

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)	
)	
Annual Assessment of the Status of)	MB Docket No. 15-158
Competition in the Market for Delivery)	
of Video Programming)	
)	

COMMENTS



I. INTRODUCTION

The American Cable Association (“ACA”) submits these comments in response to the request for comment in the Public Notice (“PN”) in the above-captioned proceeding regarding the Commission’s Seventeenth Report on the state of competition in the delivery of video programming (“17th Report”). The PN seeks to collect information to enhance the Commission’s analysis of competitive conditions in the video marketplace in 2014, enable the Commission to better understand the implications for the American consumer, and provide a solid foundation for Commission policy-making with respect to the delivery of video programming to consumers.¹

¹ See *Media Bureau Seeks Comment on the Status of Competition in the Market for the Delivery of Video Programming*, Public Notice, MB Docket No. 15-158 (rel. Jul. 2, 2015) (“PN”).

ACA again asks the Commission to report on the continued shuttering of smaller cable systems and the reasons why this is happening.

II. SMALLER CABLE OPERATORS ARE CONTINUING TO CLOSE SYSTEMS AND EXIT MARKETS

In recent years, ACA has requested that the Commission take account of both regulatory and non-regulatory factors contributing to small cable operators closing systems and departing from markets.² In its last assessment of market entry and exit in the 16th Report, the Commission reported that as of March 25, 2014 (per data in the Commission's COALS database) there were 4,833 cable systems, a decline from the 5,127 cable systems reported in the 15th Report.³ Based on ACA's submission of data and information obtained from the National Cable Television Cooperative ("NCTC") covering developments in 2012 and 2013, the Commission reported that:

The total number of cable systems has been declining. Some cable systems have been interconnected with other cable systems, providing continuity of video service to subscribers. However, some cable systems have been shut down, terminating video service to subscribers. ACA maintains that 133 member cable systems serving 4,050 subscribers shut down in 2013 and 129 member cable systems serving 8,060 subscribers shut down in 2012. According to ACA, 1,078 small and rural cable systems serving approximately 50,000 subscribers have closed since 2008. ACA contends that the vast majority of these closed systems ceased providing video service in their communities. ACA believes that the primary causes of cable system closures in small and rural communities are increasing programming costs.⁴

² See *Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*, MB Docket No. 14-16, Comments of the American Cable Association at 6-8 (filed Mar. 21, 2014) ("ACA 16th Report NOI Comments"); *Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*, MB Docket No. 12-203, Comments of the American Cable Association at 10 (filed Sep. 10, 2012) ("ACA 15th Report NOI Comments").

³ *Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*, Sixteenth Report, 30 FCC Rcd 3253, ¶ 23 (2015) ("16th Report").

⁴ 16th Report, ¶ 70 [footnotes omitted].

In the PN, the Commission again seeks comment on the impact of the Communications Act and Commission rules on MVPD entry and competition, and information on the entry and exit of MVPDs and the reasons why MVPDs leave the video marketplace.⁵

To aid the Commission in its inquiry, ACA has again obtained data and information from NCTC showing the number of its members' systems that have shut down and ceased distributing video programming in 2014. The data show that 91 systems, operated by 47 separate entities, shut down last year, continuing the trend of small cable operator system shutdowns that ACA has previously reported to the Commission.⁶ These 91 systems served approximately 5,307 subscribers across 32 states.

Added to the 133 systems serving 8,060 subscribers and the 129 systems serving 4,050 subscribers, respectively, that ACA reported as having been lost in system shutdowns in 2013 and 2012, 353 systems serving 17,417 subscribers have lost cable service in the last three years.⁷ Overall, since 2008, NCTC members have closed a total of 1,169 cable systems, the vast majority of which reflect systems that have ceased providing video service in their communities.⁸ At the time of their closing, these systems served a total of approximately 55,302 subscribers.

⁵ PN at 6.

⁶ ACA 16th Report NOI Comments at 7 ("The data show that 133 systems shut down in 2013, and 129 shut down in 2012.").

⁷ ACA 16th Report NOI Comments at 7 ("[The systems shutdown] served approximately 4,050 and 8,060 subscribers, respectively, with an estimated total of 12,110 subscribers affected in 2012 and 2013." Compiling NCTC's latest data with what was reported previously results in the following system closures by year: 91 closed in 2014 (5,307 subscribers); 133 closed in 2013 (8,060 subscribers); 129 closed in 2012 (4,050 subscribers); 179 closed in 2011 (7,684 subscribers); 148 closed in 2010 (6,389 subscribers); 282 closed in 2009 (9,309 subscribers); and 207 closed in 2008 (14,503 subscribers). See ACA 16th Report NOI Comments at 6-8; ACA 15th Report NOI Comments at 5-6.

⁸ See also *The Cable Act at 20*, Testimony of Colleen Abdoulah, Chairwoman and Chief Executive Officer at WOW! Internet, Cable & Phone, before the Senate Committee on Commerce, Science, & Transportation, at 4 (July 24, 2012) (reporting that between 2008 and 2012, nearly 800 ACA member small systems have closed across the country), available at http://commerce.senate.gov/public/?a=Files.Serve&File_id=cc8a6776-7e54-48e0-921f-11daebeffc155.

ACA believes, as it noted in its previous comments, and as the Commission acknowledged in both its 15th and 16th Reports, that one of the primary causes of small and rural system closings continues to be increasing video programming costs.⁹ As ACA documented in its latest research paper, “High and Increasing Video Programming Fees Threaten Broadband Deployment,” programming fees have risen rapidly in recent years, at a greater rate than video revenues, and the delta between the two is expected to grow in the future, putting increasing pressure on MVPDs margins, particularly those that are smaller-scale.¹⁰ Assuming that current market trends for programming costs and multichannel video revenues continue, by 2020, video margins for smaller-scale MVPDs will turn negative.¹¹ As video margin erosion continues, ACA expects cable system closings will persist.

In order for the Commission to give Congress an accurate picture of the health of competition in video distribution markets, it is important that it include in the 17th Report not only data revealing the overall decrease in the number of cable systems from its COALS database, but information received from other sources concerning the number of these systems that closed and exited the market, which includes data from NCTC presented in this filing. Further, ACA urges that the Commission to not only gather this data, but also assess the causes of these system closings and market exits, including an evaluation of the role of substantial increases in video programming costs. Finally, the Commission should report on the likelihood that programming fees will continue to climb in the years ahead, and the expected future impact of these rising fees on cable system closures.

⁹ See ACA 16th Report NOI Comments at 7-8; ACA 15th Report NOI Comments at 8; 16th Report, ¶ 70; 15th Report, ¶ 78.

¹⁰ *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act*, GN Docket No. 14-126, Reply Comments of the American Cable Association on the Notice of Inquiry on Immediate Action to Accelerate Deployment, Appendix at 5-8 (filed Apr. 6, 2015) (“ACA Video Study”) (attached).

¹¹ ACA Video Study at 7.

III. CONCLUSION

The video programming ecosystem continues to evolve and ACA encourages the Commission to recognize in its next Report the fact that smaller systems continue to close at a steady rate, affecting thousands of subscribers in rural and hard-to-serve areas. For Congress to understand the state of competition in the video marketplace, it is vital for the Commission to note the factors and trends that ACA has highlighted in these comments.

Respectfully submitted,

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High and Increasing Video Programming Fees Threaten Broadband Deployment

A research paper from



CONNECTING HOMETOWN AMERICA

With research and supporting analysis from Cartesian

About ACA

The American Cable Association (ACA) advances the interests of smaller providers of broadband, video, voice and other communications services to a variety of customers—residential, business, government and institutional—by means of legal and government advocacy. Since 1993, the ACA has represented small- and medium-sized cable operators before the US Congress, Federal Communications Commission and other federal agencies.

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EXECUTIVE SUMMARY

Smaller-scale (small and medium-sized) multichannel video programming distributors (MVPDs) are at the forefront of deploying new high-performance broadband networks, especially in rural areas. Between 2013 and 2014, small and medium-sized MVPDs upgraded or expanded their networks of 25 Mbps or greater speeds to 11 million homes in the U.S.¹. MVPDs contributing to this growth include cable operators using DOCSIS technology, new entrants like Google Fiber, and telephone companies like CenturyLink and Cincinnati Bell upgrading their low-speed copper networks to high-speed fiber-to-the-home. In almost all instances, these providers are employing the traditional triple-play business model of offering packages of multichannel video, broadband and phone, where multichannel video provides the largest share of revenues.

Despite the growth of online video in recent years, traditional multichannel video service remains a key product for most households – and an integral part of the triple-play package for providers. While broadband offers higher margins than multichannel video, few MVPDs see a viable business model in offering only broadband today. Even Google Fiber, which has gained significant media attention for its focus on ultra-fast broadband, sells multichannel video service as a way to attract broadband customers. The economics of multichannel video service are therefore fundamental to MVPDs' decisions to invest in new broadband deployments.

In recent years, however, the economics of multichannel video service for smaller-scale MVPDs have been worsening. While MVPDs have historically been able to pass on these costs, we believe that going forward this will be more challenging. The underlying cost of programming acquisition has been rising much more rapidly than the prices MVPDs can charge subscribers for video service in recent years. This has especially been true for smaller-scale MVPDs, who often pay higher video programming fees than other MVPDs. If current trends for traditional multichannel video continue, free cash flow for MVPDs will decline as well. This would reduce the overall amount of capital available for investment in new broadband deployment.

This paper investigates the impact of this trend on the investment case for broadband for different investment situations involving smaller-scale MVPDs, and explores how some industry evolution scenarios could impact this trend. To quantify this impact, we have built an investment profitability model that aligns with the way that MVPDs measure the attractiveness of broadband investments. This paper demonstrates that if programming fees continue to climb, free cash flow will decline, making the business case for new broadband deployment less attractive.

¹ Analysis used the June 2013 and June 2014 National Broadband Map datasets, found at <http://www.broadbandmap.gov/data-download>

Smaller-scale MVPDs are at the forefront of new high-performance broadband deployments

Smaller-scale MVPDs are at the forefront of deploying new high-performance broadband networks, especially in rural areas. Google Fiber has received considerable media attention for its Gigabit fiber-to-the-home service in Provo, Utah; Austin, Texas; and Kansas City, Kansas and Missouri, and its plans to expand into nine other metro areas. Incumbent telephone companies like CenturyLink² and Cincinnati Bell³ have been expanding their fiber-to-the-home footprints throughout their service territories as well. Hundreds of municipalities throughout the U.S. have also built fiber-to-the-home networks⁴. These providers have been responsible for adding almost 11 million homes⁵ between June 2013 and June 2014 that meet the Federal Communications Commission's definition of broadband as at or exceeding 25 Mbps downstream.

To attract and retain customers, nearly all of these broadband providers offer multichannel video services. Even smaller municipal broadband networks like the Electric Power Board, in Chattanooga, Tennessee, and Greenlight, in Wilson, North Carolina, offer triple play bundles of multichannel video, broadband and phone. In an interview with the *Washington Post*, former Windstream chief executive Jeff Gardner explained, "If you're going to pull customers to your broadband and other services, you've got to lead with [multichannel video]."⁶

It may seem sensible for these providers to drop their multichannel video product and focus on broadband, a product with much higher margins⁷, especially considering the growth in broadband adoption.⁸ But very few providers are yet willing to take the plunge and move to a broadband-only business model due to the threat of losing subscribers to broadband competitors offering multichannel video services. While Google Fiber's focus has been on ultra-fast broadband, it has felt compelled to offer multichannel video as part of its bundle in order to appeal to consumers. Speaking to an audience at the COMPTTEL telecom conference in Dallas in October 2014, Milo Medin, head of Google Fiber, referred to the need to offer multichannel video as the "single biggest impediment" to Google Fiber's

² "CenturyLink Extends 1 Gig Fiber-Based Service to 16 Cities; CenturyLink," (Aug. 5, 2014) available at www.centurylink.com/fiber/news/centurylink-expands-gigabit-service-to-sixteen-cities.html.

³ "Chart of the day: Cincinnati Bell plans fiber expansion as subscribers rise" *Cincinnati Business Courier* (Aug. 7, 2014) available at <http://www.bizjournals.com/cincinnati/blog/2014/08/chart-of-the-day-cincinnati-bell-plans-fiber.html?page=all>; see also "Cincinnati Bell's Fioptics jumps 39% to \$37M on strong subscriber adds" (Nov. 5, 2014) available at <http://www.fiercetelecom.com/story/cincinnati-bells-fioptics-jumps-39-37m-strong-subscriber-adds/2014-11-05>.

⁴ White House. (2015) *Community-Based Broadband Solutions*. Retrieved from https://www.whitehouse.gov/sites/default/files/docs/community-based_broadband_report_by_executive_office_of_the_president.pdf

⁵ Analysis used the June 2013 and June 2014 National Broadband Map datasets, found at <http://www.broadbandmap.gov/data-download>

⁶ Brian Fung, "Here's the Single Biggest Thing Holding Google Fiber Back," *The Washington Post*, October 6, 2014 (www.washingtonpost.com/blogs/the-switch/wp/2014/10/06/video-is-holding-google-fiber-back/)

⁷ SNL Kagan estimates that for some of the largest MVPDs, broadband is a 60% gross margin product versus 18% for video. Tony Lenoir, "Q2 Steady, but Red Flags in Future Outlook for Video Margins," *SNL Kagan*, www.snl.com/interactivex/article.aspx?id=28833656&KPLT=6 (August 8, 2014)

⁸ According to the Leichtman Research Group, the largest cable providers in the US, serving most of the cable market, now have more broadband subscribers than cable subscribers ("About 385,000 Add Broadband in the Second Quarter of 2014," *Leichtman Research Group*, www.leichtmanresearch.com/press/081514release.html) (August 15, 2014)

deployment⁹. Unless consumer preferences and behavior changes rapidly in the next few years, providers are unlikely to drop their multichannel video services and move toward a broadband-only business model.

Programming fees have risen rapidly in recent years

In recent years, the economics of multichannel video service have become increasingly challenging. Programming fees, charged on a per-subscriber basis by multichannel video networks and broadcast TV stations, have generally risen much more rapidly than prices for multichannel video. Over the last eight years, total programming fees for the US multichannel video industry have more than doubled¹⁰. On an annual basis¹¹, per subscriber programming fees have increased an average of 9.4% a year between 2010 and 2015¹².

For smaller-scale MVPDs, the growth in programming fees has been even greater. Carriage fees for a typical member of the National Cable Television Cooperative, a not-for-profit that acts as a buying group for smaller-scale multichannel video providers to negotiate lower rates from nationally-distributed video programming vendors, have gone up 10.6% a year between 2010 and 2015¹³—and this excludes two categories of programming that have risen faster than the market, regional sports networks (like New England Sports Network) and local broadcast stations (affiliates of ABC, NBC, CBS and FOX). Some American Cable Association members have recently seen annual programming fee growth of 15% or greater.¹⁴

Programming fees will continue to grow rapidly in the future

Moving forward, we expect this trend of steep programming fee increases to continue.

One of the biggest drivers of rising programming fees is retransmission consent fees. These fees, charged by local broadcast stations to MVPDs for retransmitting the broadcast signals, have been rising rapidly as broadcast ratings have fallen and advertising revenues have flat-lined. Industry analyst Michael Nathanson told TVNewsCheck that broadcasters will not approach a limit on how much they can receive in retransmission consent fees for many years.¹⁵ Leslie Moonves, CEO of CBS Corp., has set a target of \$2 billion in annual revenue from retransmission consent fees by 2020, up from \$500 million in 2013—which implies an average annual increase of 21%¹⁶. Regional sports network fees are also expected to rise rapidly as well.

⁹ Brian Fung, "Here's the Single Biggest Thing Holding Google Fiber Back," *The Washington Post*, October 6, 2014 (www.washingtonpost.com/blogs/the-switch/wp/2014/10/06/video-is-holding-google-fiber-back/)

¹⁰ Robin Flynn, "The Larger Picture of Multichannel Video Revenues, Costs," *SNL Kagan*, <https://www.snl.com/InteractiveX/article.aspx?id=27923399> (April 28, 2014)

¹¹ All annual growth rates in the paper are compound annual growth rates

¹² Robin Flynn, "The Larger Picture of Multichannel Video Revenues, Costs," *SNL Kagan*, <https://www.snl.com/InteractiveX/article.aspx?id=27923399> (April 28, 2014)

¹³ This does not include retransmission consent fees or regional sports network fees (aggregated information given by the National Cable Television Cooperative in February 2015)

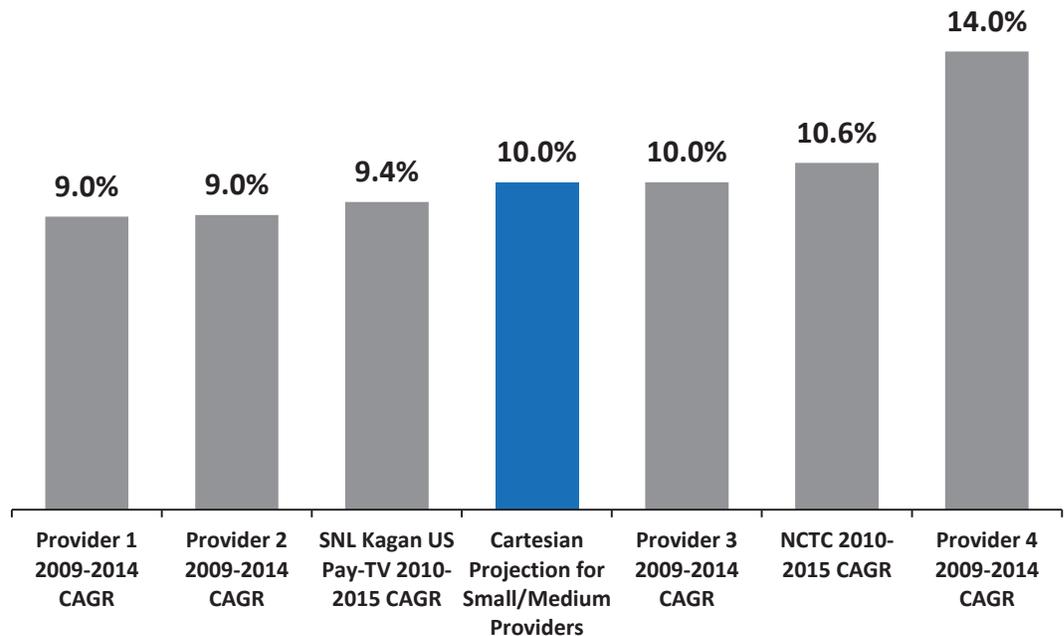
¹⁴ These increases include retransmission consent fees and regional sports network fees. Interviews conducted with ACA members in January 2015

¹⁵ Harry A. Jessell, "Nathanson: No Limit In Sight for Retrans \$," TVNewsCheck, <http://www.tvnewscheck.com/article/83547/nathanson-no-limit-in-sight-for-retrans-> (March 9, 2015)

¹⁶ Keach Hagey, "CBS Plays Hardball as Affiliate Fees Pile Up," *The Wall Street Journal*, August 20, 2014 (<http://www.wsj.com/articles/cbs-plays-hardball-as-affiliate-fees-pile-up-1408578087>)

Figure 1: Historical Programming Growth Rate Benchmarks, and Cartesian Projection

Note: We collected publicly available data and interviewed smaller-scale MVPDs (less than 3 million subscribers) to estimate the growth in programming fees in recent years; the providers have been numbered to protect their anonymity.



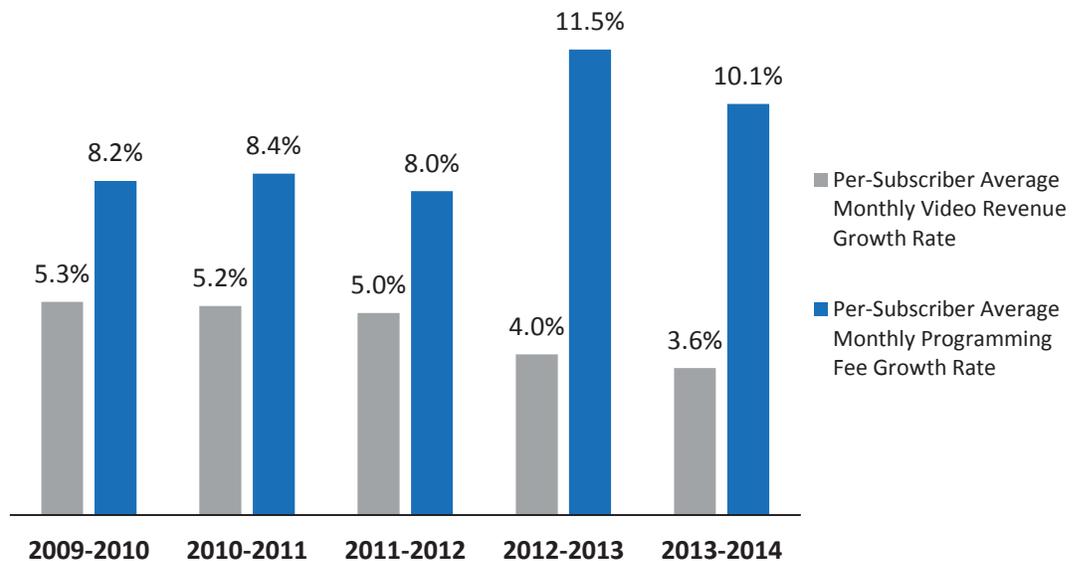
Sources: SNL Kagan, Interviews with ACA members, National Cable Television Cooperative

Programming fees have been rising more rapidly than video revenues, putting pressure on MVPDs’ margins

As programming fees have continued to rise, multichannel video revenues have not kept up. According to analysis by SNL Kagan, U.S. multichannel video per subscriber programming costs grew at an annual rate of 9.4% between 2010 and 2015 while multichannel video average revenue per subscriber only grew at an annual growth rate of 4.1% during the same period.¹⁷

¹⁷ Robin Flynn, “The Larger Picture of Multichannel Video Revenues, Costs,” *SNL Kagan*, <https://www.snk.com/InteractiveX/article.aspx?id=27923399> (April 28, 2014)

Figure 2: US Multichannel Video Per-Subscriber Monthly Revenue and Programming Fee Growth Rate (2009-2014)



Source: SNL Kagan

Looking forward, we expect MVPDs' ability to pass programming fee cost increases along to customers to be constrained. Price hikes put MVPDs at risk of losing subscribers to direct competition and online video services like Netflix and Amazon Prime. The most price-sensitive multichannel video subscribers will disconnect their service in pursuit of lower-price options such as satellite TV. Between 2009 and 2014, multichannel video penetration in the U.S. decreased from 88.6% to 86.0%¹⁸. This gradual decline in multichannel video penetration over the past few years suggests the danger for MVPDs of continually trying to pass along programming fee increases onto customers. If MVPDs are not able to pass on the programming fee increases to customers, their margins will continue to be squeezed, reducing free cash flow. This is especially the case for smaller scale MVPDs, who typically pass along 60%¹⁹ of their video revenues to programmers for programming fees. They therefore must increase their video revenue by 60% of the rate of increase of their programming costs, or their video margins will decline.

If we assume that the current market trends for programming costs and multichannel video revenues continue, video margins for smaller-scale MVPDs will become negative by 2020. For our analysis, we assumed that 60% of multichannel video average revenue per user ("ARPU") is spent on programming fees in 2015. We project that programming fees continue to grow at a rate of 10%²⁰ per year and that average multichannel video revenue per user grows 3.5%²¹ per year.

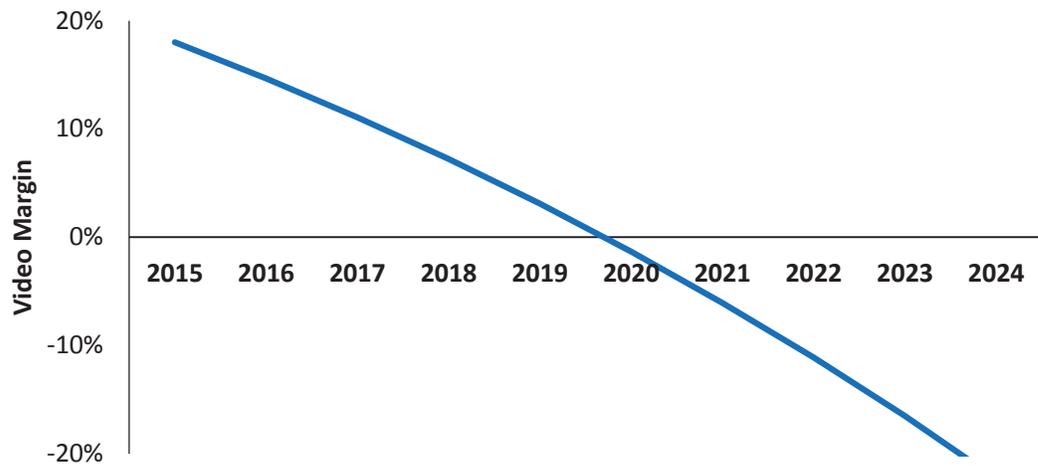
¹⁸ Global Multichannel Comparison Table, SNL Kagan

¹⁹ Refer to *Table 2: Initial Value Assumptions* on page 23

²⁰ Refer to *Figure 1: Historical Programming Growth Rate* on page 6

²¹ Refer to *Table 2: Initial Value Assumptions* on page 23

Figure 3: Projected Multichannel video Margin for Smaller-Scale MVPDs (2015-2024)



Note: We've assumed that non-programming multichannel video costs are 22%²² of multichannel video average revenue per user and increase at 1.5% a year – roughly equivalent to inflation.

²² SNL Kagan estimates that multichannel video is an 18% margin product (Tony Lenoir, "Q2 Steady, but Red Flags in Future Outlook for Video Margins," *SNL Kagan*, www.snl.com/interactivex/article.aspx?id=28833656&KPLT=6 (August 8, 2014). Our research shows (see *Figure 10*) that programming fees are 60% of multichannel video average revenue per user, which means that non-programming multichannel video costs are 22% of multichannel video average revenue per user.

METHODOLOGY

This whitepaper explores the relationship between rising programming fees and broadband deployment for smaller-scale MVPDs

To quantify the impact of rising programming costs on broadband investment, we have built an investment profitability model that aligns with the way that MVPDs measure the attractiveness of broadband investments. Our hypothesis is that as programming fees continue to climb, absolute margins from the triple play bundle will decline, making the business case for new broadband deployment less tenable.

Introduction of use cases

All broadband deployments are not created equal. Competition, geography and provider size affect providers' decisions to deploy broadband. For example, the decision by Google Fiber to deploy broadband in a suburban area with two entrenched MVPDs offering a triple play is very different from a rural provider's decision to deploy broadband in an area with no triple-play competition. To capture this variability, we have identified four use cases based on situations in which broadband deployment is most likely. These use cases are modeled on common situations faced by smaller-scale MVPDs.

The **Rural Expansion** addresses deployment in rural areas without any existing competition. Rural expansion deployments are typically undertaken by small, rural providers, and usually utilize fiber-to-the-home technology.

The **New Fiber Overbuild** use case addresses broadband deployment in densely populated urban areas with multiple triple play competitors. The high density of the areas leads to lower deployment costs, but the overbuilder typically has two triple play competitors, one cable provider and one telephone company offering multichannel video, phone and broadband via digital subscriber line or fiber-to-the-home. In the **Telco Fiber Overbuild** use case, an incumbent telephone company is planning to upgrade its facilities in urban/suburban areas to offer triple play services via fiber-to-the-home. These areas are typically already served by an incumbent cable provider.

Incumbent MVPDs typically focus their new deployments on new developments. In the **Suburban Incumbent Expansion** use case, an existing MVPD is investigating the economics of building out cable in non-serviced urban/suburban areas within its existing service area. In this use case no competition exists at the start of the build, but we assume a telephone company will launch triple play service around the same time the incumbent does.

The investment profitability model considers key factors and cost inputs that influence MVPDs' decision-making

We use net present value (NPV) as the metric for measuring the profitability of investments, which can be summarized as the sum of discounted free cash flows. Net present value is widely used by businesses and government entities for evaluating investment opportunities²³. It's a way of calculating return on investment that accounts for key aspects of investment opportunities such as financing costs,

²³ Amy Gallo, "A Refresher on Net Present Value," *Harvard Business Review*, November 19, 2014 (<https://hbr.org/2014/11/a-refresher-on-net-present-value>)

opportunity cost, and inflation as well as the long time horizon of most opportunities. Our model also accounts for the terminal value of the business, that is, the value of the business after the modeled time horizon.

In our model, we have used 10 years as the time horizon for the investments, which is typical for MVPDs considering new broadband investment. We calculate NPV by build-out year to see how profitability changes if MVPDs were to wait to deploy broadband.

For the terminal value after the 10-year time horizon, we have used the book value of the business, rather than the commercial value of the business. Book value is effectively the liquidation value of the business's assets at the end of the investment period, while commercial value is based on the future earning potential of the business at the end of the investment period. Book value is calculated by taking the original investment and subtracting depreciation, while commercial value is typically calculated as a multiple of the perpetual earning potential of the business. Use of book value aligns with the FCC's approach to modeling the terminal value of the assets that will be subsidized by the Connect America Fund Phase II.²⁴ The FCC uses book value because of the uncertainty around the future earning potential of broadband assets.

When making investment decisions, MVPDs consider two key cost metrics: "cost to pass" and "cost to drop." Cost to pass refers to the cost to deploy broadband to a given area, divided by the number of homes. "Cost to drop" refers to the cost incurred when a household subscribes to the company's service, which can require new wiring and equipment²⁵. While there are numerous factors that affect the cost to deploy new broadband, low housing density has the highest correlation with increased deployment cost. In rural areas with low housing density, there is much greater distance between homes, increasing labor costs of stringing wires or digging trenches for new wires. The cost to build out broadband to a single home is therefore much higher in rural areas than in urban areas. The cost to drop is dependent on the technology used in the deployment: fiber-to-the-home has a higher cost to drop than cable.

The size of the MVPD limits the negotiation leverage that the provider has with content owners and broadcasters and thus affects the per subscriber programming fee for the provider. Given the focus of this paper on smaller-scale MVPDs, all four use cases assume that the provider has less than three million subscribers²⁶ and purchases programming via the National Cable Television Cooperative, which allows its members to receive the same price for multichannel video network programming due to the scale of the buying group.²⁷

To ensure that the most accurate data is used for each use case, we gathered data from public companies and research reports from widely used industry sources such as SNL Kagan and J.P. Morgan. Data was also collected from members of the American Cable Association and the National Cable Television Cooperative to better understand how triple play economics differ for smaller-scale MVPDs. The data were aggregated to best represent economics faced by each provider profile found in the use cases. The following assumptions are constant across all use cases and are based on historical industry trends:

- Overall market penetration for multichannel video, broadband, and phone²⁸

²⁴ See Connect America Fund, et al., Report and Order, DA 13-807 (rel. April 22, 2013), para. 18, 34, 36.

²⁵ Includes labor and equipment costs such as optical network terminals

²⁶ There are over 10 million households in the US served by MVPDs with less than 1 million subscribers ("Top Cable MSOs, SNL Kagan, <https://www.snl.com/interactivex/TopCableMSOs.aspx>)

²⁷ All MVPDs participating in deals negotiated by the NCTC are generally charged the same programming rates (information given by the National Cable Television Cooperative during an interview with the authors in January 2015)

²⁸ Refer to *Table 2: Initial Value Assumptions* on page 23

- ARPU for multichannel video, broadband, and phone²⁹
- Overall market penetration annual growth rate for multichannel video, broadband, and phone³⁰
- ARPU annual growth rate for multichannel video, broadband, and phone³¹
- Broadband costs³²
- Phone costs³³
- Cost of set top box³⁴

Additionally, we assumed that all new broadband deployments are capable of delivering download speed of at least 25 Mbps.

We use 60% as the assumption for programming fees as a percent of multichannel video ARPU. For providers with fewer than 3 million subscribers, the percentage ranged between 54.1% and 69.3%³⁵. We project that programming fees will grow 10% a year³⁶. We assume that the cost to pass in rural areas is \$2,500³⁷ for the Rural Expansion use case based on interviews with smaller-scale MVPDs that operate in rural areas. Based on our research, we make the assumption that the cost to pass is \$650³⁸ in urban/suburban areas. Refer to the Appendix, pages 19-30, to see details on all assumptions and their sourcing.

The use cases differ in their assumed market shares, cost to pass and cost to drop. The Rural Expansion use case involves expanding in areas with no existing triple-play competition, which would lead to higher market shares and quicker gain of market shares. At the same time, the rural nature of the markets significantly increases the cost to pass per home due to the lower housing density³⁹. For the New Fiber Overbuild use case, the presence of two triple play competitors in expansion markets constrains steady-state market shares and the ability to gain market shares quickly⁴⁰. Compared to New Fiber Overbuild, the Telco fiber overbuilder has only one triple play competitor, so it's able to gain higher market shares⁴¹. We assume that the Suburban Incumbent Expansion MVPD will build using cable instead of fiber-to-the-home, leading to a lower cost to drop⁴².

²⁹ Refer to [Table 2: Initial Value Assumptions](#) on page 23

³⁰ Refer to [Table 4: Growth Rate Assumptions by Scenario](#) on page 28

³¹ Refer to [Table 4: Growth Rate Assumptions by Scenario](#) on page 28

³² Refer to [Table 2: Initial Value Assumptions](#) on page 23

³³ Refer to [Table 2: Initial Value Assumptions](#) on page 23

³⁴ Refer to [Table 2: Initial Value Assumptions](#) on page 23

³⁵ Refer to [Figure 10: Programming Fee as Percent of Multichannel Video ARPU](#) on page 24

³⁶ Refer to [Figure 1: Historical Programming Growth Rate](#) on page 6

³⁷ Refer to [Figure 12: Cost to Pass per Home \(Rural Areas\)](#) on page 25

³⁸ Refer to [Figure 11: Cost to Pass per Home \(Urban/Suburban Areas\)](#) on page 24

³⁹ Refer to [Table 3: Competition-Dependent Variable Assumptions](#) on page 27

⁴⁰ Refer to [Table 3: Competition-Dependent Variable Assumptions](#) on page 27

⁴¹ Refer to [Table 3: Competition-Dependent Variable Assumptions](#) on page 27

⁴² Refer to [Table 2: Initial Value Assumptions](#) on page 23

ANALYSIS

If current market trends continue, the profitability of broadband investments for smaller-scale MVPDs will continue to decline

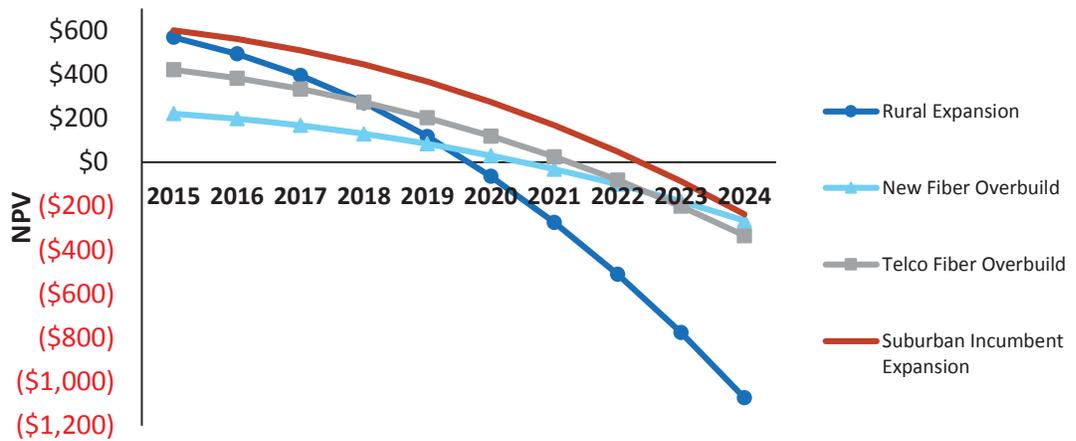
Under the current market trajectory, programming fees will continue to see rapid growth as retransmission and other programming fees grow and MVPDs are constrained by consumer demand for multichannel video products. Customers' price sensitivity and the presence of competition from satellite providers, other MVPDs and online video services, will prevent MVPDs from passing on all of the programming fee increases to consumers. On current trends, total market broadband penetration will continue to grow slowly but multichannel video will remain a key product for broadband MVPDs. Total market multichannel video adoption is gradually declining but at a slow pace. The decline in the importance of multichannel video products and the slow increase of the higher-margin broadband product would not be enough to offset the impact of higher programming costs. In this scenario, between 2015 and 2025, EBITDA (earnings before interest, taxes, depreciation and amortization) margin for all use cases decreases by nearly half.

Table 1: Projected EBITDA Margin under Current Market Trajectory (2015-2025)

Use Case	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Rural Expansion	43%	42%	41%	40%	39%	38%	36%	33%	31%	28%	24%
New Fiber Overbuild	44%	43%	42%	41%	40%	39%	37%	35%	32%	29%	26%
Telco Fiber Overbuild & Suburban Incumbent Expansion	42%	41%	40%	39%	38%	36%	35%	32%	29%	26%	23%

While providers would still be expected to have positive EBITDA margins by 2025, telecommunications is a capital-intensive business. When capital expenditures are taken into account, the picture looks dramatically different.

Figure 4: NPV-Per Home Passed by Build-Out Year under Current Market Trajectory



Note: The chart shows the profitability for each provider type if they were to start their build-out in different years. For example, the Rural Expansion provider has a NPV of \$570 if it began building in 2015 but if the build-out were to be delayed until 2020, the NPV will have become negative, at -\$64.

Based on the current market trajectory, the business case for broadband deployment for all use cases would be expected to decline and eventually become unprofitable in the coming decade. The Rural Expansion use case appears to be the most vulnerable due to the high cost of building out new broadband. The Suburban Incumbent Expansion has the most positive outlook of all use cases under current market trajectory. Because the provider is building out in its own markets, the lack of competition during the initial expansion phase and the lower cost to drop for cable makes the situation more positive than the other use cases. Both overbuilder situations face similarly challenging economics.

The triple play bundle has several potential evolutionary scenarios for the future

With the rise of online video services, the slow decline in multichannel video penetration and rising programming fees, the multichannel video market is in a state of flux. The current market trajectory will likely not continue indefinitely. As MVPDs continue to grapple with rising programming fees and changing consumer preferences, the triple play market may evolve away from the current model. In anticipation of the possible changes, we explored three alternative evolution paths for the triple play market to see how broadband deployment would be affected in each scenario.

Since 2010, the number of households without a multichannel video subscription in the United States rose from 5.1 million (then 4.5% of households) to 7.6 million, 6.5% of households.⁴³ An Experian study revealed that adults under the age of 35 are almost twice as likely to be without a multichannel video subscription. As this generation ages and forms its own households, multichannel video service will likely become less pervasive. Rising programming fees have the potential to accelerate this shift. Cable One CEO Tom Might told SNL Kagan that “coping simultaneously with spiraling content costs and

⁴³ John Fetto, “Rise in Cord Cutting Creates Opportunities for Marketers,” *Experian*, www.experian.com/blogs/marketing-forward/2014/05/06/rise-in-cord-cutting-creates-opportunities-for-marketers/ (May 6, 2014)

escalating technologic disruption is something even a company the size of TWC could not manage. Is it any wonder that small cable companies...are starting to rethink their [multichannel video] models?"⁴⁴

In anticipation of potential shifts in the multichannel video market, we consider three potential evolution scenarios for the multichannel video market as consumer preference changes. The scenarios range from incremental change from the current market state to more dramatic shifts. In all cases, the base year, 2014, is based on current market conditions, but the market changes differently in the years that follow depending on the scenario. We have assessed the NPV of broadband deployment under each potential scenario.

Slimmer Video Bundle

As more content is available via online video services, consumers are likely to shift allocation within their entertainment budget. Where the budget was once used exclusively for multichannel video, it is now split between traditional linear TV and online video services. In response, some MVPDs have begun moving toward slimmer multichannel video products in order to retain and acquire newly price-sensitive customers. Comcast recently launched two slimmer double-play packages, both including Internet, HBO and Streampix, and 10 linear TV channels, with prices starting at \$45/month for 50 Mbps download speed. Verizon FiOS launched a similar package that includes Internet, local TV stations, HBO or Showtime, and a free year of Netflix for \$60/month with 50 Mbps download speed.

MVPDs have begun pushing back on rapidly increasing programming fees, especially from programmers with less popular programming. In April 2014, Cable One dropped all of Viacom's 24 channels, including Nickelodeon, after protracted negotiations. Viacom asked for a rate increase greater than 100% and Cable One had asked Viacom to reduce its rates or allow Cable One to drop some of the less popular networks to reduce its total cost. Soon after Cable One dropped Viacom, Suddenlink followed suit.⁴⁵

During an interview with SNL Kagan at the 2015 Consumer Electronics Show, Time Warner Cable Executive Vice President Joan Gillman explained her take on the future of multichannel video services. "Human beings aren't going to change on one very fundamental principle, and that is they want to be able to control expense. They do not have unlimited income. They have a fixed budget to make tradeoffs between products and services"⁴⁶. She also said, "[I]f you think about the packaging of the future, it's really going to be the best package that combines different entertainment experiences at the right price. It's going to come."

This Slimmer Video Bundle scenario assumes providers offer more slimmed down multichannel video packages. Although MVPDs are constrained by contracts with content owners from offering only a subset of a content owner's programming, they can drop entire packages of programming from content owners, as CableOne and Suddenlink have done with Viacom. Multichannel video ARPU stays flat as subscribers pay for fewer channels. The growth of per subscriber programming fees slows as the average multichannel video subscriber subscribes to fewer channels.

⁴⁴ Sarah Barry James, "Cable Operator Tries to Live Without Viacom," *SNL Kagan*, www.snl.com/interactivex/article.aspx?id=27630159&KPLT=6 (April 3, 2014)

⁴⁵ David Lieberman, "Suddenlink to Drop Viacom Channels in Dispute Over Contract Terms," *Deadline*, www.deadline.com/2014/09/suddenlink-drop-viacom-843850/ (September 30, 2014)

⁴⁶ Joseph Williams, "Time Warner Cable Exec Discusses the Future of Data, Pay TV and Wearables," *SNL Kagan*, www.snl.com/interactivex/article.aspx?id=30514112&KPLT=6 (January 8, 2015)

Broadband-Centric

As consumer viewing shifts more toward online video and away from traditional linear TV, and as more programming become available online, more households may be willing to rely solely on broadband for their content needs. Between 2008 and 2014, the number of Netflix subscribers more than tripled from 9.4 million⁴⁷ US subscribers to 36 million⁴⁸. Providers are likely to respond to this change in consumer preferences by encouraging more online viewing of content, which the providers may be able to monetize by offering customers higher speed tiers. Wave Broadband's CEO Steve Weed said at the Independent Cable Show that the company will continue selling multichannel video packages but that it will focus on "what [Wave] can do to help customers get online, go get content directly from the content owner and pay that content owner directly."⁴⁹

Online video will likely grow in popularity as content that was previously only available via linear video becomes available online. Dish Network's Internet TV service, called Sling TV, launched in January 2015 and is available to all with an Internet connection, regardless of whether they are subscribers to a multichannel video package. The most basic package, called The Best of Live TV, costs \$20/month and includes 12 channels such as ESPN, ESPN2, TNT, and TBS. In October 2014, CBS launched its own online video service offering its signal over the Internet for \$6/month.⁵⁰ Verizon is also working on an Internet TV service.

In the Broadband-Centric scenario, broadband becomes the central product for consumers in the triple play bundle in place of multichannel video, but multichannel video is not entirely displaced. Instead of the larger multichannel video packages offered today, providers will offer more flexible multichannel video packages to keep up with consumer demand for slimmer video packages. More flexible multichannel video packages offered over the Internet leads to flat multichannel video ARPU and slower growth of programming fees. Focus on broadband would accelerate uptake in broadband penetration and a sharper decline in multichannel video penetration. We assume that broadband ARPU will rise moderately more quickly than it has in recent past due to two contributing factors: (1) customers will demand higher speeds to keep up with their streaming needs and (2) MVPDs have more scope to raise broadband prices because demand for broadband becomes more inelastic. Our assumption for broadband ARPU growth is still moderate as the lack of differentiation between broadband offerings by different MVPDs makes it challenging for providers to push through large price increases to the customers without losing subscribers.

"Cablization" of the Internet

The change in the market from a multichannel video-centric triple play bundle to a broadband-centric triple play bundle inevitably affects content owners' revenue and profits. Content owners may try to recapture revenue by transposing their current business model to the Internet, i.e. charge carriage fees to providers per broadband subscriber instead of per multichannel video subscriber and require ubiquitous or near ubiquitous subscription. This last scenario stems from the original revenue generating strategy for ESPN3. Regardless of whether its subscribers watched ESPN3, MVPDs were

⁴⁷ "Netflix, Inc. Q4 2008 Earnings Call Transcript," <http://seekingalpha.com/article/116612-netflix-inc-q4-2008-earnings-call-transcript> (January 27, 2009)

⁴⁸ James O'Toole, "Netflix Passes 50 Million Subscribers," *CNN Money*, <http://money.cnn.com/2014/07/21/technology/netflix-subscribers/> (July 22, 2014)

⁴⁹ Tony Lenoir, "Q2 Steady, but Red Flags in Future Outlook for Video Margins," *SNL Kagan*, www.snl.com/interactivex/article.aspx?id=28833656&KPLT=6 (August 8, 2014)

⁵⁰ Mike Farrell, "CBS Unveils OTT Subscription Service," *Multichannel*, <http://www.multichannel.com/news/technology/cbs-unveils-ott-subscription-service/384799> (October 16, 2014)

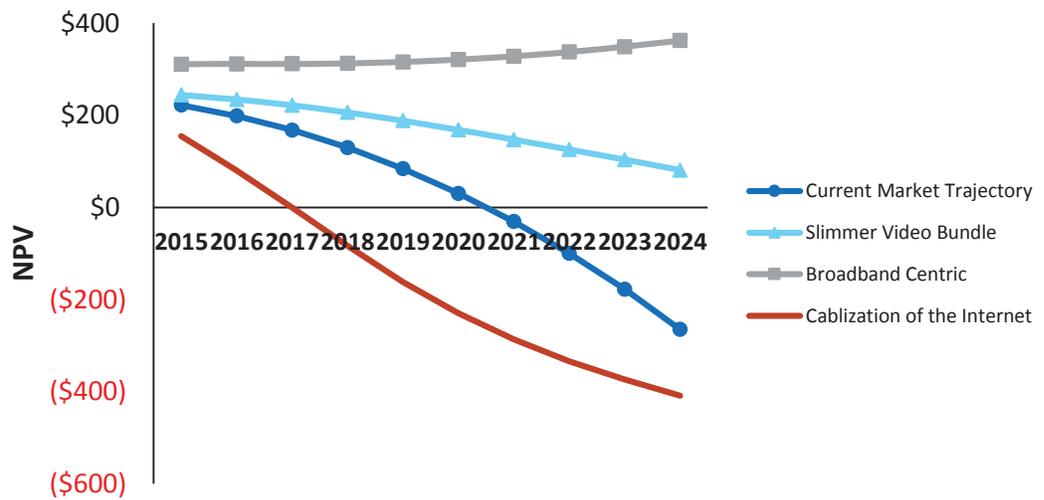
required to pay a per broadband subscriber fee to Disney in order to give its subscribers even the option of accessing ESPN3.⁵¹

The underlying assumptions for this scenario are identical to the Broadband-Centric scenario, with the one difference being that programming fees gradually switch from being charged on a per-multichannel video subscriber basis to a per-broadband subscriber basis.

A broadband-centric future is the only scenario conducive to expanded broadband deployment

Shown below is the NPV of broadband deployment for the New Fiber Overbuild provider under each of the four scenarios: Current Market Trajectory, Slimmer Video Bundle, Broadband Centric and “Cablization” of the Internet.⁵² The charts for the other use cases (Rural Expansion, Telco Fiber Overbuild and Suburban Incumbent Expansion) are included in the Appendix on pages 16 and 17.

Figure 5: NPV-Per Home Passed by Build-Out Year for New Fiber Overbuild



Note: The chart shows the profitability for a New Fiber Overbuild for each scenario if the provider were to start its build-out in different years. For example, under Current Market Trajectory, the New Fiber Overbuilder has a NPV of \$222 if it began building in 2015 but if it were to wait until 2020 to begin building, the NPV will have decreased to \$30.

Under the **Current Market Trajectory**, broadband deployment NPV becomes negative by build-out year 2020 for the new fiber overbuilder. As multichannel video products have a smaller role in the triple play bundle in the **Slimmer Video Bundle** scenario, the NPV decline is moderated as providers’ margins are less constrained by programming fees. Even so, the business case for deploying broadband goes away in 10 years. In the **Broadband-Centric** scenario, broadband takes center stage in the triple play bundle. The

⁵¹ Ryan Singel, “Cable ISPs See Net Neutrality Foul in ESPN Online-Video Charges,” *wired.com*, <http://www.wired.com/2009/06/cable-isps-see-net-neutrality-foul-in-espn-online-video-charges/> (June 12, 2009)

⁵² See *Figure 6* on page 19 for Rural Expansion, *Figure 8* on page 20 for Telco Fiber Overbuild, and *Figure 9* on page 20 for Suburban Incumbent Expansion.

high margin broadband product more than makes up for the loss of profits from multichannel video, Under this scenario, broadband deployment becomes more lucrative the later the build-out year. If content owners respond to the decline of the multichannel video market by charging MVPDs by broadband subscriber (as in **“Cablization” of the Internet** scenario), the business case for broadband employment becomes negative as soon as build-out year 2016. In other words, unless new fiber overbuilders begin their build-out in the next four years, deploying new broadband may not be a sound investment. The story is similar for the other use cases: Rural Expansion, Telco Fiber Overbuild and Suburban Incumbent Expansion (Appendix, pages 19 and 20).

CONCLUSION

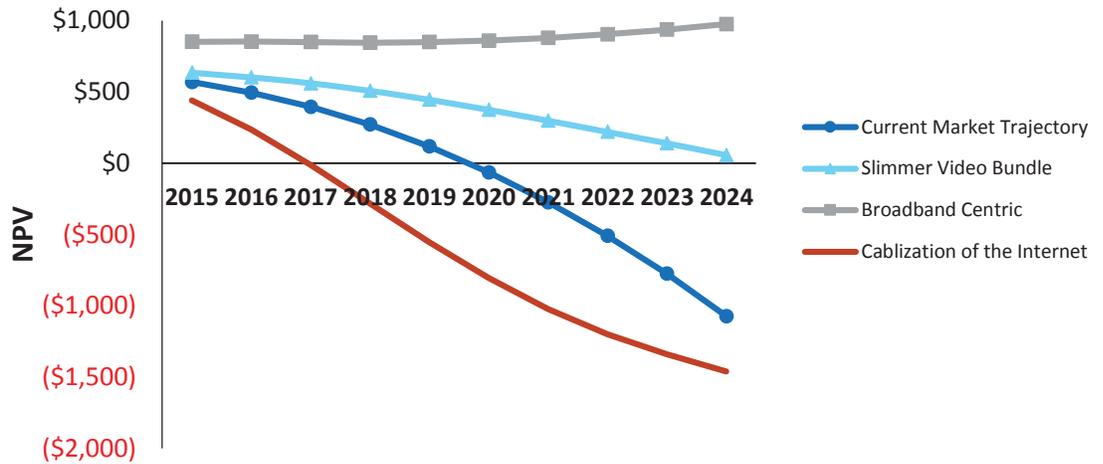
Given the continued market power of programmers and broadcasters over MVPDs, programming fee growth is unlikely to abate in the near future. At the same time, continuing consumer demand for traditional multichannel video limits MVPDs' ability to shift their business model, while competition limits their ability to raise prices. Although consumer preferences have been shifting in recent years, change has been slow, as more than 85% of households still subscribe to multichannel video. Rising programming fees will continue to squeeze margins, reducing free cash flow available for investment. If current trends persist, the business case for new broadband deployment will deteriorate in the coming years.

The case for new broadband deployment could improve if consumer preference shifts significantly. But no one is certain when, or if, the paradigm will shift. Providers are trying to offer slimmer multichannel video packages, but their success is uncertain. No triple-play provider has yet dropped multichannel video entirely. Even if providers believe the market will evolve to a different state than it is today, they will likely take a wait-and-see attitude toward new investments so as to feel more certain about changes in consumer preference. In the meantime, multichannel video economics are deteriorating and may limit new broadband deployment by smaller-scale MVPDs.

APPENDIX

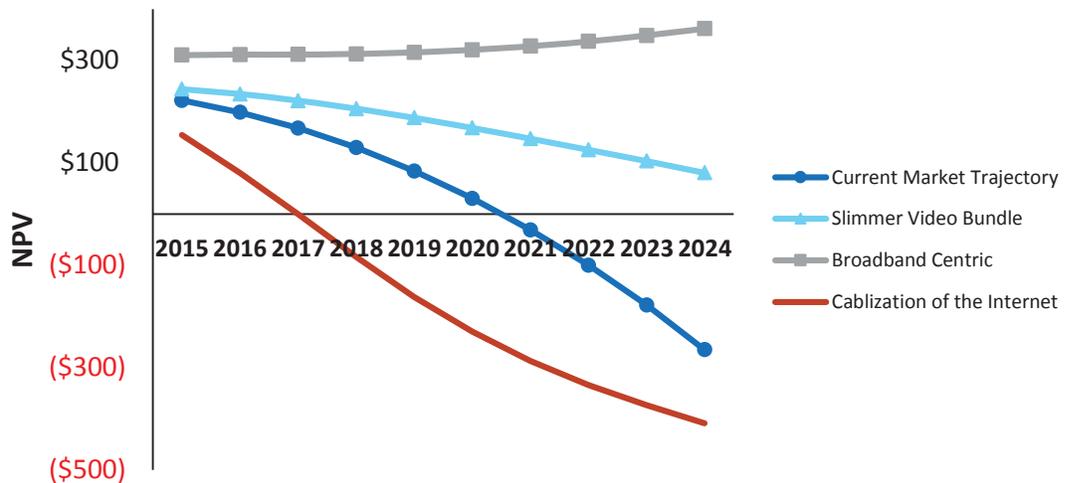
Scenario Results

Figure 6: NPV-Per Home Passed by Build-Out Year for Rural Expansion



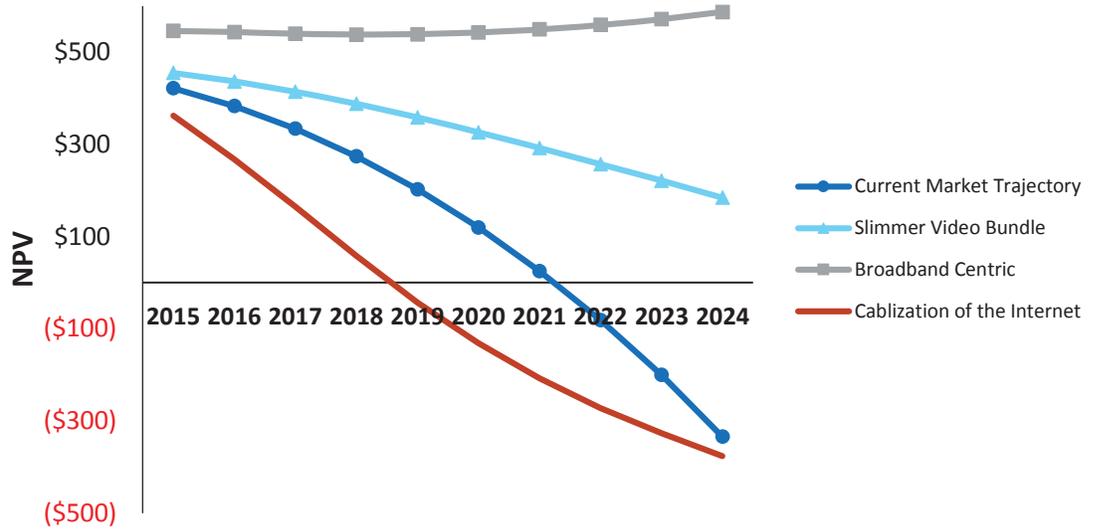
Note: The chart shows the profitability for each provider type if each were to start its build-out in different years. For example, under Current Market Trajectory, the Rural Expansion provider has a NPV of \$570 if it began building in 2015 but if it were to wait until 2020 to begin building, the NPV will have become negative at -\$64.

Figure 7: NPV-Per Home Passed by Build-Out Year for New Fiber Overbuild



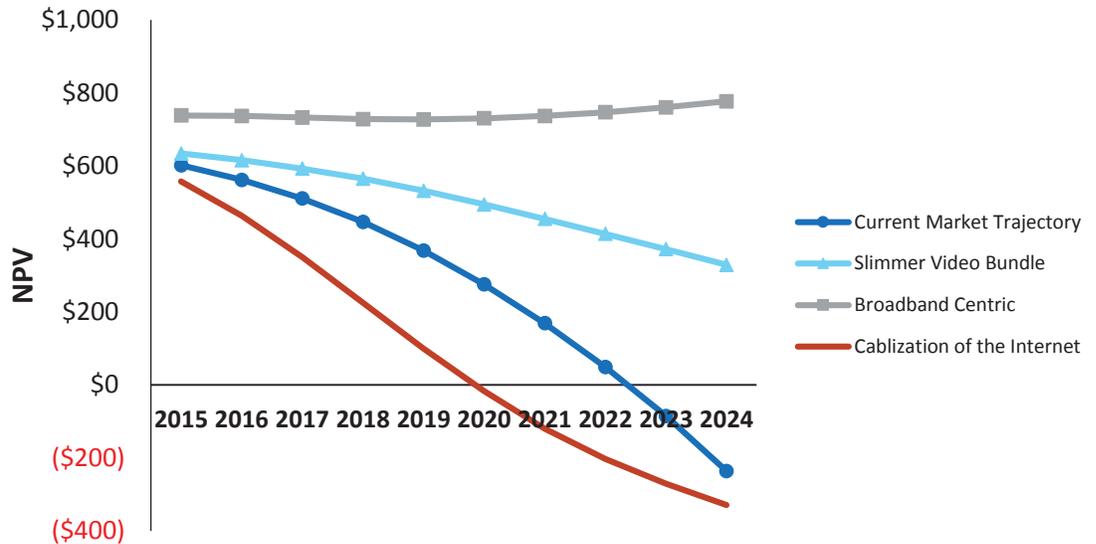
Note: The chart shows the profitability for each provider type if each were to start its build-out in different years. For example, under Current Market Trajectory, the New Fiber Overbuild provider has a NPV of \$222 if it began building in 2015 but if it were to until 2020 to begin building, the NPV will have decreased to \$30.

Figure 8: NPV-Per Home Passed by Build-Out Year for Telco Fiber Overbuild



Note: The chart shows the profitability for each provider type if each were to start its build-out in different years. For example, under Current Market Trajectory the Telco Fiber Overbuild provider has a NPV of \$455 if it began building in 2015 but if it were to until 2020 to begin building, the NPV will have decreased to \$120.

Figure 9: NPV-Per Home Passed by Build-Out Year for Suburban Incumbent Expansion



Note: The chart shows the profitability for each provider type if each were to start its build-out in different years. For example, under the Current Market Trajectory the Suburban Incumbent Expansion provider has a NPV of \$602 if it began building in 2015 but if it were to until 2020 to begin building, the NPV will have decreased to \$275.

NPV Calculation

The model uses net present value (NPV) as the measure of profitability for broadband investment based on the way MVPDs assess investment opportunities. Net present value is a financial concept used to estimate an investment's future profitability. For a MVPD considering broadband deployment, a large portion of its cost is incurred at the beginning of the investment, while its revenue comes in as a series of payments from customers over a long time horizon. Due to the time value of money, the concept that money today is worth more than money in the future, the company cannot simply compare its costs to the sum of the monthly customer payments. Instead, it discounts future cash flows and adds the discounted cash flows up to determine the present value of these cash flows. The discount rate used is the cost of capital, which accounts for financing, opportunity costs, and inflation. Once the costs and revenues have been discounted to their current value, they can be summed to find the NPV, which is the value of the investment as of today. Using NPV to capture the profitability of broadband investment takes into consideration the long time horizon of the business. We have used 10 years as the time horizon for the investments, which is typical for MVPDs considering new broadband investment.

The 10-year net present value is calculated on a per-home-passed basis by build-out year to reflect the capital-intensive nature of broadband deployment. We have opted not to calculate NPV at the company level to avoid making assumptions about the mix of new build vs. existing footprint. MVPDs' investments are largely fixed while their revenues are variable with a large portion of the cost driven by the initial capital expenditure. Thus, they look at NPV per home passed rather than per subscriber because the cost of build-out per home passed is a certain sunk cost, while the cost per subscriber is subject to variability.

Lastly, we calculate NPV by build-out year to see how profitability changes if MVPDs were to wait to deploy broadband. We observe some broadband expansion in the market today, as there is still a business case for broadband deployment. If the economics for multichannel video products worsen under the current market trajectory, the business case for broadband build-out would worsen as well. To understand the magnitude of the effect that rising programming fees have on broadband deployment, we calculate the net present value of investments for build-out year 2015 to 2024. For example, if multichannel video economics deteriorate over time, a provider may have a strong business case for deployment in 2015 but a worse one in 2020.

The NPV calculation uses the following variables:

Total market penetrations

- Total multichannel video market penetration: of homes passed, the percentage with a multichannel video subscription from a cable, telco, or satellite company
- Total broadband market penetration: of homes passed, the percentage with a primary broadband subscription from a cable, telco, or wireless company
- Total phone market penetration: of homes passed, the percentage with a phone subscription from a cable or telco

Revenue

- Multichannel video average revenue per user: average monthly revenue per subscriber for multichannel video services
- Broadband average revenue per user: average monthly revenue per subscriber for broadband services

- Phone average revenue per user: average monthly revenue per subscriber for phone services

Cost

- Per subscriber programming fee: average monthly payment made to programming providers, including multichannel video networks and local broadcast stations charging retransmission consent fees
- Per subscriber non-programming multichannel video cost: average monthly cost of supplying multichannel video products, excludes programming fee
- Per subscriber broadband cost: average monthly cost of supplying broadband products
- Per subscriber phone cost: average monthly cost of supplying phone products
- Per home cost to pass: average cost to pass per home, includes cost of labor and equipment
- Per subscriber cost to drop: average cost to drop per home, includes cost of labor and equipment
- Set top box costs: average cost of a set top box (includes costs incurred by replacing set top boxes every five years)

Other

- Years it takes for provider to reach its expected (steady state) market share in new deployment areas
- Cost of capital
- Useful life of network

Assumptions

Use Case Initial Values

Table 2: Initial Value Assumptions

	Variable	Rural Expansion	New Fiber Overbuild	Telco Fiber Overbuild	Suburban Incumbent Expansion	Sources
Total Market	Total Multichannel Video Market Penetration ⁵³	85%				SNL Kagan
	Total Broadband Market Penetration ⁵⁴	70%				Pew Research
	Total Phone Market Penetration ⁵⁵	50%				SNL Kagan
Revenue	Multichannel Video ARPU	\$80				SNL Kagan, American Cable Association members
	Broadband ARPU	\$45				SNL Kagan, American Cable Association members
	Phone ARPU	\$25				SNL Kagan, American Cable Association members
	Steady State Multichannel Video Market Share*	60%	20%	30%	30%	Adapted based on SNL Kagan, American Cable Association members
	Steady State Broadband Market Share*	85%	30%	40%	40%	Adapted based on American Cable Association members
	Steady State Phone Market Share*	100%	35%	50%	50%	Adapted based on American Cable Association members
	Years from Build-Out to Steady State Market Shares	3	5	5	3	Cartesian
Cost	2015 Programming Fee as % of Multichannel video ARPU	60% (\$48.00)				SNL Kagan, American Cable Association members
	Non-Programming Monthly Multichannel Video Cost (% of Multichannel video ARPU)	22% (\$17.60)				SNL Kagan, American Cable Association members
	Broadband Costs (% of Broadband ARPU)	10% (\$4.50)				Cartesian (assumed incremental cost)
	Phone Costs (% of Phone ARPU)	20% (\$5.00)				American Cable Association members (assumed incremental cost)
Capex, WACC, and Terminal Value	Cost to Pass	\$2,500	\$650			Cartesian, American Cable Association members
	Cost to Drop	\$350				Cartesian, American Cable Association members
	Cost of Set Top Box	\$150				Infonetics, American Cable Association members
	Cost of Capital	8.5%				Federal Communications Commission, American Cable Association
	Useful Life of Network (Terminal Value)	40 years				Cartesian

*Market shares are shown as percentages of the corresponding market penetrations

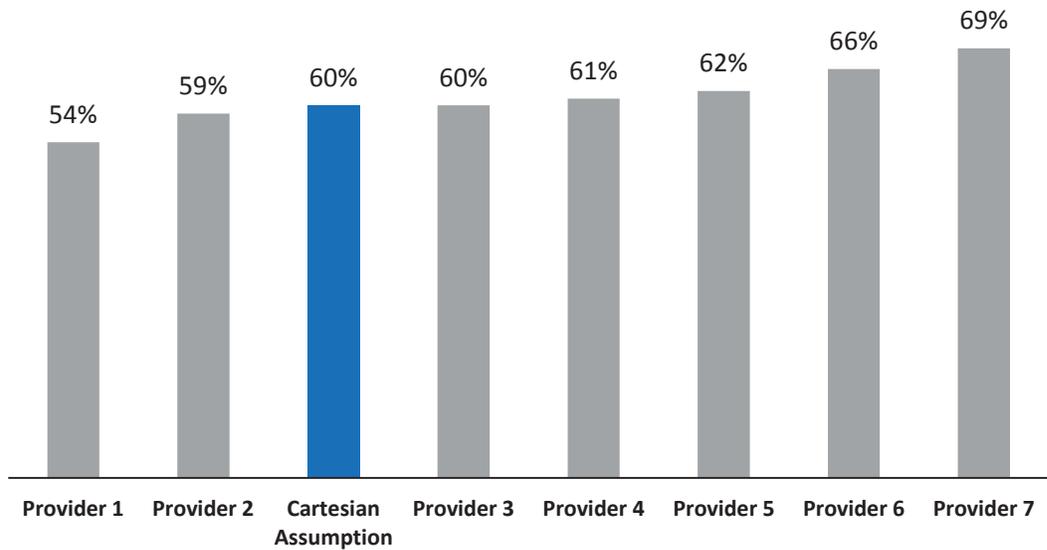
⁵³ Includes satellite

⁵⁴ Includes wireless broadband

⁵⁵ Does not include wireless phone

Programming Fee as Percentage of Multichannel Video ARPU

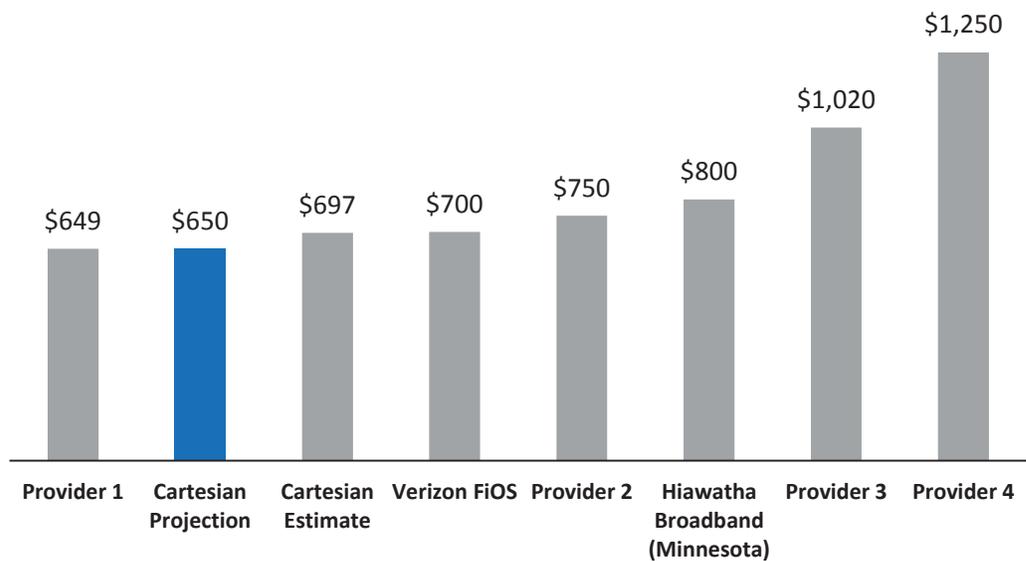
Figure 10: Programming Fee as Percent of Multichannel Video ARPU



Source: We interviewed smaller-scale MVPDs (fewer than 3 million subscribers) to estimate programming fees as a percent of multichannel video ARPU; the providers have been numbered to protect their anonymity.

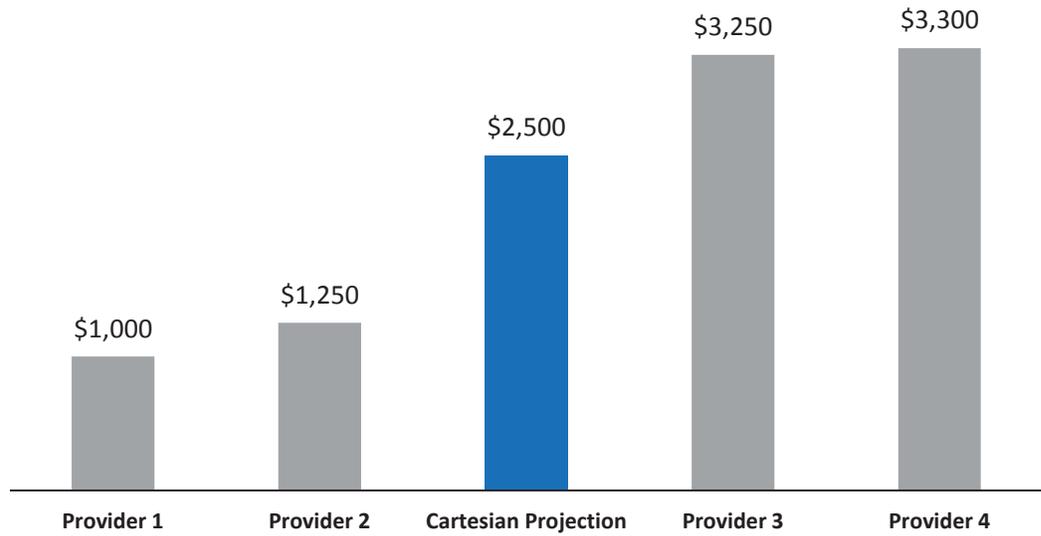
Cost to Pass

Figure 11: Cost to Pass per Home (Urban/Suburban Areas)



Source: Jaguar, SNL Kagan, interviews with smaller-scale MVPDs (fewer than 3 million subscribers)

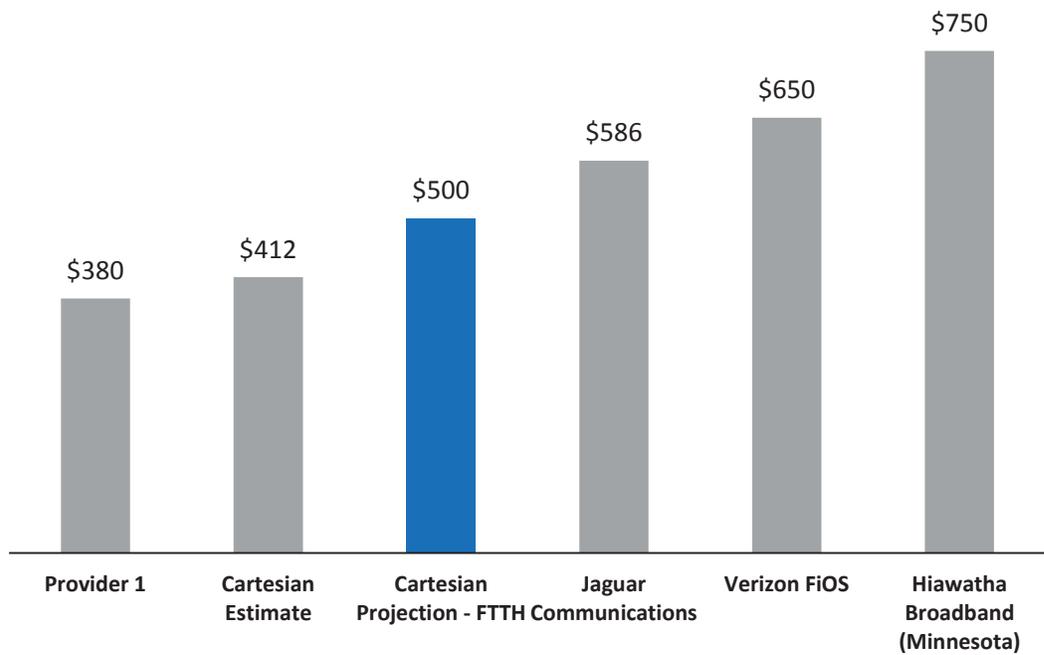
Figure 12: Cost to Pass per Home (Rural Areas)



Source: Interviews with smaller-scale MVPDs (fewer than 3 million subscribers)

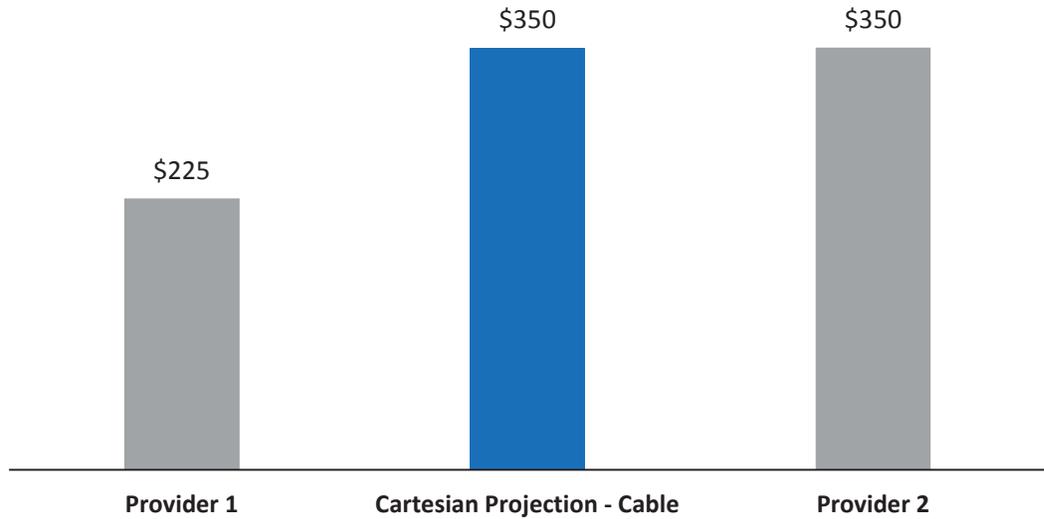
Cost to Drop

Figure 13: Cost to Drop per Home (Fiber-to-the-Home)



Source: Jaguar, SNL Kagan; interviews with smaller-scale MVPDs (fewer than 3 million subscribers)'

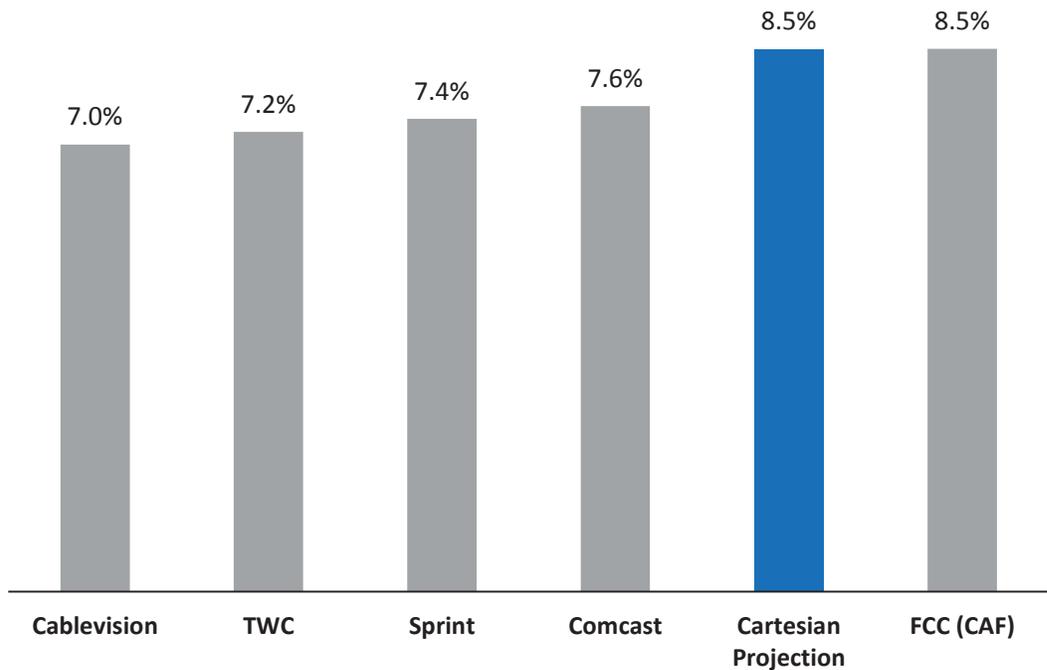
Figure 14: Cost to Drop per Home (Cable)



Sources: interviews with smaller-scale MVPDs (fewer than 3 million subscribers)

Cost of Capital

Figure 15: Cost of Capital

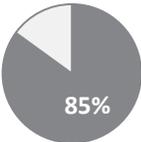
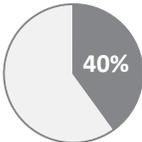
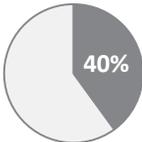
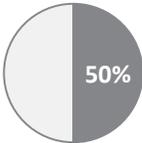
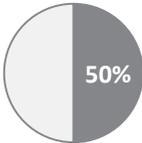


Sources: company websites; Federal Communications Commission; CAF stands for the Connect America Fund

Competition-Dependent Variables

Steady state market shares are shown in grey.

Table 3: Competition-Dependent Variable Assumptions

Use Case	Rural Expansion	New Fiber Overbuilder	Telco Fiber Overbuilder	Suburban Incumbent Expansion	Notes
Number of Triple Play Competitors	0	2	1	1	Assumption
Steady State Multichannel video Market Share					Assumes satellite takes 40% market share
Steady State Broadband Market Share					Assumes wireless broadband takes 15% market share
Steady State Phone Market Share					--
Years it takes for provider to reach its expected (steady state) market share in new deployment areas	3	5	5	3	Dependent on whether or not triple play competitor present at build-out

Growth Rates

Table 4: Growth Rate Assumptions by Scenario

	Variable	Current Market Trajectory	Slimmer Video Bundle	Broadband Centric	"Cablization" of the Internet	Sources
Total Market	Total Multichannel video Market Penetration	-0.5%		-5.0%		Adapted from SNL Kagan (US multichannel video, 2009-2014 CAGR) for Current Market Trajectory; Cartesian assumptions for others
	Total Broadband Market Penetration	4.5%		9.0%		Adapted from SNL Kagan (US broadband, 2009-2014 CAGR) for Current Market Trajectory; Cartesian assumptions for others
	Total Phone Market Penetration	-1.5%				Adapted from SNL Kagan (US phone, projected)
Revenue	Multichannel video ARPU	3.5%	0.0%			Adapted from SNL Kagan (US cable, 2009-2014 CAGR) for Current Market Trajectory; Cartesian assumptions for others
	Broadband ARPU	2.5%		3.5%	4.5%	SNL Kagan (US cable BB, 2009-2014) for Current Market Trajectory; Cartesian assumptions for others
	Phone ARPU	-4.5%				Adapted from SNL Kagan (US cable phone, 2009-2014 CAGR)
Cost	Programming Fee	10%	5.0%			Adapted from SNL Kagan for Current Market Trajectory; Cartesian assumptions for others
	Non-Programming Multichannel video Cost	1.5%				Inflation rate
	Broadband Cost	2.5%				Tracks broadband ARPU growth
	Phone Cost	-4.5%				Tracks phone ARPU decline

End State Market Penetrations

Given that the multichannel video, broadband, and phone markets are still in flux, we made assumptions around the equilibrium point for multichannel video, broadband, and phone market penetrations under the current market trajectory. We refer to these equilibrium points as end state market penetration. These end state market penetrations cap the growth of corresponding market penetrations.

Table 5: End State Market Penetration Assumptions

Variable	Current Market Trajectory	Slimmer Video Bundle	Broadband Centric	"Cablization" of the Internet	Sources
End State Multichannel video Market Penetration	75%		30%		Cartesian assumption
End State Broadband Market Penetration	90%				Cartesian assumption
End State Phone Market Penetration	10%				Cartesian assumption

Model Structure

The model calculates NPV as follows:

Figure 16: Net Present Value Calculation

Revenue	Video	$[\text{Video ARPU}] \times [\text{Video Market Share}] \times [\text{Total Video Market Penetration}]$	+	
	Broadband	$[\text{Broadband ARPU}] \times [\text{Broadband Market Share}] \times [\text{Total Broadband Market Penetration}]$		
	Phone	$[\text{Phone ARPU}] \times [\text{Phone Market Share}] \times [\text{Total Phone Market Penetration}]$		
NPV	Costs	Content Cost	$[\text{Per Sub Content Cost}] \times [\text{Video/Broadband Market Share}] \times [\text{Total Video/Broadband Market Penetration}]$	-
		Opex	$[\text{Non-Programming Video Cost}] \times [\text{Video Market Share}] \times [\text{Total Video Market Penetration}] + [\text{Broadband Cost}] \times [\text{Broadband Market Share}] \times [\text{Total Broadband Market Penetration}] + [\text{Phone Cost}] \times [\text{Phone Market Share}] \times [\text{Total Phone Market Penetration}]$	-
		Capex	$[\text{Cost to Drop}] \times \Delta([\text{Video/Broadband Market Share}] \times [\text{Total Video/Broadband Market Penetration}]) + [\text{Cost of Set Top Box}] \times \Delta([\text{Video Market Share}] \times [\text{Total Video Market Penetration}]) + [\text{Cost to Pass}] + [\text{Maintenance Capex}]$	-
	Terminal Value	$[\text{Cost to Pass}] + [\text{Cost to Drop (Depreciated)}]$	+	
	Cost of Capital	Used in the NPV calculation		

Methodological Notes

- End State Market Penetration: Given that the multichannel video, broadband, and phone markets are still in flux, we made assumptions around the equilibrium point for multichannel video, broadband, and phone market penetrations under the current market trajectory. We refer to these equilibrium points as end state market penetration. We believe that multichannel video market penetration will slowly decline from its current rate of 85% and flatten at 75%, the broadband market penetration will continue grow from its current rate of 70% and eventually reach 90%, and that the phone market penetration will continue its decline from its current rate of 50% to 10%.
- Set top box replacement cycle: We have assumed that set top boxes need to be replaced every 5 years and that the MVPDs pay for the replacement of set top boxes.
- Terminal Value: As noted previously, for the terminal value after the 10-year time horizon, we have used the book value of the business, rather than the commercial value of the business. Book value is effectively the liquidation value of the business’s assets at the end of the investment horizon. We’ve assumed that the equipment has a 40-year useful life, meaning that the equipment slowly loses value over the course of 40 years and is assumed to have no value after 40 years. The depreciation method used is linear depreciation, meaning that the equipment loses the same amount of value each year. For example, assume that a piece of equipment cost \$400 and the cost is incurred during the first year of the build-out. After one year, it will have lost $1/40=2.5\%$ of its

APPENDIX

value, so it would be worth \$390. After 10 years, at the end of our model's time horizon, the equipment would be worth \$310.