to terrestrial television use. Third, because Berlin is not near other major cities, no signal interference concerns arose in the area, as they might for cities such as Bonn or Cologne, which are near other cities and the German border with other countries. Finally, Berlin also has fairly simple topography—it is basically flat—enabling easier transmission of television signals.

Length of Simulcast. mabb and industry participants implemented the DTV transition in the Berlin area with a short simulcast period. The DTV transition agreement negotiated between mabb and the broadcasters specified a three-phase simulcast process:

- On November 1, 2002, the simulcast period commenced as digital signals for some of the stations of both public and commercial broadcasters began to be transmitted. Berlin officials dedicated two additional channels

¹⁴By the end of 2004, eight islands plan to have digital terrestrial television, including Berlin, Cologne and Bonn, Düsseldorf and Ruhrgebiert, Hannover, Bremen, Frankfurt, Hamburg and Lübeck, and Kiel.

for the simulcast, with each of these channels carrying four multicast digital stations. Thus, eight of Berlin's eleven analog stations were initially simulcast.

- On February 28, 2003, five previously analog channels were converted to digital channels, with each channel carrying multiple stations. Thus, the digital signals of more stations were turned on, including stations that were not previously available terrestrially in Berlin. The analog transmission of all national private broadcasters stopped, and public broadcasters transitioned their analog signals to lower-power analog frequencies.
- On August 8, 2003, all analog transmission stopped.

The government and industry officials with whom we spoke with cited several reasons for the short simulcast period. First, Germany does not have enough spectrum dedicated to television service to implement a long simulcast period while also providing additional stations; the spectrum used for analog transmission is the same spectrum that will be used for digital transmission. Second, an extended simulcast period is costly for broadcasters, who, as mentioned earlier, must pay for terrestrial transmission. Third, a quick and certain shutoff date provides an incentive for households to purchase the necessary set-top boxes. German federal officials and other Media Authorities are generally encouraged by the success of the short simulcast period in Berlin. In the state of North-Rhine Westphalia, the Media Authority intends to implement a 6-month simulcast period for public broadcasters, with no simulcast period for private broadcasters, in the state's two islands.

Private broadcaster support. mabb made the decision to provide financial and nonfinancial support to private broadcasters. Public broadcasters were able to finance their transition costs through the radio and television license fee they receive. Private broadcasters, on the other hand, do not receive license fees, but were viewed as important participants in the DTV transition. Therefore, mabb decided to provide support to private stations, which consisted of three elements. First, for 5 years, mabb will pay the broadcasters' incremental costs associated with digital transmission (i.e., mabb will pay the difference between the broadcasters' former analog transmission costs and their digital transmission costs). In return, the private broadcasters agreed to provide digital terrestrial television for at least 5 years. Second, as incumbent broadcasters, the private broadcasters received authority to provide multiplexed service. That is, the private broadcasters were allowed to increase the number of terrestrial channels

they provide in Berlin using the spectrum they were already assigned.¹⁵ Third, one broadcaster told us that in return for participating in the DTV transition in the Berlin island, it received favorable must-carry status throughout the region that mabb regulates—that is, mabb will require that its stations be carried on cable systems in the region. At this time, it is not clear whether and to what extent the other Media Authorities plan to provide similar support for private broadcasters' DTV transition in other regions.¹⁶ One private broadcaster told us that it would be unwilling to participate in the DTV transition in other islands if it does not receive the multicast authority.

Subsidy of set-top box for needy households. In addition to supporting private broadcasters, mabb provided support to certain households for the purchase of set-top boxes. According to mabb, the overriding principle was that households must pay for the set-top boxes necessary to watch terrestrial digital broadcast signals. However, mabb made contingencies for low-income households. Households that were entitled to government aid could apply to the Social Welfare Office for assistance. If the household met the income eligibility criteria and relied solely on terrestrial television (i.e., the household did not receive cable or satellite service), the household received a voucher for a free set-top box. Qualifying households received their set-top box either from specified retailers, or the box was delivered to their home, whichever means was least costly. During the DTV transition period, mabb paid 75 percent of the subsidy cost and the Social Welfare Office paid the remaining 25 percent of the subsidy cost. mabb funded its share of the subsidy through the portion of the radio and television license fee that it receives, while the Social Welfare Office funded its share of the subsidy through its regular budget. Following the transition period, the Social Welfare Office began paying the entire cost of the subsidy, up to 129 Euro (\$158.70). According to mabb, a total of 6,000 set-top boxes were provided to needy households with a total cost of 500,000 Euro (\$615,100).

Extensive consumer education. mabb and industry participants conducted an extensive consumer education effort. One official told us that a primary concern with the DTV transition is making sure that

¹⁵Public broadcasters were also allowed to provide multicast service.

¹⁶The private broadcasters that we spoke with told us that they do not anticipate receiving financial support in Germany's northern states, since the anticipated digital transmission costs will be similar to the existing analog transmission costs.

households that rely solely on terrestrial television understand that they must do something to be able to continue receiving television. In Berlin, two important consumer education mechanisms were messages on terrestrial-only television signals and information sessions with retailers. On television signals received by terrestrial television, households saw a rolling scroll that informed them about the DTV transition. Deutsche TV-Plattform and the Berlin Chamber of Commerce also held information sessions with retailers. Other consumer education mechanisms included a direct mailing to every household, a consumer hotline, flyers and newsletters, an Internet Web site, and advertisements on buses and subways.¹⁷ One primary concern with the consumer education effort was to avoid confusing cable and satellite subscribers. Because the DTV transition only affected households relying solely on terrestrial television, the consumer education effort focused on means that would target only these households, and not households subscribing to cable and satellite service. We were also told that a short consumer education period was best for informing households about the DTV transition; in Berlin, the consumer education effort lasted approximately 4 weeks and cost approximately 800,000 Euro (\$984,160).¹⁸

The Berlin DTV Transition Is Generally Viewed as Successful, but Full DTV Transition May Not Occur in Rural Areas

Relatively few consumer complaints and problems arose during the Berlin DTV transition. For example, a consumer organization that we spoke with told us that there were very few complaints, and that most complaints that did arise concerned the cost of the set-top box, which they said was approximately 100 to 125 Euro (\$123.02 to \$153.78).¹⁹ We were also told that there were minor technical problems and few reception problems. An mabb official with whom we spoke thought that reception had improved following the DTV transition, because the agency ensured a strong digital signal and because digital transmission is superior to analog transmission. The technical and reception problems that did arise included difficulties installing and using the set-top box; reception problems in some multiple-dwelling units, particularly ground-floor units and buildings with rooftop antennas and boosters; and interference problems for some cable subscribers because of the strength of the digital signal.

¹⁷We were told that the direct mailing was expensive and not very effective.

¹⁸This figure does not include the value of commercial time that broadcasters devoted to the DTV transition.

¹⁹This consumer organization did mention that the DTV switchover could be expensive for households with multiple televisions, as each television would need a separate set-top box.

During the Berlin DTV transition, some households changed the mechanism through which they receive television service. We were told that between one-third and one-half of households that previously relied solely on terrestrial television switched to either cable or satellite service, rather than purchase the set-top box. An official with mabb told us that the percent of households switching from terrestrial television to cable and satellite was less than they had expected. On the other hand, more set-top boxes—over 200,000—were sold than the number of former terrestrial-only households, indicating that some households purchased multiple boxes, and that some cable and satellite households also purchased set-top boxes for a second or third television that only received terrestrial service. We were also told that relatively few cable subscribers switched to terrestrial television following the DTV transition. As previously mentioned, cable payments are often included in the household's rent payment and some cable contracts are long-term in nature, thereby reducing the incentive and flexibility that some households have to switch away from cable service. Some industry officials told us, however, that they expect some cable subscribers to switch to terrestrial service in the longer term.

The government, industry, and consumer representatives with whom we spoke mentioned several factors as contributing to the success of the Berlin DTV transition. These factors include the following:

- The DTV transition provided enhanced consumer value for Berlin households. The number of channels available through terrestrial television increased from approximately 11 to 27 and included an electronic program guide.
- The government and broadcasters did not have to finance the new programs. The new channels available through terrestrial television following the DTV transition already existed on cable and satellite systems.
- There was good cooperation between the government officials and broadcasters, which helped ensure that consumers received additional channels.
- The transition affected a relatively small percentage of Berlin households; only households that relied solely on terrestrial television—less than 10 percent of Berlin households—had to take action to avoid losing their television service.

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- The set-top boxes were relatively inexpensive, and the price fell throughout the transition period.
 - There was a scheduled time line for the DTV transition and a firm shutoff date.
 - There was good communication to consumers about the DTV transition.

While the Berlin DTV transition appears successful, a full DTV transition might not extend throughout Germany. Government and industry officials with whom we spoke said that private broadcasters will most likely not provide digital service in rural areas outside the islands, but that public broadcasters will provide digital service in these areas. This is not entirely different than the current situation with analog television, where the private broadcasters do not provide terrestrial television in all areas of the country. However, it does raise the possibility that a full DTV transition, including the digital terrestrial transmission of both public and private broadcasters, might not occur throughout Germany.

Finally, some groups we spoke with identified problems with the Berlin DTV transition. The cable television industry in Germany mentioned several problems. Cable industry officials with whom we spoke objected to the use of the radio and television license fee for the DTV transition. These officials told us that all German households pay the license fee, but only terrestrial households in the islands benefit from the DTV transition. In fact, the cable industry has petitioned the European Commission about the use of the license fee for the DTV transition. Other problems noted by the cable industry officials with whom we spoke include cable subscribers purchasing set-top boxes by mistake and the expense and problems cable operators incurred to upgrade their headend facilities to receive the digital signal. Regarding the set-top box subsidy, the Social Welfare Office thought that the process could have been handled a little better. In particular, it found that approximately 20 percent of the applications for subsidies were not handled adequately, most often because they were incomplete or missing signatures.

Need for Set-Top Box Deployment Is Key Challenge in Germany and in the United States

Based on our examination of the DTV transition in Berlin and other areas of Germany, it is clear that the manner in which DTV is to be rolled out is considerably different than in the United States. Nevertheless, we found that much of the focus in Berlin leading up to and during the simulcast period was on making sure that consumers who receive television solely through terrestrial means obtain the necessary set-top boxes so that they would be able to view DTV signals once the analog signals were turned off. Since the DTV transition in the United States is already in a simulcast phase—that is, most digital broadcast television signals are already being transmitted—the phase of encouraging consumers to adopt DTV equipment is upon us. FCC has yet to fully determine how cable and satellite households will count toward the 85 percent threshold. Ultimately, the Congress and FCC will need to turn their attention to providing information, incentives, and possibly assistance to those who need to purchase equipment in order for the transition—and the return of valuable spectrum—to be completed. Ensuring that consumers understand the transition, how they will be affected by it, and what steps they need to take is critical not only for ensuring the transition moves forward, but for ensuring that consumers do not unexpectedly lose television reception or incur costs beyond what is necessary to successfully transition to digital television.

The Berlin experience highlights a few factors, which relate to consumers' purchase of set-top boxes, that were very important for the success of the DTV transition in that city:

- *Information provided focused a great deal on need for set-top box and benefits of completing the transition.* The Berlin authorities and broadcasters provided extensive information to the public, the media, and retailers about what the transition would entail, what consumers needed to do, how they would benefit by transitioning to digital television, and where to get assistance if there was confusion about what equipment was necessary or if there were problems with equipment or reception. This effort was planned and coordinated among many parties, adequate resources were dedicated to the information campaign, and nearly everyone we spoke with told us it a critical factor to the success of the rapid DTV transition in Berlin.
- *Set-top boxes were subsidized for needy households.* Subsidies were provided to certain households that might have had difficulties affording the necessary set-top boxes. In particular, low-income households that rely on terrestrial television could apply for financial assistance for the purchase of a set-top box. Because of the low penetration of terrestrial

television, only about 6,000 households required this subsidy at a cost of about half a million Euro (\$615,100). Nevertheless, this may have helped in the management of the transition by ensuring that the transition would not be an undue burden for lower-income households.

- *Near-term date certain for transition deadline made clear when set-top boxes would need to be in place.* Finally, the Media Authority in Berlin set a date certain for the transition that required consumers to make decisions quickly about how they would adapt to the transition. This enabled all stakeholders to know what they needed to work toward: when set-top boxes needed to be available in the market; when education of consumers, hotlines, and TV scroll information would be required; and the date by which consumers needed to decide how to transition or lose their television service.

To summarize my statement, Mr. Chairman, although the context of the transition differs considerably in Germany as compared with the United States, there may be interesting and helpful lessons for the Congress and FCC from the DTV transition in Berlin and other areas of Germany. This concludes my prepared statement. I would be happy to respond to any questions that you or other Members of the Subcommittee may have at this time.

GAO Contacts and Staff Acknowledgments

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