THE DIGITAL TELEVISION TRANSITION: WHAT WE CAN LEARN FROM BERLIN

HEARING

BEFORE THE

SUBCOMMITTEE ON TELECOMMUNICATIONS AND THE INTERNET

OF THE

COMMITTEE ON ENERGY AND COMMERCE

HOUSE OF REPRESENTATIVES

ONE HUNDRED EIGHTH CONGRESS

SECOND SESSION

JULY 21, 2004

Serial No. 108–101

Printed for the use of the Committee on Energy and Commerce

Available via the World Wide Web: http://www.access.gpo.gov/congress/house

U.S. GOVERNMENT PRINTING OFFICE

95–459PDF WASHINGTON : 2004

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2250 Mail: Stop SSOP, Washington, DC 20402–0001

COMMITTEE ON ENERGY AND COMMERCE

JOE BARTON, Texas, *Chairman*

W.J. "BILLY" TAUZIN, Louisiana
RALPH M. HALL, Texas
MICHAEL BILIRAKIS, Florida
FRED UPTON, Michigan
CLIFF STEARNS, Florida
PAUL E. GILLMOR, Ohio
JAMES C. GREENWOOD, Pennsylvania
CHRISTOPHER COX, California
NATHAN DEAL, Georgia
RICHARD BURR, North Carolina
ED WHITFIELD, Kentucky
CHARLIE NORWOOD, Georgia
BARBARA CUBIN, Wyoming
JOHN SHIMKUS, Illinois
HEATHER WILSON, New Mexico
JOHN B. SHADEGG, Arizona
CHARLES W. "CHIP" PICKERING, Mississippi, *Vice Chairman*
VITO FOSSELLA, New York
STEVE BUYER, Indiana
GEORGE RADANOVICH, California
CHARLES F. BASS, New Hampshire
JOSEPH R. PITTS, Pennsylvania
MARY BONO, California
GREG WALDEN, Oregon
LEE TERRY, Nebraska
MIKE FERGUSON, New Jersey
MIKE ROGERS, Michigan
DARRELL E. ISSA, California
C.L. "BUTCH" OTTER, Idaho
JOHN SULLIVAN, Oklahoma

JOHN D. DINGELL, Michigan *Ranking Member*
HENRY A. WAXMAN, California
EDWARD J. MARKEY, Massachusetts
RICK BOUCHER, Virginia
EDOLPHUS TOWNS, New York
FRANK PALLONE, Jr., New Jersey
SHERROD BROWN, Ohio
BART GORDON, Tennessee
PETER DEUTSCH, Florida
BOBBY L. RUSH, Illinois
ANNA G. ESHOO, California
BART STUPAK, Michigan
ELIOT L. ENGEL, New York
ALBERT R. WYNN, Maryland
GENE GREEN, Texas
KAREN McCARTHY, Missouri
TED STRICKLAND, Ohio
DIANA DeGETTE, Colorado
LOIS CAPPS, California
MICHAEL F. DOYLE, Pennsylvania
CHRISTOPHER JOHN, Louisiana
TOM ALLEN, Maine
JIM DAVIS, Florida
JANICE D. SCHAKOWSKY, Illinois
HILDA L. SOLIS, California
CHARLES A. GONZALEZ, Texas

BUD ALBRIGHT, *Staff Director*
JAMES D. BARNETTE, *General Counsel*
REID P.F. STUNTZ, *Minority Staff Director and Chief Counsel*

SUBCOMMITTEE ON TELECOMMUNICATIONS AND THE INTERNET

FRED UPTON, Michigan, *Chairman*

MICHAEL BILIRAKIS, Florida
CLIFF STEARNS, Florida *Vice Chairman*
PAUL E. GILLMOR, Ohio
CHRISTOPHER COX, California
NATHAN DEAL, Georgia
ED WHITFIELD, Kentucky
BARBARA CUBIN, Wyoming
JOHN SHIMKUS, Illinois
HEATHER WILSON, New Mexico
CHARLES W. "CHIP" PICKERING, Mississippi
VITO FOSSELLA, New York
STEVE BUYER, Indiana
CHARLES F. BASS, New Hampshire
MARY BONO, California
GREG WALDEN, Oregon
LEE TERRY, Nebraska
JOE BARTON, Texas, (Ex Officio)

EDWARD J. MARKEY, Massachusetts *Ranking Member*
ALBERT R. WYNN, Maryland
KAREN McCARTHY, Missouri
MICHAEL F. DOYLE, Pennsylvania
JIM DAVIS, Florida
CHARLES A. GONZALEZ, Texas
RICK BOUCHER, Virginia
EDOLPHUS TOWNS, New York
BART GORDON, Tennessee
PETER DEUTSCH, Florida
BOBBY L. RUSH, Illinois
ANNA G. ESHOO, California
BART STUPAK, Michigan
ELIOT L. ENGEL, New York
JOHN D. DINGELL, Michigan, (Ex Officio)

CONTENTS

	Page
Testimony of:	
Cooper, Mark N., Director of Research, Consumer Federation of America	11
Goldstein, Mark L., Director, Physical Infrastructure, U.S. Government Accountability Office	9
Hartenstein, Eddy W., Vice Chairman, DIRECTV Group, Inc	32
Lawson, John M., President and Chief Executive Officer, Association of Public Television Stations	26
McGrath, Carl J., Corporate Vice President and Chief Technology Officer, Broadband Communications, Motorola, Inc	37
Schmidt, Gregory, President of New Development and General Counsel, Lin Television Corporation	15
Snider, James H., Senior Research Fellow, New America Foundation	43
Willner, Michael S., Vice Chairman and Chief Executive Officer, Insight Communications	20
Additional material submitted for the record by:	
National Cable & Telecommunications Association, prepared statement of	63

THE DIGITAL TELEVISION TRANSITION: WHAT WE CAN LEARN FROM BERLIN

WEDNESDAY, JULY 21, 2004

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ENERGY AND COMMERCE,
SUBCOMMITTEE ON TELECOMMUNICATIONS,
AND THE INTERNET,
Washington, DC.

The subcommittee met, pursuant to notice, at 10 a.m., in room 2123, Rayburn House Office Building, Hon. Fred Upton (chairman) presiding.

Members present: Representatives Upton, Stearns, Gillmor, Deal, Shimkus, Pickering, Buyer, Bass, Bono, Terry, Barton (ex officio), Wynn, Boucher, Stupak, and Engel.

Also present: Representatives Burr, Norwood, and Issa.

Staff present: Howard Waltzman, majority counsel; Neil Fried, majority counsel; Will Nordwind, majority counsel and policy coordinator; William Carty, legislative clerk; Gregg Rothschild, minority counsel; and Peter Filon, minority counsel.

Mr. UPTON. Good morning. Cardinal fan, you are in trouble.

Today's hearing is entitled "The Digital Television Transition: What We Can Learn From Berlin."

Mark Twain once said "I don't believe there's anything in the whole earth that you can't learn in Berlin, except the German language." Fortunately, for us today we are simply trying to learn about Berlin's recent experience with implementing a hard date for its DTV transition. This is an important evaluation because there's growing concern that without a hard date, we may never see the timely end to the DTV transition here in the United States.

With public safety—not to mention commercial, wireless carriers—in need of spectrum currently encumbered by broadcasters, time is of the essence. While opinions differ on how to bring the DTV transition to a timely conclusion, I believe that Congress may very well need to act, so we need to explore all the options.

Last month, we examined a proposal by the FCC's Media Bureau which would interpret the 85 percent penetration test in a fashion that gets all of the Nation's broadcasters' analog spectrum back by 2009, while many broadcasters would have to return it well in advance of that. While I still view the Media Bureau's plan as bringing a lot to the table and worthy of our continued attention, some view that plan as fundamentally flawed, particularly it's reliance in its calculations of the 85 percent penetration test on cable companies down converting broadcasters' digital signals to analog at the cable subscriber's home. Others view that plan as not aggressive

enough and still favor a hard date, perhaps as soon as December 31, 2006.

While the DTV transition intimately involves many industries, it is still, above all, about the consumer. And as we debate the terms of the broadcasters' surrender of the analog spectrum, it is critically important that we put ourselves in the shoes of the average American consumer before we act. That's why I, and a number of our my colleagues, on both sides of the aisle, commissioned the GAO to do a study of Berlin's hard date implementation which occurred in August 2003.

We wanted to learn more about this implementation to determine where, if anywhere, we could draw lessons for application here in the U.S., particularly as it relates to the consumers' experience. Based on my review of the GAO's work, I think the title of the GAO testimony today sums it up best, German DTV transition differs from U.S. transition in many respects, but certain key challenges are similar.

To be sure, there are many differences between the TV marketplace in Germany and the TV marketplace here. There are also many differences with respect to the overall DTV transition implementation in our respective nations. Nevertheless, our process can be informed by the Berlin's government implementation of the hard date and its attempt to ease the impact of the transition on its citizens, particularly those who rely solely on over-the-air TV.

Based on Berlin's experience, we should carefully examine both the need and feasibility of providing a subsidy to low income households for the purpose of digital to analog converter boxes. Presumably, such a program could be underwritten by tapping a portion of the proceedings derived from the auction of the reclaimed spectrum. Also, the implementation of such a program, along with a hard date might very well spur mass production of such boxes and over a relatively short period of time bring the price down significantly. That could be very good for every consumer.

While on its face such a program may have considerable appeal, we may need to determine what the scope of such a subsidy should be. Would we limit to low-income households? Would we limit it to one box per household? Would we limit it to those households that rely solely on over-the-air? The answers to those questions could dramatically impact the potential cost and scale of such a program.

Moreover, we have to ask ourselves tough questions about how a program would be administered and whether it could be effectively administered. So I hope that we can begin to answer some of those questions today.

In closing, I want to particularly welcome the GAO with its newly coined name, the Government Accountability Office. I want to congratulate the GAO on a job well done with its testimony and as always, it provided an invaluable resource for the Congress.

And I would yield to my colleague, Mr. Boucher, for an opening statement.

Mr. BOUCHER. Well, thank you very much, Mr. Chairman, I want to commend both you and Chairman Barton of the full committee for the innovative thinking which has led to today's hearing.

I think we all agree that the digital TV transition should be accelerated. We would all welcome an early return of the analog spec-

trum which could then be utilized for a variety of valuable communication services. I think that all of us would also agree that the owners of analog television sets should not find themselves with stranded equipment as the conversion to digital television takes place. It's a difficult balance to strike. Accelerating the digital transition while holding harmless the owners of analog television sets.

The Berlin experience is interesting and while in major respects it does not translate well to the very different characteristics that we have here in the United States, it is certainly worth our examination this morning and I again, commend the Chairman for convening this outstanding panel of witnesses in order to address the subject.

In these remarks this morning, I want to strike a cautionary note and underscore some problems that we would encounter were we to employ the Berlin strategy in this Nation. Berlin used public funds to subsidize the purchase of digital to analog converter boxes for some of its population and I'll underscore the word some in that sentence. The idea of using public funds to purchase set-top converter boxes has a certain appeal. In theory, ample revenues would be available for this purpose when the analog spectrum in the United States is returned to the government by the television broadcasters and then auctioned by the Federal Government. But there are some obvious complicating factors should we attempt this strategy in our country.

First, I would note that Berlin is a city with a high penetration of cable and satellite access, only about 8 percent of the homes in Berlin relied, prior to this transition, on terrestrial television broadcasts. In the United States, at least 15 percent of homes receive their primary television signals over-the-air, and this is very important, in at least 30 percent of homes, one or more television sets receive their signals from over-the-air broadcasts even though other televisions in the home may be connected to satellite of cable. In rural areas of the United States where over-the-air signal reliance is high, cable is often not available at all and local-into-local satellite delivered television service is not offered.

Funding by government means the acquisition of set-top converter boxes in the United States would be far more costly than funding the 6,000 boxes that ultimately were purchased with government subsidies in the city of Berlin. I've seen estimates that in the United States, 20 million analog television sets receive signals today by over-the-air broadcasts. At today's price of $150 per converter box, it would cost $3 billion to fund the conversion, a problem that is of a very different kind than that faced in Berlin.

Second, I think it's far from clear that the Berlin strategy will be carried out in the balance of Germany, including the rural areas of the Nation where more people rely on over-the-air reception. So far, that experience is restricted to the city of Berlin.

Third, only the people who qualified for welfare got public subsidies in the Berlin experiment. Everyone else was basically on their own. Let me say very clearly that that approach absolutely will not work here in the United States. We cannot have a means test if we decide on government funding of converter box acquisition. The owners of analog sets must, in my view, be held completely harmless as this transition occurs.

And fourth, if we adopt a modified Berlin strategy and fully fund the $3 billion cost of buying converter boxes, we have a challenge in making certain that proceeds from the analog spectrum auction actually get spent for the purpose of subsidizing the purchase of the converter boxes.

Our Federal budget is replete with dedicated revenue streams that are frequently under appropriated for their intended purpose: The Highway Trust Fund, the Abandoned Mine Reclamation Fund, the Airport Trust Fund and the list goes on.

As the Representative of an area with a very high percentage of over-the-air signal recipients, I will not be able to support a hard analog transmission cutoff date with public funding for the purchase of converters, unless the measure that mandates the transmission termination also contains an appropriation of money sufficient to fund the entire converter box purchase and I hope we keep that principle in mind should this committee decide to go forward with a measure similar to that in Berlin.

Mr. Chairman, I thank you very much for a stimulating conversation today. I think it is a subject worth our examination and with these notes of caution, I very much look forward to today's testimony. Thank you.

Mr. UPTON. I recognize the chairman of the full committee, Mr. Barton.

Chairman BARTON. Thank you, Mr. Chairman. I appreciate you for holding this hearing. I think it's important that we have a debate on this particular idea of digital transmission in Berlin. I personally believe that we should complete the DTV transition here in the United States as soon as possible. I believe that we can learn much from what happened in Berlin.

Obviously, the German television industry is very different than our own. As the GAO has indicated, Germany and the United States do face the same obstacles in the DTV transitions, however, and that is fear that consumers relying on their old analog sets and over-the-air broadcasts will sit there and watch their television sets literally go blank. Berlin addressed this problem by setting a hard date, educating their consumers, and subsidizing digital to analog converter boxes to help their low-income households. We should consider a similar approach.

The education campaign and hard date would promote the transition by giving industry and consumers the necessary information and importantly, a concrete date for which to plan. The increased auction value that the certainty of a hard date would provide would more than offset the cost of any subsidy of the broadband spectrum. Approximately 12 million households in the United States now rely on over-the-air analog broadcasts. There will likely be many fewer than that by December 31, 2006, as more people buy digital receivers and subscribe to cable and satellite services. If we presume 10 million people will still be relying on over-the-air broadcasting at the time of the hard date, near the December 31, 2006 deadline, you can assume that it would cost as much as $1 billion to provide the set-top box to convert to digital.

One billion dollars is a lot of money and it's nothing to scoff off, but auctioning the reclaimed spectrum with a hard date in place would bring in many, many more times that amount to the United

States Treasury. If a hard date can accelerate the transition, free valuable spectrum for public safety and commercial use would more than cover the cost of a subsidy and still produce additional revenue for the United States Treasury. It's an idea that is well worth considering.

I am encouraged by the FCC Media Bureau's idea to continue for their DTV transition proposal. We discussed that some at our last DTV hearing. However, that proposal does not, and cannot, completely avoid a certain amount of delay that will result from the current statutory provision that requires 85 percent digital penetration before the spectrum can be reclaimed. The time has come to end the bottleneck created by that provision and the Berlin proposal is an idea that has been shown to work.

In contemplating a hard date deadline here in the United States, we have to consider a number of fundamental questions. No. 1, what date should we set? As I've stated in the past, right now, I would favor December 31, 2006 date.

No. 2, should Congress subsidize digital to analog converter boxes? Should the subsidy be available for only one box per over-the-air household? Should it only be available to low-income households? How would Congress administer such a subsidy?

No. 3, should hard deadline legislation also impose other requirements such as multicast, must carry obligations.

Four, should the hard deadline legislation prohibit down conversion?

These are all questions that hopefully we may get some answers to at today's hearing. I look forward to the hearing today and asking questions of our witnesses. I want to thank you all for attending and I hope that we have a very productive hearing. With that, Mr. Chairman, I would yield back.

Mr. UPTON. I recognize the gentleman from the great State of Michigan, Mr. Stupak.

Mr. STUPAK. Mr. Chairman, first, I'd like to commend you and Ranking Member Markey for their dedicated pursuit of digital television future prompted both by the benefits to consumers that digital television has to offer, as well as the desire to turn over spectrum to other important uses.

As co-chairman of Law Enforcement Caucus, I share in the interest that public safety community has in obtaining this spectrum. It's apparent that there is little or no chance of full digital transition by the end of 2006 and further delays in the transition will only hamper efforts to improve communication systems amongst our public safety agencies.

We need to find a way to make this transition happen once and for all. However, I also know that when it comes to the transition to digital television in my rural District in Northern Michigan, the challenge is great. We've had many hearings on this subject and today's discussion will also be informative in helping us to determine the right strategy to implement this transition so that no consumer loses television service while freeing this valuable spectrum for public safety communications.

So with that, Mr. Chairman, those are the areas I'll be focusing on and I look forward to hearing from our witnesses.

Mr. UPTON. Thank you. Mr. Deal.

Mr. DEAL. I'll waive, Mr. Chairman.

Mr. UPTON. Mr. Shimkus.

Mr. SHIMKUS. Thank you, Mr. Chairman. Just briefly, this is really an interesting hearing and I want to thank you for calling it and reading some of the documents in preparation for this. The issue falls down for me, theory and practicality, how do you actually practically do this and move everybody, but also, I'd like the German debate and discussion on the fact that they wanted their broadcasters to have more signals to be competitive to satellite and cable. And we have had the same debate as far as do we still accept the premise of free over-the-air broadcasting? And is there still a need?

So if we want a really competitive market with multiple signals, providing broadcasters a little bit more of spectrum so that they can be really competitive with satellite and cable, may not be a bad idea and so that's why I think this hearing is a good idea, Mr. Chairman. I thank you and I look forward to hearing the testimony of the witnesses.

Mr. UPTON. Mr. Stearns.

Mr. STEARNS. I thank you, Mr. Chairman, and like my colleagues, thank you for holding this hearing. We all recognize the challenges that cable operators, broadcasters, content community, manufacturers and retailers face in making digital television a reality and as such, the light at the end of the tunnel, I think, is starting to grow bigger as the players in the different fields industry are working together to make it a reality. I might point out, Mr. Chairman, in Florida, we have the home of several broadcast companies that focus on programming for under served and distinct constituencies, not just only in the public educational area and the religious area, Spanish language and family friendly area. Many of these stations are smaller and are independent and are not part of the major network groups. I believe their service is invaluable in bringing local and varied viewpoints to my District, State and to the country. And some of these companies are making the transition ahead of the curve, others aren't.

I think we have to, when we look at this transition and what we can learn from Berlin, we must take into account the valuable services of these local and varied broadcasters. For example, a public station in Jacksonville, Florida, WJCT, provides quality, educational programming and a high definition prime time schedule. It's on target to introduce two more broadcast streams focusing on children and lifelong learning and in addition, the local cable provider has offered a commitment to carry four streams of the WJCT programming, just as soon as it is available. That, my colleagues, is the kind of vision and cooperation that's needed in this industry. If they can do it, others certainly should be able to do it in making the successful transition.

It's vital that we ensure that an expedited transition to digital remains a top priority for the government and industry. While progress has been made in broadcast, cable, satellite and consumer electronics, we still lack the certainty of a specific transition date and I think that's the key, despite all of us mandating the termination of analog signal by the year 2006.

Now I'm glad we're looking at how Germany is handling this. I notice that Germany has additional taxes by the government as incentives. I'm not sure we want to do that, but it's worthwhile looking at that. They include the issue of consumers who will likely be left in the dark once analog signals cease. There are many differences and the size and the variability of the U.S. market in terms of broadcasting sources offer, I think, more complex challenges than in Berlin. Still, it's a welcome opportunity to study what happened in Berlin. And I look forward to the testimony and I thank you, Mr. Chairman.

Mr. UPTON. That concludes the testimony. I'm going to make unanimous consent that all members on our panel be allowed to offer their statement as part of the record. So done. And I would just note too that a number of subcommittees are meeting and I've got a mark-up as an example in the Education Committee. There's a very important hearing that Mr. Shimkus has run off to on methyl bromide which is a major agriculture issue. So he's got my proxy on that.

So you're going to see members come in and out, but those opening statements will be part of the record.

[Additional statements submitted for the record follow:]

PREPARED STATEMENT OF HON. BARBARA CUBIN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WYOMING

Thank you, Mr. Chairman.

This is our second hearing in two months on the Digital Television, or DTV, transition. Since Congressional and FCC policies are not crafted in a vacuum, this hearing will give us an opportunity to review the successes and failures of the Berlin digital transition.

Not that the American and German television markets are identical—they aren't. But there are similarities such that we can assemble some lessons learned from the Berlin transition from last August. The matter that affects both transitions is the percentage of residents who are unable to receive the new digital programming over the air when the transition occurs. How we address that situation is very important. Clearly, no Member of Congress wants to be responsible for turning off a television signal.

But there is a need to complete the Digital Transition, as that will free up precious spectrum for important national interests—like first responders and advanced wireless services. The longer this transition drags on, the longer we put off a windfall to the U.S. treasury, and the allocation of highly desirable spectrum assets.

The December 31, 2006 deadline is rapidly approaching. This Committee has heard from many panelists on this matter and is seeking to establish a record of deliberation on how to make the transition a success. There are still difficult decisions to be made, and I believe this requires Congressional action. Inaction, and retention of the current statutory framework for Digital Transition could mean that December 31, 2006 could slip to 2010 or later before we reap the benefits of DTV and advanced wireless services.

That's why I look forward to hearing from our distinguished panel on these matters today and want to continue our dialog as we take the next steps in this transition.

I yield back the balance of my time.

PREPARED STATEMENT OF HON. ELIOT ENGEL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW YORK

Thank you Mr. Chairman,

I am very pleased we are looking into the issue of how to help facilitate the transition to the digital television format. I am truly appreciative that the Chairman of the full Committee has hinted that he supports providing subsidies for at least the neediest among us.

A small step forward has already been made with the FCC's digital tuner requirement. This will turn into a big step when all televisions sold include one.

In reviewing the Berlin model, I find that the most compelling effort was the public education campaign. I suspect that most people, if they have heard of digital television, think it is just for aficionados. They do not understand that, at least under existing law, every analog TV will need to be either replaced or have a set top box attached.

I think we should be looking at producing public service announcements that can be used to educate the American people as to why we are undertaking this enormous change. We are all aware that there is a desperate need for interoperable radio communications for our first responders. The additional spectrum set aside for public safety will help ameliorate this problem greatly. I believe that is one way to start the dialogue with the American people about digital television.

I do want to note that some have advocated a hard date in 2006 to turn off the analog signal. I want to clearly state that the number one media market will not be able to meet such a deadline. Most of our TV transmission facilities are temporarily located atop the Empire State Building. The Empire State Building does not have the electrical capacity for all our needs. We lost our primary location on September 11th and are waiting for the Freedom Tower to be built.— The builders hope that it will be complete sometime in 2008 or 2009. Until then, the people of New York and northern New Jersey will not be at full digital capability. Should an effort be made to set such an early hard date, I would hope that the Chairman would work with me on a waiver.

I want to explore ways that move this process forward more quickly without causing undue harm to our constituents—or our political careers.

PREPARED STATEMENT OF HON. JOHN D. DINGELL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MICHIGAN

Thank you, Mr. Chairman, for calling this hearing.

In August 2003, the state of Berlin, Germany completed its transition to digital broadcasting and successfully shut-down all broadcasting in the analog format. According to news reports at the time, Berlin was able to take this step without damaging its broadcasters and without leaving its residents unable to receive their television broadcast signals.

Shortly thereafter, Mr. Chairman, you, Mr. Tauzin, and I asked the GAO to take a close look at what happened in Berlin and to report back to this Committee on whether there are lessons for us on how to improve upon and, perhaps, expedite the transition here in the United States.

I have reviewed the GAO testimony. Though there are certainly substantial differences in the U.S. and German broadcast markets, there are also many similarities and much that we can learn from the Berlin experience.

First, our top priority must be to protect the consumer and ensure that our constituents are able to continue to receive free-over-the-air television. As in Germany, both government and industry must work in partnership to implement a major consumer education campaign. We must work together to ensure that America's television households are aware of the transition and what they must do to receive digital programming. Government cannot do this without the full participation of the private sector.

Second, we must work to ensure that all households have the financial means to acquire converter boxes or other equipment essential to receiving digital broadcast signals. If the transition results in stranding millions of American homes without the ability to receive their local broadcast signals, we will have failed miserably, and the voters will know who to blame.

Finally, the Berlin transition demonstrated that a firm deadline was essential to focus the attention of industry and consumers. The transition suggests we must at least consider the option of establishing a date-certain for the cessation of analog broadcast signals and the return of the analog spectrum. It is very possible only a hard deadline will induce all parties, including consumers, to make final preparations for the digital conversion. Clearly, there are many questions that must be asked and answered before Congress makes a final decision to adopt such a hard deadline. The hearing today will put the issue squarely before us.

The GAO has done a fine job in researching the Berlin transition. I thank them for their effort, and I look forward to working with you, Mr. Chairman, as we consider legislation in this area.

Mr. UPTON. We are delighted to have the panel that we have this morning. We are joined by Mr. Mark Goldstein, Director, Physical Infrastructure from the U.S. Government Accountability Office; Dr. Mark Cooper, Director of Research, The Consumer Federation of America; Mr. Greg Schmidt; Vice President of the New Development and General Counsel of LIN Television Corporation; Mr. Michael Willner, Vice Chairman and CEO of Insight Communications; Mr. John Lawson, President and Chief Executive Officer, Association of Public Television Stations; Mr. Eddy Hartenstein, Vice Chairman, The DirecTV Group, Inc., Mr. Carl McGrath, Corporate Vice President and Chief Technology Officer of Broadband Communications for Motorola; and Mr. Jim Snider, Senior Research Fellow of The New America Foundation here in Washington.

Gentlemen, your statements are made part of the record in their entirety. We'd like to limit your remarks to about 5 minutes apiece for your opening statement.

And Mr. Goldstein, we'll begin with you. Welcome.

STATEMENTS OF MARK L. GOLDSTEIN, DIRECTOR, PHYSICAL INFRASTRUCTURE, U.S. GOVERNMENT ACCOUNTABILITY OFFICE; MARK N. COOPER, DIRECTOR OF RESEARCH, THE CONSUMER FEDERATION OF AMERICA; GREGORY SCHMIDT, PRESIDENT OF NEW DEVELOPMENT AND GENERAL COUNSEL, LIN TELEVISION CORPORATION; MICHAEL S. WILLNER, VICE CHAIRMAN AND CHIEF EXECUTIVE OFFICER, INSIGHT COMMUNICATIONS; JOHN M. LAWSON, PRESIDENT AND CHIEF EXECUTIVE OFFICER, ASSOCIATION OF PUBLIC TELEVISION STATIONS; EDDY W. HARTENSTEIN, VICE CHAIRMAN, THE DIRECTV GROUP, INC.; CARL J. MCGRATH, CORPORATE VICE PRESIDENT & CHIEF TECHNOLOGY OFFICER, BROADBAND COMMUNICATIONS, MOTOROLA, INC.; AND JAMES H. SNIDER, SENIOR RESEARCH FELLOW, THE NEW AMERICA FOUNDATION

Mr. GOLDSTEIN. Good morning, Mr. Chairman, and members of the subcommittee. I'm pleased to be here today to report on our ongoing work on the DTV transition. The DTV transition offers the promise of more programming options, interactive services and high definition television. To facilitate the transition, the Congress and the Federal Communications Commission temporarily provided television stations nationwide with additional spectrum to broadcast both an analog and a digital signal simultaneously. This simulcast is mandated to end in December 2006 where 85 percent of American households can receive digital broadcast signals. At that time, TV stations will return valuable radio spectrum for public safety and other commercial services. However, as we reported in 2002, the deadline seems unlikely to be met.

In Berlin, Germany, a rapid DTV transition culminated in the shutoff of analog broadcast television signals in August 2003. To gain information on the German television market and the Berlin TV transition, we met with a variety of Federal, State and—with Federal and State government officials in Germany as well as representatives of public television stations, private television stations, cable providers, a consumer group and several other key stakeholders. My statement will summarize our findings.

First, 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 in the telecommunications sector, it manages the allocations of the German radio frequency spectrum, 15 media authorities organize and regulate broadcasting services within their areas of authority. The two public broadcasters, whose broadcasts capture about 40 percent of viewers' time are largely financed through a mandatory television license fee of 16 Euros or the equivalent of $19.68 per household per month. Overall, this fee amounts to about 6 billion Euros, $7.38 billion per year.

Today, only 5 to 7 percent of German households rely exclusively on terrestrial broadcasts and the remaining households obtain either cable service which typically costs less than 15 Euros, about $19 per month, or satellite service which is free once the household has installed the satellite receiving dish and receivers.

Two, 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 return after the transition. The transition only pertains to terrestrial viewers, households that subscribe to cable or obtain satellite television are not affected. Also, German officials made the decision to transition major metropolitan areas, or islands, in particular timeframes rather than to attempt to transition all areas of Germany to DTV at once.

Officials from the Media Bureau in Berlin, as well as representatives from industry, engage in extensive planning for the rapid DTV transition which took less than 1 year. The media authority in Berlin also made a decision to provide financial and nonfinancial support to private broadcasters to cover their costs and transition. The media authority, along with the Social Welfare Office, provided subsidies to certain low-income households for the purpose of necessary set-top boxes. Additional, government and industry worked together to undertake an extensive consumer education effort.

Three, certain aspects of the DTV transition in Berlin and other regions in Germany are relevant to the on-going 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 challenges for completing the transition. In particular, we found that leading up to and during the brief simulcast in Berlin, government officials focused much of their attention on ensuring the households obtain the necessary consumer equipment to support the switchover to digital. In the United States, most broadcast television stations are now providing a simulcast signal. Thus, the concern today, as was the case in Berlin is how to coax consumers to purchase set-top boxes or digital televisions. The key components of the Berlin transition that enabled the rapid deployment of set-top boxes to terrestrial consumers and thereby enable the switchover to digital television 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.

Mr. Chairman, this concludes my prepared statement. I'd be happy to respond to any questions that you or other members may have at this time or once the panel is finished.

Thank you.

[The prepared statement of Mark Goldstein appears at the end of the hearing.]

Mr. UPTON. Thank you.

Dr. Cooper.

STATEMENT OF MARK N. COOPER

Mr. COOPER. Mr. Chairman, members of the committee, I appreciate the opportunity to give the consumer answer to the question what can we learn from Berlin. For me the answer is quite clear. The gatekeeper model of exclusive program licensing, spectrum licensing, is kaput. The digital transition in America has been botched by the policy of driving broadcasts and cajoling cable operators so that we just haven't even barely started this transition.

Fortunately, while they were dragging their feet, technology has made a whole new approach to digital spectrum management possible. Thus, there are two transitions going on. One is technological from analog to digital. The other is sociological and legal, from licensed to unlicensed. If we accomplish the technological transition without the socio-legal transition, we will have failed and I believe by that standard, Berlin has failed.

Spectrum is not property, real establish or resource. It provides the capacity to communicate by transmitting signals electronically at a distance. The nature and extent of the capacity is defined by the power of technology, but the opportunity to use the capacity is established by public policy, by law, regulating where, when and how people can transmit signals, thus technology determines capacity. Law defines opportunity.

Because the communications capacity defines and is defined by the first amendment right of free speech by all citizens, spectrum "belongs" to the public. Now I placed the word "belong" in quotes because citizens don't own it, they all share it as a common right. Licensing was an intrusion on the free speech rights of people driven by the fear that a free for all in spectrum would create interference and noise and drown out all voices. Better to allow a few to have a clear electronic voice, it was argued than to risk having no voices at all.

To offset the compromise, the fact that only a few would speak through spectrum and the vast majority would not have a voice, we imposed public interest obligations on those who were given the give of an electronic voice. Thus, the highest use of spectrum is not now and never has been to maximize the economic value of the opportunity to speak. It's highest use has always been to maximize the opportunity for citizens to have a voice. Of course, when commercial interests are given the opportunity, they should pay for it.

The compromise embodied in licensing is no longer necessary. Rules that reduced interference by excluding speakers, because technology was dumb and weak, can now be replaced by rules that instruct smart and powerful technologies to not interfere with each other. The unlicensed wireless networks that result promote democratic discourse. The decentralized investment in communication

and computer capacity expands the opportunity for innovation. The distributed nature of communications and capacity transforms passive listeners into active speakers.

This digital transition attracts a great deal of attention because the part of the spectrum that has been devoted to analog television provides some of the best capacity for communications. These signals pass through physical objects and therefore they are a place where people really would like to be able to have an electronic voice.

I believe that the technological possibility of unlicensing makes licensing unconstitutional because licensing prevents me from broadcasting and the Supreme Court does not take kindly to people who infringe my right to speak. So I anticipate that when unlicensing is demonstrated, the Supreme Court must conclude that it is the only constitutional use of spectrum and they will give me back my rights to speak.

Nevertheless, a transition is necessary so that we can prove this is the right model to maximize the first amendment right to speak. We must take care of the needs of citizens first and consumers second. At least half of the spectrum that is freed up in this transition should be dedicated to unlicensed uses. All licensed uses should, in fact, pay for the opportunity to use the spectrum. Broadcasters who continue to occupy spectrum on an exclusive basis should continue to be obligated to provide public interest programming and over time they must accommodate more and more sharing or bear the burden of proving why they cannot share spectrum.

For the consumer, public policy must not allow television sets to go dark. The broadcast industry has not driven the transition. The costs of that transition cannot fall on the public. We must not allow the quality of pictures to be deteriorated in order to achieve the transition. And we must allow consumers to enjoy the benefits of the maximum use of digital spectrum.

In short, if we speed the transition, it must be to promote the interest of citizens first to protect the interests of consumers second and ensure that we expand the right to speak to the digital spectrum that we share.

Thank you.

[The prepared statement of Mark N. Cooper follows:]

PREPARED STATEMENT OF MARK N. COOPER, DIRECTOR OF RESEARCH, CONSUMER FEDERATION OF AMERICA

Mr. Chairman and Members of the Committee, my name is Dr. Mark Cooper. I am Director of Research of the Consumer Federation of America (CFA). CFA is a non-profit association of 300 groups that was founded in 1968 to advance the consumer interest through research, advocacy and education. I have testified several times on digital television in Congress and CFA has filed comments in the numerous proceedings at the Federal Communications Commission on various aspects of the digital transition, including public interest obligations, the broadcast flag, the digital tuner mandate, plug and play, and spectrum management.

I appreciate the opportunity to appear today to provide the consumer and citizen answer to the question posed in the title of this hearing—*The Digital Television Transition, What Can We Learn from Berlin?* For me the answer is quite clear. We must learn that media moguls have far too much power in America. The policy of bribing broadcasters and cajoling cable operators into treating consumers fairly and giving citizens new avenues for expression has failed. The gatekeeper model of exclusive spectrum licensing on which this country has relied for three-quarters of a century is kaput. The digital transition in America has been botched so badly that an entirely new approach should be tried.

In one sense, we should be thankful that the media moguls have been so slow and acted in such an unfriendly manner to consumers and citizens. Not only has their mismanagement of spectrum demonstrated the bankruptcy of the old, gatekeeper model, but while they were dragging their feet a revolution in digital technology has made an entirely new appraoch to spectrum management possible. The end of the tyranny of spectrum licensing is at hand.

There are actually two transitions going on in the use of spectrum. One is technological—from analog to digital. The other is sociological and legal—from licensed to unlicensed use of spectrum. I am much less concerned about how quickly the former takes place than I am about ensuring that the latter occurs. If we accomplish the technological revolution without the socio-legal revolution, we will have failed miserably.

THE END OF LICENSED GATEKEEPERS

Spectrum is not "property," "real estate" or a "resource." It provides a capacity to communicate by transmitting signals. The nature and extent of the capacity is defined by the power of the technologies—transmitters and receivers—that send signals through the spectrum. The opportunity to use the capacity of spectrum to transmit speech is established by public policy (by regulating where, when and how people can transmit signals). Thus, technology defines capacity; law defines opportunity.

Fortunately, three-quarters of a century ago, when technology first created the capacity to use the spectrum to communicate electronically at a distance, Congress and the Supreme Court recognized that use of spectrum critically affects the ability of citizens to speak. Because this communications capacity defines and is defined by the First Amendment right of speech enjoyed by all citizens, spectrum is considered to "belong" to the public. I place the word "belong" in quotations because citizens do not own it; they all share it.

The highest use of spectrum is not to maximize the economic value of the opportunity it provides; its highest use is to maximize the opportunity for citizens to speak. Of course, when commercial interests use the spectrum for profit, they should compensate the people for the opportunity.

Licensing was an intrusion on the free speech rights of the people, allowed by the Supreme Court only because it was believed that exclusive licensing was necessary to allow at least some people to speak. Policymakers feared that a free for all in the use of spectrum would deteriorate into a babble of interference and noise in which all voices would be drowned out. It was deemed better to allow a few to have clear electronic voices, than risk having no voices at all. To offset the exclusion of the vast majority from the ability to hold broadcast licenses, the few who received the licenses were required to serve the public interest. Unfortunately, they became gatekeepers, a handful of wealthy and powerful corporations that enriched themselves, much more than enriched (some would say the impoverished) our cultural and political life.

The compromise embodied in licensing is no longer necessary. Interference, which was reduced by excluding speakers because technology was weak and could not manage interference, can now be managed in a different way. Rather than preventing people from speaking, we can now manage the flow of voices. Rules that exclude can be replaced by rules for sharing. Smart transmitters and receivers can share the spectrum without interfering with one another.

The unlicensed wireless networks that have grown up around the country, indeed in this very building, promote democratic discourse. The decentralized investment in communications capacity that typifies unlicensed uses of the spectrum expands the opportunity for innovation. The distributed nature of communications and computer capacity transforms passive listeners into active speakers, consumers into producers. Citizens, consumers and democracy all win.

The possibility of unlicensing exists throughout the spectrum, but the digital transition attracts special attention because the part of the spectrum that has been dedicated to the exclusive use of analog television signals provides some of the best capacity for communications. The characteristics of the signal transmitted in those frequencies are such that they pass through physical objects readily, which makes that a very inviting place for people to broadcast their messages.

I am confident that the socio-legal revolution is inevitable, because the technological possibility of unlicensed use of the spectrum makes licensing unconstitutional. To wit: licensing prevents me from broadcasting and the Supreme Court does not take kindly to such an infringement of my right to speak. It should jump at the chance to eliminate this impediment to speech, an opportunity I am certain it will get quite soon.

Nevertheless, I agree that it is important to recognize that a transition phase is necessary and to move the transition as quickly as possible. It is especially important to manage the transition in such a way that the viability of an unlicensed approach will be demonstrated. Public policy could slow the transition down and we should not be naïve about how hard the media moguls will resist the revolution. An *ancien* regime dies just as hard in cyberspace as it does in physical space.

Therefore, it is appropriate to ask how to speed and manage the transition to unlicensed use of the spectrum. I believe that a rapid a transition is in the public interest, if and only if, it ends the model that subsidizes corporate gatekeepers and replaces it with one that empowers citizens and consumers. First, we must take care of citizen needs; then we should see to consumer interests.

FOR THE CITIZEN

First, the part of the spectrum currently occupied by licensees who use it to broadcast analog TV signals needs to be vacated as quickly as possible so that a large part of this wonderful opportunity can be dedicated to unlicensed uses. At least half of the spectrum that is made available by the transition should be dedicated to unlicensed uses (net of what is set aside for security and safety uses, which are public functions of equal, but not greater, importance with freedom of speech). All spectrum that is set aside for exclusive television licenses but is presently unutilized should be converted to unlicensed status. All spectrum that is set aside for television licenses and is currently utilized should be placed on notice that, over time, it will have to accommodate increasing levels of sharing with unlicensed users. A heavy burden of proof should be placed on those claiming the need for exclusivity in access to the opportunity to broadcast.

Second, all licensed, commercial users of the spectrum should pay for the opportunity to exploit it. All license fees, whether collected at auction or as a recurring charge, should be dedicated to public purposes—supporting non-commercial broadcasting and promoting program diversity. The legacy of allocating the right to distribute radio and television signals through licenses and franchises is very powerful. A handful of corporations, all of whom have benefited mightily from the exclusive right to distribute television programming, now dominates the TV screen. Six corporations own all of the national broadcast networks and account for three-quarters of the total TV programming and writing budgets, as well as the TV audience. Vigorous steps to support noncommercial programming, community media, and educational and civic voices should be taken to balance the immense impact and reach of the commercial broadcasters who have been favored by licenses.

Third, the broadcasters who occupy the spectrum being used for transmission of digital television signals have squandered a golden opportunity, but they remain the recipients of an immensely valuable gift. Indeed, one might even argue that there are 75 years of uncompensated opportunity costs due. On a going forward basis, they remain obligated to provide public interest programming that serves the cultural and political needs of the citizenry, not the narrow commercial interest of the broadcasters.

FOR THE CONSUMER

First, public policy must ensure that television sets do not go blank. Congress had hoped that the industry would drive the transition to digital television by making compelling programming available, so that consumers would voluntarily replace their analog sets with digital receivers of one form or another. That approach has failed. Almost no progress has been made. Just last week the cable industry estimated that a full transition to digital set top boxes for the public it serves would cost $34 billion and that does not include the twenty million TV sets in households that receive their television signals over the air. We think the number is overstated, but there is no doubt that billions of dollars will have to be spent, if public policy seeks to accomplish the transition on an accelerated basis without obsolescing a substantial number of television receivers. The public, which has received no compensation from broadcasters for the use of spectrum, should not be forced to bear that burden. These costs should be covered by the use of fees collected from the entities that make commercial use of the spectrum.

Second, since digital delivery is supposed to expand consumer choice, and it dramatically lowers the transaction costs of choice, any television service that relies on use of the spectrum should be required to offer consumers a la carte choice of programming. Because distributors of multichannel video programming force consumers to buy their service in huge bundles of channels, the rapid increase in channel capacity made possible by digital delivery has resulted in a dramatic increase in cost imposed on the public. The consumer is forced to buy about 70 channels be-

fore he or she can enter the digital tier, even though they do not watch three-quarters of those channels.

Third, efforts to diminish the ability of consumers to enjoy the use of legally obtained programming, as with the broadcast flag or digital rights manglement (DRM) should be halted. The ultimate value of the digital transition is not in a prettier picture—if that were the case, the television industry would not have failed so miserably. The ultimate goal is to provide consumers with a wider array of functionalities that empower them as users. This has been the driving force behind all digital technology. The attack on consumer fair use rights is a dagger aimed at the heart of the digital transition that will ultimately diminish its ability to fulfill its promise, if it does not destroy its value entirely. Of course, if an assault on the value of digital television by diminishing its functionality is a concern, the strategy of reducing the quality of the picture (reducing the resolution or downrezzing) is so absurd it should be too embarrassing to even mention. If we sell tuners and TV's that are programmed to limit the quality of the picture, the public will rightly be outraged and should reject them, along with the policymakers who concocted such a scam in the first place.

A decade ago Congress debated whether to charge broadcasters for the use of the spectrum. It chose to give them a free ride, hoping that they would drive the transition to digital television with compelling content. That approach, grounded in the old licensed-gatekeeper model, was ill conceived and has failed—failed to produce meaningful new avenues of expression for citizens or vigorous competition for consumers. Technology has made an entirely new approach to spectrum management possible and I urge you to embrace and speed the socio-legal revolution that digital technology has ignited.

Mr. UPTON. Thank you, Dr. Cooper.

Mr. Schmidt.

STATEMENT OF GREGORY SCHMIDT

Mr. SCHMIDT. Thank you, Mr. Chairman. I'm afraid my remarks will be somewhat less provocative.

I'm Greg Schmidt with LIN Television, a licensee of WOTV in Kalamazoo, Michigan. Thank you very much for having this hearing today. I'm pleased to report on the status of the transition to digital television and comment on some possible lessons from the Berlin experience.

There are reasons for optimism in the DTV transition. We now have 1411 television stations on-air and digital serving 207 markets that encompass more than 99 percent of U.S. television households. Over 88 percent of U.S. households are in markets that are served by five or more digital signals.

This season we will see over 2500 hours of broadcast high definition programming. We commend both the committee and the FCC for their leadership in the transition by implementing a phased-in tuner mandate and the broadcast flag protection. Television broadcasters have every financial incentive to see this transition brought to a timely close. Our industry has already spent billions of dollars rolling out DTV services. My mid-size company has now spent over $70 million just in digital transmission capital and is spending millions more each year on maintaining dual transmissions, all of which has generated exactly zero dollars in incremental revenue.

One major piece of the puzzle has yet to fall in place. Cable companies continue dragging their feet, resisting bringing the full benefits of over-the-air digital to the American consumer. A digital must carry rulemaking has been pending at the FCC for 6 years, but there are still no rules. Cable carriage of digital signals is highly relevant to the subject of today's hearing. In Berlin, mandatory cable carriage was a crucial component of the plan for a rapid transition. Cable companies were required to carry all broadcast signals

and to protect analog-only households after the switch over to digital. Any transition that does not contain such a component will take far, far longer to implement.

There are also, of course, many other reasons that Berlin uniquely, not only in the world, but in its own country was able to flash cut to digital. The biggest single reason was the compelling proposition offered to consumers. For a one time expenditure in the neighborhood of $100, a household with an analog set received the equivalent of European basic cable free for life. You may have had a public education campaign, but I don't think it was too tough to convince the consumers that that was a good deal. Buying a set-top box or digital set increased your terrestrial broadcast viewing options from 7 or 8 channels to nearly 30. This digital channel bonus stems from the decision of the Germans, like the British, and the rest of the Europeans to use the digital transition to create more channels of standard definition programming and forego the greater signal quality of high definition. Foregoing HDTV also reduced the cost of the digital set-top boxes and receivers.

And of course, the number of broadcast-only households is, as Mr. Boucher pointed out, was not large, 160,000 total, only about 7 percent of the Berlin households, as compared with nearly 20 million, we believe, not 12, over 15 percent of U.S. households. There was also a smaller percentage of households with second or third sets, not hooked up to cable or satellite. We believe that number is closer to 40 to 45 million sets.

So the Berlin success was achieved, in part, because their goals were more modest and the area and population smaller. Most importantly, the Germans have not, as we have, endeavored to use the digital transition to ensure that digital broadcast delivery can deliver the highest possible quality of service. Since the inception of the DTV transition, Congress has repeatedly stated that preserving and strengthening America's system of free, local, over-the-air broadcasting for both urban and rural America is an important policy goal. While, like the Germans, we believe that increasing consumer choice should be part of the equation, we also believe that broadcasters must have the ability to provide HDTV with the highest quality pictures available for the foreseeable future. I believe the European broadcasters and consumers will come to regret the fact that they have squandered the opportunity to provide HDTV.

The Berlin experience provides some valuable insights. I will also note with some envy that the German government heavily subsidized the out of pocket costs of the commercial broadcasters which I find to be the most attractive feature of the plan. But I do not think the Berlin experience shows us to be basically on the wrong track, nor that there are any magic bullets to speed the transition. A flash cut here would clearly be vastly more complicated and expensive.

And while we may disagree with the Germans on their tactics, we agree entirely, as Mr. Shimkus alluded, with their over arching objective, the strengthen the terrestrial broadcasting system and to create a viable broadband competitor for cable and satellite. That too was the ultimate objective of Congress in initiating the digital transition and should remain its lodestar in these deliberations.

After years of effort and billions of dollars expended, Congress, local broadcasters and your constituents, our viewers, are well on the road to completing our shared journey to digital television and to vigorous new competition in the media marketplace. We appreciate the committee's continued leadership on this issue and pledge to work with you to make the transition as expeditious and cost effective as possible, without losing sight of the ultimate goal.

Thank you.

[The prepared statement of Gregory Schmidt follows:]

PREPARED STATEMENT OF GREGORY M. SCHMIDT, VICE PRESIDENT-NEW DEVELOPMENT AND GENERAL COUNSEL OF LIN TELEVISION CORPORATION ON BEHALF OF THE NATIONAL ASSOCIATION ON BROADCASTERS

Good morning Mr. Chairman. I am Gregory Schmidt, Vice President of New Development and General Counsel of LIN Television Corporation, and I appear today on behalf of the National Association of Broadcasters to discuss the transition to digital television in Berlin and the relevance of that experience to the DTV transition in the United States.

Berlin—the first place in the world where digital television broadcasting has completely supplanted analog—offers some instructive comparisons to the DTV transition in the United States. There are striking differences between the situation in Berlin and ours which amply demonstrate why accelerating the digital transition will require significantly more consumer-friendly actions by the government.

Let's look at some of the ways German digital television differs from the DTV transition on which we are embarked. The single biggest difference is that Berlin—like other European DTV plans—does not include any provision for High Definition Television. DTV in the United States began in response to HDTV, a new Japanese technology that promised much greater picture and sound quality. Although the U.S. digital television system will also permit multicasting and the distribution of new data services, it has always included HDTV capability, and the amount of HDTV programming available here is great and continues to expand. In the United States, HD has been the only incentive for consumers to purchase digital receivers, particularly since most cable systems have refused to pass through any other DTV services. The full benefits of HDTV are generally only realized on large-screen TVs.

By contrast, European DTV was intended less to offer greater quality of TV display than to offer more programming choices. European analog television for the most part has offered far fewer television signals to consumers than are available in the United States and a far higher percentage of noncommercial services (for which viewers pay a receiver tax).[1]

This profound difference has several consequences. First, European consumers who move to DTV reception receive an immediate benefit of more channels at no additional cost. In Berlin, buying a digital TV or a set-top box increased viewer choice from eight channels to roughly 30 channels.[2] Second, since there is no need to decode or display HDTV signals, the memory and processing requirements of DTV receivers and set-top boxes is much less in Europe than in the United States. Thus, it is relatively cheaper to manufacture digital receivers for European DTV. DTV receivers were available in Berlin, for example, for around 200 euros, far less than HDTV-capable receivers cost here,[3] and set-top boxes there were also less expensive.[4]

---

[1] In many countries, penetration of cable or satellite multi-channel video providers has been far less than in the United States and, even where MVPD penetration has been substantial (like Berlin), the number of channels provided has been fewer than typical American systems provide.

[2] The Berlin authorities thought it particularly significant that moving to DTV resulted in consumers "receiving more services for which the license fee is paid." DVB-TV: Das Überall Fernsehen, Berlin Goes Digital (accessed at http://www.mabb.de/start.cfm?content=aktuelles&id=632) at 15 (hereinafter Berlin Goes Digital). Berlin already had more operating channels than other parts of Germany where three to five analog channels are typical. Berlin was able to have these additional channels because of spectrum vacated by former East German stations after reunification. While some other German cities are expected to begin digital transmission this year, much of Germany under current plans will never have digital over-the-air television because sufficient channels are not available.

[3] Id. at 5.

[4] The current exchange rate is approximately $1.24 to the euro. Set-top boxes have been on sale in Berlin for as little as 69 euros, or about 85 dollars.

Moreover, because digital transmissions in Germany are not high definition, a consumer with an analog receiver who acquires a digital set-top box will receive the same programs at almost the same quality as a consumer with a new digital receiver. Similarly, if a cable system in Berlin converts a broadcast digital signal to analog for display on analog receivers connected to the cable system, the cable subscriber receives essentially the same thing as he or she would if the cable system were delivering the digital signal in its native format to a digital receiver. That is not the case in the United States. If a U.S. cable system downconverts a broadcast DTV signal, as some have suggested, cable subscribers will not receive what they would get if they had a digital receiver and the cable system carried the broadcast digital signal. They would not receive high definition pictures or better sound and they would not receive multicast signals or data transmissions. There would be little reason for those consumers to purchase digital receivers and, of course, if they already had DTV sets, they would not get much of the benefit of their purchase.

As a consequence of these differences, the digital conversion in Berlin presented consumers with a very different value proposition—for a fairly modest one-time expenditure, the consumers could get the equivalent of free basic cable for life. Moreover, nearly the full benefits of the conversion could be realized on TV sets, small and large, analog and digital alike. So it was not difficult to persuade consumers to buy the digital sets and boxes and there was little danger of consumer resentment over the premature obsolescence of their existing sets.[5] In the long run, we believe that European consumers and broadcasters will come to regret foreclosing the benefits that HDTV will provide, particularly as other digital media increase their ability to deliver the highest quality sound and pictures.

Another distinction between the Berlin and American transitions are the obligations placed on cable. Cable in Berlin was required to carry all broadcast services and to protect analog-only households after the switch-over to digital. Although the FCC has had a digital must carry rulemaking proceeding pending since 1998, there are still no rules requiring American cable or satellite systems to carry local digital television signals, no rules ensuring that new broadcast digital services will be available to cable or satellite households, and no obligations on cable systems to ensure that their analog-only subscribers will have access to local television signals after analog broadcasting ends.

Indeed, one of the reasons that analog broadcasting was able to be switched off in Berlin was the prevalence of cable and satellite delivery systems. Only about seven percent of Berlin households received television over the air, a lower percentage than in the rest of Germany.[6] An even smaller number of homes in Berlin (about 90,000) relied on terrestrial transmission for second and third sets.[7] In the United States, it is estimated that there are 38-40 million sets in homes that are not connected to any cable or satellite system and an additional 40-45 million unwired sets in cable or satellite households. In total, about 30 percent of all televisions (75-85 million receivers) rely solely on over-the-air transmission and will need to be replaced or have converters attached in order to operate after analog broadcasting ends.

Because so large a percentage of Berlin homes relied on cable or satellite to receive local television, and those systems were required to ensure that broadcast digital programming reached all of their subscribers, there was very little risk that ending analog broadcasting would result in a significant loss of audience or revenue for commercial broadcasting. In fact, the availability of more channels of free television over the air appears to be reducing the reliance on cable and satellite and thus reducing those providers' ability to exercise gatekeeper control.

One of Congress' objectives when it authorized the transition to digital beginning in 1996 was to strengthen the over-the-air broadcasting system. A premature end to analog broadcasting before consumers are ready may have the opposite effect of reducing the audience of local stations and thus reducing their ability to provide attractive programming and local public service. If consumers are driven to cable and satellite programming, that would increase those monopoly providers' gatekeeper power and frustrate Congress' goal of improving local broadcasting.[8]

---

[5] The license fee paid by all set owners is 16 euros per month, so the cost of a set-top box represented about four months of license fees.

[6] Berlin Goes Digital at 2. In Germany, satellite service is free to the consumer after the purchase of the receiver; cable service typically costs only 12-15 euros, much less than the cost of American cable service.

[7] Id. at 3.

[8] In this regard, it is worth noting that there are no plans to bring terrestrial digital service to much of rural Germany. It is not clear whether those areas will lose over-the-air service altogether or be left with analog service only. The American DTV transition is intended to ensure that high-quality digital television be available across the country.

The Berlin plan also sought to avoid imposing on broadcasters the costs of extended operation of dual systems. The transition was thus designed to be short-lived and, unlike the U.S. plan where stations have had to undertake the costs of dual operations, the government in Berlin subsidized broadcasters which were required to provide both analog and digital signals.

These differences are significant and call into question suggestions that Berlin provides a ready model for the United States. In particular, the very much larger number of sets that rely on over-the-air transmissions, as well as the very large number of analog sets in cable and satellite homes for which no DTV transitional carriage rules have been established, make it impossible to conclude that a Berlin-style transition would not harm the public interest in a strong local broadcasting system.

On the other hand, there are certainly lessons that we can take from the Berlin experience. The German authorities recognized that moving millions of consumers from analog to digital, while resulting in significant benefits for consumers, would create burdens that should not fall on broadcasters. Instead, they concluded that "[s]olving the issue of social acceptability of the switchover is a public duty to be fulfilled by the state."[9] The response from consumers in Berlin also counters suggestions that it is not important to maintain the level of over-the-air services. "Numerous comments by viewers . . . refute the claim that viewers traditionally receiving television through the air would be content with fewer services—the opposite is the case."[10]

Another important lesson is that free TV is crucial to any transition from analog to digital. The experience not only in Germany, but also in the United Kingdom and in Spain with pay digital television—where those services languished—shows that the "switchover must be undertaken with free-to-air television."[11] Indeed, in England, the subscription terrestrial DTV service collapsed; digital penetration began to increase significantly only with the development of the Freeview system that greatly expanded consumer choice by providing multiple channels of free over-the-air programming.[12]

One other part of the Berlin experience is instructive. The Berlin authorities concluded that one of the advantages that could be obtained from a transition to DTV was the increased potential for portable applications. This is achieved through a system of distributed transmission where additional transmitters repeat the signal and enable it to reach televisions without roof-top antennas. The same capability has been developed for the U.S. digital broadcast system, and broadcasters have asked the FCC to authorize its use. Quick action by the FCC on this issue would also help advance the transition here.

What does this all mean for the United States? It tells us that relying on cable or satellite services to drive the transition to digital—as some have argued—will ultimately fail. Free local broadcasting has always been the core of television service. It will be, it must be a primary driver of the digital transition. With it, we will have a vibrant new television service. Without it, we will have simply more variations on the same pay services, as well as diminishing news, emergency services and other public interest activities for which our communities rely on local broadcasters.

It also tells us that the circumstances that allowed the Berlin authorities to end analog broadcasting quickly without significant public outcry do not exist here. The number of television receivers and households that rely on over-the-air analog service is far greater here than in Berlin. Replacing those sets or providing set-top boxes for them will require a far larger public commitment than the German authorities faced. Set-top boxes or cable or satellite converted digital signals in Berlin were also equivalents for over-the-air digital television; that is not true here where high definition, multicasting and data services characterize DTV and will not be available to consumers viewing a downconverted signal. Further, while the obligation of cable systems in Germany to carry the complete digital offerings of local broadcasters should be the rule here; so far the FCC has declined to adopt such a rule.

It is worth noting that the German authorities have warned that extending the Berlin model to even the rest of Germany "would not appear to present a realistic option at present."[13] Similarly, NCTA in a presentation to the FCC on the Berlin

[9] Berlin Goes Digital at 12.
[10] Id. at 15.
[11] Id. at 3; see id. at 16.
[12] See Office of Communications, Driving digital switchover: a report to the Secretary of State (April 5, 2004)(accessed at http://www.ofcom.org.uk/research/dso—report/?a=87101).
[13] Berlin Goes Digital at 20.

transition concluded that "it's highly uncertain whether those unique circumstances exist elsewhere in Germany. They do not exist in the United States." [14]

Broadcasters share the desire to bring the DTV transition to a close. Unlike Germany, American commercial broadcasters have been required to shoulder an enormous financial burden to build and operate digital facilities. No broadcaster wants to continue paying for both analog and digital operations for any longer than necessary. Instead, we look forward to an all-digital future.

The FCC has taken significant steps to advance the transition, including the digital tuner mandate, the "Powell plan" and the agreement on cable compatibility standards. It is to be commended for its constructive approach. These steps are bearing fruit, not only in the availability of more and more exciting programming, but also in increased sales of digital receivers and displays. These steps and a few more—notably the long-delayed adoption of digital must carry rules for the transition and afterwards—can bring the transition to an end in this decade without causing significant disruption to consumers or reducing service.

Mr. UPTON. Thank you.

Mr. Willner.

STATEMENT OF MICHAEL S. WILLNER

Mr. WILLNER. Thank you, Mr. Chairman. Needless to say I did find parts of Mr. Schmidt's statement a little bit controversial.

I'm Michael Willner, President and CEO of Insight Communications, the ninth largest cable television operator in the United States with about 1.3 million subscribers. I happen to be very proud of the cable industry's leadership in transitioning digital television in the United States. Cable recognized the need to convert to digital when Congress determined that our Nation must modernize its broadcast system in order to efficiently utilize our valuable public spectrum. The cable industry prepared itself for this event by developing a platform that today delivers digital television to more households than any other digital distribution system.

Because of our $85 billion investment which every time I say the words I have to add fully funded without any government help, cable is delivering not only high definition programming created by numerous cable networks, but also high definition services offered by many, many broadcasters. As of March 31 of this year, the digital signals of nearly 400 broadcast stations were being carried on cable.

What concerns me today is the continued assertion by broadcasters that the transition will only occur if additional regulatory burdens are placed on cable and satellite. Specifically, broadcasters claim that they require a digital multicast must carry on all cable systems in order to return the analog spectrum that they previously promised to give back in the year 2006. Some broadcasters claim that unless they are given this right, they'll be unwilling to develop compelling new programming for the digital spectrum and therefore nobody will go out and buy a digital television.

Now that argument is really ironic. Mandated multicast must carry would actually reduce the incentive of broadcasters to create compelling new content, precisely the opposite of their claim. Why? Because guaranteed carriage would remove the marketplace focus of broadcasters to go after consumers and interest those consumers and what they are creating in terms of content.

[14] NCTA, The Transition to Digital Television in Berlin, MM Docket No. 98-120 (filed March 30, 2004)(emphasis supplied).

Must carries lowers the bar and protects less desirable programmers. Consumers are best served by simply letting the marketplace work as it did for 400 broadcast stations in their conversion to digital.

Digital must carry has no impact on easing the digital transition for your constituents. Rather, the focus of Congress, the FCC and industry should be on tackling the fundamental issue of that digital transition, and that is, what happens to all of those analog TV sets the morning after we turn off the analog frequencies?

Analog televisions hooked up to digital cable will continue to work on that date. Cable operators have already seen to that. But millions of TVs in households with no cable or satellite distribution systems and millions more in our customers' households that are not hooked up to cable in the bedrooms and the playrooms will not work the next morning unless we do something about it.

This is not a household problem. It's not a cable problem. It's not a satellite problem. It's a device problem. I believe that it's not the intention of this government to force tens of millions of consumers to purchase digital televisions before they're ready to buy one. However, you can create a marketplace that will result in the phasing out of analog TVS over time, even after the analog broadcast system is turned off. The consumer will then decide when they are ready to buy that new TV while their old ones continue to function.

If I might, this is the device we're all talking about in Europe. This is the size of it. It is a digital to analog converter box and it is very inexpensive. And it converts digital signals to analog. The success in Berlin occurred principally because of one thing, the availability of this box. And it was successful even though the device was far costlier there than what might be available in the United States simply because of the economies of scale that the U.S. market offers.

I urge you to stay the course and remain focused on fostering the digital transition as quickly as possible. Set and stick to a date certain. This is not about broadcasters needing expanded digital must carry rights or imposing additional regulatory burdens on their competitors. That action will have no impact on this conversion. It's about enabling analog TVs to continue to work after the transition. From cable's perspective, as evidenced by our existing investment and commitment, we stand ready, willing and able to support this transition. Focus on the real solutions so that American consumers can choose, if and when, to buy a new digital TV set in order to receive all of the new services being developed in a healthy, consumer-focused and competitive marketplace.

[The prepared statement of Michael S. Willner follows:]

PREPARED STATEMENT OF MICHAEL WILLNER, PRESIDENT AND CHIEF EXECUTIVE OFFICER, INSIGHT COMMUNICATIONS

I. INTRODUCTION

Mr. Chairman, Congressman Markey, members of the subcommittee, my name is Michael Willner. I am President and CEO of Insight Communications, the nation's ninth largest cable operator. I am also a Director of the National Cable & Telecommunications Association (NCTA) and serve on its Executive Committee. Thank you for inviting me to testify about the cable industry's efforts to advance digital television in the United States and what lessons we might learn from the broadcasters' transition to DTV in Berlin.

II. INSIGHT COMMUNICATIONS: COMPANY OVERVIEW

Insight Communications provides bundled, state-of-the-art services to 1.3 million cable customers living in mid-sized communities in Illinois, Indiana, Kentucky, and Ohio. The company pursues an aggressive business plan to deliver leading-edge technology to its customers and has successfully upgraded its infrastructure to support numerous advanced services including high definition television (HDTV), digital video recorders (DVR), video-on-demand (VOD) and subscription video-on-demand (SVOD), two tiers of high-speed Internet access service, voice telephony, and standard analog video. At the end of the first quarter of 2004, Insight Communications served 1,297,900 basic customers; including 418,400 digital customers; 258,000 high-speed Internet customers, and 60,100 switched telephony customers. The capital investment required to make these enhancements was approximately $500 million.

Insight Communications was an early proponent of HDTV programming and first launched high definition service in 2002. Today, it provides significant HDTV programming, including PBS in all markets where it is available over-the-air. Insight carries at least one major broadcast network in HD format in all but one market (where the company is currently in negotiations). Currently 26,184 customers have HDTV-enabled set-top boxes in their homes, and 94 percent of Insight's customers have access to HD services (98 percent of Insight's digital customers).

III. THE CABLE INDUSTRY IS LEADING THE TRANSITION TO DIGITAL TELEVISION IN THE UNITED STATES

Insight exemplifies what the cable industry as a whole is doing to promote digital television. With an investment of $85 billion since 1996, the cable industry has upgraded its facilities to launch a whole host of digital services, including HDTV. As part of its deployment of advanced video, voice, and data services, cable companies are now offering high definition television on systems passing 84 million homes. At least one cable operator in 99 of the top 100 markets now offers HDTV, and HD over cable is available in 155 of the 210 U.S. television markets.

Cable operators are now offering packages that include a full mix of broadcast, basic, and premium networks featuring HD content. Overall, cable systems are currently carrying nearly 400 broadcast stations offering HDTV or other compelling digital content—a more than four-fold increase just since January 2003, when the HD programming of 92 local broadcast stations was being carried.

Cable programmers are also leading the way in creating compelling high definition content that will drive the sale of digital television sets. Seventeen different cable networks are producing HD programming, including Bravo HD+, Cinemax HDTV, Comcast SportsNet INHD, Discovery HD Theater, Encore HD, ESPN HD, HBO HDTV, HDNet, HDNet Movies, INHD, INHD2, MSG Networks in HD, NBA TV, Showtime HD, Starz! HD, The Movie Channel HD, and TNT HD currently provide high definition programming. Unlike many broadcast stations—which offer HD programming for only a few hours a day—most cable networks that offer HD do so on a 24-hour or nearly full-time basis.

Cable compatibility issues are being resolved through industry agreements. The consumer electronics industry and the cable industry have reached a landmark agreement which allows "one-way" digital television sets to be connected directly to cable systems without the need for a set top box. The FCC adopted implementing rules in September 2003 and multiparty, inter-industry negotiations to resolve issues related to "two-way" digital television sets are fully underway.

IV. THE TELEVISION MARKET IN BERLIN IS DIFFERENT THAN THE U.S.

Today, the General Accountability Office (GAO) is releasing a report requested by this subcommittee on the transition to DTV in Berlin. NCTA was similarly interested in whether the Berlin experience could provide a model for the United States and sent its own research team to Germany earlier this year. To aid this subcommittee in its review of the Berlin transition, I have appended a copy of the researchers' report, *The Transition to Digital Broadcasting in Berlin,* to my testimony.

Before drawing lessons from the Berlin experience, we must first understand the differences between television markets in the United States and Germany and why the Berlin experience does not provide a rationale for imposing multiple must carry obligations on cable operators and satellite providers in the United States.

Key differences between the German and U.S. television markets include the following:

- **In Germany, HDTV was not the driver or goal of the digital transition.** The state of television in Germany is far less advanced than in the U.S. Rather, the German Government simply wanted to promote the survival of seven broadcasters who reached only seven percent of the population over-the-air (the other 93 percent of homes in Berlin receive broadcast signals via cable and satellite).[1] By transitioning to digital television, broadcasters could multiplex four channels in the space they formerly used to broadcast one, thus quadrupling the number of broadcast channels available in Berlin to 28. Since the local cable system has only 30 channels, this made reliance on over-the-air television a viable consumer alternative to cable service.[2] Both the broadcast and cable industries in Germany lag their U.S. counterparts in offering HDTV.
- **The economic models for cable, broadcasting, and satellite in Berlin do not compare with the United States.** Broadcasters in Germany do not own their own facilities for transmitting programming over-the-air. Rather, they pay an independent broadcast network operator (T-Systems, a branch of Deutsche Telekom) for transmission service. They also lease capacity on cable and satellite systems[3] to distribute their programming and **pay the cable and satellite operators for carriage.** As such, in Germany, broadcasters have to pay cable operators to carry their 28 digital channels—much like leased access channels are used by independent programmers in the United States to reach cable audiences. In contrast, U.S. broadcasters do not pay cable operators for "must carry" of their signals—nor would they likely want to. (In fact, the economic relationship in the U.S. is reversed, with cable operators compensating broadcasters through copyright and retransmission consent mechanisms.)
- **All program networks—cable, satellite, and broadcasting—are advertiser supported in Germany** (with the exception of one subscription service, *Premier*[4]). Cable and satellite program networks do not charge distributors licensing fees, and cable serves primarily as a common carrier which is paid by private and public broadcasters and other programmers like *Premier* to carry their signals.
- **Much of the cable system's channel line-up is determined by government regulators,** who require carriage of local broadcast stations (each of Germany's 15 media authorities establishes its own must carry requirements). Cable prices to residential customers are regulated, as are the rates which cable operators charge broadcasters for mandatory carriage of their signals (under a common carrier "just and reasonable" standard).

As noted, multicasting was a factor in Berlin because it allowed broadcasters to quadruple the number of channels they offered over-the air (to 28) and compete head-on with a 30-channel cable system. With the one-time purchase of an affordable set-top converter, consumers in Berlin can watch basically the same programming for free on broadcast television that they pay 14 Euros a month to watch on cable. In the U.S., by contrast, cable companies provide 200-300 channels of programming, including HD and free carriage of must carry stations, while most broadcasters have yet to develop a viable business plan for multicasting. In Germany, it was possible for broadcasters to acquire the program content needed to fill 21 new channels. (These channels more closely resemble basic cable channels in the United

---

[1] The transition to DTV occurred in Germany because commercial broadcasters indicated that the expense of over-the-air broadcasts to only seven percent of TV households had become too much to bear. They threatened to stop broadcasting altogether and rely on DBS and cable to reach their audience instead. In addition, it was also becoming politically difficult to force 93 percent of households to pay the TV tax used to subsidize free, over-the-air broadcasting to only 7 percent of Germany's homes. The German Government, however, was not prepared to cut off service to the 160,000 Berlin homes that relied on over-the-air television.

[2] Consumers pay cable operators a monthly subscription fee of 14 Euros (1 Euro = US$1.25), but they receive only one analog tier of 30 channels (mostly national and local broadcast networks) over aging facilities that were built in the 1980s. The main attraction of cable is signal quality, even though it requires payment of a monthly subscription fee on top of the 16 Euros per month assessed on all TV households to support public broadcasting.

[3] DBS in Europe has 690 channels and distributes program services "in the clear" (unscrambled) on satellite transponders leased by the individual broadcasters and program networks. DBS does not serve as a packager or distributor of bundled services the way Dish/EchoStar and DirecTV do in the U.S.: once consumers have purchased a dish and receiver, *they can receive all 690 program services on satellite for free, with no monthly subscription charge.* If it weren't for the fact that Berlin is highly urbanized and many residents do not have a clear line of sight to a satellite, most Berliners would probably receive their television via DBS.

[4] The only premium video service in Germany—*Premier*—leases capacity from both cable and satellite operators to distribute its encrypted video service directly to consumers. Customers get converter boxes directly from *Premier* and pay a monthly subscription fee of 30 Euros to the premium service itself—not the cable or satellite operator.

States.) It was also possible to quadruple the number of broadcast channels without fatally diluting the advertising revenues required to sustain private broadcasters due to the relative paucity of advertiser-supported cable channels.

Significantly, nothing in the Berlin experience supports the claim made by U.S. broadcasters that the government needs to impose additional must carry requirements on all cable systems in order to expedite return of the analog frequencies that broadcasters promised to give back by 2006. Some U.S. broadcasters claim that unless they are given multiple must carry rights, they will be unwilling to develop new digital broadcast programming and therefore people will not purchase digital TVs. The irony of this argument is that multiple must carry would actually reduce the broadcasters' motivation to create compelling new content—precisely the opposite of their claim. The reason is simple: guaranteed carriage would remove any incentive for broadcasters to create content such as HDTV that consumers demonstrably want. Must carry lowers the bar and protects little-viewed programming by taking up valuable spectrum on cable systems which could otherwise be used by programmers who offer compelling digital content.

V. POLICY LESSONS TO BE LEARNED FROM THE BERLIN EXPERIENCE

Despite the stark differences between the economics of cable, satellite, and broadcast television in Berlin and the United States, several lessons can be drawn from Berlin's successful 2003 transition to digital broadcasting:

- The U.S. Government should set a hard date for the broadcasters' transition to digital television—as the government did in Berlin. If Congress mandates the return of the analog spectrum by a date certain, consumer electronics companies will develop and manufacture tens of millions of inexpensive set-top converters and the necessary antennae to receive digital broadcast signals—just as they did in Germany.
- Simple digital set-top boxes could be manufactured in quantity and sold to consumers probably for about $50 in the U.S. (We have already seen such scale economics in cable modems, which now sell for about $50.) As in Berlin, the Government could provide a subsidy directly to the consumers who need it—perhaps from the revenue that will be raised by auctioning the analog spectrum reclaimed from the broadcasters.
- The public in Germany was willing to pay about 100 Euros for a set-top box that converts digital broadcasts to analog so that they can be viewed on analog TV sets. In the United States, the public's willingness to buy inexpensive converter boxes is critical since there are 250 to 300 million analog TV sets still in service and 15 percent of TV households rely on over-the-air broadcast transmissions. If the approximately 16 million TV households with no cable or satellite service have the national average of 2.5 to 3 televisions per household, the digital transition in the United States will require the placement of 40-50 million inexpensive digital converter boxes in these homes. In addition, set-top boxes must be readily available at retail for cable and satellite subscribers who do not wish to lease or purchase converter boxes from their service providers for additional TV sets in their homes.
- The U.S. Government is unlikely to adopt policies that require tens of millions of consumers to purchase digital TV sets before they really want to. Congress can facilitate a marketplace, however, that will result in the phasing out of analog televisions over time—years after the analog broadcast system is turned off. The success of the digital marketplace will depend on the availability—and low cost—of simple set-top boxes that convert digital broadcast signals to analog, allowing for the continued use of millions of "legacy" TV sets in the United States. Consumers will decide when they are ready to buy new digital TVs while their old sets continue to deliver the analog pictures they were previously receiving.
- To aid in the transition—especially before most consumers acquire digital-to-analog broadcast converter boxes—cable operators should be allowed to convert digital broadcast signals to analog at the cable headend, providing continuity of local broadcast service to all their customers. (As is the situation today, many cable operators would also elect to carry the broadcasters' HDTV signals.) As a matter of policy, if a cable operator is best able to serve its customers by converting digital broadcast signals to analog at the headend (until 85 percent or more of its customers have digital TVs or low-cost digital-to-analog boxes), it ought to be given the right to do so by either Congress or the FCC. Consumers could then choose when to buy a new digital TV and receive all of the newly developed services being delivered in a healthy, competitive marketplace.

VI. CONCLUSION

As NCTA's research team concluded in *The Transition to Digital Broadcasting in Berlin,* "The Berlin experience demonstrates that given the right conditions, a hard cutover to digital terrestrial television can be successful." I would add that the success in Berlin occurred principally because of one thing—the widespread availability of relatively inexpensive digital-to-analog converters. Quadrupling the number of over-the-air broadcast channels to 28 (in a 30-channel cable environment) was also a significant factor.

It is imperative for American policy makers to base our DTV policies and timetable on the economic circumstances of the cable, satellite, and broadcasting industries that exist in the United States. For example, it would be a mistake to assume that "must carry" policies from Germany—where states determine which broadcast channels are carried by cable, and where the government requires broadcasters to compensate cable operators for carriage of their signals under a common carrier regime—would work in the United States. In the U.S., a successful transition to digital television will require: (1) adopting a date certain for returning the analog spectrum and broadcasting in digital; (2) solving the "15 percent problem" about how households that rely on over-the-air transmissions for television will be able to purchase equipment which allows their analog TV sets to receive the new digital signals; (3) giving cable operators the flexibility they need to convert broadcast signals from digital to analog; and (4) requiring broadcasters to compete in the market with other programmers rather than giving them expanded digital must carry rights.

Thank you again for the opportunity to appear before this subcommittee. I would be pleased to answer any questions that you might have.

INSIGHT COMMUNICATIONS, INC.

HD/DVR Deployment by market as of June 2004

All systems use Motorola DCT6208 set-top box for HD/DVR service

Market	HD Broadcast Carriage	HD Cable Programming	DVR Deployment
Anderson, Noblesville, IN ..	ABC-WRTV NBC-WTHR CBS-WISH PBS-WIPB	HBO, Showtime, Bravo HD+, HD Pak**	Currently available
Bloomington, Greensburg, Greeenwood, Franklin, IN.	ABC-WRTV CBS-WISH NBC-WTHR PBS-WTIU	HBO, Showtime, Bravo HD+, HD Pak**	Currently available
Bowling Green, KY	ABC-WBKO CBS-WTVF PBS-WKGB PBS-WKYU	HBO, Showtime, Bravo HD+, HD Pak**	Currently available
Champaign, IL		HBO, Showtime, Bravo HD+, HD Pak**	Currently available
Columbus, OH	ABC-WSYX CBS-WBNS NBC-WCMH	HBO, Showtime, Bravo HD+, HD Pak**	Currently available
Covington, KY	NBC-WLWT CBS-WKRC ABC-WCPO PBS KET 1-4 PBS-WCET 2-5	HBO, Showtime, Bravo HD+, HD Pak**	Currently available
Dixon, IL	ABC-WQAD NBC-KWQC CBS-WHBF	HBO, Showtime, HD Pak**	Currently available
Evansville, IN	NBC-WFIE ABC-WEHT PBS-WNIN	HBO, Showtime, Bravo HD+, HD Pak**	Currently available
Kokomo, IN	ABC-WRTV NBC-WTHR CBS-WISH	HBO, Showtime, Bravo HD+, HD Pak**	Currently available
Ladd-Sterling, IL	ABC-WQAD NBC-KWQC CBS-WHBF	HBO, Showtime, HD Pak**	Currently available

INSIGHT COMMUNICATIONS, INC.—Continued

HD/DVR Deployment by market as of June 2004

All systems use Motorola DCT6208 set-top box for HD/DVR service

Market	HD Broadcast Carriage	HD Cable Programming	DVR Deployment
Lafayette, IN	ABC-WRTV NBC-WTHR CBS-WISH PBS-WIPB	HBO, Showtime, Bravo HD+, HD Pak**	Currently available
Lexington, KY	CBS-WKYT PBS-WKLE	HBO, Showtime, Bravo HD+, HD Pak**	Currently available
Louisville, KY	ABC-WHAS CBS-WLKY NBC-WAVE PBS-KY Ed TV (4 Channel Numbers carrying whichever is Broadcasting in HD)	HBO, Showtime, Bravo HD+, HD Pak**	Currently available
Mendota-Peru, IL	ABC-WQAD NBC-WMAQ CBS-WHBF	HBO, Showtime, HD Pak**	Currently available
Peoria, Bloomington, IL	ABC-WHOI PBS-WTVP	HBO, Showtime, Bravo, HD Pak**	Currently available
Richmond, IN	ABC-WRTV CBS-WISH PBS-WIPB NBC-WTHR	HBO, Showtime, Bravo HD+, HD Pak**	Currently available
Rockford, Freeport, Belvidere, IL.	ABC-WTVO NBC-WREX CBS-WIFR	HBO, Showtime, HD Pak**	Currently available
Springfield-Decatur, IL		HBO, Showtime, Bravo HD+, HD Pak**	Currently available

*Insight Digital service required for access to all HD programming

**HD Pak includes the following networks: ESPN HD, Discovery HD Theater, HDNet and HDNet Movies.

Mr. UPTON. Thank you.

Mr. Lawson.

STATEMENT OF JOHN M. LAWSON

Mr. LAWSON. Thank you, Mr. Chairman. Public television's mission has grown a lot since 1967 and we're fortunate to have a 21st century delivery system, DTV, to meet it. Since the transition began, our system has raised more than $1 billion to make the conversion and as of today, 75 percent of U.S. public stations are transmitting a digital signal in markets that include more than 88 percent of households.

Our challenge now is to move from simply delivering a digital signal to creating and delivering actual digital services. Most stations are broadcasting in HD and multicasting. Many are also data casting directly to PCs, for instance, KERA in Dallas is data casting standards based content directly to school computer networks and pioneering DTV for homeland security.

However, while consumer acceptance of DTV has improved, it has yet to reach a tipping point. Meanwhile, PTV stations are spending more each year, running and replacing analog transmission equipment and Congress appropriates to CPB for digital grants. I know the committee is examining a hard date for analog switchoff, but imposing a hard date without first resolving the fate of carriage rights and over-the-air analog consumers is a recipe for disaster.

The success in Berlin and with the U.K.'s Freeview service led us to explore some new thinking about the transition. In February, we surveyed our stations, you read polls, we read member surveys. We found that 86 percent did not expect to be able to switch off analog by the year 2009. However, under three conditions, guaranteed cable and satellite carriage, low cost converter boxes and yes, a limited trust fund to produce content, the responses were almost exactly reversed. Eighty-one percent of our stations said they could give up their analog spectrum by 2007. Since public stations hold 21 percent of all U.S. TV spectrum, this presents a clear roadmap to Congress for freeing up a lot of spectrum early.

Our plan is based on the notion that all spectrum, like all politics, is inherently local. It's not necessary or even desirable for all spectrum to be returned at once. In Berlin, 15 separate regional authorities set the timetable for the transition. A market by market approach might work well here as well. Wireless service providers or others who want access to spectrum might find it advantageous to test new applications and business models before rolling them out nationwide. And who knows, it might even help cover the cost of converter boxes, if it helped them to gain access to spectrum early.

However, our recent real world experience in this area is not encouraging. When public station KCSM in the Bay Area was forced to go digital only, it launched a thorough campaign to tell viewers where to purchase converter boxes. But when KCSM's analog transmitter finally went dark this spring, many over-the-air consumers, especially elderly ones, were stranded. Converter boxes were very hard to find and prices for the few that were available ranged from nearly $300 to $600. One retailer actually called the station asking that it not send any more customers to buy boxes that they did not stock. Clearly, the nationwide shutoff that a hard date implies would entail an enormous information campaign and the mobilization of converter box production on a war time scale. The country would benefit from trying digital only broadcast in a few test markets first, allowing the supply chain and consumers to adjust.

GAO's research also points out another key difference between Germany and the U.S., how the two societies finance public television. This is very important because public television has been a driver of the transition in Berlin and the U.K. The average household in Germany pays a fee the equivalent of about $236 annually for their public broadcasting system, while the American Federal subsidy for public television and radio amounts to about $4.19 per household, about the price of a Happy Meal at McDonald's.

While the tax on households would never fly in the U.S., the surrender of analog broadcast spectrum does present an opportunity to both accelerate the transition and to finance new educational content. The idea of a trust fund has been around since the 1960's, but our concept is different. It's limited in scope. It's highly targeted toward education and we believe will help unlock tremendous economic benefits for the Nation.

Mr. Chairman, generating auction revenue has been the main objective of regaining the analog spectrum in the U.S., unlike in Germany. However, a uniform hard date for the whole U.S. would cre-

ate a spectrum glut that will depress auction revenue for the public. And the larger issue goes beyond auction revenue. Our plan to return some spectrum early promises much greater economic benefits than auction revenue. If the wireless industry is correct, their use of vacated spectrum will lead to equipment orders, jobs and tax revenue to the government. We can make that happen sooner rather than later.

We believe this is a win-win-win proposal that will advance the transition, begin to unleash the economic potential and public safety benefits now bottled up with the analog spectrum and finally, deliver a new generation of digital educational services to our communities.

While time is running short on this Congress, we stand ready to work with you and the other members of the committee to accelerate the digital transition.

Thank you.

[The prepared statement of John M. Lawson follows:]

PREPARED STATEMENT OF JOHN M. LAWSON, ASSOCIATION OF PUBLIC TELEVISION STATIONS

Thank you Mr. Chairman. I am John Lawson, president and CEO of the Association of Public Television Stations, the national representative of our nation's local public television stations. Local public television stations are an important part of today's media landscape, reaching 99 percent of the population with distinctly local programming and services. Each of our 176 licensees is locally programmed, locally managed, and—most important—truly locally controlled.

Given the many choices in media available today, public television must offer something decidedly different and valuable if it is to survive. Given that federal funding provides about 18 percent of our system's total revenues, it is our *duty* to provide services to communities that fill particular needs.

These twin objectives of localism and public service are at the heart of everything our stations do. It is evident in our Ready To Learn children's programming, which constitutes a true early childhood learning experience with measurable results. It can be found in the public affairs programming that we offer, including candidate debates and other commercial-free political coverage.

And it is inherent in our role in offering truly universal service that covers rural communities and underserved populations that may benefit most from our services. The relevance to today's subject is that *no other* stakeholder has a greater responsibility to ensure that no viewer is left behind in the digital transition.

INNOVATION WITH NEW DIGITAL SERVICES

Mr. Chairman, if one accepts that public television's mission has grown since 1967, we are fortunate to today have a 21st century delivery system to meet it. Digital television (DTV) has geometrically expanded our capacity to meet our mission. Since the DTV transition began, our system has raised more than $1 billion to make the conversion. As of today, 271 of the country's 357 PTV stations are transmitting a digital signal in markets that include more than 88 percent of households, and we are optimistic that most of the remainder will be on the air by the end of this year.

It is no exaggeration to say that our local stations view digital as their greatest opportunity ever to serve the public; our true challenge now is to move from simply delivering a digital signal to creating and delivering actual digital *services.* We are bullish on DTV, and—to the point of this hearing—we are eager to entertain new ideas for accelerating the DTV transition.

Most stations are broadcasting high-definition television, especially in primetime. During the daytime, many are broadcasting new, multiple standard-definition channels, which are expanding citizens' access to quality children's and educational programming and public affairs coverage. For instance, New Hampshire Public Television is launching a new channel dedicated to local and statewide public affairs and other New Hampshire content. SCETV has launched the South Carolina Channel with local content. And Thirteen/WNET in New York and WGBH in Boston are launching two new channels of content, titled "World" and "Create."

Many of our member stations are using some of their digital bandwidth for datacasting, another service made possible by DTV. Datacasting uses a station's digital signal for sending high-end video, audio, text, and graphics, directly to personal computers—wirelessly. Several stations, including KERA in Dallas, are datacasting standards-based content directly to school computer networks to boost academic achievement. This is one way that stations are fulfilling their voluntary commitment of one-quarter of their digital bandwidth for education.

Notably, many of our stations also are providing DTV datacasting to improve emergency communications and enhance our homeland security. The June 7 issue of *Broadcasting and Cable* magazine (see Appendix B) reports on a soon-to-be-finalized agreement between the Federal Emergency Management Agency at the Department of Homeland Security, our association, WETA/Washington, Maryland Public Television and the Public Broadcasting Service (PBS). The project will pilot DTV as a backbone of emergency communications for the National Capital Region and could be rolled out nationally after that. Meanwhile, Nashville Public Television is pioneering the use of datacasting for local homeland security applications in partnership with local and state agencies.

Appendix C of my testimony lists just some of the examples of how local public television stations are pushing the envelope in the use of digital broadcasting in real ways to help real people.

DIGITAL TELEVISION AT THE CROSSROADS

However, despite recent progress in the DTV transition, the nation remains a long way from achieving the full benefits of digital. While consumer awareness and acceptance of DTV has improved, it has not reached a sufficient "tipping point" at which the transition might shift into high gear. The analog broadcast spectrum, needed by public safety and coveted by new wireless service providers, remains out-of-reach for these other uses.

Meanwhile, broadcasters, both commercial and noncommercial, continue to incur the costs of operating redundant transmitters. In public television, we spend more each year running and replacing analog transmission equipment than Congress appropriates to the Corporation for Public Broadcasting for digital grants. The irony is not lost on our stations.

Public stations hold licenses to 21 percent of the nation's broadcast spectrum. Our stations know that they hold this spectrum in trust, and that the government will reclaim it at some point.

But when? A 2002 study by the National Association Broadcasters found that, absent new government action, the statutory conditions for the end of the transition might not be met until 2021. Since then, efforts such as Chairman Powell's voluntary plan and the DTV roundtable discussions hosted by the leadership of this committee have had a definite positive impact on the transition. However, with no change in policy, the end of the transition remains a distant goal.

Recently, policymakers have begun to consider what policy reforms might be appropriate. Most of the discussion has centered on imposing a so-called "hard date" by which analog broadcasting would cease and spectrum be returned to the government. The variables are first, how soon that date might be; second, whether a single hard date would apply universally to every market in the country; and third, how to handle the rather significant details of cable and satellite carriage rights and over-the-air analog consumers.

Setting a hard date is a tricky proposition: If the date is too soon, policymakers risk damaging the economy and stranding consumers. Also, regardless of the date itself, imposing a hard date without first resolving the fate of carriage rights and over-the-air analog consumers is a recipe for disaster.

PUBLIC TELEVISION'S ROLE IN THE TRANSITION

The success in Berlin, and in the U.K. with the Freeview digital service, led us to begin exploring whether our stations could contribute some new thinking about wedding some modest policy reforms to market forces.

In February, we asked our stations when they believed conditions would be in place that would allow them to switch off analog broadcasting and achieve what we call DOB—Digital-Only Broadcasting. The survey found that, assuming the status quo in government policy, 86 percent of stations didn't expect conditions to be in place for DOB by 2009, the hard date proposed by the FCC's Media Bureau plan.

This is the bleak DTV transition scenario with which we are all too familiar. It led us to ask: What would it take to change that scenario?

So we asked the question again, this time proposing three reforms to take place:

- first—ensuring full post-transition cable and satellite carriage of digital broadcast signals, including multicasting;
- second—ensuring the availability of low-cost, digital-to-analog set-top converter boxes for serving households that rely upon free, over-the-air television; and,
- third—creation by Congress of a new funding stream, such as a digital content trust fund, for the production and distribution of a new generation of digital educational content to drive market acceptance of DTV.

The results were astonishing: *81 percent* of stations indicated that with implementation of these important reforms, the conditions would exist for *voluntary* surrender of analog by the end of *2007*, a year earlier than the FCC's Media Bureau plan would require. (See Appendix A)

Stations in Roanoke, Virginia; Houston, Texas; and Durham, Hew Hampshire; have indicated they might be ready for Digital-Only Broadcasting by an early date if the above conditions are met. Barry Baker of WDCQ in Michigan, which serves thirteen counties in the "thumb" of Michigan, says his station could be ready to return its spectrum by the end of this year. However, we need to protect consumers in states like Montana, Oregon and North Carolina where some believe that DOB may take much longer.

In sum, we concluded that 1) it may be unnecessary or even undesirable for the entire country to be subject to a single hard date, and 2) there may be great benefits to encouraging early return of analog spectrum in the markets that are ready to go sooner.

PUBLIC TELEVISION'S DTV BLUEPRINT

Mr. Chairman, we think we are on to something here, and we would like to offer a blueprint today that would accomplish the triple goals of returning a significant amount of spectrum to the government in the next four years, providing a market-based boost for the transition and—most important—delivering new digital *services,* in the truest sense of the word, to consumers. Let me note that the plan we are presenting is still a work-in-progress, and much is dependent upon Congressional and FCC action. But we appreciate the opportunity to share our thinking with the Committee today.

First, we ask that the Commission adopt rules providing for full post-transition digital carriage rights, including multicasting, for local broadcast signals on cable and satellite, and that individual stations be accorded those rights *when they surrender analog.* We would rather negotiate these agreements with the cable and satellite industries, but it is critical that the Commission and/or Congress be prepared to weigh in if necessary. We have shared our views with the Committee regarding carriage provisions in the reauthorization of the Satellite Home Viewer Improvement Act.

Second, we propose that Congress create a trust fund, based upon auction revenues that would support the creation of digital education content by public stations and our partner institutions. GAO's valuable research points out on page one of its report a key difference between Germany and the U.S.: how the two societies finance public television. In Germany, public broadcasters are financed through a monthly fee of nearly $20 per household, which nets about $7.4 billion *per year.*

Here is a comparison to consider: The average household in Germany contributes about $236 annually to the German public television system while the American federal subsidy for public television amounts to about $4.19 per household. About the price of a cheeseburger and fries.

While a tax on households would never fly in the U.S., the surrender of analog broadcast spectrum presents an historic opportunity to both accelerate the transition and to finance new educational services. The idea of a public broadcasting trust fund has been around since the 1960s, but we believe our concept is different. It is limited in scope, is highly targeted toward education and, we believe, will help unlock tremendous economic benefits for the country.

Under our plan, public stations would be permitted to surrender their analog spectrum—on a market-by-market basis—almost immediately, if the policy changes we have outlined are instituted. Our plan is based on the notion that all spectrum, like all politics, is inherently local. It is not necessary *or even desirable* for all spectrum—public and commercial—to be returned at once. In Berlin, 15 separate regional authorities set the timetable for transition. A regional or market-by-market approach might work here, as well.

Wireless service providers or others who want access to UHF and VHF spectrum might find it advantageous to market test new applications in specific markets before rolling them out nationwide. Others have referred to this as "conditioning" the market.

Here is a hypothetical example: If ten public stations were willing to surrender analog by the end of 2005 or even sooner, some of the new wireless applications we have heard so much about might be tested in those markets, to be rolled out more broadly as spectrum became available. We would expect that wireless broadband companies would seek to work with stations in those markets to speed the process: For instance, might a wireless company be willing to help underwrite set-top boxes in a particular market if it knew it would gain access to the spectrum sooner?

By contrast, putting all analog broadcast spectrum on the market at the same time might create a spectrum glut, ensuring an uncertain return for the Treasury and taxpayers. And if spectrum is not to be auctioned all at once, there is little point to forcing the country to go through a massive common analog switchoff that a universal hard date would entail.

NO VIEWER LEFT BEHIND

This last point addresses the need for protecting universal access for consumers who rely upon over-the-air television, either exclusively or for second and third sets in the home. Taking care of these citizens is a prerequisite for completing the digital transition.

There may be, therefore, a need to subsidize digital-to-analog set-top converter boxes for some Americans, perhaps on a means-tested basis. However, we believe most consumers can be motivated to buy set-top boxes or new digital sets. The key is rolling out and marketing new, over-the-air digital services to consumers. The success of the Freeview service in Great Britain is very encouraging in this regard. Perhaps in America, there is an opportunity to re-brand and re-launch broadcast television as "wireless TV" for new generations who have known only cable.

Actually, as three public television licensees already have ceased analog broadcasting, we have some real world experience on which to draw. For example, when KCSM/San Mateo, California was forced to go digital-only about a year ago, it instituted a thorough notification campaign, which included information on where over-the-air analog viewers might go to purchase converter boxes. When KCSM's analog transmitter finally went dark this spring, many consumers, especially elderly ones, still were not prepared to deal with the change. Those who were prepared found a shortage of converter boxes in stores, with prices ranging from $299 to $600 and had to go to other stores to purchase rooftop antennas. One national retailer actually called the station asking that it not send any more customers to buy the scarce boxes.

Clearly, the nationwide shutoff that a hard date implies would entail an enormous information campaign and the mobilization of converter box production of wartime proportions. We believe the country would benefit from trying digital-only broadcast in a few test markets first, allowing the supply chain and consumers to adjust. Certainly, there is less risk—and potentially greater gain—in this approach.

TRUST FUND FOR A NEW GENERATION OF DIGITAL EDUCATION CONTENT

Under our scenario, self-selected stations that choose to surrender analog early would be eligible for grants from a new federal digital educational services trust fund. This fund would not replace the current appropriation to the Corporation for Public Broadcasting; it would instead provide a new, targeted source of funding for Public Television digital educational and informational content, paid for by future auction revenues.

Because stations would be unlikely to participate in this plan if they were forced to wait years for spectrum auctions, we propose that this fund be created by an initial appropriation. The Treasury then would be reimbursed later by the proceeds of the spectrum auctions but, in the meantime, local stations could begin immediately to deliver new digital educational content.

Mr. Chairman, I realize that much of the focus on the return of analog television spectrum has centered on auction revenue for the government. However, we believe there are much greater economic benefits at stake if the analog spectrum is freed up sooner rather than later. If the wireless industry is correct, their use of vacated spectrum will lead to a great deal of new economic activity. This means equipment orders, jobs, and tax revenue to the government.

The establishment of a digital educational services trust fund itself will have important economic benefits for the nation. The fund would support the creation of a new generation of education and training content and services, and the link between education and economic growth is well known. A trust fund would allow for the localization of educational content and services; universal access to education; meeting the training needs for tomorrow's workforce; building richer digital libraries; and fi-

nally, fulfilling public television's original mission to provide quality educational services to the American public.

A MARKET-BASED SOLUTION

We believe the voluntary, market-based solution we propose will free up large blocks of spectrum much earlier than would otherwise be the case with minimal consumer disruption. Furthermore, our plan would rely upon market forces and the involvement of future spectrum beneficiaries in ensuring universal service and the provision of set-top converter boxes. The new educational services that would flow from the creation of a dedicated fund would represent true digital public service that otherwise will not happen.

Mr. Chairman, we believe this is a win-win-win proposal that will advance the transition, begin to unleash the economic potential of the now-bottled up analog broadcast spectrum and, finally, deliver a new generation of digital educational services to our communities.

While time is running short in the 108th Congress, we stand ready to work with you to seek the most efficient ways to accelerate the digital transition. Thank you for the opportunity to be here today, and I look forward to responding to your questions.

[Additional material submitted is retained in subcommittee files.]

Mr. UPTON. Thank you.

Mr. Hartenstein, welcome.

STATEMENT OF EDDY W. HARTENSTEIN

Mr. HARTENSTEIN. Thank you, Chairman Upton and members of the subcommittee. My name is Eddy Hartenstein. I'm the Vice Chairman of DirecTV and thank you for inviting me to testify briefly regarding the DTV transition and in particular, the Berlin model.

My message today is quite simple. As the Berlin model suggests, satellite operators can play an important role in achieving a hard date for the return of analog spectrum. DirecTV stands ready, as my colleague, Mr. Willner has said in the cable side, to play such a role in that transition, but cannot do so if required to carry broadcasters' multicast programming or datacast services and to forego the use, in our case of compression technology. The Berlin model is attractive in several ways. By relying on cable and satellite operators to deliver broadcast signals, it seems to have enabled a nearly instantaneous transition from analog to digital broadcasting. If a similar approach could be reached to accelerate the digital transition here, it could create enormous benefits for the American public. It would make spectrum available for public safety and commercial purposes, generating, by some estimates, tens of billions of dollars in auction revenue. It would give all parties in the digital transition greater certainty, and it would end the controversy and possibly future litigation over dual must-carry.

Can a Berlin variant accomplish this in the United States? It's certainly worth exploring. In any event, the most important thing is that this committee is leaving no stone unturned in finding ways to accelerate the digital transition.

Indeed, as a company that made its name by offering the first all digital service a decade ago, DirecTV has been at the forefront of the digital transition for years and is now exploring ways to retransmit hundreds of high definition local channels in markets nationwide. DirecTV thus stands ready to play its part in advancing the digital transition.

I'd like, however, to spend the balance of my time discussing one crucial point. DirecTV cannot help advance the digital transition if required to carry multicast and datacast services in the same way broadcasters have suggested. If DirecTV must make available to each broadcaster an enormous and fixed amount of capacity, it cannot offer a full slate of local broadcaster DTV service. As this committee is currently considering SHVIA reauthorization, you're well aware that satellite systems operate under very different capacity constraints than due cable systems. A typical cable system will transmit even in the largest markets at most about 20 broadcast signals at one time. Satellite operators, by contrast, must retransmit all broadcast signals nationwide using a very limited number of orbital locations in spectrum.

Thus, in order to provide local service in the first 105 markets that it does today, here at DirecTV, we must retransmit the signals of nearly 900 local stations simultaneously. DirecTV has met this challenge by employing state-of-the-air technology. First, we've launched spot beam satellites that allow the geographic reuse of satellite spectrum. Second, DirecTV has created capacity by compressing signals, that is, removing unneeded bits in the video signals. Such technologies have enabled DirecTV to provide local-into-local service in 105 markets today and hopefully in a few weeks, take that up to 130, and are a crucial underpinning of our commitment to serve all 210 markets in the United States by no later at the outside of 2008.

Some broadcasters, however, want to change this formulation, arguing that satellite carriers should retransmit not just the primary video of DTV signals, but also associated multicast and datacast material. Satellite carriers would essentially have to offer a fixed capacity pipe to all broadcasters in a market before retransmitting the DTV signals for any such broadcaster. DirecTV simply could not provide meaningful DTV service under such a rule.

DirecTV is procuring over $1 billion worth of satellites beyond what we already have up there that will enable us to retransmit the high definition signals of all broadcasters in many markets, but these plans depend upon the ability to compress signals and the carriage of primary video signals only.

Both of these elements are crucial. In fact, compression will be even more important in tomorrow's high definition and high bandwidth world than it is today and because even compression has its limits, the amount of underlying material to be carried must be reasonable.

In conclusion, DirecTV's ability to deliver local, standard and high def signals to its consumers depends on its continued ability to use compression and on reasonable limitations on the material that it must carry.

Thank you for allowing me to present our view and perspective on these issues. I welcome questions later.

[The prepared statement of Eddy W. Hartenstein follows:]

PREPARED STATEMENT OF EDDY HARTENSTEIN, VICE CHAIRMAN, THE DIRECTV GROUP, INC.

Chairman Upton, Mr. Markey and members of the Subcommittee, my name is Eddy Hartenstein and I am the Vice Chairman of The DIRECTV Group, Inc.

("DIRECTV"). Thank you for inviting me to testify on behalf of DIRECTV regarding the digital television ("DTV") transition, and, in particular, the so-called Berlin model. My message today is quite simple. First, DIRECTV believes the Berlin model can provide useful lessons for the United States in advancing the digital transition, in particular the role that satellite operators can play in achieving a hard date for the return of analog spectrum. Second, while DIRECTV stands ready to play such a role, I must caution members of the Committee that our ability to bring digital services to U.S. consumers will collapse if satellite operators are required to carry broadcasters' multicast programming or datacast services.

While I am not an expert on the Berlin model, it certainly appears to have some extremely attractive aspects. By relying on cable and satellite operators to deliver over-the-air signals to viewers, it seems to have made possible a nearly instantaneous transition from analog to digital broadcasting. If a similar approach could accelerate the digital transition in the United States (for example, as suggested by FCC Media Bureau Chief Ken Ferree), it would create enormous benefits for the American public.

- It would, of course, make prime "beachfront" spectrum available for a wide variety of public safety and commercial purposes—a worthy goal in and of itself. By doing so, it would generate an enormous amount of auction revenue for the U.S. Treasury—as much as $40 billion, according to some estimates.
- It would give everyone involved—consumers, broadcasters, consumer electronics manufacturers, and programming distributors—greater certainty and a stable target toward which to work. This would eliminate the "chicken and egg" dilemma that has plagued the digital transition to date. A date certain for the transition would lead to greater capital investment by distributors to carry digital content, the creation of more high-definition programming, and better and cheaper consumer equipment. The efforts of this Committee and FCC Chairman Michael Powell have certainly led to significant progress in this regard, but I think we all agree that a hard transition date would dramatically jump-start the transition.
- And not least, it would end the controversy over whether distributors should be required to carry simultaneously the analog and digital signals of broadcasters. While the FCC has tentatively concluded that so-called "dual carriage" is unconstitutional, a final ruling on this subject has yet to be issued. Regardless of the ultimate decision, it would lead to years of litigation, which in itself would slow the digital transition for years to come.

Can the Berlin model or some variant thereof accomplish all this in the United States? DIRECTV believes it is well worth exploring. Certainly, the Berlin experience provides one answer to perhaps the most important question associated with the digital transition—how to avoid "stranding" the 12.5 million Americans who still rely on over-the-air television. And, as some of my fellow panelists have observed, in the United States it might be possible to use proceeds from the analog spectrum auctions to fund subsidies of digital-analog converters, or even cable or DBS subscriptions. While there may be some elements of the Berlin plan that will make implementation difficult in this country, the most important thing is that the Committee is leaving no stone unturned in finding ways to accelerate the digital transition. We applaud this approach.

Indeed, as a company that made its name by offering the first all-digital service a decade ago, DIRECTV has been at the forefront of the digital transition for years. It is now actively exploring ways to create the infrastructure necessary to retransmit hundreds of high-definition local channels in markets nationwide. Therefore, if policy-makers conclude that such a plan makes sense in the United States, DIRECTV stands ready to play its part in advancing the digital transition.

I'd like to spend the balance of my time discussing one point I do not believe has received enough attention in this discussion: DIRECTV and other U.S. satellite operators simply cannot help advance the digital transition if required to carry multicast and datacast services in the way some broadcasters have suggested. Unlike cable operators, DIRECTV retransmits broadcast signals today by first digitizing the analog signal into a standard definition format and then employing video compression techniques. This allows us to make the most efficient use of valuable spectrum resources without degrading signal quality received by our viewers. Indeed, DIRECTV uses such compression to deliver viewers its current slate of high definition programming as well. A key underpinning to our future plans for transmitting high definition programming is the continued ability to use such advanced technology. If, as some broadcasters ask, DIRECTV must instead make available to each broadcaster an enormous (and fixed) amount of capacity on its satellites, DIRECTV will be unable to use these techniques. Without them, DIRECTV will sim-

ply be unable to offer a full slate of local broadcasters' DTV service, and our ability to advance the digital transition will effectively be negated.

Satellite Operators Have More Severe Capacity Constraints Than Do Cable Operators

As this Committee is currently considering reauthorization of the Satellite Home Viewer Improvement Act ("SHVIA"), I probably do not need to remind you that, when it comes to retransmitting local broadcast signals, satellite systems operate under very different capacity constraints than do cable systems. A typical cable central office, or "headend," collects over-the-air broadcast signals from the surrounding community, and retransmits those signals to viewers. Thus, a cable system will retransmit, at most, perhaps twenty broadcast signals at a time.

Satellite operators, by contrast, must retransmit *all* broadcast signals in each of the markets they serve from coast to coast using a very limited number of orbital locations (the satellite equivalent of the cable headend). Thus, in order to provide local-into-local service in the 105 markets it does today, DIRECTV's distribution system needs to retransmit the signals of nearly 900 local stations simultaneously from two orbital slots. This requires an enormous amount of capacity, and has been the principle engineering challenge DIRECTV has faced since SHVIA's enactment.

DIRECTV Relies on State of the Art Technology to Retransmit Local Stations

DIRECTV has met this challenge by employing state of the art technology. First, DIRECTV has launched *spot-beam satellites* that create additional capacity by reusing spectrum in different geographic areas. The more traditional CONUS-beam satellites have a single, multi-frequency (or multi-transponder [1]) footprint that covers the entire continental United States. While CONUS satellites are excellent for retransmitting *national* programming, using them to retransmit *local broadcast* programming is a very wasteful use of spectrum. For example, if DIRECTV wanted to retransmit a Boston station on a CONUS satellite, it would have to retransmit the station to the entire United States, even though, by law, only Boston-area subscribers could watch it. Naturally, if one were to try to retransmit local broadcast stations in every market throughout the country via CONUS satellites, capacity on the satellites would quickly be exhausted leaving little, if any room for national cable programming.

By contrast, spot-beam satellites are much better for the retransmission of local broadcast signals because, rather than "seeing" the entire United States with a large number of transponders, they "see" multiple, discrete areas, each with only one or two transponders. Spot beam satellites thus allow the geographic "reuse" of satellite frequencies—as transponders operating over the same frequencies can simultaneously transmit signals to Houston and Chicago. This reuse is akin to your car radio—there might be FM stations operating at 99.5 in Washington, D.C., New York, and Boston, and, as long as they are far enough apart, they do not interfere with one another. Thus, the 99.5 frequency is "re-used" among these three cities. By covering discrete and non-overlapping geographic areas, satellite spot-beams can accomplish much the same thing.

To give you an idea of how important this technology is, DIRECTV has 46 DBS frequencies, 10 of which have been dedicated for use in spot beams to deliver nearly 900 local broadcast stations. If these same frequencies were used in CONUS beams, they could carry only on the order of 120 stations. Clearly, DIRECTV's use of advanced spot beam technology has been a lynchpin of its local service capability.

The second technique used to increase capacity is *compression,* a technique for mathematically manipulating digital content to remove redundant and unneeded bits. In the early 1990s, compression rates were roughly 5:1 (meaning that you could fit five cable channels or broadcast signals on a standard 24 MHz DBS transponder). Today, for standard definition television signals, compression rates are typically between 11:1 to 12:1 (although we occasionally compress at a slightly higher rate in order to fit stations into a particular spot beam), and further improvements are likely on the horizon. Compression rates for HD signals are, of course, much lower—but these, too, are expected to improve.

This is, of course, a very complicated subject. But the bottom line is that, if you want to know how much capacity a satellite operator has to retransmit local broadcast signals in a particular market, you need to know not just how many transponders the satellite operator has, but also how many transponders are available *in the spot beam or beams* covering that market, as well as *how much the satellite operator is able to compress the signal* while still maintaining signal quality.

Take, for example, the Washington D.C. designated market area. DIRECTV has assigned two transponders to the spot beam covering Washington, D.C. At 12:1 com-

[1] A single DBS transponder covers 24 MHz of spectrum.

pression, the retransmission of each of Washington's 12 broadcast stations in standard definition format can be achieved using a single transponder in this beam, leaving additional capacity for carriage of local signals in other markets covered by this beam. However, if DIRECTV were required to carry each station's multicast signal without using compression, it would have to allocate an entire transponder to each station. Under this scenario, DIRECTV could carry only two Washington stations, and thus, under the current "carry one carry all" rules, DIRECTV could not retransmit any signals to Washington (much less have capacity remaining to support local service in other markets within the beam). Accordingly, the spot beam infrastructure that DIRECTV has developed and deployed at a cost of hundreds of millions of dollars would be rendered essentially useless. Moreover, even if it were possible to take all of the frequencies DIRECTV currently uses for local signal carriage nationwide and dedicate them to providing local stations in Washington at a 1:1 compression ratio, there still would not be sufficient capacity to serve even this single market.

Multicast and Datacast Proposals Would Prevent DIRECTV From Advancing the Digital Transition

DIRECTV is able to retransmit local broadcast signals in the first place only because the "carry one, carry all" rules specify only that DIRECTV retransmit the "primary video [and] accompanying audio" signals of local broadcast stations. They do not mandate the amount of *bandwidth* that DIRECTV must use to retransmit the signals, or that DIRECTV must retransmit signals that do not relate to the primary video feed. Indeed, the law specifically permits DIRECTV to use "reasonable compression techniques" in such retransmissions. DIRECTV can thus meet its statutory obligations while reducing the bandwidth of the signals, all the while maintaining the digital clarity that is a hallmark of our service.

Some broadcasters, however, want to change this formulation for the retransmission of DTV signals. They say that satellite carriers should be required to retransmit not just the "primary video" of digital signals but also associated multicast and even datacast material. This may sound benign, but what it really means is that satellite carriers would be required to retransmit the entire bitstream of a broadcaster's digital transmission—including redundant and other bits unnecessary for a quality digital video signal and even bits that have nothing to do with video service at all.[2] Were such a rule applied under today's carry one, carry all regime, this would mean that satellite operators would have to offer such a "pipe" to *all* broadcasters in a market before retransmitting the digital signals of *any* such broadcaster. As my earlier discussion of the Washington, DC market illustrates, if that were the rule, I can assure you DIRECTV would be carrying local stations in a handful of markets versus the 105 we are in today.

DIRECTV believes its future lies in bringing its customers more high-definition signals, particularly local stations in high definition. Moreover, those signals will have to be of sufficient quality to compete with the high-definition offerings of cable operators, or DIRECTV will likely lose subscribers to cable. To this end, DIRECTV is in the process of procuring a billion dollars worth of spot-beam satellites that will enable it to retransmit the high-definition signals of all broadcasters in many markets within a few years. These plans depend critically upon the ability to use cutting-edge technology, especially the use of advanced compression techniques, and the carriage of a broadcaster's primary video signal only.

Both of these elements are crucial. First, compression has long been the key to DIRECTV's ability to provide the widest possible array of compelling programming to consumers given a limited amount of bandwidth. That technology will be just as fundamental in tomorrow's high definition world as it is today. Second, because even compression has its limits, the amount of underlying material to be carried must be reasonable. If DIRECTV must carry each broadcaster's multicast programming, it will simply have to cut back on the number of markets it can serve. Moreover, if DIRECTV must carry each broadcaster's datacast signals as well, the problem is exacerbated even further—DIRECTV will be unable to achieve the benefits of compression because data transmissions are already compressed. Thus, it is imperative that satellite carriers be allowed to transmit only the compressed primary video signal—as they do today under SHVIA—if they are to continue providing local-into-local service in a substantial number of the nation's markets.

All of this obviously has enormous implications for DIRECTV's ability to help accelerate the digital transition, and, indeed, to retransmit local signals in high defini-

[2] *See, e.g.,* Letter from Henry L. Baumann, NAB, *et al.,* to Chairman Michael Powell, FCC, MB Docket No. 98-120 (Sept. 5, 2002) (suggesting that cable operators not be permitted to "alter the bits within the "data packets" of the broadcast DTV stream).

tion after the transition. We stand ready to assist in the digital transition. But the key to any decision in this area is DIRECTV's continued ability to use state of the art technology for the most efficient use of spectrum for the delivery of broadcasters' primary video signals. This in turn will drive the digital transition forward, and we look forward to continuing to be at the forefront of this effort.

Mr. Chairman and Members of the Subcommittee, I would like to thank you for allowing me to give DIRECTV's perspective on these issues. I am happy to take your questions.

Mr. UPTON. Thank you.

Mr. McGrath.

STATEMENT OF CARL J. McGRATH

Mr. MCGRATH. Good morning, Chairman Upton, Ranking Member Markey and members of the subcommittee. My name is Carl McGrath. I am the CTO of Motorola's Broadband Business Sector. My business is a leader in developing and deployment digital broadband entertainment communications and information systems for the home and for the office.

I want to thank you, Mr. Chairman, for your leadership on communication matters and for scheduling this hearing to address the issue of how to resolve the DTV transition in a timely manner and preserving and improving the TV viewing experience of the American public.

Mr. Chairman, since the beginning of television and throughout its transitions, Motorola has been at the forefront of technology development in the field. In 1947, we built one of the first affordable television sets. In 1963, Motorola developed the first truly rectangular picture tube for color TV. In 1972, we developed the first remote controlled set top box and in 1992, Motorola helped launch the digital revolution by proposing a transition from analog to digital technology to drive the market to HDTV and facilitate the recovery of spectrum.

Along the way and with a complete set of products for broadcasters, cable network operators and consumers, Motorola has continued to pioneer solutions that drive the delivery of digital television.

You are developing a solid record on the path forward to concluding the transition. On June 2, you heard about the FCC's DTV plan. The committee leadership sent a strong message that the digital day should be January 1, 2007. Chairman Barton's proposal changed the debate and we would like to express appreciation for his leadership and the direction he is setting for the transition. This gives rise to the subject of today's hearing.

Pursuing a model like that used in Berlin will provide certainty for U.S. consumers, law enforcement and industry by setting a firm date of no later than December 31, 2006, you will enable all sectors of industry and public safety to plan for the deployment of technologies in the 700 megahertz band. This will spur all of the relevant stakeholders to quickly conclude this transition.

Chairman Upton, as you and Ranking Members Dingell and Markey noted at the last hearing, another of the key benefits of concluding the DTV transition as soon as possible is improved public safety communications interoperability. Wireless communications provide our first responders with the right information at the

right time in the right place whether that information is video, voice or data. Use of this spectrum can literally save lives.

We are mindful of the other considerations that are involved in clearing these channels and we believe the adverse effects can be mitigated. As you explore ways to resolve the transition, we are encouraged by the examination of the Berlin experience where crisp, analog cutoff date was achieved by deploying digital to analog converter boxes to some analog TV owners who did not subscribe to cable or satellite service. This intervention ensured a seamless changeover for all TV customers and protected every consumer's continued availability to enjoy broadcast TV content.

It is encouraging to note that the GAO is working with this body to assess the applicability of the solution to the U.S. While there are high end digital analog converters on the market today, what is required for wire to consumer market is a low cost device that will allow our TV viewers to continue to use their existing televisions. There's currently no demand for such a mass market product because of the uncertainty created by the 85 percent penetration loophole in the Telecom Act. If Congress removes this uncertainty, there will be clear market for low cost converter boxes and manufacturers will have the incentives to produce them in quantities that drive down cost. Such boxes will benefit consumers, providing low cost alternative to view free over-the-air programming.

To support the conclusion of DTV transition, my team is presently completing its cost analysis for an over-the-air digital to analog converter that would facilitate a Berlin-type solution in the U.S. by 2007. In fact, we anticipate placing on record at the SEC an estimated cost of $67 per unit if the hard transition date was set in early 2007.

Today, approximately 80 percent of the television viewers nationwide receiver their content via cable and satellite services. Set top solutions like this can provide the remaining Americans with full TV access. This technology solution would facilitate an affordable implementation of a Berlin-type solution in the U.S. Government subsidies for converter equipment and effective consumer education campaign informing the public about the transition to digital television will ease the transition.

In closing, Mr. Chairman and members of the subcommittee, making spectrum available for new innovative technologies for first responders and consumers nationwide by the start of 2007 will not happen without your commitment and your help. We respectfully urge Congress to take action and close out the DTV transition we began together. We are proud of our technology heritage and Motorola pledges its support to you to help make this happen smoothly. We feel strongly that with digital to analog solutions like ours, this can be achieved with a trifeca, a win for the consumer, a win for industry and a win for the first responders. Thank you.

[The prepared statement of Carl J. McGrath follows:]

PREPARED STATEMENT OF CARL MCGRATH, CORPORATE VICE PRESIDENT & CHIEF TECHNOLOGY OFFICER, BROADBAND COMMUNICATIONS SECTOR, MOTOROLA

Good morning, Chairman Upton, Ranking Member Markey and Members of the Subcommittee.

MOTOROLA'S TECHNOLOGY HERITAGE

My name is Carl McGrath, and I am the Chief Technology Officer of Motorola's broadband business sector. I have worked with the cable, broadcast, and satellite industry for nearly 25 years, and my business is a leader in developing and deploying digital broadband entertainment, communication and information systems for the home and for the office.

I want to express my appreciation to you, Mr. Chairman, for scheduling this hearing to address such an important issue as how to resolve the digital television transition in a timely manner while preserving and improving the TV viewing experience of the American public.

Mr. Chairman, since the beginning of television and throughout its various transitions, Motorola has been at the forefront of technology development in the field. In 1947, we built one of the first affordable TV sets, which was offered to consumers for under $200. In 1957, the company built the technology for the first pay-per-view cable event. In 1963, as TV upgraded from black and white to color, Motorola developed the first truly rectangular picture tube for color television in a joint venture with the National Video Corporation. The tube quickly became the standard for the industry. In 1972, we developed the first remote-controlled set-top box, and in 1992, Motorola helped launch the digital revolution by proposing to the government a concept that no one else had seriously considered—transitioning from analog to digital technology to drive the market to High-Definition TV (HDTV) and facilitate the recovery of spectrum.

Along the way, Motorola has continued to pioneer solutions that drive the delivery of digital television. With a complete set of products for broadcasters, cable network operators, and consumers, the company looks forward to bringing technology to the table that will help the Committee meet its objective of expeditiously concluding the DTV transition.

In 2003, Motorola began bringing innovative HDTV solutions to a growing number of consumers—HD enthusiasts who desire these capabilities in their homes. As part of the company's connected home vision, Motorola enables viewers to enjoy the functionality of digital cable and HD, with products such as fully-integrated set-tops and media center gateways that support both standard and high-definition television signals.

Motorola's HDTV consumer equipment includes set-tops, which support both standard- and high-definition television signals and allows viewers to enjoy the functionality of digital cable and HD in a single, cost-effective solution—enhancing their TV experience with seamless surfing between analog TV channels, digital standard-definition channels, off-air (local broadcast) HD programming carried by cable operators. In addition to HDTV, some of our boxes are equipped with a cable modem to support future IP and video-based interactivity, including streaming media, IP and video telephony, file transfer capability, and session-oriented gaming.

We also offer media center gateways which allow consumers to send an array of advanced digital entertainment and communications services—including HDTV and Personal Video Recorder—to any room of the home when used with Motorola Broadband Media Center Extension (BMCx) devices. By attaching a Motorola BMCx to TVs, stereo systems, PCs, and other devices, consumers can network numerous electronic products, and enjoy the sharing of data and video throughout their homes. As you can see, moving all content to the digital environment will bring immeasurable benefits to consumers.

TECHNOLOGY CAN ENABLE A DATE CERTAIN FOR DIGITAL TRANSITION AND PRESERVE CONSUMER CHOICE

With approximately 70 percent of television viewers nationwide receiving their content via cable, the efficient carriage of digital HD content over cable systems is crucial to the successful, economical rollout of HDTV services.

Accordingly, Motorola continues to help lead the DTV transition through the development of a line of products that enable the simple and efficient carriage of digital HD content over cable systems—making it easier and even more efficient for broadcasters to offer HD programming to viewers.

Building on a decade of experience in HD encoding technology, Motorola also offers encoders that now incorporate techniques to provide users with exceptional picture quality at bit rates far below those originally anticipated. Using these new encoders, broadcasters are able to combine additional standard-definition services with their HD broadcasts, and cable programmers can transmit multiple HD streams on existing transponders.

As you can see, we have been working to develop complex solutions to deliver on the promise of the new technology that industry and Congress envisioned would

take shape in the digital TV environment. It is an honor to be here with you today to discuss how digital-to-analog converter technology can enable new services for consumers and first responders when used as a tool to complete the transition. The right decisions by the Congress can provide an aggressive and achievable timetable by which the public can benefit from improved public safety communications, new commercial services and new broadcast entertainment services.

You are developing a solid record on the path forward to concluding the transition. On June 2nd you heard about the FCC's DTV plan, and the Committee leadership sent a strong message that the digital day was beginning to dawn. Chairman Barton's proposal changed the debate, and we would like to express our appreciation for his leadership and the direction he is setting for the transition. This gives rise to the subject of today's hearing.

Pursuing a model like that used in Berlin will inject needed certainty into the US market for consumers, law enforcement, and industry. By setting a firm date of no later than December 31, 2006, you will enable all sectors of the industry and public safety to plan for the deployment of beneficial technologies in the 700 MHz band. This will spur all of the relevant stakeholders to quickly conclude this transition in the best interests of the public.

We generally believe that government intervention in the marketplace is to be avoided. However, in this case it is necessary to correct an unintended market conflict that flows from the Telecom Act. Setting a firm transition date is critical to resolve the current chicken and egg conundrum of the DTV transition. As you know, doing so will unlock new entertainment and information services for consumers and will provide additional opportunities for American industry.

Chairman Upton, as you and Ranking Members Dingell and Markey noted at the last hearing, another of the key benefits to concluding the DTV transition as soon as possible is improved public safety communications interoperability. Wireless communications provide our first responders with the *right information, at the right time* and *in the right place,* whether that information is voice, data, or video.

Public safety must have access to the 700 MHz spectrum by year-end 2006 to deploy interoperable voice and advanced data technology as early as possible. This spectrum can literally save lives. Together, we can improve the quality of mission critical information to our front line responders. While 24 MHz of spectrum has been allocated to public safety in the band, even more may be required to support homeland security coordination among Federal, State & local agencies and critical infrastructure entities.

Unfortunately, most metropolitan area public safety operations cannot use this spectrum today, nor can they predict with any certainty when they might have access to these frequencies. *The 85% threshold raises uncertainty.* In reality, there is no "hard date" for ending the DTV transition, leaving public safety and the deployment of vital technology in limbo.

We are mindful of the other considerations that are involved in clearing these channels, and we believe the adverse effects can be mitigated. As you explore ways to resolve the transition, we are encouraged by your examination of the Berlin experience where a crisp analog cut-off date was achieved by deploying digital to analog converter boxes to some analog TV owners who did not subscribe to cable or satellite service. This intervention ensured a seamless change-over for all TV consumers and protected every consumer's continued ability to enjoy broadcast TV content. It is encouraging to note that the GAO is expertly working with this body to assess the applicability of this solution in the US.

While there are digital-to-analog converters on the market today, they are generally targeted at the high-end, "early adopters" who want to experience the benefits of new technology as soon as possible. For example, Motorola has a high-end digital tuner box on the market today that displays digital content on TV sets that otherwise could not receive it, including conventional analog television. However, what is required for the wider consumer market is a low cost device that will allow TV viewers to continue to use their existing televisions. There is currently no demand for such a mass market product because of the uncertainty created by the 85% penetration loophole in the Telecom Act. If Congress removes this uncertainty, there will be a clear market for low cost converter boxes and manufacturers will have incentives to produce them in quantities that drive down costs. Such boxes will benefit consumers, not only by providing a low cost alternative for continuing to view free over-the-air programming, but also by allowing the public to access the multiple streams of content that broadcasters can place on a digital channel.

To support the conclusion of the DTV transition, my team is presently completing its cost analysis for an over-the-air digital-to-analog converter that would facilitate a Berlin Model-type solution in the US by 2007. Based on our analysis, the cost of such a device should be well under $100. In fact, we anticipate placing on the record

at the FCC an estimated cost to retailers of $67 per unit, if the hard transition date was set in early 2007. This technology solution would facilitate an affordable implementation of a Berlin Model-type solution in the US. Government subsidies for converter equipment and an effective consumer education campaign informing the public about the transition to digital television will ease the transition.

Manufacturers generally need 12-18 months to design and build a new device such as this. This cycle time points to the need to enact DTV transition legislation, if such a solution were part of the plan, by mid-year next year to meet the 2007 goal without disruption. In addition to providing those consumers who rely on over-the-air TV delivery with a cost effective way to continue to do so, Motorola believes the availability of a cost-effective converter box is another tool to help recover spectrum for new services.

PUBLIC SAFETY NEEDS 700 MHZ SPECTRUM FOR CRITICAL TECHNOLOGIES

Motorola's partnership with the public safety community over the years has taught us that first responders need systems designed specifically for mission critical operations to get the job done. As with most of the Northeast and Midwest, the State of Michigan was confronted with a large-scale emergency during the August 2003 blackout. Despite the failures experienced by various commercial carrier networks in Michigan and surrounding states due to these power outages, Michigan's nearly 12,000 public safety radios experienced no interruptions in communications. Police officers, firefighters and EMS providers worked as a team in real time to serve the public. Michigan had control over its communications because it had created a statewide mission critical network designed specifically for catastrophic situations and events, including the disruption of normal power sources. While many public safety entities also use public carrier networks for less critical communications, there is no substitute for mission critical systems when the safety of first responders and the public they serve is at risk.

Effective mission critical mobile and portable communications systems are absolutely essential to public safety operations. Police officers, firefighters, emergency medical personnel and their departments use mobile and portable communications to exchange information that can help protect public safety officials and the citizens they serve. Traditionally, this information was mostly exchanged by voice. Increasingly, as public safety entities strive to increase efficiency and effectiveness in today's world, they also need the capability to reliably transmit and receive high performance data, still images and video . Spectrum is the road upon which such communications travel, and increased communications requirements lead to the need for more spectrum.

Based on a thorough justification of need, Congress and the Federal Communications Commission dedicated 24 MHz of spectrum in the 700 MHz band to State and local public safety in 1997. The FCC established specific nationwide interoperability channels within this spectrum allocation, as well as both narrowband and broadband channels to support a variety of identified public safety communications requirements.

However, seven years later, incumbent television stations operating on channels 62, 63, 64, 65, 67, 68 and 69 prevent public safety access to this essential resource in most major urban areas where the demand for more spectrum is the greatest. The recent focus on increased interoperability and Homeland Security make availability of this public safety spectrum nationwide even more critical.

These channels are critical to public safety for two reasons:

(1) Together, the new 700 MHz and current 800 MHz bands provide the best opportunity to integrate interoperable communications. The 700 MHz band's proximity to the 800 MHz band allows public safety agencies to expand their current 800 MHz narrowband voice and data systems for interoperability and regional coordination on an "intra" as well as "inter" agency basis. Equipment operating in these combined frequency bands on the FCC-endorsed Project 25 interoperability standard is commercially available today. The FCC has granted each state a license to operate such narrowband communications in the 700 MHz band. Localities throughout the country are actively engaged in spectrum planning at 700 MHz, a prerequisite for obtaining their own FCC licenses. For example, after a yearlong review by the FCC, the Southern California regional plan was recently approved, but TV incumbency prevents actual use of the spectrum in much of that area.

(2) 700 MHz is the only dedicated spectrum allocation where public safety can implement advanced mobile wide area systems that bring high-speed access to databases, the intranet, imaging and video to first responders out in the field.

This technology offers a whole new level of mobile communications capabilities, which is far beyond today's voice and low speed data applications. For example:

a. An officer or agent could transmit video of a potential bomb, or biological weapon and get real time counsel from an expert in another location.
b. Local or state police could instantly send or receive a photograph of a missing or abducted child.
c. Crime scene investigators can transmit live video of footprints, fingerprints and evidence to speed analysis and apprehension of perpetrators.
d. Firefighters can access building blueprints, hydrant locations hazardous material data and other critical information.
e. Paramedics can transmit live video of the patient to doctors at the hospital that would help save lives.

Motorola previously conducted wideband trials together with public safety entities in Pinellas County, Florida and the City of Chicago, and we are currently participating in the District of Columbia's broadband trial. As to the Chicago trial, we greatly appreciate Chairman Upton leading a delegation of Committee Members, including Congressmen Bass, Rush, and Terry to participate in a demonstration last year with the Chicago Police Department. Trials like this one operate under experimental 700 MHz licenses from the FCC. The capabilities demonstrated are the emerging powerful multi-media applications that will bring public safety communications into the Twenty-First Century.

We commend and encourage efforts by this Committee and the FCC to ensure that this 700 MHz spectrum is cleared nationwide for public safety and other uses. The reality is that only 75 stations, equally less than 5% of this country's of the more than 1500 US television stations are blocking improved public safety communications for 84% of the population in the largest cities, those over 200,000. Motorola's analysis of independent television industry data shows that, on average, only 14% of the TV households who have the option to view these stations actually do so at all, and that of those viewing, 82% watch by cable. This means that, on average, only 3% of the TV households within these stations' coverage areas actually tune to these stations over-the-air sometime during an average week.

The Committee is also aware of an FCC plan that would complete the analog to digital TV transition by January 1, 2009. We applaud the FCC for taking the leadership and initiative to move the debate toward a successful conclusion. While 2009 may be an appropriate date by which all 1500 or more TV stations would complete the transition, the public safety community has stated that its needs justify clearing the stations blocking its channels by year-end 2006. At that time, public safety will have waited almost ten years to access this spectrum. Digital-to-analog converter box solutions could also be brought to bear in this environment to preserve access to broadcast TV content for all Americans.

We urge the Committee not to be deterred from sticking to the December 31, 2006 goal because it has been hard to achieve to date. Rather, once it has been reaffirmed without exceptions, the affected parties, including the relevant government agencies, the public safety community, the broadcasters and other industry parties, including our company, should be called upon to devote our energies to making it happen.

As you know, the 24 MHz of spectrum in the 700 MHz band is allocated for State and local public safety use. That spectrum, if cleared, would only partially satisfy the spectrum need documented by the public safety community. No comparable spectrum allocation exists for meeting the Homeland Security requirements of Federal agencies or critical infrastructure entities. Such interoperability among State and local first responders, Federal agencies and critical infrastructure entities will best be achieved through the availability of comparable spectrum resources. Therefore, we recommend that Congress consider meeting these additional needs by reallocating the remaining 30 MHz of commercial spectrum in the 747-762 MHz and 777-792 MHz portions of the band which are presently targeted for auction. This spectrum should be reallocated as a Homeland Security band to support State, local, Federal and critical infrastructure (such a utilities and nuclear facilities) communications needs. In the previous hearing, this Committee also heard testimony from Mr. Robert LeGrande, Deputy Chief Technology Officer for the District of Columbia Government. Mr. LeGrande pointed out that a portion of this additional 700 MHz spectrum is critical for broadband public safety services.

Should the government wish to pursue this important reallocation of spectrum, anticipated auction revenue from this 700 MHz band spectrum would no longer be available. However, we believe substitute spectrum that could provide potentially stronger auction receipts can be identified to replace this anticipated revenue and could be used to support a Berlin Model-type subsidy solution domestically.

Motorola greatly appreciates this Committee's continued policy thrust to find ways to reinvest spectrum auction revenues in ways to advance technology deploy-

ment and economic development, whether it is the Commercial Spectrum Enhancement Act that this body passed last year and is under active consideration in the Senate, or the Chairman's discussion of using auction revenue to help support the return of the analog TV frequencies for other valuable services—including public safety interoperability.

In closing, Mr. Chairman and Members of the Subcommittee, making spectrum available for new innovative technologies to support first responders and consumers nationwide by the end of 2006 will not happen without your commitment and your help.

We respectfully urge the Congress to take action to conclude the DTV transition we began together. We are proud of our technology heritage in this space, and Motorola pledges its support to our customers and to this Committee to help make this happen as smoothly as possible. We feel strongly that an expeditious date certain, together with digital-to-analog solutions like ours and those of the industry at large, will provide a trifecta—a win for first responders, a win for American consumers, and a win for industry.

Thank you.

Mr. DEAL [presiding]. Thank you.

Mr. Snider.

STATEMENT OF JAMES H. SNIDER

Mr. SNIDER. Thank you, Mr. Chairman, for the opportunity to testify about the freeing up 108 megahertz of the most valuable natural resource of the information age, the public airways.

I believe there's a consensus about two points on this committee and that is first, that it is desirable to free up as quickly as possible those 108 megahertz and that second, we want to do so in such a way that those relying on analog TV sets are not disenfranchised.

To pursue this goal there are two types of means, the means that we've employed for the last 15 years in the United States is what I call the producer subsidy model. The alternative represented by Berlin is the consumer subsidy model and I'm going to devote my comments to contrasting those two approaches.

The consumer subsidy model directly addresses the problem that is the bottleneck for the DTV transition which is the consumers that have analog TV sets. The producer subsidy model attempts to deal with that problem indirectly and is a far less efficient, in my view, method to incentivize the transition. As an example, if I want to get my daughter to clean up her room and do chores, I can give her a direct incentive or I could perhaps bribe all her friends not to distract her. I could bribe her not to watch TV and use the family car and I could hope that her sister who is manically clean will at some point just clean up because she doesn't like the mess. Clearly, the more efficient method is to give my daughter the direct incentive.

Berlin is a case in point and in 18 months they did the transition and they did it on a per capita cost at a tiny fraction of the U.S. transition. There are producer subsidies in the Berlin, don't get me wrong, but the cost per capita is a tiny fraction of the producer subsidies we're employing in the United States. So just a sample of some of the producer subsidies that we have given over the last 15 years to speed the transition, the biggest one has been spectrum flexibility. Originally broadcasters had a right to provide one standard definition TV channel as a result of this transition. They have the right to provide numerous standard definition TV channels or multiple high definition channels and data services.

They got a free spectrum loan, indefinite time to return to spectrum which gives them incredible negotiating leverage to get additional producer subsidies which is one of the reasons we're here today, a very valuable benefit. They won the rights to provide pay TV service. They only have to provide one free analog TV channel. With current compression technology, they get 19.4 megabits a second. You can get a standard definition TV channel now in 1.5 megabits a second. More than 90 percent of their spectrum now can be used for pay TV service. That's an extraordinary change. The DTV tutor mandate requiring every American and every TV to provide a broadcast TV tuner even though more than 85 percent rely on other means, cable and satellite being the most notable, to receive their TV.

Larger geographic areas, the larger the geographic area, the more eyeballs revenue and ultimately subscription revenue the broadcasters have used the transition to secure large geographic areas. Digital TV allows you to use more of the guardbands and they are doing so.

Better spectrum. They've moved from UHF spectrum, high UHF to lower spectrum which is far more valuable spectrum as a result of this transition. And that's just a subset of the producer subsidies. And there are many on the table going forward to so-call speed the transition.

Has this been a success? No. I would say it's been an abject failure, all these producer subsidies. A, look at the United States at the relative penetration of DTV via broadcast versus cable, satellite, broadband, DVD, all those DTV transitions have progressed very rapidly and far more successfully without a subsidy. We have less than 2 percent penetration of broadcast DTV in the United States. More than 40 percent, 8 percent penetration with all these other DTV formats and with no producer subsidies. I think that speaks volumes.

Internationally, England is actually the great case. They have 1200 percent more broadcast DTV penetration in England without any producer subsidies or minimal producer subsidies, plus they have greater DTV penetration in cable and satellite, again, without DTV transitions. So the DTV transition has not at all been speeded up with all these subsidies. England is a great case for that argument.

Now, I don't want to say that the producer subsidy model is the sole reason for the failure of the DTV transition. One of the big problems is we chose an inferior DTV standard in the United States as opposed to Europe. In Europe, they emphasize choice and mobility in their DTV standard. In the United States, we emphasize pretty pictures. The proof is that four countries have, the last I checked, have adopted the ATSC or the USDTV standard. Thirty-six countries have adopted the European DTV standard.

Now in phase two, they will have more like European choice and mobility emphasis with the U.S. standard and conversely, in Europe, in phase two, they will have more high definition.

So now let's go to the consumer subsidy model which is the heart of my comment here. The key element is how do you finance the DTV sets. My preferred approach would be to revoke the tuner mandate because you're requiring 85 percent of the people who

don't even want to watch broadcast TV to buy a tuner set which is a very inefficient mode to speed this up. But the proposal that I would like to focus on is auction receipts because that is the most politically feasible approach.

So revenue,the going rate for spectrum today is about $500 million per megahertz. That's down about 60 percent for the peak in 2001 with the Next Wave auction. Verification or backing for that number is recently, for example, Verizon offered a minimum opening bid of $5 billion on the 10 megahertz, 1.9 gigahertz band. And the FCC in the last few weeks has endorsed that number by coming up with the Nextel swap that they estimated at $4.8 billion for that 10 megahertz and there's quite a bit of other backing now for that number as a reasonable rate for unencumbered beachfront spectrum.

So if you have 108 megahertz and you multiply it by $500 million in megahertz, you get $54 billion. Now we're not assuming that all of that is going to be auctioned. We want to take some of it off for public safety. A little of it has already been auctioned, but we're talking about many billions of dollars.

On the cost side, in a recent cable TV show they were showing cable converter set top boxes for as low as $35. Using $50 which APTS and the FCC and various forums have used, if you bought a converter box for all 110 million American households that's a little over $5 billion. If you just provide converter boxes to low-income people dependent on over-the-air TV, you're talking about maybe $8 million, a total cost of $400 million, which is still much greater than what they did in Berlin because they focused only narrowly on low income. This is a low and middle income converter box subsidy that I'm proposing.

The bottom line is the economic analysis is overwhelmingly favorable in terms of return on investment for a consumer converter box subsidy. It's a very robust analysis. Even if the selling price is a third of the current market rate, and even if you auctioned less than a third of the spectrum, you still end up with a tremendous return on investment.

Now we argue that we also, we have enough money that we can fund the APTS Broadcast Trust Fund and also the dual proposal with those fees.

So what is the—I'd like to focus on——

Mr. DEAL. Mr. Snider, I'm going to have to ask you to wrap it up. You're about 3½ minutes over.

Mr. SNIDER. Okay. One critical difference between the U.S. and the Berlin one is in Berlin they were able to give digital flexibility as part of the transition. We've already given away that carrot, so we have to come up with a new carrot and the one on the table is must carry is the most—that's a real significant difference. Also, they were willing to just focus on low-income consumers for the converter box subsidy in Berlin. The focus in the United States has been we need to protect everybody or a larger segment of the population than just the low income people.

For more details, I have a detailed issue brief that we've submitted as an appendix to our testimony and I would encourage you to look at that for the details of our proposal. Thank you for this opportunity.

[The prepared statement of James H. Snider follows:]

PREPARED STATEMENT OF J.H. SNIDER, SENIOR RESEARCH FELLOW, SPECTRUM POLICY PROGRAM, NEW AMERICA FOUNDATION

Good morning. My name is Jim Snider, and I'm a senior research fellow at the New America Foundation, a nonpartisan public policy institute here in Washington. Thank you, Mr. Chairman and members of the Subcommittee, for this opportunity to testify today. My comments will focus on the difference between the Berlin and U.S. models for speeding the broadcasters' DTV transition while also ensuring that no American loses access to "free" over-the-air programming. Please see Appendix A, a New America Foundation issue brief co-authored by myself and Michael Calabrese, for a more detailed discussion of this proposal.

There is a general consensus that rapidly completing the broadcasters' digital TV transition—thereby freeing up 108 MHz of "beachfront" spectrum corresponding to TV channels 52-to-69—is in the public interest. There is also a general consensus that this transition cannot come at the expense of large numbers of Americans losing access to "free" over-the-air TV. The debate centers on the best means to achieve these two ends: continuing the present producer subsidy model or shifting to the consumer subsidy model illustrated by Berlin.

We believe that the Berlin experience teaches us that the direct consumer subsidy model is a faster and more efficient way to speed the broadcasters' DTV transition than the indirect producer subsidy model employed in the United States. In Berlin, the broadcasters' DTV transition took a total of 18 months and was completed at a cost per capita to taxpayers and consumers only a tiny fraction of the lagging transition in the United States.

The underlying reason the consumer subsidy model has proven to be so much more efficient is that it directly addresses the problem that is slowing the broadcasters' DTV transition: the slow rate of consumer purchase of devices that can receive broadcast DTV signals over-the-air. The producer subsidy model, in contrast, only indirectly deals with that problem. The difference is a bit like encouraging my teenage daughter to finish her chores not by offering her a simple and direct bonus for doing so but by paying all her friends not to distract her, bribing her not to watch TV or use my car, and granting her numerous extensions in the hope that her younger sister, who is compulsively clean, will do the job for her. The complex, indirect approach may indeed get the chores done but not without huge waste.

THE PRODUCER SUBSIDY MODEL

During the past 15 years, local TV broadcasters have lobbied for and won a myriad of government subsidies to speed America's transition to digital TV services. The most valuable of these subsidies include:

"Spectrum Flexibility"—Converting an FCC license with the right to provide one standard definition TV programming stream into a license to transmit ten or more standard definition TV programming streams or other data services, including HDTV.[1]

"Free Spectrum Loan"—An indefinite, interest-free loan to existing broadcast TV licensees of a second 6 MHz channel with no fixed termination date.

"Pay TV over Public Airwaves"—Rights to use as much as 90% of the 6 MHz DTV channel for pay TV or other pay data services, the revenue from which is supposed to subsidize ad-supported ("free") broadcast DTV services (subject to a 5 percent ancillary service fee to the government).

"DTV Tuner Mandate"—Last year the FCC adopted a terrestrial, broadcast over-the-air tuner mandate—which began phasing in on July 1 of this year (for high end TVs) and applies to all new sets by July 2007—requiring manufacturers to produce TVs with a built-in tuner, even though the vast majority of TVs will receive their TV programming via cable, satellite, Internet, or DVD.

"Broadcast Flag"—A requirement that the sphere of free TV be potentially restricted by requiring consumer electronics devices to recognize a "broadcast flag," which prevents retransmission of an FCC licensed broadcast signal without the permission of the broadcaster.

[1] With current video compression standards such as Windows Media Player 9 and MPEG4, a standard definition TV signal can be compressed into 1.5mbps. The broadcast DTV stream is 19.4 mbps, suggesting that 13 standard definition TV signals could be carried over that data stream. RealNetworks, Inc., distributor of the popular RealPlayer, claims to have video compression software that can compress an HDTV signal into 5 mbps, suggesting the 19.4 mbps data stream could carry three HDTV signals, with data to spare.

"More eyeballs"—Expanded geographic and household coverage for existing TV licenses rather than allowing "white space" to be auctioned or otherwise used by a potential competitor.[2]

"Sales Tax Exemption"—A sales tax exemption in more than a dozen states on all equipment purchased for broadcast studios. (The exemption is only for DTV equipment but there is little analog equipment now being purchased).

The abject failure of the producer subsidy model is illustrated both domestically and internationally. In the U.S, non-broadcasters have led the DTV transition both in terms of penetration and innovation. Figure 1 shows the relative U.S. penetration of broadcast DTV and other forms of DTV, including satellite DTV, cable DTV, broadband DTV, and DVD DTV. Despite all its subsidies and early start, broadcast DTV represents only a tiny fraction of the total DTV market.

Internationally, consider the case of England, shown in Table 1. British broadcasters were given minimal subsidies, yet the rate of broadcast DTV uptake is more than 1,200% (12 times) higher than in the U.S. Moreover, the DTV transitions over satellite and cable have progressed at virtually the same rate in the U.S. and England. Total DTV penetration, including cable, satellite, and broadcast DTV, is 20% higher in England.

Table 1: Digital TV Transition Rates in England vs. U.S.

	Digital Terrestrial (% of all Households)	Digital Cable (% of all Households)	Digital Satellite (% of all Households)	Total Digital (% of all Households)
U.K.	12%	9%	29%	50%
U.S.	1.1%	20.8%	19%	41%

Admittedly, the failure of the producer subsidy model in the U.S. may be influenced by a number of factors having nothing to with the intrinsic problems of producer subsidies. In particular, the U.S. adopted a broadcast DTV standard that is inferior in crucial respects to the one adopted in both England and Berlin. In Europe, a decision was made that consumers most wanted choice and mobility from an enhanced broadcast TV service, not high resolution pictures, so the DTV transition was focused on providing enhanced choice and mobility, with HDTV left for a future upgrade. The wisdom of that approach is illustrated by the fact that only four countries have adopted the U.S. broadcast DTV standard while 36 have adopted the standard used in England and Berlin. It is also illustrated by the fact that the broadcasters themselves are actively seeking to modify their standard so that it can better compete with the type of technology used in England and Berlin.

Another factor may be that the level of marketplace competition is higher in England and Berlin. Neither market provides commercial broadcasters with the same degree of must-carry rights, yet broadcasters must compete with more than a hundred channels offered via satellite. The result of the U.S. must-carry rights—the government guaranteeing broadcasters free distribution into the viewer's living room—is that U.S. broadcasters may have less incentive to innovate.

THE CONSUMER SUBSIDY MODEL

We propose that the consumer subsidy model be paid for via one of three methods: Auction receipts, leasing receipts, or repeal of the broadcaster only tuner mandate. From an economic standpoint, repeal of the tuner mandate would probably maximize consumer welfare. But from a political standpoint, an auction is most feasible, so my comments here will focus on that proposal.

Let's start with potential auction receipts. The going rate for unencumbered beachfront spectrum in the United States is approximately $500 million/MHz,[3] down

[2] In the average TV market, more than 80% of spectrum is set aside as guard band spectrum, the type of "white space" referred to here. Digital technology allows for a reduction in guard band spectrum. Some of that spectrum has been allocated for migrating channels 52-69 to 2-51; some of the balance has been allocated to increase the coverage areas for incumbent TV stations, especially UHF stations.

[3] The $/MHz metric applies to the value of one megahertz of spectrum with national coverage. A more conventional measure of spectrum value for the investment community is $/MHz-pop, the value of one megahertz per person. Translated into this metric, the $500/MHz figure suggests a valuation of approximately $1.50 to $2.00/MHz-pop. Most auctions are either not designed to maximize revenue (e.g., the lower 700 MHz auction) or do not offer beachfront, lower frequency spectrum (e.g., the proposed 24 GHz auction).

about 60% from its peak in 2000 and 2001.[4] That suggests that if all 108 MHz of returned spectrum were auctioned—an outcome we neither expect nor desire—the auction receipts would be $54 billion. Note that 24 MHz of the returned spectrum has been promised for public safety and another sliver has already been auctioned, albeit without the goal of maximizing auction receipts. If only a third of the returned spectrum were auctioned to maximize receipts, and it, in turn, generated less than a third of the expected market price, the receipts would still be over $5 billion.

Now let's look at the cost of the consumer subsidy.[5] Digital to analog converters, which allow analog TV sets to receiver broadcast digital signals over-the-air, were demonstrated last month at a cable show for as low as $35 a converter box. But for the sake of argument, let us use $50/converter box, a figure used by the FCC and the Association of Public Television Stations. If all 108 million TV households were mailed one of these cigarette box sized converters, the cost would be approximately $5.4 billion or 10% of the market value of the returned spectrum. If a converter box subsidy were only provided to low-income households exclusively dependent on over-the-air TV—the only type of household that received such a subsidy in Berlin—the number of households requiring a converter box subsidy would be under 8 million, with a total cost of $400 million.

We thus conclude that if strictly financial concerns dominate the analysis, the consumer subsidy model offers an outstanding return on investment. Moreover, this economic analysis is so robust that it comes to the same conclusion even when the most unfavorable assumptions are used: 110 million households, rather than 8 million, need the converter box subsidy; the auction price is only a third of the current market price of $500 million/MHz; *and* only a third of the 108 MHz returned spectrum is auctioned to maximize receipts.

Indeed, the economic analysis of the consumer subsidy model is so favorable that we feel no hesitancy in endorsing both the APTS and DOIT proposals to earmark a portion of spectrum auction revenue for investment in the future of public television and digital education. These proposals address the distinctive market failures of the digital age, so it is appropriate that receipts from auctioning the most valuable natural resource of the information age, the public airwaves, be earmarked to address that market failure.

We also believe that 42 MHz of the 108 MHz of returned spectrum should be set aside for unlicensed service. This figure was derived by deducting the 24 MHz allocated for public safety and then splitting the difference between licensed and unlicensed service. In recent years, unlicensed service has been at the heart of spectrum innovation and investment. Already, American families own far more unlicensed than licensed devices. But only about 1% of spectrum below 1 GHz—the beachfront spectrum—is currently allocated to unlicensed service on a dedicated basis. To bring the next generation of broadband Internet services most economically to America, we believe more lower frequency spectrum needs to be allocated as unlicensed. For the details on this argument, please see Appendix B, a New America Foundation issue brief written by MIT economist William Lehr.

POLITICAL DIFFERENCES BETWEEN THE BERLIN AND U.S. SITUATIONS

I'd like to highlight two critical political differences between the U.S. and Berlin DTV transitions.

First, in regard to producer subsidies, U.S. broadcasters have already been given spectrum flexibility, whereas in Berlin this subsidy could be provided to the broadcasters to win their political support. The consequence is that in the U.S. a new producer subsidy will probably have to be provided to get the broadcasters to return their indefinitely loaned spectrum. The producer subsidy most often cited is digital multicasting must-carry.

Second, in regard to consumer subsidies, Berlin demonstrated less concern about middle- and upper-class consumers who lost use of their analog TV sets as a result of broadcasters' shift to digital TV. The Berlin converter box subsidy was directed solely to low income individuals. In the U.S., broadcasters and policymakers have expressed greater concern about any individual, regardless of income, losing analog TV functionality as a result of the DTV transition.

---

[4] The 2001 Nextwave auction brought in bids totaling more than $16 billion, or $1.2 billion/MHz. The high bidders tended to be very savvy telecommunications companies such as Verizon and Sprint. Recent bids by these same companies have been substantially lower. For example, Verizon recently offered $5 billion as the opening bid for 10 MHz of spectrum at 1.9 GHz, providing a valuation of $500 million/MHz. This month the FCC confirmed that valuation with its Nextel compromise proposal valued at $4.8 billion for the same 10 MHz of spectrum.

[5] The accompanying policy analysis in Appendix A uses a slightly different set of numbers based on the information available when it was written.

These two political considerations suggest that both producer and consumer subsidies are likely to be substantially larger for the U.S. than in Berlin. It's not my expertise to advise members of Congress on the political consequences of turning off analog broadcast TV. But there are a few considerations I hope members of Congress will keep in mind.

The public has ample experience with technological obsolescence. For example, a comparable number of Americans own TVs and computers. Despite the fact that computers are more expensive than TVs and become obsolete more frequently, the public has come to understand this obsolescence as the price of progress. In Berlin, there was minimal public outcry as a result of the government-mandated shutdown of analog service. Perhaps we should reconsider the price of viewing a five-year-old computer as a doorstop but a 20-year-old TV as a public good.

Lastly, the timing of any additional producer subsidies is critical. Any future producer subsidies should be timed to coincide with or follow the return of the loaned 108 MHz of spectrum. Otherwise, as the history of the first fifteen years of the broadcast DTV transition illustrates, the public compensation for the returned spectrum may be renegotiated, reduced, and perhaps even eliminated by the time payment is supposed to be made.

CONCLUSION

This subcommittee can best serve the public interest by adopting a modified version of the Berlin DTV transition plan that includes the following highlights from the New America Foundation's detailed transition plan contained in Appendix A.

Fixed Turn-off Date: Announce a January 1, 2008 deadline (at the latest) for analog turn-off and spectrum clearance.

Consumer Converter Subsidy: Using a fraction of auction revenues, authorize a refundable tax credit available to consumers during a 12-month period to offset the cost of converting from analog to DTV reception.

Consumer Choice: Give consumers the flexibility to apply the credit to a digital-to-analog converter box, a new DTV set, or for initial satellite dish or cable set-up costs.

Revoke the DTV "Tuner Tax": Reverse the FCC's 2003 DTV tuner mandate, which seeks to reach the statutory 85% DTV threshold by requiring manufacturers to integrate over-the-air digital reception in every set over 13 inches by 2007—increasing the cost to consumers by over $1 billion annually—despite the fact that 85% of consumers who receive TV by cable or satellite may not need or want a broadcast over-the-air tuner.

Spectrum Reallocation for both Unlicensed and Licensed Wireless: In addition to the 24 MHz allocated for public safety, divide the remaining 84 MHz equally for use by licensed and unlicensed wireless broadband providers.

Update the DTV Public Interest Obligations: In return for the many new subsidies broadcasters have received in recent years—often with the express intent to preserve and enhance the public's access to local civic and electoral information—the obligations of broadcasters should be extended to all "free" over-the-air programming streams and quantified to include the lesser each week of 3 hours or 3 percent of programming time (half of this in prime time) of local civic and electoral programming.

Earmark Spectrum Revenue to Capitalize a PBS trust and DOIT: A portion of the spectrum auction revenue should be earmarked for investment in the future of public television and digital education.

Thank you again for this opportunity to testify. I will be most happy to respond to any questions or to assist staff as the Committee develops its own solution to the difficult problem of 1) reclaiming spectrum for 21st century information services, without 2) harming those still possessing the information technology of the last century.

[Additional material submitted is retained in subcommittee files.}

Mr. DEAL. Thank you. I want to thank all the panel members. It's certainly been an interesting panel and a variety of opinions have been expressed. Certainly, some of these we have heard before. Some, we have not.

Let me just across the board with the panel, ask you one general question and without getting into the details of the dates and the structure of a subsidy which we've heard some details in your comments, without getting into those details, do you, each of you, do

you believe that Congress should expedite the DTV transition by setting a hard deadline.

I guess a yes or no, if you possibly could to that response.

We'll start over here, Mr. Goldstein.

Mr. GOLDSTEIN. Congressman, from our perspective, it's really a policy issue for the Congress. What we can tell you is what we found in Germany which is that it clearly did help in the Berlin scenario and quite frankly in the other areas, the other islands in Germany, the simulcast period and the date certain, the amount of time between the beginning and the ends of the periods are likely to be shorter, even than it was in Berlin.

Mr. DEAL. Mr. Cooper.

Mr. COOPER. I guess the answer is yes, but and there's lots of buts. We've outlined in our testimony. The point of the transition is not to get there, but to make sure you end up in the right place. And one of the buts I didn't get a chance to mention was a la carte choice. We think that ought to be wrapped in here.

Mr. DEAL. Strange you should mention it.

Mr. COOPER. It just popped into my head when you moved to the chair. So that this can be in the public and citizen and consumer interest. But it has not been well managed. It was just a pure giveaway 10 years ago. It hasn't worked and now we have a chance to really establish the policy goals we want, so do it as fast as you can, but make sure you end up in the right place.

Mr. DEAL. Mr. Schmidt?

Mr. SCHMIDT. I don't believe that NAB or MSTV has taken a position on a hard date yet, but I think the same issues, similar to what Mr. Cooper, Dr. Cooper was talking about. At some point, you're going to have to draw a line. Where you draw that line really matters and what you do before then really matters. And if you can do things that will mitigate the expense and the dislocation and confusion for the viewers, obviously, our concerns are mitigated as well, but it really matters what happens before you get to that date. And just setting a hard now without taking those extra steps is going to be catastrophic.

Mr. DEAL. Mr. Willner?

Mr. WILLNER. I for one am really prepared to move forward with the digital transition. I think the Nation could be moving forward with digital transition as early as the date that's already set. So I'd be prepared to say yes. As a New Yorker and a witness to September 11 and I know some of the uses being contemplated for those frequencies, I would encourage this committee and Congress to move along as quickly as they can.

Mr. DEAL. Mr. Lawson?

Mr. LAWSON. I would agree with Mr. Schmidt. A hard date, by itself, without the other conditions in place will be a catastrophe. Second, I think it would be unwise to impose a uniform national hard date. I think we have to look at conditions in different markets. And third, Public Television's offer is that against any reasonable hard date, under right conditions, we will voluntarily free up spectrum early.

Mr. DEAL. Mr. Hartenstein?

Mr. HARTENSTEIN. I think an unequivocal yes is the right answer for all the reasons of getting the spectrum back, but it has to be

reduced to something very simple that first of all consumers can understand what yes means and when that date is it means, what's it going to mean to them.

This is an amazing economy. This is an amazing industry. But a yes with the correct provisos that say what will happen, who has to carry what is, I would urge this committee and the Congress to put a complete answer together so that everyone understands what it means. The manufacturers, the distributors, the broadcasters, all need to make preparations for that.

So I think the elements are all on the table here and we stand, I think all of us stand ready to have the debate that's associated with it and let's move on. We are behind, as you look at other countries, in doing this and we ought to take a leadership role.

Mr. DEAL. Mr. McGrath?

Mr. MCGRATH. I would say absolutely yes. There are many challenges. The technology is ready to help resolve those challenges. A quick focus on a date will get the dialog focused and those challenges can be solved very quickly.

Mr. DEAL. Mr. Snider.

Mr. SNIDER. Yes, absolutely, with one caveat. The 2009 FCC plan date is too late. Berlin took a total of 18 months from the time the parties came to agreement to when it was done and the simulcast period was 9 months for the next set of transitions. It's now even been reduced to 6 months. We don't need to wait so long to get to that hard date.

Mr. DEAL. I think there's general agreement that we certainly need to move with some deliberate speed in that direction. Obviously, I think if I asked you all what would be the actual transition date in the absence of a hard date without all the contingencies that are currently attached to the date we've established, we probably would be all over the spectrum in terms of your estimation of when that date would be, but I would—let me just ask it this way then. Do any of you think that we will reach the target date now that it's set of 2006 without some additional action by Congress to facilitate that? Does anybody think we'll do that? I don't see anybody saying so.

Well, all of you have touched on a variety of things that we could do to expedite it and I would like to ask just very briefly, Mr. McGrath, I believe you said that the unit that you were talking about would be a $67 price per unit.

Mr. Snider, is that in the range of what you estimated the cost of the device to be?

Mr. SNIDER. Yes. I'd just like to bring this committee's attention to a report that NAB and MSTV did in 2001 on the DTV tuner cost. They estimated over 5 years that the cost of those tuners would decline from $200 to roughly $10 because of learning curve and manufacturing. If you apply, these are computer devices, any type of analogous learning and production curve, even if they are $70 today and as I mentioned the company came out with the $35 converter at the recent cable show, we're talking about clearly a decline in cost, whatever it might be at this time.

Mr. DEAL. Mr. Willner, what would be price range of the device you're talking about there?

Mr. WILLNER. Our view is that—this particular device was over $100. There are different models in Germany, but our view is that in the mass market with CD manufacturers competing for the marketplace in a retail model that the price could be as low as what Mr. Snider said originally which was between $35 and $50.

Mr. MCGRATH. And I guess I would just add that any benchmark cost or price in the marketplace, I No. 1 absolutely believe that the competitive marketplace will meet or beat $67. And I intend to be a player in that market, but this is achievable. I just remind you that a 50 kilowatt analog voice modem still costs you over $50 at Wal-Mart.

Mr. DEAL. But if that 110 million households is the target, obviously, the magnitude of the target tends to bring the cost of the box down.

Mr. MCGRATH. I would absolutely agree. Our targets are on the much lower end of that, maybe a lower $8 to $10 million type of number and if this gets into the multi tens of millions certainly costs will come down faster. Learning curve here is the key. Get it started and get down the price learning curve.

Mr. SCHMIDT. Mr. Chairman, if I might add one note, however, one party that's not at this table is the receiver manufacturers.

Mr. DEAL. Yes.

Mr. SCHMIDT. And you can see the difficulties presented by putting a hard date on—I don't know what their time table is on putting these things in the sets, but if you put a hard date on any of the dates that these gentlemen are talking about, it seems to me it's going to be incumbent upon the retailers to put a sticker on each of those sets that says this DV will not work after January 1, 2007, unless you have an extra $50, $100 box or subscribe to cable or satellite. I'm not sure what that means for their sales, but I suspect it will not help them.

Mr. DEAL. Well, we have had manufacturer representatives in previous hearings and I think your point is well taken. And one of the concerns I think I have and I'm sure others is that every time we let somebody buy a television set or not let them, but every time they buy a television set voluntarily in this country that is not equipped to make the transition, your point is correct, is that they made an investment for which they will have to make an additional investment if they're going to move into the transition stage.

Mr. SCHMIDT. And I think we're going to see another 20 million analog sets sold this year.

Mr. DEAL. That is a lot. I've used way beyond my time and I'm borrowing the chair, so I don't want to abuse my time. We'll get back to some of you.

Mr. Boucher, I'll go to you.

Mr. BOUCHER. Thank you, Mr. Chairman, and I want to thank each of the witnesses for sharing their very interesting views with us today on what I think is a timely subject, but one that is fraught with a certain amount of uncertainty and I think our witnesses have underscored the degree of uncertainty that attends the question of whether or not the Berlin experience would translate well into the United States.

Mr. Schmidt, let me ask a couple of questions of you. Your testimony reveals some very interesting figures which I think perhaps

bear underscoring. Let me start by just asking a basic question and that is do you agree that the owners of analog sets should be held completely harmless if we set a hard date for the termination of analog over-the-air transmission?

Mr. SCHMIDT. Yes.

Mr. BOUCHER. And by holding them completely harmless, that means that they should not have to incur any cost in keeping their analog television set functioning in a totally digital era, is that correct?

Mr. SCHMIDT. I think we share that interest.

Mr. BOUCHER. And so you would say then that the means test that was employed in Berlin where the only people who got a government subsidy for the purchase of a converter box to convert digital to analog signals for their sets were the ones eligible for welfare. You would agree that we should not use that kind of model in the United States.

Mr. SCHMIDT. I agree.

Mr. BOUCHER. And so whatever subsidy we provide should be provided uniformly to whoever owns an analog set, is that correct?

Mr. SCHMIDT. That's correct. I think also competition policy would support that as well, because you don't want that extra stickiness from people switching providers by the fact that they not only have to go through the difficulties of switching, but now getting another box if they want to switch back to over-the-air.

Mr. BOUCHER. Another matter that you mentioned in your testimony was the approximate number of television sets that are not connected either to cable or satellite and therefore depend upon over-the-air transmission and I think you pegged that number at something on the order of 45 million.

How reliable do you think that estimate is?

Mr. SCHMIDT. Well, we've done some studies. I don't think anybody has a firm grip on it, but it's—we know it's a very big number, much bigger than the number that are exclusively the household of 15 percent number. That number is pretty good because these guys keep track of their subscribers, but the other number is less clear, but I think if anything, I suspect it's conservative.

Mr. BOUCHER. And included in that larger number would be the homes where one or more television sets would be connected to either cable or satellite, but where there are other television sets in the house that are not connected to cable or satellite and therefore depend upon over-the-air delivery, is that correct?

Mr. SCHMIDT. That's correct. I believe there are also other devices such as video recorders that also have over-the-air tuners that would be disabled, that are not even included in that count.

Mr. BOUCHER. So the number of sets that we would have to take into account, if there were some kind of government subsidy to purchase converter boxes and we've agreed at least the two of us have that every consumer who has an analog set should be eligible equally for this subsidy would be on the order of 45 million sets.

Now does every one of those sets require a separate converter box?

Mr. SCHMIDT. At this point they would. And even though this box is small, a lot of those sets are not very large and this box might be kind of unwieldy to have on a TV that you say took to a football

game or carried around otherwise. I mean there's going to be some breakage here, no matter what, but I think you're generally talking about sets that are not the high end set in the household and to have a $50, even a $50 proposition on a $75 TV is not a very consumer-friendly proposition.

Mr. BOUCHER. Well, I just did some rough math here. The approximate price of the converter box today is $150. That's about what it was in Berlin. I understand that's about what the typical device sells for in the United States. If you multiply that number times the 45 millon sets to which one of these would have to be attached, you get a figure of approximately $7 billion. Now discounting the price of the box to $100 a box, you would get $4.5 billion which would be the cost of providing this subsidy which is considerable.

And I have heard that the low end of the estimate, in terms of what revenues the government would receive as we auction a portion of the analog spectrum would be approximately $4 billion. Now I heard with interest Mr. Snider's comments that he anticipates a far higher sum. But I think he's anticipating that we will auction a principal portion of the 108 megahertz of the analog spectrum that would be returned. Some substantial portion of that will be devoted to public safety. Some substantial portion I hope and I know others hope will be devoted to unlicensed uses and so we may wind up auctioning only approximately half of that spectrum and the estimate I've seen at the low end is $4 billion. By that number, we might not even realize enough from the total receipts from the government from the analog spectrum auction to finance the $4.5 billion cost of subsidizing converter boxes.

Now my numbers may be low and I'll readily concede that, but others' estimates may be high and we're frankly dealing with something that we really can't estimate with any proficiency. What we have learned over the years is that every time we try to estimate the receipts from a public auction of spectrum, we're always wrong, sometimes on the high side, sometimes on the low side, but we're normally fairly dramatically wrong. And so before we head off into a legislative effort here, based upon assumptions that are hopeful, but perhaps inaccurate, I think we need to have a realistic view of what these costs potentially could be and the fact that we may not have enough receipts from the spectrum auction to satisfy the subsidy to 45 million television sets.

I want to say thank you once again to each of these witnesses and thank you, Mr. Chairman, for your indulgence.

Mr. UPTON. Mr. Shimkus.

Mr. SHIMKUS. Thank you, Mr. Chairman. As you know, you and I have been at different meetings and stuff, and so let me—something just popped into my head. Again, the great debate, a lot of friends at the table, answer me this question. Can you provide, okay, my opening statement mentioned in interest to the German model about over-the-air broadcast and maybe a little more spectrum so they can what I'll say is send more programs. And many times during this subcommittee, I've asked the question, I guess I'll start with that. Is free over-the-air TV still in the national interest and should be public policy of the United States of America? And I can exempt the GAO guy since he's the Accountability Office.

But why don't we go from the far left? Is free over-the-air TV still—to have that still in the public interest, yes or no?

Mr. COOPER. Yes, but——

Mr. SHIMKUS. That's fine.

Mr. COOPER. Can I do that again?

Mr. SHIMKUS. I really have limited time and if we can go yes or no, then I can move on. That's what I got last time. Next?

Mr. COOPER. One sentence on the but.

Mr. SHIMKUS. Okay.

Mr. COOPER. The but is in my testimony I described one of the essential characteristics of why we wanted free over-the-air TV as a manner of speech.

Mr. SHIMKUS. That's one sentence.

Mr. COOPER. That's what we have to get back to and I believe unlicensed can fill a substantial part of that objective.

Mr. SHIMKUS. Mr. Schmidt?

Mr. SCHMIDT. Yes, no buts.

Mr. SHIMKUS. Mr. Willner?

Mr. WILLNER. Yes, I do believe there is a place.

Mr. SHIMKUS. Yes, thank you. Mr. Lawson.

Mr. LAWSON. Yes, no buts.

Mr. SHIMKUS. Thank you. Mr. Hartenstein?

Mr. HARTENSTEIN. Yes.

Mr. SHIMKUS. Mr. McGrath.

Mr. MCGRATH. Yes. I do have to add two caveats. First——

Mr. SHIMKUS. Is that two sentences?

Mr. MCGRATH. Yes. It should not be just restricted to broadcasters. Satellite should be able to provide free service like they do in Europe. The satellite is a free service.

Mr. SHIMKUS. That is a different thing when——

Mr. MCGRATH. But the key point is as a de facto policy we've abandoned free TV as a model. Again, only one channel, less than 10 percent of the spectrum now needs to be allocated to free TV and the broadcast side of that is a major move away to free TV.

Mr. SHIMKUS. Let me follow up on that comment. Would allowing the broadcasters the ability to keep—I'm not saying the whole spectrum that they're required to turn back, but some so they have a couple of different options will that help us return to the debate of free over-the-air and the ability of the public at large to have access to that or is really free over-the-air gone by the wayside of the buggy whips and the candles and everything else?

Mr. SNIDER. I think there is very little commitment within the broadcast community for free over-the-air TV. They very much want a dual stream and if you look at the actual regulations they already allow it.

Mr. SHIMKUS. The dual stream subscription revenue, multiple sources.

Mr. SNIDER. Right. They can do that already with your DTV spectrum, the vast majority. Only a trivial portion are they required to provide free TV on now, so it's already happened.

Mr. SHIMKUS. So the argument that you provide a limitless spectrum for the broadcasters to compete that has to be with a requirement of the broadcasters to demand dual must carriage of all these additional channels that they then give the opportunity of? I mean

that's the complaint from the cable and the satellite folks is they don't want to be forced to carry the additional channels of the local broadcasters. Is that correct?

Mr. COOPER. Mr. Shimkus, the broadcasters have told you their model of free over-the-air TV won't work. They're demanding access to the wire, that is—and they've said, we can't make this work. So they've given you the answer to the question. The world is changed and they say they must have carriage on closed systems, on wired systems in order to survive.

Mr. SHIMKUS. But we still accept the debate going back to the first question, are we as a Nation still concerned with free over-the-air? If free over-the-air doesn't work, based upon what you're saying is the premise of the broadcasters, the question is can through public policy can we reclaim that through more opportunity for free over-the-air. Can you ever reclaim that or is a gone by era?

Mr. SCHMIDT. Actually, let me clarify our position for Dr. Cooper. We did not say it did not work. We said you can't pick one of these dates without that carriage, that we can't move the transition along on the time and pace that he's talking about. There is no question that being a single revenue stream business in a multiple revenue stream world is an enormous liability. And might I add it's a liability that is imposed on us by law and is the reason we needed the second channel to convert because we had a legal mandate to be available in every set and unlike everybody else who is converting to digital, whether it's cellular or satellite or anybody else, we don't have control over the consumer equipment. Everybody else does. And that is an obligation imposed on us by the government. So we're not, in Mr. Snider's words, the producer subsidy is somewhat undercut by this huge liability.

Now we can deal with that liability and there's some exciting new proposals to do the kinds of things I think you're talking about even without additional spectrum. There's an outfit called U.S. Digital and a proposal by Mr. Smuylan of Emmis Communications to create wireless cable, essentially, out of the broadcast digital spectrum. They're launched in three markets and I think there's some promise there for something that might provide the basis for a longer term viability.

As Mr. Snider said, the components have to be some element of a second revenue stream in order to assure that we have that open, unencrypted universally available part of the signal. It is not, as Mr. Snider said, however, a trivial part of the signal. Virtually all of us are providing full, high definition in prime time every night and that is a huge part of our bandwidth.

Mr. SHIMKUS. Thank you again and my time is well exceeded. Thank you, Chairman, and this just continues to highlight the great debate between friends. Thank you, Mr. Chairman.

Mr. UPTON. Thank you, Mr. Shimkus.

Mr. Goldstein, how do they deal with multicasting in Berlin? And who paid for it and walk us through that?

Mr. GOLDSTEIN. Multicasting in Berlin was decided by the media authority, principally. They determined that the various broadcasters could do it. In some of the other——

Mr. UPTON. And the broadcasters pay the cable companies, is that right?

Mr. GOLDSTEIN. That's correct. Yes sir. In some of the other areas of the country where they're deciding this now, it's still unclear as to whether or not there's going to be allowed sort of a full must-carry or not. It's unclear. Some have indicated to us that that is not the case and I think it's still evolving at this point.

Mr. UPTON. And you indicated in your testimony that you thought, again, Berlin did this, the rest of Germany didn't, right? But you said that there might be even a quicker transition throughout the rest of Germany without perhaps setting a hard date? Where are we in terms of that?

Mr. GOLDSTEIN. I think most of the islands, most of the other parts of the country that are transitioning and many of them are transitioning this year, do have a hard date, but the amount of time in which that transition is occurring appears to be less than it was in Berlin.

Mr. UPTON. What is that hard date that they set for the rest? Is it by States?

Mr. GOLDSTEIN. It varies. In each State—some States have two areas that are transitioning. Others have just one. It just depends on the geography and those dates vary.

Mr. UPTON. One of the things that I see as a true benefit of transition to digital, not only do we obviously recapture that analog spectrum, but the advantage of digital would be the use of high def is what really sells it to the consumers. A consumer can go into any—and see that picture, and that's what you want.

And it's my understanding that in Berlin, Berlin model, they don't—the digital capability that's being provided, does not allow for high def. Is that right?

Mr. GOLDSTEIN. That's correct. At this point, what they've provided is standard definition which allows for a lot more stations. It's allowing for terrestrial television to be much more competitive with cable because they've been able to greatly increase the number of channels. In fact, they can provide almost as many channels now as cable and while still allowing—of course, it's free and will also——

Mr. UPTON. But at some point they're going to say we want to get with the rest of the planet. We want to get with the Yanks. They're going to see——

Mr. GOLDSTEIN. I didn't hear them say that.

Mr. UPTON. They're going to want high def. They're going to want to watch those ballgames and news and Olympics and all those different things and what type of transition will they then have to go through 5, 10, 15 years from now, all of a sudden, hey, how come we're getting in essence a real degradation of what we're able to get?

What kind of transition will they then have to go through for those folks that now have that little converter box to get high def so they can get with the rest of us?

Mr. SNIDER. Mr. Chairman, if I could address that question?

Mr. UPTON. Yes. Go ahead.

Mr. SNIDER. I think England is a great example. They do not have high definition TV in England, but they have 1200 percent, 12 times the penetration of D Broadcast DTV of the United States. What they offer is choice, more channels and they offer mobility

which, for example, allows them to provide radio services which our TV standard does not allow under 19-4.4. Those are killer applications. So they have the option to upgrade later to HDTV, but for phase one, they don't. In the United States, we went with the pretty pictures approach. There's less consumer demand as evidenced by U.K., but for phase two, the enhanced VSB, the next generation which will create other obsolescence problems, we will be able to——

Mr. UPTON. My question is how—what will the cost be and how will they come about timewise and technology-wise to move from where they are now to be able to get the high def at some point later.

Mr. SNIDER. Are you talking about the European standard, how they might——

Mr. UPTON. Yes.

Mr. SNIDER. They have an HDTV option to the DVB standard, but they just haven't implemented it because they don't think the market most wants that for their phase one. They have to have more spectrum or different boxes.

Mr. UPTON. Actually, are the boxes wired—as I've gone out to the cable, to the CEA Show, they have great technology already built into that cable box that they know it's ready to just be flipped n, right?

Mr. SNIDER. Yes.

Mr. UPTON. The box, Mr. Willner, that you showed us, is that going to be able to bring them high def at some point?

Mr. WILLNER. No, this box doesn't bring in any high def. This is about making televisions work after you turn off the analog frequency so that consumers don't have to purchase high definition televisions until they are ready to. And the question really is—it all gets mumbled up all the time. This is about getting the frequencies back to the United States government so they can auction them off again and they can use them for public safety and how do you make all the consumers in America continue to watch television the day after you do that? When they choose to go out and buy a high definition television set or a television set that's capable of using interactive digital services that are available either over-the-air or over the cable system is their choice. And that should be their choice. And I think if we can stop expanding the focus on all these other issues and talk about how do you make everything work so you can get your frequencies back and do what you need to do with them. It's about an inexpensive set top or behind-the-set box that will make those TVs work.

Mr. UPTON. All right. Mr. Terry.

Mr. TERRY. I want to follow up on some questions by Mr. Boucher regarding the cost of the boxes. I think the fundamental question if we're going to do a Berlin-esque plan and who to get the consumer electronics to for over-the-air, I'm more inclined to focus on those folks who can't absorb the cost of buying that consumer equipment to continue watching TV.

In fact, most of the people that I know that don't have cable or satellite are doing it more out of protest to not giving in to that system than it is about economics and not having the dollars for it. And frankly, as we adopt policies on who should be eligible, I

don't want to pay for them to have a box, quite frankly. But I do feel and am compassionate toward those folks that are economically deprived that will have to fork out dollars that may take food off the table so that they can continue to get their free over-the-air.

So I want to know from you, is there societal or are there policy implications of just the government buying boxes for the economically deprived folks and not everyone, the 45 million that get free over-the-air television and whoever wants to pipe up, come on up.

Mr. WILLNER. Look, I personally believe it's up to the wisdom of Congress to decide that. I don't think it has any impact on our industries if that's what the policy of Congress is and either Mr. Boucher's viewpoint or your viewpoint will prevail and whatever you decide, you decide.

Mr. TERRY. So you said there will be no impact on your industry. Do you view that there are any greater societal impacts then?

Mr. WILLNER. Look, if you were subsidizing everybody and I had three TVs personally in my house, I don't know that I'd even think about filing for the refund. I would forego it. But I can afford to forego it. I do understand that some people can't and as long as the safety net is put in place and I'm speaking as an American citizen now and not as a cable operator, because it isn't a cable issue. I would think it has no societal issues whatsoever, the decision that you would make.

Mr. TERRY. Any others that have an opinion of whether there is——

Mr. COOPER. I would invite you to seek out the citizens in your District and tell them that you turned off their TV set and if they want to turn it back on, they can spend another $50 or $100. I think consumers have purchased those devices. They like to have them in the garage to watch the game while they're working on their cars and that will go blank. That's a cost that you imposed upon them by picking a date certain and unplugging it. I think that's a consumer impact and the fact that you think that person can afford the $50, I suspect that person would like—will suggest that you really ought to fork in the $50. First answer.

Second answer——

Mr. TERRY. I've had those calls.

Mr. COOPER. So the answer is that it's interesting to suggest that we only want to do it for poor people, but everyone will be disadvantaged.

The second answer I'd like to offer is it's fascinating to me on how quickly these costs will decline when they want to get something done and yet, if we have another hearing on a different issue, they'll swear these costs are going to stick up there because they don't want it to happen. So you get a lot of really excited people about oh, every chip costs a nickel, that's because they like the policy and next week every chip costs $5 because well, they don't want to do it. So I think there's a real cost here and I think it has an impact.

Mr. TERRY. I'll you also I'll probably get more calls from people who say I bought it out of my own pocket and I'm tired of my tax dollars paying it for people who could afford it too. So it will cut both ways.

Mr. SNIDER. Just to note as an enforcement problem, it was easy in Berlin because all TV sets are licensed, so it was easy to identify who had TV sets and they gave a subsidy to people already on the welfare rolls and they already had a system, believe it or not, for subsidizing TV sets for low income people. It's harder in the U.S. with our unlicensed system on the TV sets to administer the program. I would not underestimate the political problem that Mark has estimated and the very real problem that if there's any granny in the United States who is going to lose her TV that's a serious problem. That's why we're endorsing expanding the eligibility pool significantly.

you may question why we have to say the United States, a 5-year-old computer is a door stop and a 25-year-old TV is a public good. But whether that makes sense or not, that's the political reality of the United States and we think we ought to break from that premise.

Mr. TERRY. Anybody else like to comment?

Mr. GOLDSTEIN. Congressman, I would just add one quick point which is that GAO is continuing work for this committee in which we are looking at what the overall costs are going to be. We're looking at a number of things about the transition, including what equipment may be needed, what the costs might be in terms of if subsidies were required and that kind of thing. We will be reporting to the committee early next year.

Mr. TERRY. I appreciate that.

Mr. LAWSON. Mr. Congressman, if you look at the experience of the other European experience which I would urge the committee to look at very closely is the Freeview service in the U.K. which is through digital bringing back free over-the-air television and that model, as in fact, in Berlin, most consumers were motivated to go out and buy these boxes and under the right circumstances I think we could make that happen here.

Mr. MCGRATH. I guess I would also add that we should not lose sight of the offset that there is a dramatic improvement in the communications ability of public safety and first responder that flows out of this and one way or the other every American would benefit from this.

Mr. UPTON. Mr. Bass.

Mr. BASS. Thank you, Mr. Chairman. Another interesting hearing on a very complex subject.

Mr. Schmidt, you represent the broadcasters, right?

Mr. SCHMIDT. That's correct, yes.

Mr. BASS. It's my understanding that you're worried about televisions going dark after the deadline. Why not let cable and satellite operators down convert for consumers who want to continue using analog televisions, consumers with high definition TVs will receive your signals over-the-air and cable and satellite operators will gladly charge consumers for your and their own high definition programming.

Do you have any comments on that?

Mr. SCHMIDT. Well, we have proposed a slight modification. We would like the down conversions to be done at the consumer equipment rather than at the head end so that the consumers actually have the choice. It's not so easy to do a combination of over-the-

air and satellite. It is doable, but I think that's our tweak on the down conversion approach.

It's not clear to me as a matter of public policy why you would want to reinforce the dependence on those providers, rather than have a transition phase where at the end of the day you're looking at a fully independent provider, multicasting, broadband wireless provider and ultimately I think that ought to be the goal but as a transition matter, again, with some tweaks on it, the down conversion idea is obviously inherent in some of what we've been proposing.

I think it doesn't get you out of all of these other problems. It doesn't deal with the 15 percent. You still have to find a motivation and I don't think it's going to be quite—we've glossed over the difficulties of getting those things out there, but I can tell you that my mother is never going to be able to figure out that box no matter how small and simple it looks. And one of us is going to have to go over there and fix it for her and with my wife's parents, somebody's going to have to figure out how to do it in California and it's going to be—there are going to be a lot of dislocation and trouble getting these things done.

In Berlin, as I think it's another reason why Mr. Lawson is clearly correct. The more you can get people to do this voluntarily, through an incentive program, the less fall out you'll get on consumer resentment from that kind of implementation problem which is going to be formidable.

Mr. BASS. One other quick question, Mr. Schmidt, according to GAO written testimony, Berlin broadcasters must compensate cable operators for carriage, even when they have must carry rights. Why aren't you willing to compensate cable for carrying your multicast programming?

Mr. SCHMIDT. I'm not fully familiar with the model there, but I believe the cable carriers there are essentially common carriers without their own services that they provide independently and that that model is a different model than the cable we have here and satellites similar and they provide their services, especially the satellite providers, provide their services free over-the-air and I can definitely see how you would end up paying there and I believe that's what happens with Freeview as well.

Mr. WILLNER. If I could respond to that. The model in Germany about multicast was very different. They had 30 channels on a cable system. They had seven channels over-the-air. This was about more television programming being available and using the easiest technology to deliver it. This is the usual blurring of the issues here, bring in multicast, must carry, so that we can have another land grab here and take more frequency space away from cable operators who then can't offer those to other programmers who don't have the gift of public airwaves to be delivered to consumers. They have to come and negotiate their deals based on the content that they are creating for us to deliver to our consumers.

So the entire concept of multicast must carry just expands the bad idea of must carry to begin with which lowers the bar for programming to be created, because it's a free pass into people's homes and that's just not good marketplace practice.

Mr. BASS. I yield back, Mr. Chairman.

Mr. UPTON. Mr. Engel.

Mr. ENGEL. Well, thank you. Thank you, Mr. Chairman. I know the hour is late and we have a vote and I had a bunch of things to run around to this morning and I'm going to read the testimony of all the distinguished witnesses, but I just want to say from a parochial point of view, representing New York City, I just want to state my opposition to a date hard in 2006 to turn off the analog signal. Obviously, most of our TV transmission facilities are temporarily located adopt the Empire State Building which doesn't have the electrical capacity for all our needs and obviously on September 11, we lost our primary location and the new Freedom Tower is waiting to be built and they're talking about a completion date of 2008 or 2009. So until then, the people of New York and northern New Jersey and southern Connecticut won't be at a full digital capacity.

So I just would hope that there ultimately is an effort made to set an early hard date. We're going to need a waiver and I would hope that we could work with it, but there's quite a distinguished panel and I'm going to do a lot of reading today and tonight to look at their testimony and I thank them all for coming here.

Mr. UPTON. And we'll quiz you on your reading tomorrow.

If I see you at the Republican Dinner tonight I'll know that you have not done your reading.

Mr. ENGEL. You can attend for me, Mr. Chairman.

Mr. UPTON. All right.

Mr. ENGEL. I'll do the reading of the testimony.

Mr. UPTON. I saw you at another table.

Gentlemen, thank you. And we have four votes in the House floor, so we're going to adjourn the hearing. We appreciate very much your expertise, your willingness to be before us today. I would guess that a number of us will have additional questions that we'll be asking and maybe a different setting, but your work today has been very valuable as we progress on this road.

Thank you very much.

[Whereupon, at 11:55 a.m., the hearing was concluded.]

[Additional material submitted for the record follows:]

DVB-T in Berlin
The Transition to Digital Over-The-Air Broadcast

July 2004

National Cable & Telecommunications Association

By:

Steve Mace, Director, Systems Technology
Michael Schooler, Deputy General Counsel

TABLE OF CONTENTS

Executive Summary 3

I. The Video Marketplace in Germany 6

II. Purpose of the Digital Transition 12

III. Implementation: Berlin and Beyond 16

IV The Technology Behind the Transition 27

IV Conclusion 35

Executive Summary

On August 4, 2003, following a brief transition period, all analog terrestrial broadcasting in Berlin ceased, and only digital broadcast signals were available over-the-air to the city's residents. The transition seems to have been implemented without major resistance from consumers. In January of 2004, NCTA representatives traveled to Germany to try to gain some understanding of how this occurred. This report sets forth the facts that were learned regarding the context, purposes, and implementation of the transition.

The principal purpose of the digital transition in Germany was to preserve the viability of over-the-air broadcasting. Broadcast television in Germany developed along the lines of the BBC model in the United Kingdom. The first broadcasters to be licensed by West Germany after World War II were public broadcasters, funded by a fee assessed on all television households. This fee structure continues today. While the funding covers program acquisition and production, a substantial portion is devoted to the costs of transmitting signals. Subsequently, the government also allocated frequencies to private commercial broadcasters, who are funded entirely by advertising.

In addition to transmitting their signals over the air, broadcasters also lease capacity on cable systems and satellites. The large majority of television households receive their television via cable and direct-to-home satellite; only 7% rely solely on over-the-air reception.

This was viewed as too small a portion of the population to justify the costs of transmitting signals over the air – which, in the case of public broadcasters, continue to

be funded by a tax levied on all television households. Private commercial broadcasters had indicated that they might simply stop broadcasting over the air and rely solely on cable and satellite distribution. The government, however, was not prepared to strand households that could not receive or afford cable or satellite receptions by letting over-the-air broadcasting disappear.

The transition to digital television was meant to keep this from happening by enhancing the value of broadcast, using digital multicasting as a vehicle for increasing the number of available channels. Multicasting would enable each broadcaster to transmit four channels of programming instead of one within the same frequency spectrum. This would not only make broadcasting more attractive to existing over-the-air viewers, but would also make broadcast a viable alternative to cable in Berlin, which, for a variety of reasons, provides only about 30 channels of programming.

Proponents of the digital transition also envision the provision of new specialized broadcast services. In particular, digital broadcasting is expected to result in new mobile applications, including video programming and Internet services, in cars, cell-phones, and other handheld devices. High-definition television, on the other hand, has not been promoted in Germany and is not a factor in the German digital transition.

Berlin and Brandenburg were the first German cities to transition to a digital-only environment. Pursuant to agreements between the Berlin-Brandenburg regulatory authority and the broadcasters, the transition was implemented in a relatively brief, three-stage process, at the end of which all analog broadcasting ceased. Viewers who wanted to continue receiving television over-the-air on any of their existing analog television sets

needed to purchase set-top digital receivers – and they have done so in large numbers, with minimal protest.

Personnel interviewed during this study believe that consumers were willing to make the added one-time expenditure of approximately 129 Euros to receive 27 channels of digital television, which made broadcasting comparable to the approximately 30 channels available on cable for approximately 14 Euros per month. Still, most observers were surprised at how smoothly the transition went.

The transition is only now beginning to spread beyond Berlin to other areas of Germany; however it is not clear that it will be implemented as easily in those areas. In many places, there are fewer available over-the-air channels. Moreover, the timetable and manner of implementation are largely determined by the individual German State regulatory authorities, and other states may not be as adept as Berlin and Brandenburg in establishing procedures and deadlines for ending analog transmission. In addition, government funding of various aspects of the transition is running out.

The Berlin experience demonstrates that given the right conditions, a hard cutover to digital terrestrial television transmission can be successful. However, there are marked differences between broadcast, cable and satellite television in Germany and the U.S. that must be taken account in considering application of the Berlin model to the U.S.

I. The Video Marketplace in Germany

To understand the purposes of the German digital terrestrial transition, and why its initial implementation in Berlin has gone so smoothly, it's important first to have some understanding of the history and structure of the video marketplace in Germany. That history and structure are markedly different from our own. Like ours, the German marketplace includes commercial broadcasting, public broadcasting, cable television and direct-to-home satellite service; but those services have developed very differently there than here. Moreover, there's an extra stakeholder in the mix: the network operator.

A. Broadcasters

German TV broadcasting more closely resembles the British model than the American system. At the outset, and for many years, the broadcast system was entirely a "public broadcasting" system. Only subsequently were licenses and frequencies allocated to commercial broadcasters. Unlike in the United States, German broadcasters generally do not own their own facilities for transmitting their programming over the air to television viewers. Instead, the transmission functions of terrestrial broadcasting are managed by a network operator – which, in virtually all cases is "T-Systems", an arm of Deutsche Telekom. Broadcasters pay the network operator for transmission service.

Although public and commercial broadcast programming is the most watched programming in Germany, only a small portion of households – approximately 7% – rely on terrestrial over-the-air reception to watch such programming. The remaining 93% receive their programming via cable (56%) or direct-to-home satellite (37%).

B. Public Broadcasters

Public broadcasters are primarily supported by public funding from a tax imposed on all television households, although they are permitted to supplement this funding to a limited extent with income from advertising.

Regional public broadcast corporations were initially chartered by each of the 11 state governments in the former West Germany. These corporations formed the Association of German Broadcasters ("ARD"). The ARD operates a channel, the "First Program," which is broadcast throughout the country on the stations chartered to the member companies. All member companies contribute programming to this broadcast channel. Two other analog public broadcasting channels are typically available to viewers. ZDF ("Second German Television") is available nationwide pursuant to a 1961 agreement with the 11 state governments. And the "Third Channel" is provided on a regional basis by ARD's member stations, offering foreign language, educational, special interest, and minority interest programming.

Funding of public broadcasters is determined, first, at the federal level by an independent commission, which recommends a fee based on the costs of operating and transmitting broadcast channels. Each State then reviews and decides on the acceptability of the fee. The federal government requires that the public broadcast station content be primarily determined by an internal commission at each station, comprised of various relevant sectors of the public, such as academics, political leaders, sports and cultural figures, enthusiasts, and religious leaders.

C. Commercial Broadcasters

In the 1980's, the state governments began licensing private commercial broadcasters to provide over-the-air service along with the established public broadcasters. Private broadcasters receive no public funding and are supported entirely by advertising. They generally provide national services, with little or no local or regional programming. Their over-the-air access to television households, however, is hampered by the fact that the public broadcasters were given the best available frequencies and power limits to maximize their reach. What remained for the private broadcasters were in most cases markedly inferior – although in Berlin, private broadcasters had access to the most powerful transmitters, which gave them good coverage of the Berlin area.

D. Cable Operators

Cable television passes and is available to 69% of all German households, and is purchased by 56% (18 million) of those homes. The cable infrastructure was largely deployed and operated by Deutsche Telekom (DT) in the 1980's, when DT was still owned by the German government. In that respect, its infrastructure was publicly funded. The cable facilities were deployed on a monopoly basis, and there has not generally been wireline competition among cable operators in most areas.

In the late 1990's DT was privatized, although the government has retained a minority ownership interest in the company. DT, which was also the provider of telephone, satellite and other telecommunications networks, was required to divest some of its businesses – and it chose to get rid of its cable television assets. As a result, for

several years – at precisely the time when digital technology was encouraging cable operators in the rest of the world to upgrade their facilities to provide digital television programming, Internet and telephone services – cable television in Germany was in a state of transition and was largely stagnant.

Knowing that it was about to sell off its cable facilities, DT did not invest in significant infrastructure upgrades. Meanwhile, as the nation's principal provider of telephone service, DT actively deployed and marketed DSL service, diminishing future prospects for cable modem service. Moreover, the transition to new ownership of DT's regional cable facilities was delayed by the government's refusal to approve a transfer of ownership to Liberty Media, and the bankruptcy of CAI, one of the other American ventures that purchased a regional network.

In addition, cable's digital transition was frustrated to some extent by the fact that while DT owned all portions of the cable infrastructure up to the home or apartment building, it did not own or control the facilities inside the buildings and dwelling units. Even if DT, or the subsequent owners, were to upgrade their facilities to deliver digital services, those services would not be available to customers unless the owners of the facilities inside the buildings and dwelling units allowed residents to access them. (Apparently, this is one reason why CAI, the American venture that purchased the system in North-Rhine Westphalia, went bankrupt. It invested in a substantial upgrade but operators of the facilities in apartment buildings and other dwelling units refused to enable the company to offer Internet and telephone services to residents.)

So, while 56% of the German population receives their television over cable, what they generally receive is a single "basic" tier of approximately 30 analog channels. Most

of the programming consists of national and regional broadcast services (for which over-the-air reception in many areas is poor or unavailable). Programmers generally receive no payment from cable operators for being carried. They are either completely advertiser-supported or, in the case of public broadcasters, state-supported, and they pay the cable operator for carriage.

Thus, the cable operator in Germany more closely resembles a common carrier provider of telecommunications services – to subscribers and to program services – than a purchaser, packager and retailer of programming (This reflects the fact that originally the cable operator was DT – historically, a common carrier provider of network services.). Cable rates to residential customers are regulated. The government largely dictates the services that cable carries, since they are required to offer certain broadcast channels ("Must Carry" requirements are established at the state level and vary from state to state.). Lease rates for carriage are subject to common carrier ("just and reasonable") regulation.

Most of the people interviewed during this study, believe that the prices cable operators are permitted to charge subscribers are too low to be profitable. On the other hand, they also expressed that subscribers generally think prices are too high. In part, this is because all TV households – not just those who rely on over-the-air reception – pay a tax that is used to support public broadcasters (about 16 Euros per month). Cable subscribers pay an additional 14 Euros per month for their basic service.

The only optional premium service available to cable subscribers is Premier – a pay service that charges an additional 20 Euros per month for movies and other premium

programming. Premier leases capacity from the cable operator and then sells its service directly to subscribers, who must purchase a set-top box from Premier to receive it.

Some cable operators are trying to move towards a system of optional tiered programming, which would enable them to develop new types of proprietary programming supported by a combination of advertising and subscriber fees, like those offered by cable systems in the United States. They have been trying to persuade the large and popular commercial broadcaster RTL to be an anchor tenant on such a tier in order to lure subscribers. So far, RTL isn't interested. RTL officials see no reason to facilitate the development of new tiers of services supported by subscriber fees – services that would further dilute the viewership of RTL's own broadcast services. So, for now, cable operators are generally stuck offering only about 30 channels – which is more than what's generally available in most communities from analog broadcasters over-the-air. However, cable's program offering is substantially less than is available to consumers who are able to receive direct-to-home satellite service.

E. Direct-to-Home Satellite Service

Direct-to-Home (DTH) satellite service is provided to households in Germany in a very different manner than in the United States. There is no retailer or packager of DTH services to consumers – in other words, no service that resembles DirecTV or EchoStar's Dish Network. Programmers lease transponders from the operator of the satellite network (SAS Astra, which is headquartered in Luxembourg). Households that want to receive satellite-delivered television simply have to purchase the receiving equipment – a dish and a receiver. Then, they can receive virtually everything that is transmitted by the satellites that provide service to Germany without paying any

additional fee to a packager or programmer (except in the case of Premier, which is the only encrypted pay service and requires a special set-top receiver).

As in the case of German cable television, the DTH model provides no subscriber fees to programmers. Satellite-delivered programming must, therefore, rely on advertising or other sources of revenue (such as, in the case of public broadcasting, state funding). But unlike cable television, DTH offers viewers 690 channels of programming, much of which is delivered and targeted to European audiences other than or in addition to German viewers.

If a household wants a multichannel video service and has the option of cable or DTH, it will almost always opt for DTH. Since households can receive over 690 channels via DTH for the one-time price of a receiver and dish, or 30 channels via cable for 14 Euros per month, the two services are not really competitive. But many households either do not have a clear line of sight to the satellite or do not have space for the satellite dish (which, at 60 cm, is much larger than the dishes used to receive DirecTV and the Dish Network and more closely resemble older C-band dishes). As a result, only about 37% of television households get their television from DTH, while cable retains 56% of the market.

II. Purpose of the Digital Transition

The driving force that caused the government to force the digital transition was the fact that the transmission costs of terrestrial broadcasting could no longer be justified when only 7% of the television households received their television over the air. For public broadcasters, these transmission costs are borne by all television households, and it was becoming harder and harder to force the remaining 93% of households to pay for the

costs of an over-the-air system that they did not use. For commercial broadcasters (who receive no government subsidy), the alternative was simply to stop broadcasting terrestrially and rely solely on satellite and cable.

But the government was not prepared to abandon terrestrial broadcasting altogether. It had no faith that satellite and cable would be able to serve the entire market, and it was not prepared to strand any significant number of viewers without any available means of receiving television. The digital transition was embraced as a way to justify the costs of – and thereby preserve – over-the-air broadcasting.

A. Multicasting

One way that digital broadcasting could offer a solution to this problem would be to cause more viewers to rely on over-the-air broadcasting. Replacing a single channel of analog television with a multicast digital signal had the potential to achieve this result. Under the German system, multicasting enables broadcasters to transmit four channels of programming on their digital signal, thereby quadrupling the number of channels available to over-the-air viewers. Moreover, most of the available set-top boxes that are used to receive digital television include an electronic program guide, which enhances the ability of viewers to identify and select available programming.

Multicasting would not do much to enhance the attractiveness of over-the-air reception vis-à-vis DTH satellite reception. Increasing the number of over-the-air channels from approximately 7 to 28 (in Berlin) does little to make broadcasting a good substitute for the over 690 channels available by satellite. But it does make broadcasting a competitive alternative to a 30-channel cable system. Where over-the-air reception is available, at least some cable subscribers would be likely to decide that buying a digital

set-top box and antenna to receive a free 28-channel digital broadcast service was a better choice than paying 14 Euros per month for cable.

Additionally, digital multicasting gave commercial broadcasters added incentives to continue providing a terrestrial over-the-air service. According to the RTL official interviewed, the prospect of a competitive free over-the-air multichannel service is expected to give commercial broadcasters additional leverage in negotiating the terms of carriage on cable systems. A popular service like RTL can make a much more credible threat to walk away from carriage on cable if there is a competitive multichannel service to which viewers can turn in order to continue receiving the station. So, RTL and other commercial broadcasters support digital multicast broadcasting even though they may not yet have a substantial over-the-air audience for their new multicast programming.

DT, the provider of network transmission service for public and commercial broadcasters, is also supportive of the transition insofar as it preserves and extends the value and viability of broadcasting. After all, DT receives substantial revenues from public and commercial broadcasters, which it would lose if over-the-air broadcasting were abandoned.

As noted above, the transition makes terrestrial broadcasting a more viable alternative to cable service without posing any similar threat to DTH satellite service. Nevertheless, the transition so far has not resulted in a net loss of cable subscribers in Berlin. To continue receiving broadcast television, over-the-air households are required to purchase a set-top box and antenna. Those sets currently cost between 100 and 200 Euros. As a result, approximately 40,000 former over-the-air analog households in Berlin decided to become cable subscribers and pay 14 Euros per month. At the same

time, cable lost approximately 25,000 subscribers as the result of the transition to digital broadcasting. Still, if more and more television sets are eventually replaced with sets that have digital tuners, and if digital-to-analog set-top converters become even less expensive, the balance may shift to a point where cable loses more customers than it gains.

B. Mobile Applications

Multicasting was not the only way that digital TV was seen as enhancing the value of terrestrial broadcasting to consumers. Proponents of the transition also envisioned the development of new mobile applications to be delivered terrestrially by broadcasters and others. The DVB-T standard is currently being used in Berlin for reception in vehicles traveling at high speed. Additional work is being done to develop and deploy DVB-H, a new standard that allows reception of TV programming on low power handheld devices. DVB-H is seen as a value proposition that will encourage new business models and drive services to mobile phones, so that such phones – which are already used to play games and take pictures – can also be used to watch TV programming and access the Internet. Nearly all of the participants interviewed during this study expect DVB-H to prosper as a longer term (within the next several years) platform, while enhancing the value of digital terrestrial broadcast and acting as a catalyst for new revenue, encouraging fresh entrants to the marketplace.

C. HDTV

One technology that was not viewed as a significant part of the transition to digital broadcasting was high definition television. Unlike the case in the United States, where broadcasters initially expressed great interest in providing HDTV, German broadcasters have shown absolutely no interest in HDTV. There are no HDTV sets on the market in Germany, and, as one of the regulators we spoke with said of HDTV, "broadcasters hope no one learns about it." The official from the commercial broadcaster RTL confirmed that his company has no interest in supporting or promoting HDTV, which would just entail "more cost and no benefit."

On the other hand, at least one of the people interviewed – the official from T-Systems (the network provider owned by DT) – believes that HDTV will be introduced in Germany within the next five years. Flat screen and large screen televisions are becoming increasingly popular in Germany, just as in the United States, and ultimately that will drive demand for the better picture quality that HD can provide. But the T-System official believes that it will be cable operators who will be best positioned to offer HD once they figure out how to market HD tiers of programming to subscribers.

III. Implementation: Berlin and Beyond

To achieve the goals described in the previous section, the federal and state governments in Germany embarked on a transition to digital broadcasting. The Federal Telecommunications Act mandates a complete switchover to digital television broadcasting by the end of 2010. The transition requires implementation by the German

states. Some of the rules and regulations will be uniform throughout the nation as the result of the Interstate Broadcasting Treaty. For example, the Treaty provides that existing analog broadcasters are to be given a preferential priority in allocating digital frequencies, but separate agreements and regulations may also apply in the various states.

The broadcasters' costs of converting to digital transmission are being subsidized by the government. The calculation of the license fee assessed on all television households and distributed to public broadcasters specifically takes into account the costs of converting to digital. Private commercial broadcasters receive no such license fee revenues, but the Berlin-Brandenburg regulatory authority has made funds available, for a limited time, to such broadcasters upon the return of their analog spectrum.

While the conversion to digital broadcasting was conceived as a way to preserve the continued availability of over-the-air television, no one could be sure of how consumers would react to the digital transition. Would they view the availability of four times as many over-the-air channels as a valuable enhancement of broadcast television that justified the cost of the required set-top receiver and antenna? Would there be widespread protest and resistance to the switchover? Would the small percentage of remaining over-the-air viewers simply abandon broadcast television and switch to cable or DTH?

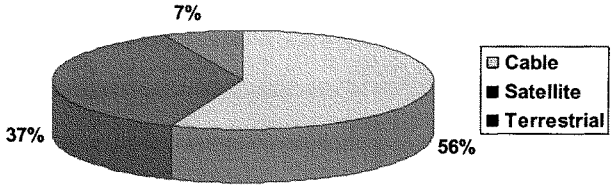
Berlin and its surrounding areas were the first areas to implement the transition, and the transition has so far gone more smoothly than most of the people we spoke with had anticipated.

A. Television Households Prior to the Berlin Transition.

Prior to the rollout of DTT in Berlin, approximately 7% of television households (160,000 homes) relied solely on terrestrial over-the-air reception. An additional 90,000 homes used over-the-air reception for second and third sets in the home.[1]

- 1.8 million homes total in the area available to receive analog terrestrial
- 160,000 homes with analog terrestrial reception only
- 90,000 homes with analog terrestrial reception for second and third sets

Of the total subscriber base in Berlin, the diagram below displays a breakdown of consumers receiving television services by type:[2]



B. The Three Stages of the Berlin Transition.

The details of the switchover to digital broadcasting were agreed to in a Memorandum of Understanding, executed on February 13, 2002, between the Berlin-Brandenburg regulatory authority ("MABB"), the public broadcasters, and the private

1 "Berlin goes digital, Experiences and Perspectives" DVB-T: DasUberall Fernsehen. August 2003

2 "Digital Terrestrial Television DTT Roll-out in Germany", Detlef Pagel, Niedersachsische Landesmedienanstalt (NLM), Hannover, 27 June 2003, Lyon.

commercial broadcasting services. Pursuant to that agreement, the transition was to have three stages.

First, at least one high-power analog channel would be switched to digital. Second, all the private national commercial broadcasters would switch to digital. Public broadcasters would switch their high-power transmitters to digital but would continue to broadcast analog signals over lower-power frequencies. Finally, all analog frequencies would be shut off.

Prior to the implementation of the transition, there were 11 stations broadcasting in Berlin – five public stations and six commercial stations. Compared to other cities and regions in Germany, this was an unusually large number. This is attributable to Berlin's unique status as a partitioned city prior to the reunification of Germany. During that period of time, frequencies were allocated in a manner that gave both East Berlin and West Berlin a full complement of broadcast channels, all of which are now available to the reunified Berlin.

The first stage of the Berlin transition began on November 1, 2002. At that time, one public broadcast station and one commercial station switched to digital transmission utilizing high power transmitters. Four public broadcasters continued analog service on high power, while five commercial stations continued to broadcast analog on lower power stations:

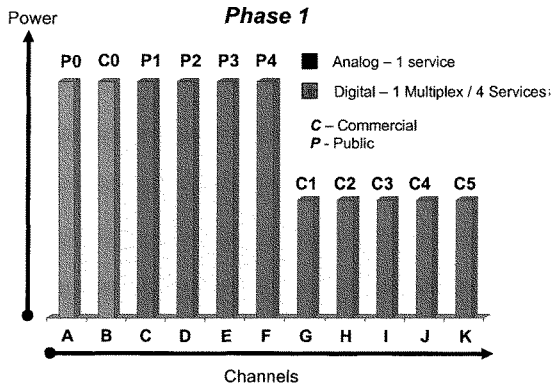


Figure 1 – Phase one of the Berlin Digital Transition

Source: "Digital Terrestrial Television DTT Roll-out in Germany", Detlef Pagel, Niedersachsische Landesmedienanstalt (NLM), Hannover, 27 June 2003, Lyon.

The second stage of the transition was implemented four months later, on February 28, 2003. On that date, all but one commercial broadcaster switched to digital multicast broadcasting. The public broadcasters (other than the one that began broadcasting digitally in the first stage) began simulcasting in analog, but only on the low-power frequencies previously occupied by the commercial broadcasters. The result was 23 digital TV services transmitted on 6 high power channels, and 5 analog TV services on 5 low power channels:

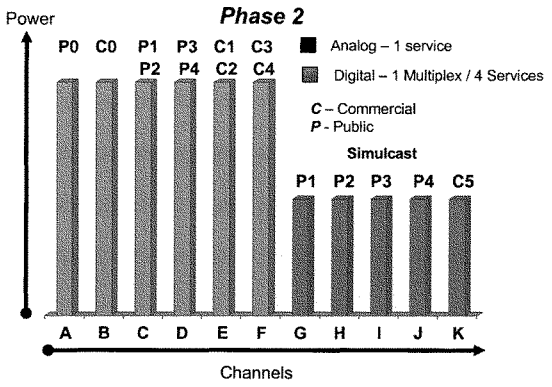


Figure 2 – Phase two of the Berlin Digital Transition

The transition was completed on August 4, 2003. On that date, all analog broadcasting in Berlin ceased. The public broadcasters who had switched to low-power analog broadcasting switched again – this time to multicast digital broadcasting. Over-the-air broadcasting in Berlin now consists of 27 digital channels:

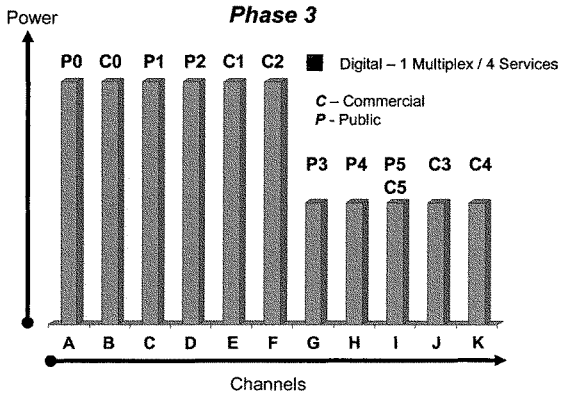


Figure 3 – Phase three of the Berlin Digital Transition

Timeline for the Transition

August 1997	Digital Terrestrial Television (DTT) test operation starts.
November 1998	The interstate media services treaty is amended.
July 2001	The DTT Statute is passed
23 August 2001	MABB presents the introduction scenario for DTT in Berlin-Brandenburg during the Media Forum held in conjunction with the Internationale Funkausstellung 2001.
29 November 2001	The agreement with the television broadcasters on the switchover is initialed.
17 December 2001	The MABB Media Council decides to support the switchover financially.
13 February 2002	The agreement between MABB, ARD, ORB, SFB, ZDF, ProSiebenSAT.1 Media AG and RTL Television on the switchover to DTT transmission in Berlin-Potsdam is signed.
7 May 2002	The capacity requirements for the states of Berlin and Brandenburg are filed with the Regulatory Authority for Telecommunications and Posts (RegTP), coordination for capacity begins.
October 2002	RegTP allocates the frequencies required.
31 October 2002	Stage one of the switchover: Two high-power frequencies are switched from analog to digital transmission.
28 February 2003	Analog transmission of all national commercial television services ends in Berlin; the high-power public-service frequencies (except for channel 39) are switched to digital operation; the public-services programs are switched to lower-power analog
4 August 2003	Analog transmission of terrestrial television in Berlin-Potsdam ends.

C. The Berlin Communications Plan

Before and during the transition, an intense cross-media communications campaign was put into place jointly designed by the broadcasters and a private advertising agency "Die Brandenburgs". The goals of the campaign were to provide detailed information about the various stages of the cutover; discuss the impact on consumers that were relying on over-the-air television transmission; and provide

objective information on DVB-T, cable and satellite, in order to educate consumers on their viewing options. The intensity of the advertising campaign peaked during actual transition periods.

The primary vehicle for communication of this information was television. This was supplemented by leaflets, brochures, and newsletters, as well as a letter sent to every home in February 2003 to reinforce the fact that only those homes relying on antenna reception would be impacted. The Berlin Tenants Association and local consumer associations were also involved. Finally a dedicated Internet website was established in cooperation with the Deutsche TV-platform (http://www.ueberallfernsehen.de). The tagline for the campaign was "DasUeberallfernsehen,"which roughly translates to "TV Anywhere."

Throughout the switchover campaign, a hotline was established to support consumers with questions to both procedural and technical issues. The hotline received approximately 22,000 calls of which only 600 could not be resolved directly over the phone. The total cost of the communications campaign remained below the budgeted sum of 1.2 million Euros.[3]

D. Availability of Digital Receiving Equipment.

A key element of the transition was the development and availability of affordable equipment to enable over-the-air viewers to receive digital signals on their existing television sets. This turned out to not be a significant problem.

With relatively short notice of the timetable for the transition, a significant number of equipment manufacturers produced a wide range of set-top receiver options

for consumers. To date, over 70 models of set-top receivers have been produced both from well know worldwide consumer electronics manufacturers and from lesser-known non-international brands. Some of the brand names available to purchase include:

Digenius	EchoStar	Grundig	Hauppauge	Humax
Kathrein	Lemon	Lorenzen	Metz	Micronix
Nokia	Pace	Panasonic	Quelle	Sagem
Samsung	Schwaiger	SkyPlus	Sky-Vision	Technisat
Wela	Wittenberg	Zehnder		

Figure 4 – Available brands of DVB-T receivers

During special sales promotions prior to the end of the transition, basic receivers could be purchased at retail for as little as 100 Euros. Currently, the range of prices for various receivers varies from 109 to approximately 200 Euros. The most evident variations among the models seem to be the features included in the electronic program guides, connectivity options, and the size of the device.

During a visit to Saturn Electronics, a consumer electronics store in Berlin, we saw eight models of set-top digital broadcast receivers on display for sale. The model shown below was both the smallest and the most popular model available.

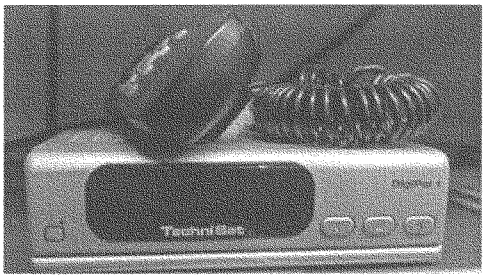


Figure 5 – TechniSat DigiPal-1 DVB-T receiver

[3] "Berlin goes digital, Experiences and Perspectives" DVB-T: DasUberall Fernsehen. August 2003

According to the sales person interviewed, all the models produce virtually the same excellent picture quality – and, in fact, the picture quality on all the sets on display was outstanding. The sales person noted that in all cases the signals were being received over the air.

Also available at retail stores in Germany are relatively high-end integrated digital television sets with built-in digital receivers. Two such sets were available for sale at Saturn Electronics in Berlin, from German manufacturers Loewe and Grundig. These sets were similar to comparable analog sets offered by such companies, but cost an additional 300 Euros for including the digital capability.

Not only did the range of available equipment manufactured exceed the expectations of the planners of the digital transition. So, too, did the willingness of consumers to purchase such equipment.

There are approximately 1.8 million homes in Berlin. As discussed above, only about 7% of all households relied solely on over-the-air broadcasting prior to the transition. Accordingly, we were told that planners set a target goal of 30,000 digital broadcast receivers to be sold in 2003. In fact, however, 85,000 households purchased set-top receivers prior to the end of the transition on August 4, 2003 – and as of January 2004, more than 200,000 receivers have been sold.[4] The sales person in the electronics store that we visited claimed that sales in his location alone were continuing at a rate of at least 20 per day.

[4] Source: Conversation with Dr. Andreas Hofmann, Technical Manager of Programming, RTL, 19 January 2004.

These sales exceed the number of broadcast-only homes. We know they include former cable subscribers (although, as discussed above, the 25,000 cable subscribers that apparently switched to over-the-air reception after the transition were more than offset by the 40,000 over-the-air subscribers that appear to have switched to cable). The sales must also include owners of cable and DTH subscribers with second and third sets that rely on over-the-air reception.

The media and government officials interviewed believe that most over-the-air households view the opportunity to receive 27 digital-quality channels of programming for the one-time cost of purchasing a receiver as a good deal. Most consumers feel that the programming offered on those digital channels is fundamentally the same as what is available on cable for 14 Euros per month; all that is generally perceived as missing is MTV, which is not available over the air. (Not everybody was happy with the transition. Apparently, the two largest groups that complained were (1) a coalition of 5,000 prisoners who could no longer receive television, and (2) 40,000 owners of high-end automobiles that had to be retrofitted from their existing PAL analog television systems in order to receive digital transmissions.)

While the prospect of receiving four times as many channels may have made most over-the-air households readily willing to purchase set-top receivers, there may still have been some households for whom even that one-time expenditure was unaffordable. Initially, the State Media Authority of Berlin and Brandenburg agreed with the state social services on an arrangement to subsidize boxes for those households entitled to television sets under Germany's social rules. The subsidy was limited to the transition period, during which approximately 6,000 subsidized digital set-top receivers were

distributed to low income households. Now that the transition has been completed, the subsidy program has been terminated.

E. After Berlin: The Next Stages.

After the switch in Berlin, DTT will also be launched in other densely populated regions: Northern Germany (Schleswig-Holstein, Hamburg, Bremen and Lower-Saxony), and North-Rhine Westphalia in 2004. Densely populated regions will be covered, although coverage outside of those regions has yet to be decided. The roll-out in the southern and remaining eastern parts of Germany is less definite and not clearly defined.

The transition is scheduled to be complete by the end of 2010. It is not clear that all the factors that made the Berlin transition a success can be replicated throughout the country. Not all areas will have as many available broadcast stations, so that a multicast digital service may still be inferior to what is available over cable and may not be viewed as worth the price of the set-top box. Not all regulatory authorities may be as adept as the Berlin-Brandenburg authority with respect to funding, timing and communications. Thus, whether the transition goes as smoothly in the rest of the country as it did in Berlin, remains to be seen.

IV. The Technology Behind the Transition

In this section, some of the technological aspects of the transition to digital broadcasting in Berlin are briefly described – specifically, the DVB-T standard used for

digital transmissions, the allocation of digital frequencies used for such transmissions, and the technology used in the digital set-top receivers.

A. Core Technology – DVB-T

The core transmission technology underlying the digital transition in Germany is the Digital Video Broadcast – Terrestrial (DVB-T) protocol. Based on Coded Orthogonal Frequency Division Multiplexing (COFDM) and 16 QAM modulation, it allows providers to match or extend coverage previously provided by analog at a fraction of the power.

As with cable television, MPEG2 is the basis for audio and video delivery within the DVB-T specification. Interoperability requirements for SDTV, HDTV and professional IRDs are covered in (TR-101-154). In addition, (ISO/IEC 13818-1) extensions to MPEG2 cover requirements for delivery of full service information (DVB-SI). To accommodate data broadcast, DVB-T utilizes elements of the MPEG2 Digital Storage Media Command and Control (DSM-CC) specification.

DVB-T interface requirements for digital set-top boxes are covered in (EN 50221). These include the standard set of interfaces; RS-232, SCART, and other video connections. The DVB Common Interface (EN 50201), based on PCMCIA is the standard for conditional access on DVB-T receivers.[5]

---

[5] "DVB, The Standard of the Digital World", http://www.dvb.org/, February 2004.

B. DVB-T Receivers

The minimum requirements for DVB-T receivers in Germany are contained in the document "DVB-T Minimum Requirements and Guideline for DVB-T Receivers, Version 1.1, and dated 15.08.2003", and are available for download at: http://www.ueberall-tv.de/1home/UeF-home.htm.

The following diagrams are excerpted from the above referenced document:

Hardware Minimum Requirements (overview):

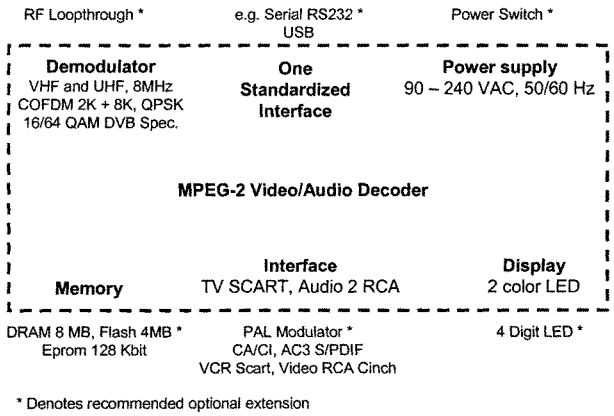


Figure 6 – DVB-T receiver hardware minimum requirements

Software Minimum Requirements (overview):

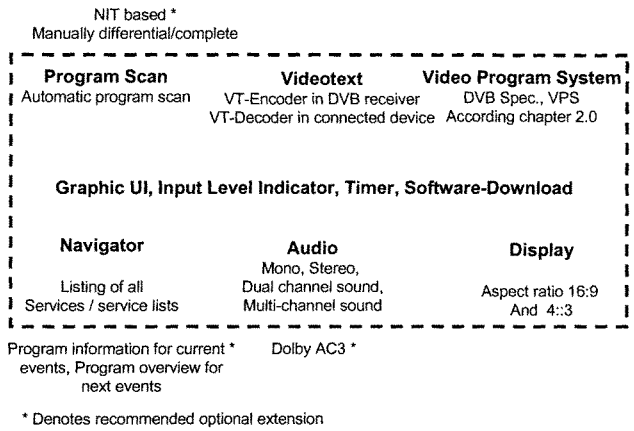


Figure 7 - DVB-T receiver hardware minimum requirements

From a feature perspective, all of the receivers include at a minimum:

- A single SCART connector for combined audio and video output (also known as a Euroconnector)
- An aerial antenna connector
- Power-switch
- Audio out (either analog or digital)
- Remote control
- Antenna output for RF loop-through (for TV's without SCART and/or VCR)
- Support for a wide range of external antennae (from a small whip antenna to external Yagi)

Some of the features that delineate one product from another include:

- Form Factor
- Multiple SCART connectors
- Coaxial output
- USB support
- IEEE 1394 support
- RS-232 Interface
- V.90 Modem
- Built-in Hard-drive
- Built-in Electronic Program Guide (EPG)
- Enhanced antenna sensitivity
- SP/DIF Audio output (AC-3)
- Pay-TV support (via "Premier" over cable)

C. DVB-T Transmission

The specifications for DVB-T transmission are documented in Standard Reference (EN 300 744) edition 1.4.1 for framing structure, channel coding, and modulation, and Standard Reference (TR 101 190) edition 1.1.1 for implementation guidelines and transmission aspects. These specifications are available at www.dvb.org.

In Berlin, the following technical parameters were used in order to provide service and efficient utilization of available frequencies within the desired range of coverage for available transmitters:

		Bitrate	
		Guard Interval	
Modulation	Coderate	1/4	1/8
16-QAM	2/3	13.27 Mb/s	14.75 Mb/s

(= Maximum 4 SDTV services and small data path per multiplex)[6]

Figure 8 – Technical parameters for DVB-T transmission in Berlin

Total radiated power is between 100 and 200 KW using a single frequency network and frequency reuse, relying on terrain masking and generally low power emissions per transmitter of 5 to 10 KW each.

Subscribers to the DVB-T system in Berlin and the surrounding area are capable of receiving service within 3 contour levels forming concentric circles from the center of Berlin outward:[7]

- Primary Contour – Requires a small omni-directional indoor antenna. Service can be either fixed, portable indoor, or portable outdoor (IE, within a moving vehicle)
    - Provides service for 4.5 million residents.
- Secondary Contour – Requires a small omni-directional outdoor antenna. Service can be fixed indoor requiring a small outdoor antenna or portable outdoor.
    - Provides service for 7.2 million residents.
- Tertiary Contour – Requires a Yagi directional outdoor antenna. Fixed service only.
    - Provides service for 11 million residents.

6 "Digital Terrestrial Television DTT Roll-out in Germany", Detlef Pagel, Niedersachsische Landesmedienanstalt (NLM), Hannover, 27 June 2003, Lyon.

As an example of how significantly transmission power can be reduced while still providing additional TV services via multicast, a test was conducted in Germany during 2003 to discover how efficient DVB-T transmission could be, in what was considered the most difficult portion of the country to provide service (due to lack of terrain features, thus limiting the ability to gain benefit from multiple antennas and frequency reuse). The test results were that a single 2 Megawatt analog transmitter could be replaced by a single 600 Kilowatt DVB-T transmitter, while increasing the number of available TV services from 1 analog channel to 4 SDTV DVB-T services.[8]

D. Channel Map

During "Phase 1" of the transition, the first two high power DVB-T transmissions to be broadcast included 8 digital channels multicast on channels 5 and 44. In "Phase 2" all digital stations went online. Channel lineups were re-mapped to group the larger commercial and public broadcast networks; ZDF, ARD, RTL, and ProSiebenSAT.1 on their own multiplexes. Medium sized stations were grouped two per multiplex and smaller operators were grouped into two "TV Bouquets" and transmitted on channels 5 and 56. Finally during "Phase 3" all analog transmission ended. Two new multiplexes are scheduled to be brought online on channels 39 and 64 sometime in 2004.

---

7 "DVB-T: DasUberallfernsehen, Empfangsgebiete 2004". 20 October 2003

8 Source: Conversation with Dr. Ulrich Reimers, Chairman DVB Technical Module, Braunshweig Technical University, 17 February 2004

The following diagram provides a graphical representation of the channel lineup and remapping activities:[9]

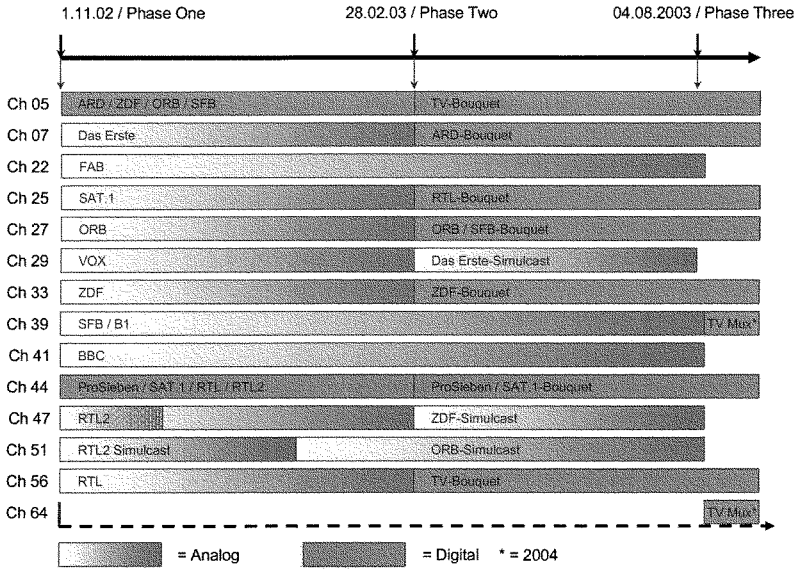


Figure 9 – Channel remapping and multicast consolidation in Berlin

[9] Die Gesellschaft zur Forderung der Rundfunkversorgung mbH (GARV), 20.08.2003

V. Conclusion

By all accounts, the transition to digital over the air broadcast in Berlin using DVB-T was very successful. Questions remain whether or not the construct used to create this new model will be viable for the rest of the country. The transition is only now beginning to spread beyond Berlin to other areas of Germany. It is not clear that it will be implemented easily in those areas. In many places, there are fewer available over-the-air channels. Moreover, the timetable and manner of implementation are largely determined by the states, and other states may not be as adept as Berlin and Brandenburg at establishing procedures and deadlines for ending analog transmission. In addition, government funding of various aspects of the transition is running low.

Nevertheless, the Berlin example show that, at least in certain circumstances, it is possible to migrate consumers from analog to digital over-the-air reception with minimal disruption. Finally, whether or not the circumstances that led to this success exist elsewhere in Germany – there are marked differences between broadcast, cable and satellite television in Germany and the U.S. In extrapolating from the Berlin experience to the U.S., these differences must be taken into account.

United States Government Accountability Office

GAO

Testimony
Before the Subcommittee on Telecommunications and the Internet, Committee on Energy and Commerce, House of Representatives

For Release on Delivery Expected at 10:00 a.m. EDT Wednesday, July 21, 2004

TELECOMMUNICATIONS

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

Statement of Mark L. Goldstein, Director
Physical Infrastructure Issues

GAO-04-926T

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;

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

- 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

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

that much of the focus of government officials leading up to and during the brief simulcast in Berlin was on ensuring that 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 corporation. In addition to their own channels, ARD and ZDF jointly operate four additional public television

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

[4]Because 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.

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.

[5]The 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.

[6]We 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

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

programming, and cost 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.

[8]The 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.[7] 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 satellite

[7] As 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.

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.

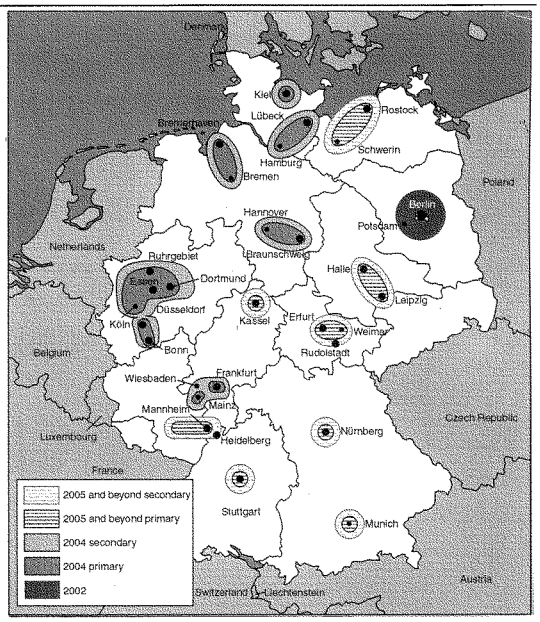
Certain Decisions about the DTV Transition Will Apply Throughout Germany

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 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 GeographixSMSanta Barbara, CA; DVB-T-Projekte/DR-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 intend to use the

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

[11]The 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.

[12]Consumer 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.

[13]The 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.

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 for the

[14] By 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.

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 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

[15]Public broadcasters were also allowed to provide multicast service.

[16]The 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.

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.

During the Berlin DTV transition, some households changed the mechanism through which they receive television service. We were told that between

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

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

[19]This 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.

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.
- 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

For questions regarding this testimony, please contact Mark L. Goldstein on (202) 512-2834 or goldsteinm@gao.gov. Individuals making key contributions to this testimony included Amy Abramowitz, Dennis Amari, and Michael Clements.

This is a work of the U.S. government and is not subject to copyright protection in the United States. It may be reproduced and distributed in its entirety without further permission from GAO. However, because this work may contain copyrighted images or other material, permission from the copyright holder may be necessary if you wish to reproduce this material separately.

GAO's Mission

The General Accounting Office, the audit, evaluation and investigative arm of Congress, exists to support Congress in meeting its constitutional responsibilities and to help improve the performance and accountability of the federal government for the American people. GAO examines the use of public funds; evaluates federal programs and policies; and provides analyses, recommendations, and other assistance to help Congress make informed oversight, policy, and funding decisions. GAO's commitment to good government is reflected in its core values of accountability, integrity, and reliability.

Obtaining Copies of GAO Reports and Testimony

The fastest and easiest way to obtain copies of GAO documents at no cost is through the Internet. GAO's Web site (www.gao.gov) contains abstracts and full-text files of current reports and testimony and an expanding archive of older products. The Web site features a search engine to help you locate documents using key words and phrases. You can print these documents in their entirety, including charts and other graphics.

Each day, GAO issues a list of newly released reports, testimony, and correspondence. GAO posts this list, known as "Today's Reports," on its Web site daily. The list contains links to the full-text document files. To have GAO e-mail this list to you every afternoon, go to www.gao.gov and select "Subscribe to e-mail alerts" under the "Order GAO Products" heading.

Order by Mail or Phone

The first copy of each printed report is free. Additional copies are $2 each. A check or money order should be made out to the Superintendent of Documents. GAO also accepts VISA and Mastercard. Orders for 100 or more copies mailed to a single address are discounted 25 percent. Orders should be sent to:

U.S. General Accounting Office
441 G Street NW, Room LM
Washington, D.C. 20548

To order by Phone:	Voice:	(202) 512-6000
	TDD:	(202) 512-2537
	Fax:	(202) 512-6061

To Report Fraud, Waste, and Abuse in Federal Programs

Contact:

Web site: www.gao.gov/fraudnet/fraudnet.htm
E-mail: fraudnet@gao.gov
Automated answering system: (800) 424-5454 or (202) 512-7470

Public Affairs

Jeff Nelligan, Managing Director, Nelligan1@gao.gov (202) 512-4800
U.S. General Accounting Office, 441 G Street NW, Room 7149
Washington, D.C. 20548

PRINTED ON RECYCLED PAPER