

GAO

Report to the Subcommittee on Antitrust,  
Competition, and Business and  
Consumer Rights, Committee on the  
Judiciary, U.S. Senate

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October 2002

## TELECOMMUNICATIONS

# Issues in Providing Cable and Satellite Television Services





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Highlights of [GAO-03-130](#), a report to the Subcommittee on Antitrust, Competition, and Business and Consumer Rights, Committee on the Judiciary, U.S. Senate.

### Why GAO Did This Study

Direct broadcast satellite (DBS) television service has grown to become the principal competitor to cable television systems. In October 2001, the two primary DBS companies, EchoStar and DirecTV, proposed a merger plan that is pending before the Department of Justice and that the Federal Communications Commission (FCC) recently announced that it had declined to approve. GAO was asked to examine several issues related to competition in providing subscription video services, including the competitive impact of the availability of cable modem Internet access, and the effects on cable prices and DBS penetration rates of DBS' offering local broadcast channels. GAO also examined the technical capability of the individual DBS companies to expand local channel services into more television markets. This report offers no opinion on the merits of the proposed merger.

### What GAO Found

DBS and cable companies compete for subscribers to their video services and to their Internet access services, although to date, cable modem service is the most popular method of broadband home Internet access. On the basis of a random survey of 3,000 individuals, it appears that the availability of Internet access services is important for some consumers—although not the majority of consumers—when they are considering various video service providers.

In 1999, DBS companies began to offer local broadcast channels in select television markets across the country. According to results from GAO's econometric model, the provision of local broadcast channels by DBS companies is associated with significantly higher DBS penetration rates, although GAO found no evidence that DBS provision of local channels influences cable prices. In general, GAO's model results suggest that DBS is able to compete more effectively for subscribers with cable in areas where DBS subscribers can receive local broadcast channels.

The two DBS companies have stated that if they merge, they will, as a combined entity, have sufficient satellite capacity to provide local broadcast programming in all 210 television markets and to introduce new services. GAO's technical expert's review of various documents related to the two DBS companies' satellite capacity indicates that—given current technologies and deployed assets—neither company would individually be able to offer all of the local channels in all markets. However, the decision of whether to introduce more local channels is, in the long term, a business decision. Whether the benefits would outweigh the costs for the individual companies to eventually offer local channels in all 210 television markets is not clear.

Both FCC and the Department of Justice declined to provide comments on the substance of this report because of the merger proceedings.

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**Abbreviations**

2SLS	Two-Stage Least Squares
3SLS	Three-Stage Least Squares
BLS	Bureau of Labor Statistics
CUID	Community Unit Identification
DBS	direct broadcast satellite
DMA	designated market area
DSL	digital subscriber line
DTV	digital television
FCC	Federal Communications Commission
HD	high definition
MABLE	Master Area Block Level Equivalency
MSA	metropolitan statistical area
MSO	multiple system operator
ORC	Opinion Research Corporation



United States General Accounting Office  
Washington, D.C. 20548

October 15, 2002

The Honorable Herb Kohl  
Chairman  
The Honorable Mike DeWine  
Ranking Minority Member  
Subcommittee on Antitrust, Competition, and  
Business and Consumer Rights  
Committee on the Judiciary  
United States Senate

Since its introduction in 1994, direct broadcast satellite (DBS) service has grown dramatically as a means of delivering television programs to U.S. households and is now the principal competitor to cable companies for subscription video services. Subscribers to DBS services use small reception dishes to receive signals beamed down from satellites in orbit over the equator. As of June 2002, more than 18 million households were served by DBS. The ability of DBS companies to compete against cable was bolstered when DBS companies gained the legal right to provide local broadcast channels—that is, to offer the signals of local over-the-air broadcast stations (such as affiliates of ABC or NBC)—via satellite to their customers.<sup>1</sup> In addition to video services, DBS and cable also compete for subscribers to their broadband (i.e., high speed) Internet access services, which is sometimes sold as a package with video services. There are currently two primary DBS providers in the United States: Hughes Electronics' DirecTV and EchoStar's DISH Network. In October 2001, DirecTV and EchoStar proposed a merger plan that is now pending before the U.S. Department of Justice (Justice). On October 10, 2002, the Federal Communications Commission (FCC) announced that it declined to approve the merger because FCC found that the transaction would not serve the public interest, convenience, and necessity. FCC provided for a full evidentiary hearing before an Administrative Law Judge.

As agreed with the Subcommittee, this report provides information on (1) whether the availability of cable modem Internet access service appears to be affecting the competitiveness of DBS companies in the provision of video services, (2) whether cable prices and DBS penetration rates appear

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<sup>1</sup>This is often referred to as the provision of “local-into-local” because the signals of broadcasters within a specific television market must be transmitted up to the satellite for transmission back down into that same television market.

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to be affected in areas where the DBS companies offer local broadcast channels, and (3) whether the two individual DBS companies are technologically capable of expanding local broadcast channel services into all 210 television markets in the United States.

To address these questions, we developed a telephone survey, projectable to the U.S. population, to explore consumers' reasons for selecting video services. We also updated a prior GAO econometric model to examine whether the availability of local channels from a DBS company, as well as other factors, influenced the level of cable prices and DBS penetration rates (measured as the ratio of DBS subscribers to housing units).<sup>2</sup> Finally, a GAO senior technologist analyzed technical information provided by DirecTV and EchoStar and other interested parties on the capacity of the DBS systems. A more detailed discussion of our scope and methodology is provided in appendix I. The consumer survey questions and responses are contained in appendix II. A complete discussion of the econometric model development, including data sources, a table of descriptive statistics for all variables, estimation design, model results, and alternative specifications, is contained in appendix III. We conducted our review from February 2002 through September 2002 in accordance with generally accepted government auditing standards.

Our objectives did not include an assessment of the proposed merger of DirecTV and EchoStar and, therefore, this report offers no opinion on the merits of the proposed merger.

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## Results in Brief

Responses to our consumer survey suggest that the availability of Internet access services is important for some consumers—although not the majority of consumers—when they are considering various video service providers. In particular, just over half of the respondents to our survey said that when thinking about purchasing television programming service, the availability of cable modem Internet service would not make them more likely to consider cable video service over DBS video service. However, almost one-third of respondents said that when thinking about purchasing television programming service, the availability of cable modem Internet service would make them “moderately more likely” or “much more likely” to consider cable over DBS, and these respondents were more likely to

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<sup>2</sup>See U.S. General Accounting Office, *Telecommunications: The Effect of Competition From Satellite Providers on Cable Rates*, GAO/RCED-00-164 (Washington, D.C.: July 18, 2000).

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have a higher household income and to be younger than respondents not influenced by the availability of cable modem service. Most respondents (88 percent) said they had never considered satellite Internet service.

According to results from our econometric model, the provision of local broadcast channels by DBS companies is associated with significantly higher DBS penetration rates, although we found no evidence that DBS provision of local channels influences cable prices. Specifically, our model results indicate that in areas where DBS subscribers can receive local broadcast channels from both DBS companies, the DBS penetration rate is approximately 32 percent higher than in areas where subscribers cannot receive local broadcast channels via satellite. Thus, it appears that DBS is able to compete more effectively for subscribers with cable in areas where the DBS companies offer local channels than in areas where the DBS companies do not offer local channels, although this competitiveness had not led to lower cable prices by 2001.

On the basis of our expert's review of current DBS technologies and deployed assets, it appears that neither company, at this time, would be able individually to offer all of the local broadcast channels in all 210 television markets while simultaneously maintaining a competitive national subscription television service. Over time, however, each company could make a business decision to introduce local channels in more markets than they currently plan to serve by deploying additional assets and new technologies. Whether the business case—the costs of deploying additional assets versus the benefits of gaining additional subscribers—would justify the individual companies' introduction of local channels in all 210 television markets is not clear. Additionally, the ongoing transition of all broadcast television stations from analog to digital television technologies allows broadcasters to provide high definition television signals, which require more satellite capacity to transmit than traditional analog signals. At this time, the DBS companies' business decisions about local digital broadcast carriage at the completion of the DTV transition is also unclear.

We provided a draft of this report to FCC and Justice for their review and comment. FCC staff provided minor technical comments that were incorporated as appropriate. Both FCC and Justice declined to comment on the substance of our report due to the merger proceedings. Letters from FCC and Justice are included in appendixes IV and V, respectively.

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## Background

According to FCC, as of June 2001, just over 86 percent of television households purchased a subscription television service, as opposed to relying solely on free, over-the-air broadcast television. Of these subscription households, 78 percent received their service from a franchised cable operator while 18 percent received their service from a DBS company.<sup>3</sup> DBS historically has been popular in rural areas where cable service is unavailable to many households. Until a few years ago, there was a significant difference between the programming packages of cable and DBS: cable systems could offer the local broadcast channels, while DBS companies generally could not because of technological limitations and legal constraints. In 1999, following advances in satellite technologies, Congress enacted the Satellite Home Viewer Improvement Act<sup>4</sup> to, among other things, allow DBS companies to offer local broadcast channels via satellite. Today, EchoStar and DirecTV, the two primary providers of DBS services, each offer local broadcast channels to their subscribers in about 45 of the 210 television markets in the United States.<sup>5</sup>

DBS and cable also compete for subscribers to their broadband Internet access services.<sup>6</sup> Many cable companies have recently upgraded their cable systems and now offer a selection of digital services, including cable modem Internet access. Cable modem service is generally considered one of the fastest methods for home Internet access and is currently the most popular broadband service. DirecTV offers a two-way satellite Internet access service called DirecWay.<sup>7</sup> Few consumers subscribe to the current satellite Internet service, although future satellite Internet access

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<sup>3</sup>The remaining 4 percent of subscription television households obtained service through other means, such as terrestrial wireless systems, satellite master antenna television systems (usually used in apartment buildings or other multiple-dwelling units), open video systems, and large “C-band” home satellite dishes.

<sup>4</sup>P.L. 106-113, 113 Stat. 1501, 1501A-526 to 1501A-545 (Nov. 29, 1999).

<sup>5</sup>The market for a broadcast station is known as its designated market area (DMA). According to Nielsen Media Research, DMAs are used to identify television stations whose broadcast signals reach a specific area and attract the most viewers. Nonoverlapping DMAs cover the entire contiguous United States, Hawaii, and parts of Alaska.

<sup>6</sup>Digital subscriber line, or DSL, broadband Internet access and terrestrial wireless Internet access are also available in some areas.

<sup>7</sup>EchoStar previously offered an Internet access service called StarBand.



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technologies are expected to be faster and more competitive with cable modems.<sup>8</sup>

Each DBS company is inherently limited in the number of programming channels and other services it can provide by the technical capacity constraints of its satellite fleet. Each satellite contains a certain number of transponders, or relay equipment, and each transponder can transmit a limited amount of information (i.e., video, audio, and data).<sup>9</sup> DBS companies have increased the capacity of their satellites through various technologies, such as digital compression and frequency reuse. Compression technologies conserve capacity by reducing the number of bits required to send digital information. For example, when transmitting video programming, compression eliminates the transmission of identical bits from frame to frame. Frequency reuse allows different programming to be transmitted over the same frequencies in different geographic areas. This is accomplished through the use of “spot beam” satellites that, rather than transmitting a signal nationwide, transmit to specific cities or other smaller geographic regions. As long as spot beams using the same frequency are at least a certain distance apart, interference among signals is avoided. Both digital compression and frequency reuse technologies have steadily improved since the launch of DBS in 1994. Satellite companies are also constrained by the number of orbital slots available for DBS services. Currently, DirecTV and EchoStar have the rights to all of the allocated frequencies at the three full-CONUS (i.e., the satellite footprint covers the entire contiguous United States) DBS orbital slots.

In October 2001, the two DBS companies signed an agreement wherein EchoStar would merge with DirecTV. One of the main arguments the companies put forth in support of the merger is that it would enable them to offer local broadcast channels to subscribers in all 210 television markets, something the companies say they cannot do independently. The companies have stated that their main competitor is cable—not each other—and that the ability to carry all local broadcast channels will make DBS a stronger competitor to cable systems. Opponents of the merger have stated that the companies could individually offer many more, if not all, local broadcast channels if they chose to do so and that the merger would

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<sup>8</sup>Several companies are currently planning to introduce Ka-band satellite systems for broadband Internet access services for use by both consumers and businesses.

<sup>9</sup>A transponder will receive a signal, amplify it, change its frequency, and send it back to earth. Individual DBS transponders typically have a bandwidth capacity of 24 MHz.

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create a monopoly in DBS service provision, which is of particular concern to rural consumers who do not have access to a cable system. The proposed merger is under review by Justice. FCC recently announced that it had declined to approve the proposed merger, although DirectTV and EchoStar have 30 days to file an amended application and to file a petition to delay the hearing. Congress has held several hearings on the matter.

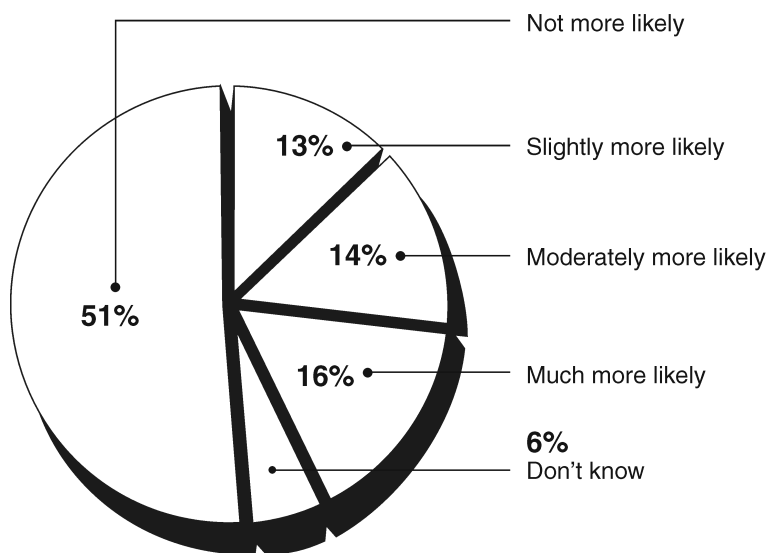
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## For the Majority of Consumers, Internet Access Technologies Do Not Appear to Play a Major Role in Their Consideration of Video Service Providers

In our random telephone survey of consumers, we asked all of our survey respondents if, when thinking about purchasing television programming, the availability of cable modem Internet service would make them more likely to choose cable video service over satellite video service (see fig. 1). Fifty-one percent of those responding said “not more likely” while 16 percent said “much more likely.” We also asked all of our survey respondents (excluding those few with satellite Internet access) if they had considered purchasing Internet service through a satellite provider; 88 percent said they had not.

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**Figure 1: Extent to Which Respondents Said That Cable Modem Internet Access Would Make Them More Likely to Choose Cable Service over Satellite Service**



Source: GAO consumer survey (May – June, 2002).

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As shown in figure 1, almost one-third of respondents said that the availability of cable modem service was “moderately more likely” or “much more likely” to make them choose cable over satellite service. We also found the following:

- Respondents with higher household incomes were more likely to say that the availability of cable modem Internet access would influence their decision to buy cable video service.
- Respondents who were younger (from 18 to 34 years old) were more likely than older respondents to say that the availability of cable modem Internet access would influence their decision to buy cable video service.

In addition to asking all respondents about the impact of Internet access on their video service decisions, we asked respondents who had begun purchasing or considered purchasing either cable or DBS service within the past 2 years to rate various reasons why they considered or purchased these services (see fig. 2).<sup>10</sup> Of those who began purchasing or considered purchasing cable, 61 percent said the availability of cable modem service was “not a reason” in their consideration or purchase of cable video programming services, although approximately one-fifth said cable modem service was a “major reason” for considering cable. The responses from those who had begun purchasing or considered purchasing DBS within the past 2 years were similar: 64 percent said satellite Internet access service was not a reason for consideration of DBS video services while 12 percent said it was a major reason.

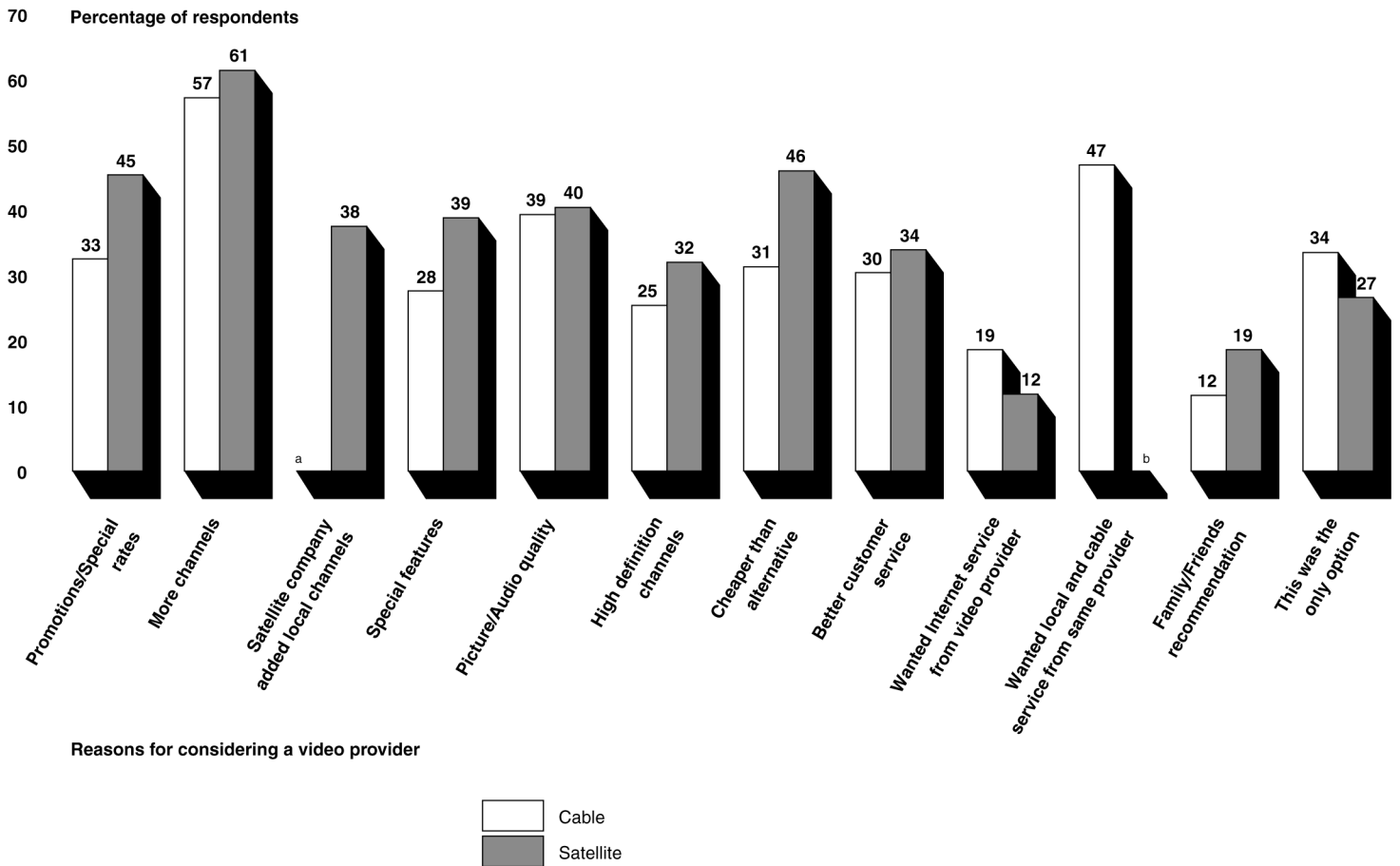
Other factors appeared to be important in consumers’ consideration of video providers. Fifty-seven percent of cable respondents and 61 percent of DBS respondents said that a major reason for selecting or considering a video services provider was because they wanted more channels than they were receiving. Those who recently selected or considered cable also rated highly the ability to get local broadcast channels from the cable company and a better signal quality. Those who recently selected or considered DBS often reported that they considered satellite service because they believed

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<sup>10</sup>Respondents were asked to rate a series of possible reasons as either a “major reason,” a “minor reason,” or “not a reason” in why they considered or selected either a cable or DBS provider. See appendix II for the detailed questions and responses.

DBS was cheaper than cable and because DBS offered special rates or promotions.

**Figure 2: Reported “Major Reasons” for Selecting or Considering Cable or DBS Video Services**



<sup>a</sup>“Addition of local channels” was not asked of respondents who had selected or considered cable in the last 2 years.

<sup>b</sup>“Wanted local and cable from the same provider” was not asked of respondents who had selected or considered DBS in the last 2 years.

Source: GAO consumer survey (May – June, 2002).

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## DBS Provision of Local Broadcast Channels Associated with Higher DBS Penetration Rates, but Not with Lower Cable Prices

According to our econometric model, the provision of local broadcast channels by DBS companies is associated with significantly higher DBS penetration rates. Specifically, our model results indicate that in cable franchise areas where consumers can receive local channels from both DBS providers, the DBS penetration rate is approximately 32 percent higher than in areas where consumers cannot receive local channels via satellite. Thus, in areas where the DBS companies offer local channels, it appears that DBS is more effectively able to compete for subscribers.

In addition to using an econometric model to study the competitive impact of DBS provision of local channels, we also examined the growth in the number of DBS subscribers between 1998 and 2001. This analysis was based on the percentage change in the number of DBS subscribers in almost all zip codes throughout the country. We found that in areas where both DBS companies introduced local broadcast channels, DBS subscribership grew by approximately 210 percent over this time period, while in areas where local channels were not available, it grew by 174 percent in the same time frame.

Our model results do not indicate that the provision of local broadcast channels by DBS companies is associated with lower cable prices.<sup>11</sup> In contrast, the presence of a second cable franchise (known as an overbuilder) does appear to constrain cable prices. In franchise areas with a second cable provider, cable prices are approximately 17 percent lower than in comparable areas without a second cable provider.<sup>12</sup>

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<sup>11</sup>In some areas, cable companies have begun offering promotions to entice current DBS subscribers to switch to cable. For example, DBS subscribers in one area who turn in their satellite equipment to the cable company receive free cable installation and an approximately \$25 per month reduction in their cable price for 1 year. Although these promotions can be thought of as a form of price discounting by cable operators, we do not know the extent to which such programs were in place during the time of our study.

<sup>12</sup>This was a larger effect than that found by FCC in its 2002 *Report on Cable Industry Prices* (FCC 02-107). Using an econometric model, FCC found that cable prices were about 7 percent lower in franchise areas when there was an overbuilder. One possible explanation for the difference in results is that we conducted further analysis of the competitive status of franchises that were reported by FCC to have an overbuilder. We found several instances where overbuilding may not have existed although FCC reported the presence of an overbuilder, and we found a few cases where overbuilders appeared to exist although FCC had not reported them. We adjusted our measurement of overbuilder status accordingly.

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Finally, we found that the provision of local broadcast channels by DBS companies is associated with nonprice competition. In areas where both DBS companies provide local channels, our model results indicate that cable companies offer subscribers approximately 6 percent more channels. This result indicates that cable companies are responding to DBS provision of local channels by improving their quality, as reflected by the greater number of channels. In our July 2000 report, we also found that cable companies responded to DBS competition by increasing the number of channels.

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## Technical Considerations and Business Decisions Can Influence DBS Companies' Expansion of Local Broadcast Services

In 1999, the Satellite Home Viewer Improvement Act provided DBS companies with the legal right to provide local broadcast station programming.<sup>13</sup> To date, DirecTV and EchoStar have each introduced local broadcast service in about 45 markets, although DirecTV plans to offer local channels in about 70 markets and EchoStar plans to offer local channels in about 50 markets. However, providing local channels uses a satellite's transmission capacity—a limited resource on each satellite. Thus, there is an important trade-off that DBS companies face in deciding how many markets to target for local service. As DBS companies roll out local channels in more markets, satellite capacity that could otherwise have been used to provide services to all subscribers (such as national cable networks or interactive services) would be used to offer local channels to select groups of subscribers.

The two DBS companies have stated that one of the reasons they want to merge is to engender economies in the provision of local broadcast channels. In particular, the companies have stated that if they merge, they will, as a combined entity, have sufficient capacity to provide local broadcast programming in all 210 television markets and add new services, while continuing to provide their current number of cable programming

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<sup>13</sup>DBS companies have a requirement somewhat analogous to cable's must-carry requirement. The Satellite Home Viewer Improvement Act allows DBS companies to provide local broadcast signals but requires in most circumstances that if they do so, they must provide subscribers with all of the local broadcast signals in that market, including stations affiliated with smaller networks and independent and public stations.

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channels.<sup>14</sup> Several opponents of the merger contend that each of the DBS companies on its own has sufficient capacity to expand the provision of local broadcast channels into even more, if not all, television markets.

Key assumptions about the technical capabilities of the DBS companies' satellite fleets varied among those with whom we spoke. Opponents of the merger made assumptions about key technical factors—such as frequency reuse capability and advances in digital compression technologies—that were optimistic. The DBS companies held more conservative views about the technical capabilities of their fleets today and considered some possible enhancements to be based on technologies that are not currently available to them nor proven in terms of quality. We found that some of the assumptions of the merger opponents focused on potential capabilities that could not be readily incorporated into satellites already deployed and that would involve substantial replacement of consumers' DBS equipment.<sup>15</sup>

Our examination of various documents related to the two DBS companies' satellite capacity indicates that—given current technologies and deployed assets—neither company would individually be able to offer all of the local broadcast channels in all 210 television markets while simultaneously maintaining a competitive national subscription television service. Were either company to offer local channels in all 210 markets today, it would have to use much more of its current capacity for local channels, thus reducing its ability to offer the large numbers of national cable networks, pay-per-view channels, and other services that each company currently provides.<sup>16</sup> This would compromise the competitiveness of a DBS company with cable.

In the long term, however, with the launch of additional satellites and the deployment of or transition to new technologies, both DBS companies could choose to provide local channels in more television markets than they currently plan to serve. Of course, these decisions would involve

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<sup>14</sup>Currently, the two DBS providers offer much of the same programming, such as the same national cable networks (e.g., CNN and MTV), and offer local broadcast channels in most of the same markets. A merger would allow the new company to increase its current capacity by ending this duplication of services.

<sup>15</sup>EchoStar and DirecTV acknowledge that a proportion of DBS subscribers will also need to replace their equipment if they merge.

<sup>16</sup>Additionally, DBS companies have contracts with national cable networks. Dropping these networks to expand local channels could prompt legal challenges by the cable networks.

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weighing the cost of such satellites or new technologies against the number of projected additional subscribers and other benefits that increased local broadcast offerings would bring to DBS.<sup>17</sup> That is, the decision of whether to introduce more local channels is essentially a business decision. Whether the benefits would outweigh the costs for the individual companies to roll out local channels in all 210 television markets is not clear.

Finally, it is also not clear how the transition of all local broadcast stations from analog to digital television (DTV) technologies will affect the offering of local broadcast channels by DBS companies.<sup>18</sup> The broadcast DTV transition is under way and will eventually culminate in the discontinuation of all analog broadcast signals. The DTV transition allows broadcast stations to provide high definition (HD) television signals—that is, a sharper television picture with roughly twice the lines of resolution of traditional analog pictures. However, even with digital compression technologies, the transmission of HD signals takes up far more satellite capacity than the transmission of traditional analog signals. If many of the roughly 1,600 broadcast stations across the country provide HD signals at the end of the digital transition (when the analog signals have been discontinued), it will take considerably more satellite capacity to provide the signals of the digital stations than it currently takes to provide the signals of the analog stations. However, the DTV transition may take several years, during which time advances in satellite technologies might mitigate this need for increased capacity. Nonetheless, at this time, the DBS companies' business decisions about local digital broadcast carriage at the completion of the DTV transition is unclear.

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## Agency Comments

We provided a draft of this report to FCC and Justice for their review and comment. FCC staff provided minor technical comments that were incorporated as appropriate. Both FCC and Justice declined to comment

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<sup>17</sup>Our model results indicate that there are benefits such as increased penetration rates in areas where local channels are offered. EchoStar and DirecTV have noted other reasons that the companies desire to serve all 210 markets, such as the ability to market their service—including local channels—nationally.

<sup>18</sup>For more information on the DTV transition, see U.S. General Accounting Office, *Telecommunications: Many Broadcasters Will Not Meet May 2002 Digital Television Deadline*, GAO-02-466 (Washington, D.C.: Apr. 23, 2002). We expect to release a second report on the DTV transition in November 2002.



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on the substance of our report due to the merger proceedings. Letters from FCC and Justice are included in appendixes IV and V, respectively.

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As agreed with your offices, unless you publicly release its contents earlier, we plan no further distribution of this report until 30 days after the date of this letter. At that time, we will provide copies to interested congressional committees; the Assistant Attorney General, Antitrust Division, Department of Justice; the Chairman, FCC; and other interested parties. We will also make copies available to others upon request. In addition, this report will be available at no charge on the GAO Web site at <http://www.gao.gov>. If you have any questions about this report, please contact me at (202) 512-2834 or [guerrerop@gao.gov](mailto:guerrerop@gao.gov). Key contacts and major contributors to this report are listed in appendix VI.

A handwritten signature in black ink, appearing to read 'P. Guerrero', with a long horizontal flourish extending to the right.

Peter Guerrero  
Director, Physical Infrastructure Issues

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# Scope and Methodology

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## Consumer Survey

To provide information on the impact of the availability of cable modem Internet access on consumer video service choice, we contracted with Opinion Research Corporation (ORC), a national research firm, to include questions on three of its national telephone surveys. The survey contained a set of 14 questions that asked people about their television and Internet use (e.g., how they access the Internet from their home) as well as questions designed to gauge the importance of receiving Internet service and video service from the same provider. The questions and response options were read to the respondents. A total of 3,000 adults in the continental United States were interviewed between May 23 and June 2, 2002. The population was taken from the contractor's random-digit-dialing sample of households with telephones, stratified by region.

In order to use the survey results to make estimates about the entire population 18 years and older in the continental United States, ORC weighted the responses to represent the characteristics of all adults in the general public according to four variables: age, gender, geographic region, and race. Because our results are from a sample of the population, the resulting estimates have some sampling errors associated with them. Sampling errors are often presented at a certain confidence interval. The percentage estimates we present in this report have a 95 percent confidence interval of plus or minus 5 percentage points or less. The practical difficulties of conducting any survey may introduce nonsampling errors. As in any survey, differences in the wording of questions, the sources of information available to respondents, or the types of people who do not respond can affect results. We took steps to minimize nonsampling errors. For example, we developed our survey questions with the aid of a survey specialist and pretested the survey questions before submitting them to ORC.

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## Econometric Model

We developed an econometric model to examine the influence of direct broadcast satellite (DBS) companies' provision of local broadcast channels, among other factors, on cable prices and the DBS penetration rates in a large sample of cable franchise areas across the country in 2001. In 2000, we developed a similar econometric model to examine the impact

of DBS penetration rates on cable prices.<sup>19</sup> In this report, we extended the previous econometric model by adding new variables to account for the recent emergence of local broadcast channels via satellite. In particular, this model sought to determine whether and how two categories of key factors affected cable prices and DBS penetration rates: (1) factors that relate to subscribers' demand for cable and DBS services and the companies' costs of providing service and (2) factors that relate to the degree of competition in the market. The availability of local channels via satellite is one variable included in the model that can influence both subscribers' demand for DBS service and the competitiveness of the market. We discussed the development of our model with the Federal Communications Commission (FCC), the Department of Justice (Justice), and several industry trade groups.

There are some important limitations to the interpretation of our model results. Generally, econometric models measure statistical relationships between explanatory factors and the factor to be explained and do not imply causation between these factors. Also, some specific limitations of our model relate to the characteristics of the sample of cable franchise areas chosen by FCC. We performed our statistical analysis on a sample of 722 cable franchise areas included in a yearly survey conducted by FCC. The survey included a sample of "competitive" franchise areas (as defined under statute) and a sample of "noncompetitive" franchise areas, selected within several size classifications (or "strata"). Although FCC conducts the survey annually, different cable franchises report every year because cable franchises are sampled.<sup>20</sup> Since data were not available for every cable franchise for several continuous years, we conducted a cross-sectional analysis, which gave us an observation from 722 different cable franchises at a single point in time. The cross-sectional analysis would not allow us to examine dynamic changes that occur through time, such as the influence of an increasing DBS penetration rate on cable prices. Rather, we were limited to describing the nature of the subscription video market in a single time period, namely 2001. However, certain limited analyses were conducted that incorporated a time-series element.

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<sup>19</sup>See U.S. General Accounting Office, *Telecommunications: The Effect of Competition From Satellite Providers on Cable Rates*, GAO/RCED-00-164 (Washington, D.C.: July 18, 2000).

<sup>20</sup>Some cable franchises are selected with a probability of one, therefore continuous yearly data are generally available for these franchises. However, in the 2001 survey, only 297 cable franchises were selected with a probability of one.

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**Appendix I**  
**Scope and Methodology**

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Appendix III contains (1) a complete discussion of the model development, data sources, estimation design, and model results and (2) a table of descriptive statistics for all variables included in the model.

# Results of Consumer Survey on Video Service Choices

The following results are based on the responses to a random telephone survey of 3,000 adults, age 18 and older, in the continental United States. After each question, the number of respondents (n) is noted. Percentages may not add to 100 percent because of rounding.

**Question 1:** What method is currently used for viewing on the main television in your home? (n=3,000)

Answer	Percentage of respondents
Over the air, through an antenna	16.0
Cable	62.0
Direct broadcast satellite, such as DirecTV or EchoStar's DISH Network, for all your channels	12.4
Direct broadcast satellite for all channels except local broadcast channels	4.2
Big dish, C-band satellite	1.4
You don't own a television	1.9
Other (Specify)	0.8
Don't know	1.3

[If respondent answered "you don't own a television," "other," or "don't know," the survey was ended for that respondent.]

**Question 2:** [Only asked of those who answered "over the air," "direct broadcast satellite," or "C-band satellite" in question 1.] Have you considered purchasing cable service for your main television viewing within the past 2 years? (n=1,018)

Answer	Percentage of respondents
Yes	22.7
No	66.5
Cable is not available to me	10.4
Don't know	0.5

**Appendix II**  
**Results of Consumer Survey on Video Service**  
**Choices**

Question 3: [Only asked of those who answered “cable” in question 1.] Did you begin subscribing to your current cable provider within the past 2 years? (n=1,854)

<b>Answer</b>	<b>Percentage of respondents</b>
Yes	29.9
No	69.2
Don't know	0.9

Question 4: [Only asked of those who answered “yes” to question 3.] What method did you previously use for your main television viewing? (n=555)

<b>Answer</b>	<b>Percentage of respondents</b>
Over the air, through an antenna	32.3
Another cable provider	49.8
A satellite provider	12.4
Other (Specify)	2.7
Don't know	2.8

Question 5: [Only asked of those who answered “yes” to question 2 or question 3.] I am now going to read you a list of reasons that someone may think of when purchasing cable service. For each of these, please tell me if it was a major reason, a minor reason, or not a reason in why you [considered/purchased] cable. Again, please rate each of these as a major reason, a minor reason, or not a reason.<sup>21</sup>

Question 5a: Because your area cable company offered special rates or other promotions, such as free installation or 3 months free. (n=785)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	32.5
Minor reason	27.8
Not a reason	39.0
Don't Know	0.7

<sup>21</sup>Questions 5a through 5j were read in a random order. Question 5k was always read as the last question of the set.

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Question 5b: Because you wanted more channels than you were receiving. (n=785)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	57.2
Minor reason	19.8
Not a reason	22.7
Don't know	0.3

Question 5c: Because you wanted to purchase special features (like sports packages, pay-per-view, or movie options). (n=785)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	27.6
Minor reason	24.9
Not a reason	47.3
Don't know	0.3

Question 5d: Because you heard or saw that the picture and audio quality with cable was better than you were receiving. (n=785)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	39.3
Minor reason	22.4
Not a reason	37.4
Don't know	0.9

Question 5e: Because you were interested in receiving high definition television channels. (n=785)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	25.4
Minor reason	24.2
Not a reason	49.9
Don't know	0.6

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Question 5f: Because you thought that cable was cheaper than satellite service. (n=785)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	31.3
Minor reason	22.0
Not a reason	44.7
Don't know	2.0

Question 5g: Because you thought cable offered better customer service quality than you were receiving. (n=785)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	30.4
Minor reason	22.8
Not a reason	45.8
Don't know	1.0

Question 5h: Because you were interested in purchasing your Internet service through a cable provider and wanted to purchase television service from the same company. (n=785)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	18.6
Minor reason	19.4
Not a reason	61.4
Don't know	0.6



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Question 5i: Because you wanted to get both your local broadcast channels and cable channels from the same company. (n=785)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	46.9
Minor reason	20.5
Not a reason	31.9
Don't know	0.9

Question 5j: Because family and friends recommended cable. (n=785)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	11.6
Minor reason	25.0
Not a reason	62.9
Don't know	0.5

Question 5k: Because cable was the only television option available to you other than over-the-air broadcasting. (n=785)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	33.5
Minor reason	20.2
Not a reason	46.0
Don't know	0.3

Question 6: [Only asked of those who answered “over the air,” “cable,” or “C-band satellite” in question 1.] Have you considered purchasing direct satellite service, such as DirecTV or EchoStar’s DISH Network, within the past 2 years? (n=2,375)

<b>Answer</b>	<b>Percentage of respondents</b>
Yes	25.8
No	72.2
Satellite is not available to me	1.3
Don't know	0.7

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**Appendix II**  
**Results of Consumer Survey on Video Service**  
**Choices**

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Question 7: [Only asked of those who answered “direct broadcast satellite” in question 1.] Did you begin subscribing to your current direct satellite service within the past 2 years? (n=497)

<b>Answer</b>	<b>Percentage of respondents</b>
Yes	48.5
No	51.1
Don't know	0.4

Question 8: [Only asked of those who answered “yes” to question 7.] What method did you previously use for your main television viewing? (n=241)

<b>Answer</b>	<b>Percentage of respondents</b>
Over the air, through an antenna	24.2
A cable provider	57.6
Another direct satellite provider	10.7
A big dish, C-band satellite	4.3
Other (Specify)	1.3
Don't know	1.8

Question 9: [Only asked of those who answered “yes” to question 6 or question 7.] I am now going to read you a list of reasons that someone may think of when purchasing satellite service. For each of these, please tell me if it was a major reason, a minor reason, or not a reason in why you [considered/purchased] satellite service. Again, please rate each of these as a major reason, a minor reason, or not a reason.<sup>22</sup>

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<sup>22</sup>Questions 9a through 9j were read in a random order. Question 9k was always read as the last question of the set.

**Appendix II**  
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Question 9a: Because the satellite company offered special rates or other promotions, such as free installation or 3 months free. (n=854)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	45.4
Minor reason	27.7
Not a reason	26.3
Don't know	0.6

Question 9b: Because you wanted more channels than you were receiving. (n=854)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	61.4
Minor reason	19.7
Not a reason	18.4
Don't know	0.5

Question 9c: Because the satellite company added local broadcast channels, such as ABC or FOX, in your area. (n=854)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	37.5
Minor reason	23.2
Not a reason	37.8
Don't know	1.4

Question 9d: Because you wanted to purchase special features (like sports packages, pay-per-view, or movie options). (n=854)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	38.8
Minor reason	25.4
Not a reason	35.2
Don't know	0.6

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Question 9e: Because you heard or saw that the picture and audio quality with satellite were better than you were receiving. (n=854)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	40.4
Minor reason	25.6
Not a reason	33.1
Don't know	1.0

Question 9f: Because you were interested in receiving high definition television channels. (n=854)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	32.0
Minor reason	23.9
Not a reason	43.0
Don't know	1.2

Question 9g: Because you thought that satellite was cheaper than cable. (n=854)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	46.0
Minor reason	21.9
Not a reason	31.1
Don't know	1.0

Question 9h: Because you thought that satellite offered better customer service quality than you were receiving. (n=854)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	33.9
Minor reason	25.2
Not a reason	39.4
Don't know	1.5

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Question 9i: Because you were interested in purchasing your Internet service through a satellite company and wanted to purchase your television service from the same company. (n=854)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	11.8
Minor reason	23.0
Not a reason	64.4
Don't know	0.8

Question 9j: Because family and friends recommended satellite. (n=854)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	18.6
Minor reason	32.7
Not a reason	48.4
Don't know	0.3

Question 9k: Because satellite was the only television option available to you other than over-the-air broadcasting. (n=854)

<b>Answer</b>	<b>Percentage of respondents</b>
Major reason	26.6
Minor reason	16.1
Not a reason	56.7
Don't know	0.7

Question 10: [Only asked of those who answered "yes" to question 6 or question 7.] When you considered purchasing direct satellite service, which service did you consider? (n=854)

<b>Answer</b>	<b>Percentage of respondents</b>
Both DirecTV and EchoStar's DISH Network	17.2
DirecTV only	62.3
EchoStar's DISH Network only	9.0
Don't know	11.6

**Appendix II**  
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**Question 11:** How do you currently access the Internet in your home? (If you use more than one method, please tell me which one you use most.) (n=2,872)

<b>Answer</b>	<b>Percentage of respondents</b>
Standard phone line modem	46.4
DSL service	4.8
Cable modem service	10.1
Satellite Internet service	0.5
You have a computer, but don't access the Internet	8.5
You don't have a computer	26.6
Other (Specify)	0.5
Don't know	2.6

**Question 12:** [Not asked of those who answered "cable modem service" in question 11.] Does your area cable provider offer Internet access through a cable modem service? (n=2,583)

<b>Answer</b>	<b>Percentage of respondents</b>
Yes	56.9
No	14.3
Don't have an area cable provider	5.8
Don't know	22.9

**Question 13:** When thinking about purchasing TV programming, would the availability of cable modem Internet access make you more likely to choose cable service over satellite service? (n=2,872)

<b>Answer</b>	<b>Percentage of respondents</b>
Not more likely	51.4
Slightly more likely	12.9
Moderately more likely	13.7
Much more likely	16.0
Don't know	6.0

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**Appendix II**  
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Question 14: [Not asked of those who answered “satellite Internet service” in question 11.] Have you considered purchasing Internet access service through a satellite provider? (n=2,857)

<b>Answer</b>	<b>Percentage of respondents</b>
Yes	9.2
No	87.8
This is not available	1.0
Don't know	2.1

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# GAO Econometric Model

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This appendix describes our econometric model of cable-satellite competition. Specifically, we discuss (1) the conceptual development of the model, (2) the data sources used for the model, (3) the merger of various data sources into a single data set, (4) the descriptive statistics for variables included in the model, (5) the estimation methodology and results, and (6) alternative specifications.

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## Conceptual Development of the Econometric Model

In response to a congressional request, we developed an econometric model to examine the influence of satellite companies' provision of local broadcast channels, along with other factors, on cable prices and DBS penetration rates in a large sample of cable franchise areas in 2001. This request represented a follow-up to a previous report that we issued which analyzed the impact of DBS penetration rates on cable prices.<sup>23</sup> Relying on our previous model, the existing empirical literature, and our assessment of the current subscription video marketplace, we developed a model that included a variety of explanatory variables that were included in our previous model, as well as other models, but that also extended those analyses by adding new variables to account for the recent provision of local broadcast channels by DBS companies as an important factor in competition between cable and DBS companies.

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## Examination of Competitive Effects in the Subscription Video Market

To examine the influence of the DBS companies' provision of local channels on cable prices and DBS penetration rates, we employed a model that is based on the subscription video market, rather than on the narrower market for cable television.<sup>24</sup> In 2001, the national market share of cable systems (as measured by subscribership) in what we call the subscription video market was about 78 percent, and the share of the DBS providers was about 18 percent. The remaining 4 percent of subscription television households obtained service through other means such as terrestrial wireless systems, satellite master antenna television systems (usually used in apartment buildings or other multiple-dwelling units), open video systems, and large "C-band" home satellite dishes.

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<sup>23</sup>[GAO/RCED-00-164](#).

<sup>24</sup>This is consistent with FCC's approach to analyzing the market. See Federal Communications Commission, *Annual Assessment of the Status of Competition in Markets for the Delivery of Video Programming*, CS Docket No. 01-129, *Eighth Annual Report*, FCC 01-389 (Washington, D.C.: Jan. 14, 2002).



Cable providers and satellite providers can be regarded as “differentiated,” not so much because they use different technologies but because the services they provide are perceived as different by subscribers and because these varied providers face different laws and regulations that influence their cost structures as well as the type of product they provide. For example, in 2001, satellite subscribers in only 42 television markets could receive local broadcast signals from either DBS provider. Also, cable companies must pay local franchise fees and are required to provide capacity for public, educational, and government channels. In sum, cable and satellite providers are differentiated in consumers’ perception, in their legal context, and in their product offerings.

In our model, cable prices and DBS penetration rates will depend broadly on the demand and cost conditions affecting both the cable and noncable providers of subscription video services. With the passage of the Satellite Home Viewer Improvement Act, DBS providers were granted authority to distribute local broadcast television channels in the broadcast stations’ local markets, perhaps allowing DBS providers to compete more fully with cable companies. To measure the influence of local channels, we used a variable that indicates whether local channels were available from both DBS providers in each franchise area.<sup>25</sup>

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### Specification of Econometric Model of Cable-Satellite Competition

Estimating the influence of DBS companies’ provision of local channels on cable prices and DBS penetration rates is complicated by the possibility that the DBS penetration rate in an area is itself determined, in part, by the cable price in that area and that the cable price is determined, in part, by the DBS penetration rate. One statistical method applicable in this situation is to estimate a system of structural equations in which certain variables that may be simultaneously determined are estimated jointly. In our previous report, we estimated a four-equation structural model in which cable prices, the number of cable subscribers, the number of cable

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<sup>25</sup>We also considered a variable that indicates whether either DBS provider offered local broadcast channels. There were seven markets where only one DBS company offered local channels. We discuss the results of this specification in the last section of this appendix.

channels, and the DBS penetration rate were jointly determined.<sup>26</sup> We modify this four-equation structural model to incorporate the influence of local channels via satellite on cable prices and DBS penetration rates.

One implication of this estimation technique is that the estimated effects we report for the influence of DBS companies' provision of local channels on cable prices and DBS penetration rates must be interpreted as direct effects on price and penetration. At the same time, there are indirect effects of local channels on cable prices and DBS penetration rates wherein these effects on cable prices and DBS penetration rates work through their effects on other endogenous variables. For instance, a DBS company's provision of local channels may influence a cable operator's decision about the number of channels to include in programming packages, which can, in turn, affect its cable price and the DBS penetration rate. We later present a table with results from reduced-form cable price and DBS penetration rate equations to show how the exogenous variables in the system of equations affect, both directly and indirectly, cable prices and DBS penetration rates.

We estimated the following four-equation structural model of the subscription television market:

- Cable prices are hypothesized to be related to (1) the number of cable channels, (2) the number of cable subscribers, (3) the DBS penetration rate, (4) the DBS companies' provision of local channels in the franchise area, (5) the size of the television market as measured by the number of television households, (6) horizontal concentration, (7) vertical relationships, (8) the presence of a nonsatellite competitor, (9) regulation, (10) average wages, and (11) population density. The cable price variable used in the model is defined as the total monthly rate charged by a cable franchise to the "typical subscriber," including the fees paid for the most commonly purchased programming tier and rented equipment (a converter box and remote control).<sup>27</sup> The

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<sup>26</sup>In previous studies that defined the market more narrowly to be cable television, equations for cable rates, the number of cable subscribers, and the number of cable channels were estimated jointly. For example, see Ford, G. S. and J. D. Jackson, "Horizontal Concentration and Vertical Integration in Cable Television Industry," *Review of Industrial Organization*, 12(4) (1997), pp. 501-518; and Rubinovitz, R. N., "Market Power and Price Increases for Basic Service Since Deregulation," *RAND Journal of Economics*, 24(1) (1993), pp. 1-18.

<sup>27</sup>The cable price does not reflect special introductory monthly rates, such as those offered to current DBS subscribers when they switch to cable service.

explanatory variables in the cable price relationship are essentially cost and market structure variables.

- Number of cable subscribers is hypothesized to be related to (1) cable prices (per channel), (2) the DBS penetration rate, (3) the DBS companies' provision of local channels in the franchise area, (4) the size of the television market as measured by the number of television households, (5) the number of broadcast channels, (6) urbanization, (7) the age of the cable franchise, (8) the number of homes passed by the cable system, (9) the median income of the local area, and (10) the presence of a nonsatellite competitor. The number of cable subscribers is defined as the number of households in a franchise area that subscribe to the most commonly purchased programming tier. This represents the demand equation for cable services, which depends on rates and other demand-related factors.
- Number of cable channels is hypothesized to be related to (1) the number of cable subscribers, (2) the DBS penetration rate, (3) the DBS companies' provision of local channels in the franchise area, (4) the size of the television market as measured by the number of television households, (5) the median income of the local area, (6) cable system capacity in terms of megahertz, (7) the percentage of multiple-dwelling units, (8) vertical relationships, and (9) the presence of a nonsatellite competitor. The number of cable channels is defined as the number of channels included in the most commonly purchased programming tier. The number of cable channels can be thought of as a measure of cable programming quality and is explained by a number of factors that influence the willingness and ability of cable operators to provide high-quality service and consumers' preference for quality.
- DBS penetration rate in a television market is hypothesized to be related to (1) cable prices (2) the DBS companies' provision of local channels in the franchise area, (3) the size of the television market as measured by the number of television households, (4) the age of the cable franchise, (5) the median income of the local area, (6) cable system capacity in terms of megahertz, (7) a dummy variable for areas outside metropolitan areas, (8) the percentage of multiple-dwelling units, (9) the angle—or elevation—at which a satellite dish must be fixed to receive a satellite signal in that area, and (10) the presence of a nonsatellite competitor. The DBS penetration rate variable is defined as the number of DBS subscribers in a franchise area expressed as a proportion of the total number of housing units in the area. As hypothesized, the DBS

penetration rate is expected to depend on the prices set by the cable provider as well as on the demand, cost, and regulatory conditions in the subscription video market that directly affect DBS.

Many of the explanatory variables appeared in our 2000 report as well as in previous studies of cable prices prepared by others.<sup>28</sup> The explanatory variables included in these studies fall into two general categories: (1) demand and cost factors and (2) market structure and regulatory conditions. Table 1 presents the expected effects of all the explanatory variables in the structural model on cable prices and DBS penetration rates.

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<sup>28</sup>For example, see Goolsbee, A. and A. Petrin, *The Consumer Gains from Direct Broadcast Satellite and the Competition with Cable TV* (Feb. 26, 2002); Crandall, R. W. and H. Furchtgott-Roth, *Cable TV: Regulation or Competition?* (Washington, D.C.: Brookings Institution, 1996); Emmons III, W. M. and R. A. Prager, "The Effects of Market Structure and Ownership on Prices and Service Offerings in the U.S. Cable Television Industry," *RAND Journal of Economics*, 28(4) (Winter 1997), pp. 732-750; Ford and Jackson (1997); Mayo, J. W. and Y. Otsuka, "Demand, Pricing, and Regulation: Evidence from the Cable TV Industry," *RAND Journal of Economics*, 22(3) (1991), pp. 396-410; and Rubinovitz (1993).

**Appendix III  
GAO Econometric Model**

**Table 1: Expected Effects of All Explanatory Variables on Cable Prices and DBS Penetration Rates**

<b>Explanatory variable</b>	<b>Definition of variable</b>	<b>Included in previous GAO report</b>	<b>Expected effect on cable prices</b>	<b>Expected effect on DBS penetration rates</b>
Cable price	The monthly rate charged for the Basic Service Tier, Cable Programming Service Tier (the most commonly purchased tier), and rental of a converter box and remote control.	Yes	Not applicable.	We expect that higher cable prices should encourage more customers to choose DBS service instead of cable service, thereby increasing the DBS penetration rate.
Number of cable subscribers	The number of subscribers to the Basic Service Tier and Cable Programming Service Tier.	Yes	Costs per subscriber of providing cable services can increase or decrease with the number of subscribers, depending on scale economies.	If cable and DBS service are substitute services, we expect a lower DBS penetration rate where there are more cable subscribers.
Number of cable channels	The number of channels provided with the Basic Service Tier and Cable Programming Service Tier.	Yes	Consumers should be willing to pay more for a greater number of channels. Also, costs should be greater for the cable operator to provide more channels.	In areas where cable companies offer more channels (a measure of quality), we expect lower DBS penetration rates.
DBS penetration rate	The fraction of housing units in a cable franchise area that have satellite service.	Yes	We expect the presence of DBS to restrain cable prices if cable and satellite were close substitutes in 2001.	Not applicable.
DBS provision of local channels	A binary variable that equals 1 if both DBS providers offer local channels in the cable franchise area.	No	If local channels make DBS service a closer substitute for cable service, we expect the presence of local channels to be associated with lower cable prices.	If local channels make DBS service a more attractive alternative for subscribers, we expect the presence of local channels to be associated with higher DBS penetration rates.
Homes passed by cable system	The number of homes passed by the cable system that serves the franchise area, including homes outside of the franchise area.	Yes	As the number of homes passed increases, the costs of operation could increase or decline depending on the scale economies.	DBS providers will be more or less competitive with cable franchises, depending on the cable companies' costs of operation.
Age of cable franchise	2001 minus the year that the cable franchise began operation.	Yes	Subscribers could have a higher demand in franchise areas with older cable franchises because they are more likely to be aware of the availability and quality of the cable system. Therefore, cable prices could be higher.	Because consumers are more likely to be aware of the availability and quality of cable, we expect lower DBS penetration rates in areas where the cable franchise is older.

**Appendix III  
GAO Econometric Model**

*(Continued From Previous Page)*

<b>Explanatory variable</b>	<b>Definition of variable</b>	<b>Included in previous GAO report</b>	<b>Expected effect on cable prices</b>	<b>Expected effect on DBS penetration rates</b>
Cable system megahertz	The capacity, measured in megahertz, of the cable system that serves the franchise area.	Yes	Higher-megahertz systems may enable the provider to offer more channels and to bundle services, such as video, voice, and broadband Internet access, together. This could increase demand for cable, leading to higher prices. Alternatively, cable prices may be discounted to attract consumers to the other (new) services.	We expect more capacity to be associated with a lower DBS penetration rate if cable providers are able to offer more channels and bundled services, such as telephony and broadband Internet services.
Horizontal concentration	A binary variable that equals 1 if the franchise area is served by 1 of the 10 largest national multiple system operators (MSO).	Yes	If large MSOs have some cost advantages, rates could be lower; if MSO ownership imposes a competitive disadvantage to potential entrants, cable prices could be higher.	If MSO ownership imposes a competitive disadvantage on DBS providers, DBS penetration rates could be lower.
Vertical relationships	A binary variable that equals 1 if the cable operator is affiliated with an MSO that has an ownership interest in a national or regional video programming service.	Yes	A vertical relationship could lower cable system costs if programming costs are reduced or efficiencies are gained, but vertical relationships could signify market power that would tend to lead to higher cable prices.	If a vertical relationship imposes a competitive disadvantage on DBS providers, DBS penetration rates could be lower.
Presence of nonsatellite competitor	A binary variable that equals 1 if a second wireline company provides cable service (including, for example, a local exchange telephone carrier offering video services) in the franchise area.	Yes	Cable prices should be lower where a nonsatellite competitor provides service.	The presence of a nonsatellite competitor increases the number of firms providing multichannel video service, possibly implying a lower DBS penetration rate.
Regulation	A binary variable that equals 1 if the cable franchise is subject to regulation of the rate charged for the Basic Service Tier.	Yes	Regulation may be associated with lower cable prices when compared with prices that would prevail under profit-maximizing pricing by monopoly cable systems. However, cable prices could be higher under regulation if the unregulated cable systems were more competitive.	DBS penetration rates could be higher or lower, depending on how regulation influences the competitiveness of the cable company.

**Appendix III  
GAO Econometric Model**

*(Continued From Previous Page)*

<b>Explanatory variable</b>	<b>Definition of variable</b>	<b>Included in previous GAO report</b>	<b>Expected effect on cable prices</b>	<b>Expected effect on DBS penetration rates</b>
Television market size	The number of television households in the market.	No	In larger markets, more alternative forms of entertainment compete with cable, which should lead to lower cable prices.	In larger markets, more alternative forms of entertainment compete with DBS, which should lead to lower DBS penetration rates.
Number of local broadcast channels	The number of over-the-air broadcast stations in the television market.	Yes	Consumers would pay more for a greater number of broadcast channels on the cable system. Alternatively, over-the-air television could be more competitive with cable in areas where there are many stations.	Over-the-air television could be more competitive with DBS in areas where there are many stations.
Average weekly wage	The average weekly wage for telecommunications equipment installers and repairers in the state where the cable franchise is located.	Yes	Areas with higher average wages should have higher costs of operation, which would make cable prices higher.	Cable franchises in areas with relatively high average wages would be less competitive with national DBS providers.
Median household income	The median household income in the franchise area.	Yes	As consumers' incomes rise, demand for cable services should increase, which would increase cable prices.	As consumers' incomes rise, demand for DBS service should increase, implying a greater DBS penetration rate.
Nonmetropolitan area	A binary variable that equals 1 if the franchise area is outside of a metropolitan statistical area (MSA).	Yes	We expect the competitive impact of DBS on cable prices to be stronger in franchise areas that lie outside of MSAs.	We expect nonmetropolitan status to be associated with higher DBS penetration rates if DBS is a closer substitute for cable in nonmetropolitan areas.
Population density	The ratio of population to square miles in the franchise area.	No	Because more customers can be served per mile of cable, areas with higher population density should have lower costs of operation and therefore lower cable prices.	Cable franchises in more densely populated areas would be more competitive with DBS providers because of possible lower costs and line-of-sight problems for DBS subscribers.
Urbanization	The percentage of the county's population that is classified as urban by the Census Bureau.	Yes	Because consumers in more urban settings have many alternative forms of entertainment competing with cable, their demand for cable services would be lower, which would lead to lower cable prices.	We expect lower demand for DBS service in urban areas because consumers have alternative forms of entertainment and are less likely to have the necessary line-of-sight to the satellite because of obstructions.

*(Continued From Previous Page)*

<b>Explanatory variable</b>	<b>Definition of variable</b>	<b>Included in previous GAO report</b>	<b>Expected effect on cable prices</b>	<b>Expected effect on DBS penetration rates</b>
Percentage of multiple-dwelling units	The percentage of housing units accounted for by structures with five or more housing units.	Yes	Where there are more multiple-dwelling units, the market has been found to be more naturally competitive because cable systems may face greater actual or potential competition, which would lead to lower cable prices.	We expect lower DBS penetration rates where there are more multiple-dwelling units because consumers' line-of-sight is more likely to be blocked and consumers may face more restrictions on where they can mount the dish at their residence.
Dish angle or elevation	The angle relative to the ground that a DBS subscriber must mount the satellite dish to "see" the satellite. A more vertical mounting is defined to be a lower "angle."	No	If satellite dishes must be mounted in a more vertical position, we expect that DBS providers will be less competitive with cable companies.	In markets in which a satellite dish must be set in a more vertical position, we expect lower DBS penetration because of the greater likelihood that obstacles would block the line-of-sight to the satellite.

Source: GAO (2002).

## Data Sources Used for the Econometric Model

We required several data elements to build the data set used to estimate this model. The following is a list of our primary data sources:

- We obtained data on cable prices and service characteristics from a 2001 survey of cable franchises that FCC conducted as part of its mandate to report annually on cable prices. FCC's survey asked a sample of cable franchises to provide information about a variety of items pertaining to cable prices, service offerings, subscribership, franchise area reach, franchise ownership, and system capacity. We used the survey to define measures of each franchise area's cable prices, number of subscribers, and number of cable channels as described above. In addition, we used the survey to define variables measuring (1) system megahertz (the capacity of the cable system in megahertz), (2) homes passed by the cable system serving the franchise area and perhaps other franchises in the same area, (3) competitive status—a dummy variable equal to 1 if the franchise faced "nonsatellite" competition from an unaffiliated subscription video company (or "overbuilder") or from a local telephone company, (4) regulation—a dummy variable equal to 1 if the franchise is subject to rate regulation of its Basic Service Tier, and (5) horizontal



concentration—a dummy variable equal to 1 if the franchise is affiliated with 1 of the 10 largest MSOs.

- From *SkyREPORT*, we obtained an estimate of DBS subscriber counts as of year-end 2001 for each zip code in the United States. We used this information to calculate the number of DBS subscribers in a cable franchise area, which, when used in conjunction with the number of housing units, was used to define the DBS penetration rate.
- We used the most recent data from the U.S. Census Bureau to obtain the following demographic information for each franchise area: median household income, proportions of urban and rural populations, housing units accounted for by structures with more than five units (multiple-dwelling units), population density, and nonmetropolitan statistical areas.
- For average wage, we used year 2000 state estimates for Telecommunications Equipment Installers and Repairers from the Bureau of Labor Statistics' (BLS) Occupation and Employment Statistics Survey.
- We used data from BIA MEDIA AccessPro to determine the number of broadcast television stations in each television market.
- To define the dummy variable indicator of vertical integration, we used information on the corporate affiliations of the franchise operators provided in FCC's survey. We used this information in conjunction with industrywide information on vertical relationships between cable operators and suppliers of program content gathered by FCC in its 2001 annual video report.
- We used information from the National Association of Broadcasters to identify in which television markets local channels were available from both DBS companies.
- From Nielsen Media Research, we acquired information to determine the number of television households in each designated market area (DMA) and to determine in which DMA each cable franchise was located.
- On the basis of a zip code associated with each cable franchise, we were able to determine the necessary satellite dish elevation for each cable

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franchise area from information available on the Web pages of DirecTV and EchoStar.

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## Merging Various Data Sources into a Single Data Set

The level of observation in our model is a cable franchise.<sup>29</sup> Many of the variables we used to estimate our model, such as each cable franchise's price, came directly from FCC's survey of franchises. However, we also created variables for each franchise from information derived from other sources. For example, median income and the extent of multiple-dwelling units were obtained from Census data, and the number of DBS subscribers was provided by *SkyREPORT*.

The assignment of these variables to each franchise required identifying the geographic extent of each franchise area because Census and DBS data are reported within geographic definitions that differ from cable franchise areas. Census data can be obtained at several geographic levels, including communities or counties. Additionally, some information—most notably DBS subscriber counts—is at a zip code level. FCC's survey and other FCC data on cable franchises contain information on the franchise community name, type (such as city or town), and county, which can be used to link franchises to Census areas. One complicating factor in using community names to assign non-survey-derived information to each franchise is that some cable franchises are in areas, such as unnamed, unincorporated areas, that do not correspond to geographic areas for which Census or other data are readily available. Another complicating factor is that FCC's 2001 survey did not contain information on the zip codes served by particular franchise areas.

We first attempted to determine the geographic area associated with each cable franchise. Our general approach was to combine each franchise's community name field with an indicator of community type, such as city or town, and then match these names to census place or, alternatively, county

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<sup>29</sup>We define a cable franchise in terms of its Community Unit Identification (CUID) number.

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subdivision<sup>30</sup> (minor civil division) files. Since many of the franchises in our sample correspond to recognizable local entities—such as cities, towns, and townships—we were able to make the link directly to Census data sources and assign demographic and other census data gathered at the level of the associated community. Of the 722 franchises used in the model, 442 were linked to census place files, and 126 were linked to census county subdivision files. For other franchises, however, the link to Census records was not as direct. For franchises in unincorporated, unnamed areas and those whose franchise areas represent a section of the associated community (which occurs in some large cities),<sup>31</sup> we acquired additional information on the geographic boundaries of the franchise areas.<sup>32</sup> For purposes of assigning demographic and other census data to each of these franchises, we identified a key zip code that we used to link to census data organized at the zip code level. Of the 722 franchises used in the model, 28 were in large cities with multiple franchises, 94 were in unincorporated areas of counties for which we obtained more specific boundary information, and 32 were in unincorporated areas for which we did not obtain more specific boundary information.

The satellite subscriber information we obtained was organized by zip code. In order to match these counts to franchises, we determined the zip code or zip codes associated with each franchise. Because zip codes often do not share boundaries with other geographies, one zip code can be

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<sup>30</sup>Places consist of what are known as census-designated places and places that are incorporated according to the laws of their respective states. Generally, incorporated places can be thought of as cities, boroughs, towns, townships, and villages. However, towns and townships in some states are not considered places in terms of census reporting, even though they might both serve some local government purpose and have large populations. Census data for many franchise areas designated as towns in FCC's master file of franchises are found in the county subdivisions file rather than the places file.

<sup>31</sup>Many large cities, such as New York City, Los Angeles, and Chicago, have multiple cable franchise areas.

<sup>32</sup>For those jurisdictions for which there were multiple franchises, including counties with franchises in unincorporated unnamed areas, we attempted to define more precise geographical boundaries for each franchise. Specifically, we contacted local government offices responsible for cable franchise oversight and received maps or other descriptive information linking the specific franchise areas to zip codes, census tracts, local government districts, or some other boundary information. When local governments did not directly provide zip code or census tract information, we used the information they did provide in conjunction with zip code overlay maps to assign zip codes to the franchise areas. For some franchises in unincorporated unnamed areas, we were unable to approximate the franchise area with any more geographic specificity than the unincorporated portion of the county.

associated with more than one cable franchise area. Also, many franchises, particularly larger ones, span many zip codes. Therefore, we needed to identify the zip code or codes in each franchise area as well as the degree to which each of those zip codes is contained in each franchise area to calculate the degree of satellite penetration for each franchise. We accomplished this by using software designed to relate various levels of census geography to one another.<sup>33</sup> For most franchise areas—that is, those that correspond to census places, county subdivisions, or entire counties as well as some of those franchises in multiple-franchise jurisdictions—we were able to use this software to relate census places, county subdivisions, and in some cases, census tracts or whole counties, directly to the zip codes that corresponded to those areas (places, etc.) and to calculate the share of each zip code’s population according to the 2000 Census that was contained in that area. We used these population shares to allocate shares of each zip code’s total DBS subscribers to the relevant franchise area.<sup>34</sup> For some franchise areas in unincorporated areas, we used the zip code or codes we identified as part of our investigation of the geographic extent of these franchises, and we used the software to estimate the proportion of the population in those zip codes living in unincorporated areas and to allocate DBS subscribers on the basis of these population proportions.<sup>35</sup>

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<sup>33</sup>Specifically, we used the MABLE/Geocorr correspondence engine (<http://mcadc2.missouri.edu/websas/geocorr2k.html>). MABLE is an acronym for Master Area Block Level Equivalency file.

<sup>34</sup>As an illustration, assume that we had a cable franchise area in the town of Anytown, which the MABLE software identifies is served by zip codes 12345 and 12346. Assume further that zip code 12345 had a population of 10,000 people in 2000, of which 8,000 were in Anytown proper and 2,000 were in the surrounding unincorporated area, and zip code 12346 had a population of 12,000 people of which 6,000 were in Anytown. In this case, 80 percent of the 12345 zip code and 50 percent of the 12346 populations are associated with Anytown, so that our approach would assign 80 percent of the satellite subscribers in zip code 12345 and 50 percent of those in 12346 to the cable franchise in the town of Anytown. Because we defined the DBS penetration rate as the number of subscribers divided by the number of housing units, our approach would divide this estimate of the number of DBS subscribers in Anytown by the number of housing units reported in the 2000 Census for the town of Anytown.

<sup>35</sup>As another illustration, suppose there is a cable franchise in an unincorporated area that we identified as being near the town of Anytown. In this case, we would treat the franchise area as being the unincorporated portion of zip code 12345. In the case where there is only one zip code involved, we would approximate the DBS penetration rate for this franchise as the number of DBS subscribers in the zip code divided by the number of housing units in the zip code as reported in the 2000 Census. In other cases where more than one zip code is involved, we would approximate the DBS penetration rate on the basis of the shares in all of the identified zip codes.

For some other franchise areas in unincorporated areas, we approximated DBS penetration using population proportions in the unincorporated portions of all zip codes in the relevant counties.

We assigned other information to each franchise on the basis of the franchise’s county, state, or the key zip code that we identified. Wage data from BLS were assigned at the state level; nonmetropolitan status, percentage of urban population, and the Nielsen television market of each franchise were assigned at the county level.<sup>36</sup> As part of the process used to match zip codes to franchises, we defined a key zip code for each franchise as that zip code with the largest franchise area population. We used this zip code to assign dish elevation for each franchise.

## Descriptive Statistics for Variables Included in the Econometric Model

Table 2 provides basic statistical information on all of the variables included in the cable–satellite competition model. We calculated these statistics using all 722 observations in our data set.

**Table 2: Descriptive Statistics**

Variable	Mean	Standard deviation	Minimum value	Maximum value
Cable price (dollars per month)	35.89	5.31	14.00	47.84
Number of cable subscribers	21,008.5	43,256.2	4.0	302,964.0
Number of cable channels	58.0	14.1	10.0	99.0
DBS penetration rate (percentage)	15.8	11.2	1.6	63.6
DBS provision of local channels	0.51	0.50	0.00	1.00
Homes passed by cable system	177,114.4	233,678.7	30.0	1,260,734.0
Age of cable franchise (years)	23.9	9.6	2.0	50.0
Cable system megahertz	637.6	172.3	216.0	870.0
Horizontal concentration	0.83	0.37	0.00	1.00
Vertical relationships	0.54	0.50	0.00	1.00

<sup>36</sup>In the Nielsen data, some counties are split between different television markets. In cases where a franchise’s county was not uniquely placed in one television market, we used additional information on zip codes to assign the franchise to a television market.

(Continued From Previous Page)

Variable	Mean	Standard deviation	Minimum value	Maximum value
Presence of nonsatellite competitor	0.14	0.35	0.00	1.00
Regulation	0.35	0.48	0.00	1.00
Television market size (households in thousands)	1,432.1	1,655.3	50.0	7,301.0
Number of local broadcast channels	11.9	5.7	1.0	25.0
Average weekly wages (dollars)	788.38	101.80	575.38	1,045.58
Median household income (dollars in thousands)	43.7	16.1	13.5	140.0
Nonmetropolitan area	0.26	0.44	0.00	1.00
Population density	2,843.9	7,066.2	2.3	87,139.8
Urbanization (percentage)	72.8	28.4	0.0	100.0
Percentage of multiple-dwelling units	14.28	13.57	0.00	98.12
Dish angle or elevation (degrees)	40.3	6.6	27.2	57.3

Source: GAO (2002).

## Estimation Methodology and Results

We employed the Three-Stage Least Squares (3SLS) method to estimate our model.<sup>37</sup> Table 3 includes the estimation results for each of the four structural equations. All of the variables, except dummy variables,<sup>38</sup> are expressed in natural logarithmic form.<sup>39</sup> This means that coefficients can be interpreted as “elasticities”—the percentage change in the value of the dependent variable associated with a 1 percent change in the value of an independent, or explanatory, variable. The coefficients on the dummy variables are elasticities in decimal form. Most of our results are consistent

<sup>37</sup>We preferred the 3SLS to Two-Stage Least Squares (2SLS) because the 3SLS accounts for the contemporaneous relationships among cable rates, cable subscribers, cable channels, and DBS penetration by using all available information. Also, we assumed that price per channel in the subscriber equation is exogenous because cable providers simultaneously decide how many channels to provide and what to charge for a package of channels, rather than deciding how much to charge for each channel.

<sup>38</sup>A dummy variable takes a value of 1 if a certain characteristic is present and a value of 0 otherwise.

<sup>39</sup>The dummy variables in the model include the following: horizontal concentration of cable systems, vertical relationship, regulation, presence of nonsatellite competitor, DBS provision of local channels, and nonmetropolitan area. Also, because the natural log of 0 is undefined, we added 1 to the observed value of any continuous variable that can take the value of 0.

with the economic reasoning that underlies our model as well as with the results from several previous studies, including our 2000 report.

**Table 3: 3SLS Model Results**

Variable	Cable prices equation	Cable subscribers equation	Cable channels equation	DBS penetration equation
Cable price				-0.2335 [0.6076]
Cable price per channel		-2.1239 [0.0001] <sup>a</sup>		
Number of cable subscribers	0.0166 [0.0816] <sup>c</sup>		0.0544 [0.0001] <sup>a</sup>	
Number of cable channels	0.2030 [0.0001] <sup>a</sup>			
DBS penetration rate	-0.0340 [0.2060]	-2.0759 [0.0001] <sup>a</sup>	-0.0245 [0.4237]	
DBS provision of local channels	0.0002 [0.9930]	0.3175 [0.1753]	0.0567 [0.0240] <sup>b</sup>	0.2772 [0.0001] <sup>a</sup>
Homes passed by cable system		0.2211 [0.0001] <sup>a</sup>		
Age of cable franchise		0.3870 [0.0052] <sup>a</sup>		-0.1253 [0.0062] <sup>a</sup>
Cable system megahertz			0.5073 [0.0001] <sup>a</sup>	-0.3134 [0.0014] <sup>a</sup>
Horizontal concentration	0.0661 [0.0001] <sup>a</sup>			
Vertical relationships	-0.0051 [0.6753]		-0.0399 [0.0116] <sup>b</sup>	
Presence of nonsatellite competitor	-0.1837 [0.0001] <sup>a</sup>	-1.4497 [0.0001] <sup>a</sup>	0.0221 [0.3852]	-0.4989 [0.0001] <sup>a</sup>
Regulation	0.0008 [0.9564]			
Television market size	0.0085 [0.3074]	-0.2599 [0.0887] <sup>c</sup>	-0.0060 [0.5989]	-0.1025 [0.0018] <sup>a</sup>
Number of local broadcast channels		0.6181 [0.0050] <sup>a</sup>		
Average weekly wages	0.0033 [0.9408]			
Median household income		-0.5452 [0.0100] <sup>a</sup>	0.0788 [0.0005] <sup>a</sup>	0.1278 [0.0404] <sup>b</sup>

**Appendix III**  
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<b>Variable</b>	<b>Cable prices equation</b>	<b>Cable subscribers equation</b>	<b>Cable channels equation</b>	<b>DBS penetration equation</b>
Nonmetropolitan area				0.4555 [0.0001] <sup>a</sup>
Population density	-0.0098 [0.0819] <sup>c</sup>			
Urbanization		0.0817 [0.2982]		
Percentage of multiple-dwelling units			-0.0148 [0.1555]	-0.2286 [0.0001] <sup>a</sup>
Dish angle or elevation				0.5883 [0.0001] <sup>a</sup>
Intercept	2.6627 [0.0001] <sup>a</sup>	14.6489 [0.0001] <sup>a</sup>	-0.3877 [0.2350]	3.2390 [0.0180] <sup>b</sup>
Sample size	722	722	722	722

Notes:

System-weighted R-square: 0.63.

P-values are in brackets.

<sup>a</sup>Significance at the 1 percent level.

<sup>b</sup>Significance at the 5 percent level.

<sup>c</sup>Significance at the 10 percent level.

Source: GAO (2002).

We found that DBS companies' provision of local channels is associated with significantly higher DBS penetration rates. As shown in table 3, our model results indicate that in cable franchise areas where local channels are available from both DBS providers, the DBS penetration rate is approximately 32 percent higher than in areas where local channels are not available via satellite.<sup>40</sup> This finding suggests that in areas where local channels are available from both DBS providers, consumers are more likely to subscribe to DBS service, and therefore DBS appears to be more able to compete effectively for subscribers than in areas where local channels are not available from both DBS providers. Several additional factors also influence the DBS penetration rate. Our model results indicate that the DBS penetration rate is greater in nonmetropolitan areas and in cable

<sup>40</sup>For dummy variables (those variables that can take a value of 0 or 1 depending on the presence of a condition (e.g., DBS providers offering local broadcast channels)), we report the percentage change arising from a discrete change from 0 to 1. We calculated this percentage change as:  $[\exp(\text{parameter estimate}) - 1]$  times 100.



franchise areas that are outside the largest television markets, as measured by the number of television households in the market. These two factors can be associated with the historical development of satellite service, which had been marketed for many years in more rural areas. Additionally, the DBS penetration rate is higher in areas that require a relatively higher angle or elevation at which the satellite dish is mounted and is lower in areas where there are more multiple-dwelling units. These two factors can be associated with the need of DBS satellite dishes to “see” the satellite: a dish aimed more toward the horizon (as opposed to being aimed higher in the sky) is more likely to be blocked by a building or foliage and people in multiple-dwelling units often have fewer available locations to mount their dish.

We did not find that DBS companies’ provision of local broadcast channels is associated with lower cable prices. In table 3, the estimate for this variable is not statistically significant, and we therefore cannot reject the hypothesis that provision of local channels has no impact on cable prices. However, we found that cable prices were approximately 17 percent lower in areas where a second cable company—known as an overbuilder—provides service. Additionally, cable prices were higher when the cable company was affiliated with 1 of the 10 largest MSOs. This result indicates that horizontal concentration could be associated with higher cable system prices. Finally, cable prices are higher in areas where the cable company provides more channels, indicating that consumers generally are willing to pay for additional channels and that providing additional channels raises a cable company’s costs.

We also found several interesting results in the cable subscriber and cable channel equations. In the cable subscribers’ equation, we obtained an estimate of the price elasticity of demand for cable services that was lower (in absolute value) than the estimate in our previous report.<sup>41</sup> In the cable channels equation, our model results indicate that local service is associated with improved cable quality, as represented by an increase in the number of channels provided to subscribers. In areas where both DBS companies provide local channels, we found that cable companies offer subscribers approximately 6 percent more channels. This result indicates that cable companies are responding to DBS provision of local channels by

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<sup>41</sup>The price elasticity of demand is estimated to be  $-2.12$ , which is elastic; this means that a 1 percent decrease in cable rates results in a 2.12 percent increase in the quantity demanded of cable. In our previous study, we found the price elasticity of demand to be  $-3.22$ .

improving their quality, as reflected by the greater number of channels. Also, cable franchises offered fewer channels (approximately 4 percent fewer) when the company was vertically integrated with a programming network.

Finally, we present reduced-form cable price and DBS penetration equations (see table 4) in which the exogenous variables in the system are included to show the net effects on cable prices and DBS penetration rates of the exogenous variables. In the reduced-form equation, the estimates for local broadcast service include both the direct effects—as measured in the 3SLS system of structural equations—and indirect effects. Consistent with the 3SLS system, local channels are associated with significantly higher DBS penetration rates. Where local channels are offered by both DBS providers, DBS penetration rates are approximately 33 percent higher than in areas where local channels are not available. Also, DBS penetration rates are higher in nonmetropolitan areas, smaller television markets, and places where the dish elevation is at a greater angle. Again, we cannot reject the hypothesis that provision of local channels via satellite has no impact on cable prices. But cable prices are approximately 15 percent lower in franchise areas where a second cable company provides service, while prices are approximately 6 percent higher when the cable company is affiliated with 1 of the 10 largest MSOs.

**Table 4: Regression Estimates of Reduced-Form Cable prices and DBS Penetration Equations**

Variable	Cable prices equation	DBS penetration equation
DBS provision of local channels	-0.0118 [0.5011]	0.2827 [0.0001] <sup>a</sup>
Homes passed by cable system	0.0190 [0.0001] <sup>a</sup>	-0.0515 [0.0001] <sup>a</sup>
Age of cable franchise	0.0368 [0.0012] <sup>a</sup>	-0.1144 [0.0046] <sup>a</sup>
Cable system megahertz	0.1321 [0.0001] <sup>a</sup>	-0.3025 [0.0001] <sup>a</sup>
Horizontal concentration	0.0589 [0.0005] <sup>a</sup>	0.2493 [0.0001] <sup>a</sup>
Vertical relationships	-0.0293 [0.0192] <sup>b</sup>	-0.0718 [0.1066]

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<b>Variable</b>	<b>Cable prices equation</b>	<b>DBS penetration equation</b>
Presence of nonsatellite competitor	-0.1613 [0.0001] <sup>a</sup>	-0.4329 [0.0001] <sup>a</sup>
Regulation	-0.0020 [0.8610]	-0.0784 [0.0574] <sup>c</sup>
Television market size	0.0230 [0.0661] <sup>c</sup>	-0.1274 [0.0043] <sup>a</sup>
Number of local broadcast channels	-0.0079 [0.6928]	0.1823 [0.0103] <sup>b</sup>
Average weekly wages	-0.0004 [0.9931]	0.0106 [0.9535]
Median household income	-0.0036 [0.8407]	0.1646 [0.0096] <sup>a</sup>
Nonmetropolitan area	-0.0157 [0.3294]	0.3090 [0.0001] <sup>a</sup>
Population density	-0.0068 [0.1473]	-0.0973 [0.0001] <sup>a</sup>
Urbanization	0.0069 [0.3246]	-0.0680 [0.0068] <sup>a</sup>
Percentage of multiple-dwelling units	0.0079 [0.1951]	-0.1095 [0.0001] <sup>a</sup>
Dish angle or elevation	-0.0329 [0.3917]	0.9525 [0.0001] <sup>a</sup>
Intercept	2.4292 [0.0001] <sup>a</sup>	1.3639 [0.4397]
Sample size	722	722

**Notes:**

Adjusted R-square: 0.40 for price equation and 0.57 for DBS penetration equation.

P-values are in brackets.

<sup>a</sup>Significance at the 1 percent level.

<sup>b</sup>Significance at the 5 percent level.

<sup>c</sup>Significance at the 10 percent level.

Source: GAO (2002).

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## Alternative Specifications

We considered an alternative specification under which we expanded the definition of local channels to include markets where only one DBS provider offered local channels. In 2001, there were seven markets where only one DBS provider, but not both, offered local channels.<sup>42</sup> By expanding our definition of local channels to include markets where either DBS company offered local channels, our data set contained an additional 35 observations (4.9 percent of all observations) defined to have local channels. The results are generally consistent with our primary specification. In both the 3SLS system of structural equations and the reduced-form equation, DBS provision of local channels is associated with significantly higher DBS penetration rates. Further, the estimate for the local channels variable is not statistically significant in the cable price equation, and we therefore cannot reject the hypothesis that provision of local channels has no impact on cable prices.

We considered another alternative specification using 3 years of cable rate and channel data in a single-equation specification. As part of its annual survey, FCC requested that cable companies report their cable rates and number of channels provided for 1999 to 2001. Using these data, we regressed cable rates on the number of cable channels provided, dummy variables for DBS provision of local broadcast channels (on the basis of the amount of time the service was available), and year and cross-section (i.e., cable franchise) dummy variables. In this panel model, we found that DBS provision of local broadcast channels was associated with higher cable rates. Because we lacked DBS penetration rate data for the 3-year period, we were unable to examine the impact of local channels on DBS penetration rates.

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<sup>42</sup>These television markets were Albuquerque, Baltimore, Columbus, Greensboro, Memphis, Milwaukee, and West Palm Beach.

# Comments from the Federal Communications Commission

FEDERAL COMMUNICATIONS COMMISSION  
Washington, D. C. 20554

OFFICE OF  
MANAGING DIRECTOR

October 2, 2002

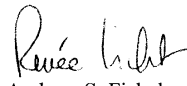
Mr. Peter Guerrero  
Director  
Physical Infrastructure Issues  
U.S. General Accounting Office  
Washington, DC 20548

Dear Mr. Guerrero:

Thank you for offering the Commission the opportunity to comment on GAO's draft report TELECOMMUNICATIONS: Issues in Providing Cable and Satellite Television (GAO-03-130).

Commission staff have reviewed the draft report. To the extent the Report describes the cable and DBS industries and presents industry statistics, there is nothing in the Report that is inconsistent with the information gathered by the Commission through a variety of rulemaking proceedings and research projects. Because the Commission's review of the proposed merger of EchoStar and DirecTV is pending, it would not be appropriate for Commission staff to comment on the draft report beyond providing the technical edits that we have already submitted.

Sincerely,

  
for Andrew S. Fishel  
Managing Director

# Comments from the Department of Justice



**DEPARTMENT OF JUSTICE**  
Antitrust Division

**CHARLES A. JAMES**  
Assistant Attorney General

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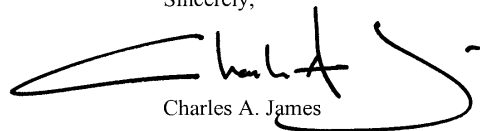
OCT 3 2002

Mr. Peter Guerrero  
Director, Physical Infrastructure Issues  
United States General Accounting Office

Dear Mr. Guerrero:

Thank you for providing us with a draft of the GAO report entitled, "Issues in Providing Cable and Satellite Television." Because the proposed acquisition of DirecTV by Echostar Communications Corporation is currently under review by the Antitrust Division, and your report touches on issues directly relevant to our investigation, we decline the offer to comment on your report at this time.

Sincerely,



Charles A. James

# GAO Contacts and Staff Acknowledgments

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## GAO Contacts

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## Staff Acknowledgments

In addition to those named above, Wendy Ahmed, Stephen M. Brown, Michael Clements, Michele Fejfar, Rebecca L. Medina, Hai Tran, and Mindi Weisenbloom made key contributions to this report.

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