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**REPORT ON CABLE TELEVISION-RELATED NEEDS AND  
INTERESTS ASCERTAINMENT  
FOR CHARLES COUNTY, MARYLAND**

By

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## **EXECUTIVE SUMMARY**

CBG Communications, Inc. (CBG) in conjunction with its Team Partners, Dr. Constance Book, Ph.D. of Elon University and President of Telecommunications Research Corporation, Carson Hamlin, Video Engineer/Media Integrations Specialist, and the Cohen Law Group (CLG), has conducted a comprehensive cable-related Residential Needs and Interests Assessment as well as a Past Performance Review, Public, Educational and Governmental (PEG) Access Needs Assessment, Institutional Network Needs Assessment, Franchise Fee/PEG Fee/I-Net Cost Review and Cable System Technical Review concerning the Comcast Cable Television System serving Charles County, Maryland (County). This Ascertainment, Review and related research has been conducted as part of cable franchise renewal proceedings with one of the local cable television providers, Comcast.

The full results of the Residential Needs and Interests Assessment, Past Performance Review, PEG Access Needs Assessment, Institutional Network Assessment, and Cable System Technical Review are presented in the comprehensive Report that follows (the Franchise Fee/PEG Fee/I-Net Cost Review is provided in a separate document) and provide a wealth of information for the County regarding issues of significance to the residents and organizations in the Charles County Comcast franchise area, related to cable communications and, correspondingly, the ability of the cable system and Comcast to meet demonstrated needs and interests. The key findings, recommendations and observations discussed in this summary and in the comprehensive Report are based on an extensive data collection including, but not limited to, the following:

- A written Residential Community survey on cable related needs and interests randomly distributed to 4,000 households within the County. Of the 4,000 mailed surveys, a total of 583 were returned by the closing date for a total response rate of 15%. Of the 583 respondents, 43% were Comcast cable subscribers in Charles County. When added to those that indicated that they had Verizon FIOS, the total cable television subscription rate was 65%. The remaining 35% were non-cable subscribers. Overall, the information obtained provides a wealth of statistically valid data on residents' needs, interests, attitudes and opinions related to both cable television in general and Comcast specifically.
- A Past Performance Review that included a review of the requirements of the existing franchise agreement between Comcast and the County, as well as Section 226, Cable Communications, of the Charles County Code. Key Franchise Agreement and Ordinance provisions were reviewed for compliance by Comcast. Additionally, complaint, service call and other information provided by both Comcast and the County were analyzed. This review enabled CBG and its Team Partners to determine Comcast's level of compliance under its existing Franchise Agreement.
- Discussions with Charles County Government Television (CCGTV) management and staff, as well as a focused discussion with government agency representatives related to the government programming provided by CCGTV on the Comcast system.
- Discussions with, and a review of information provided by, representatives of the Charles County Public Schools (CCPS) concerning current and projected Educational Access program production and distribution over CCPS TV.

- Discussions with, and a review of information provided by, representatives of the College of Southern Maryland (CSM) concerning current and projected Higher Educational Access program production and distribution over CSM-TV.
- Discussions with CSM, community organizations and representatives from the Charles County community at large concerning Public Access program production and distribution over the cable system, facilitated by CSM, on the Charles County Local Public Access Channel (LPACC-TV).
- On-site visits to the current Government, K-12 Educational Access, CSM Higher Educational Access and CSM-facilitated public access programming production and origination locations, including CCGTV's production facilities, the County Commissioners meeting room, the Blue Room public meeting production area and the CCPS production facilities, including the Board of Education meeting room and the main production facilities at CCPS's media center. On-site visits were also made to review and tour CSM's main production facilities that are utilized for both Higher Educational Access and Public Access program production.
- A review of a significant amount of existing and historical data related to the needs and interests of a variety of diverse communities within the County, that was provided by CCGTV, CCPS TV, CSM-TV and LPACC-TV.
- A work group meeting and substantial follow-up discussions with the County's and CCPS's IT staff and the Technology and Networking personnel at CSM concerning current government and educational use of the Institutional Network (I-Net), as well as the I-Net's interconnection with other networks and Institutional Network needs for the future.
- A driveout of the Comcast cable television system, in order to review the physical plant and other cable system infrastructure, as well as a review of the headend and other Comcast facilities in Charles County.
- An in-depth review of the franchise fees and PEG fees provided by Comcast, as well as the I-Net costs incurred by Comcast, to determine the level of compliance with its requirements under both the Franchise Agreement and the Cable Communications Ordinance (the results of this review are provided in a separate report).

The analysis of this data enabled CBG and its Team Partners to focus on many elements related to a renewed cable franchise.

First, CBG and its Team Partners were able to assess the needs of the Residential Community. Specifically, we were able to review:

- The general level of satisfaction with Comcast
- Suggestions from subscribers and non-subscribers on how to improve the services provided by Comcast
- The quality of specific cable service features and characteristics
- Ratings of communication experiences with the cable company

- Technical issues, including subscriber experiences with outages, picture and sound quality and restoration of services
- Viewership, ratings and support for local community programming provided by the four (4) PEG Access channels in Charles County
- The types of local programming of interest to Charles County franchise area subscribers

Regarding the Past Performance of Comcast under its existing Franchise and Ordinance obligations, our analysis enabled CBG to review:

- Provision of performance bonds
- Provision of insurance policies
- Compliance with operational standards and customer service requirements
- Compliance with system construction and permitting requirements
- Compliance with reporting requirements
- Whether violation and penalty provisions were ever required to be invoked and imposed

Regarding PEG Access and local community programming, the research methodologies utilized enabled CBG to review:

- The amount and type of PEG programming currently provided over CCGTV, CCPS TV, CSM-TV, and LPACC-TV
- The need for potential expansions in channel capacity and content delivery capabilities
- The need for implementation of new PEG services such as cable-based On Demand video
- The need for new, upgraded and replacement equipment, including migration from standard definition (SD) to High Definition (HD) and other advanced platforms

Regarding the Institutional Network (I-Net) Review, the research methodologies utilized enabled CBG to review:

- The critical nature of the I-Net as part of the County's overall network infrastructure
- The current performance of the network based on government and educational Users' experiences
- The architecture of the existing I-Net and its critical interconnections with other networks
- Capacity expansion and other enhancements needed for the I-Net in the future
- The affordability of the I-Net compared to various alternatives

Regarding the evaluation of the cable television system from an electronic performance and physical plant perspective, this portion of the project enabled CBG to determine Comcast's compliance with existing local, state and national standards and codes, as well as its ability to meet the technical system and service requirements of Charles County's subscribers in the future.

Regarding the Franchise Fee Review, the extensive data gathered enabled CBG and its Team Partner CLG to determine whether Comcast has been paying accurate franchise fees and PEG fees to the County and to ensure that the County receives all future franchise fee and PEG fee revenues to which it is entitled. The review also allowed us to evaluate the original cost of the I-Net and the reimbursement to Comcast through the I-Net fee over time. Again, this review is provided under separate cover.

Detailed Findings, along with Conclusions and Recommendations, are incorporated in the Full Report. The Key Findings, Conclusions and Recommendations for consideration by the County are the following:

Residential Community Needs Assessment

- Thirty-six percent (36%) of cable subscribers are not satisfied with Comcast cable service, with 14% being “very dissatisfied”. Those that rated cable service more negatively indicated that the primary reason was related to high rates, without enhancing the service correspondingly. Survey respondents also indicated that their satisfaction would improve if Comcast had more reliable reception and better picture quality and if improvements were made in customer service.
- Regarding technical issues, 38% of Comcast subscribers indicated that they had experienced some type of technical difficulty with picture quality, audio or a general reception problem. Additionally, the primary reason for calling the cable company (accounting for 44% of all calls made) was related to a problem with poor reception. Further, nearly ¼ of Comcast subscribers reported that they had experienced a cable outage lasting more than 12 hours or more while they still had electricity. All of this demonstrates a need to focus on system technical quality and reliability. These issues are explained in further detail in the Cable System Technical Review Section.
- Eighty-one percent (81%) of Comcast subscribers had called the company in the past year. Nine percent 9% of subscribers indicated that they had received a busy signal when calling the company (3% is the maximum level allowable). Additionally, 59% indicated that their call had not been answered within 30 seconds, including the time left on hold (10% is allowed under the customer service standards).
- Five to ten percent (5%-10%) of subscribers reported watching each PEG access channel on a daily or weekly basis, and combined PEG channel viewership shows a weekly CUME (unduplicated weekly cumulated audience) of 12%. Although these percentages may at first appear to be low, they instead demonstrate substantial viewership. In fact, many cable channels have weekly cumulative viewership of less than 1%. Accordingly, it is important to keep in mind that the cable television business model is rooted in niche channels rather than mass appeal channels.
- Fifty-two percent (52%) of Comcast subscribers favored local access programming to be made available via the “on demand” features of the cable system.
- Six in ten subscribers indicated a value for detailed program information to be available via the onscreen menu guide for PEG channels.
- Forty-five percent (45%) of subscribers expressed value in receiving the PEG Access channels in high definition.

### PEG Access Needs Assessment

- The current provision of CCGTV, CCPS TV, CSM-TV and LPACC-TV is valuable to the County, the BOE, CSM, community organizations and partners, government agencies, residential viewers and others, and should be maintained.
- There is a significant need to provide PEG Access programming in forms and formats beyond the current real-time, linear, standard definition digital provision of the four (4) PEG access channels, including:
  - High Definition
  - Cable-based Video-On-Demand
- New, upgraded and replacement equipment needs to be provided consistent with the needs demonstrated and the associated projections made, including:
  - To support the production of programming by CCGTV in County facilities, in offsite locations and by portable and remote operations, \$1,889,290 is needed over the next 10 years.
  - To support the production of programming by CCPS TV including at the schools, the BOE administration building, and CCPS media center, as well as through portable and remote operations in the field, \$1,425,320 is needed in the next 10 years.
  - To support the production of both higher educational access programming and local public access programming at CSM, \$1,261,260 is needed over the 10-year timeframe projected.
  - To provide additional facilities space through renovation, new build and expansion for each of the PEG access entities, \$2,953,250 is needed in facility improvement costs for the County, CCPS and CSM over the 10-year projected timeframe.
  - The amount of funding over a 10-year period to support the equipment and facility needs of the four PEG access entities, totals \$7,529,120 over the 10-year period. Comcast in Charles County is currently providing 1% of its gross revenues, facilitated by a subscriber pass-through, in support of PEG access. Verizon is doing likewise. This amount is somewhat lower than what is needed to support the PEG access equipment and facilities projected. Accordingly, the 1% of gross revenues amount needs to be increased for PEG access equipment and facilities support.

### Institutional Network Needs Assessment

- The fiber optic I-Net is critical to the County, CCPS, CSM and other allied entities for transporting a wide array of data, voice and video services, and enabling critical administrative applications as well as facilitating the provision of many services to residents and businesses. Accordingly, this network is critical to the current and future operations of the County, CCPS, and CSM and must be maintained going forward.

- The fiber optic network interconnects with other networks, including infrastructure that the County owns, and State of Maryland networks. These interconnects need to be maintained and additional ones added such as a diverse path redundant connection to the headend, and regional connections to infrastructure in Calvert County.
- The network standards embodied in the existing franchise have worked well in delineating responsibilities for development, maintenance and service and repair on both sides related to the I-Net. Accordingly, these should continue to be provided in any renewed franchise. In addition, a standard of 99.999% uptime averaged across all locations on the I-Net needs to be implemented in any renewed franchise.
- Additional facilities need to be added to the network. This continued evolution of the I-Net and the WAN are consistent with the 43 new sites (9 of these sites are on the I-Net; 34 sites are County WAN locations) that have been added since the I-Net's inception in the early 2000s.
- A disaster recovery plan needs to be put in place in the franchise related to the County's, CCPS's and CSM's use and operation of the dark fiber I-Net.

#### Cable System Technical Review

- CBG's technical review of Comcast's cable system included: document review, a system physical plant (infrastructure) audit, driveout and inspection, facility tours, and discussions with Comcast staff to determine the condition of Comcast's subscriber network in Charles County.
- CBG's inspection of Comcast's plant to evaluate compliance with the National Electrical Safety Code (NESC) and National Electrical Code (NEC) found 28 issues or code violations related to the drop from where it leaves the pole or pedestal up to and including the side of the house. Based on statistical probability and the margin of error at 5% confidence, CBG estimates that there are between 5,136 to 12,840 issues or code violations related to drops system wide.
- CBG documented issues and code violations at 37 poles or pedestals at the random sample addresses. Based on statistical probability, we estimate that there are between 3,558 – 8,600 issues or code violations at a pole or pedestal system wide.
- The specific issues directly found are being transmitted to Comcast for their review, response and correction. The large number of projected problems indicates that Comcast should be required by the County to provide a detailed inspection and repair plan which addresses all of the projected issues and code violations in the Comcast service area in the County. Documentation of these inspections and repairs needs to be provided to the County on a regular basis, perhaps quarterly.
- CBG found a high number of outages that should be averted by backup power supplies if they're properly functioning with adequate status monitoring. Comcast should describe how

it intends to minimize these types of outages going forward and provide the County with outage reports on a quarterly basis.

- In any renewed franchise, based on the number of households projected Countywide that do not have cable services available to them, the County should work with Comcast to develop more ways to serve more County residents that desire cable service. This may require reducing the minimum number of residential units per mile needed to require Comcast to build to new and existing unserved areas of the County, as well as innovative partnerships and contribution formulas to continue to expand service Countywide.

#### Franchise Compliance and Past Performance Review

- Analysis indicates that Comcast appears to be largely in compliance with the requirements of its Cable Franchise Agreement with Charles County and Section 226, Cable Communications, of the County Code. Several compliance issues, though, were evident from our analysis, as indicated below.
- Comcast should provide documentation to the County each year that the required performance bond has been renewed.
- The County should ensure that the required Letter of Credit, continues in full force and effect without the need of an amendment, through both the end of the current franchise and any renewal or extension
- Comcast was found to not be in compliance with telephone answering standards for the 3<sup>rd</sup> quarter of 2015. This noncompliance situation should be further investigated with Comcast to determine whether there were operating conditions outside the norm which caused the substandard performance in August and September of 2015.
- Comcast is not providing telephone answering statistics in a form sufficient for the County to be able to determine whether the standards are being met. Specifically, Comcast provides call center statistics for a 3 county area which includes Anne Arundel and Calvert Counties, in addition to Charles County. Because data from multiple counties is aggregated, it is not possible to evaluate the statistics just for Charles County residents, and thus they may not be in compliance with telephone answering standards. Comcast should be required to provide statistics specific to Charles County.

#### Franchise Fee/PEG Fee/I-Net Cost Review

- The results of the review including Conclusions and Recommendations are included in a separate document.

The Findings, Conclusions and Recommendations summarized above and fully detailed in the comprehensive Report, provide a strong and sound basis for the County to go forward in the franchise renewal proceedings and to ensure that the needs and interests of residents, organizations, institutions and other diverse communities of interest in Charles County are met in any renewed franchise.

## **SECTION A**

### **REVIEW OF CABLE-RELATED RESIDENTIAL COMMUNITY NEEDS AND INTERESTS**

## **RESIDENTIAL COMMUNITY NEEDS ASSESSMENT**

### **Introduction**

In July 2015, Charles County conducted a randomly sampled residential mail survey to assess cable television-related community needs and interests across the County.

The data collected will be used to assist the County in developing an effective franchise agreement with Comcast, a local franchised cable operator. This narrative summary reports on the findings of the mail survey.<sup>1</sup>

A random set of 4000 addresses were pulled using the current United States Postal Service's direct mail databases and compared with County maps to ensure that each of the addresses included in the study lived within the Charles County cable television franchise area. Using the US Census household count in Charles County,<sup>2</sup> roughly one out of every twelve households had an opportunity to be included in the random sampling.

The surveys were mailed first class to community residents in an envelope with a County logo in early July with a three-week return of July 28, 2015. A mark-up of the survey and the findings illustrated in this narrative are available in Exhibit A.1.

Of the 4000 mailed surveys, a total of 583 were returned by the closing date for a total response rate of 15%. All 583 surveys were coded and analyzed for the purpose of preparing this report. This survey sample of 583 surveys provides a margin of error of  $\pm 4$  points. This margin of error lets the reader know that if this random study were replicated in Charles County, the newly collected data would fall within  $\pm 4$  points of the findings reported in this narrative.

The survey instrument was designed to test community cable-related needs and interests and asked County residents to respond to a series of 38 questions related to a variety of cable service issues. Also included in this assessment were questions related to public/community, educational and government programming that appears on Channels 95, 96, 98 and 99 in the Charles County franchise area.

At the close of the survey, respondents were asked in an open-ended question if there was anything else they would like to add about Comcast and 41% of respondents added additional thoughts (N=240).

This strong response rate and rate of survey completion, including open-ended comments made at the close of the survey, suggests a substantial level of interest in cable television service among residents, as well as the additional services provided by cable communications systems, such as broadband services and telephone services, subscribed to by a substantial number of cable television subscribers and a number of non-subscribers.

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<sup>1</sup> Figures rounded to whole numbers are used in this report so that column totals will not always equal 100%, but rather fall between 99-101%.

<sup>2</sup> The Charles County Census household count utilizes data that was updated in 2013  
<http://quickfacts.census.gov/qfd/states/24/24017.html>

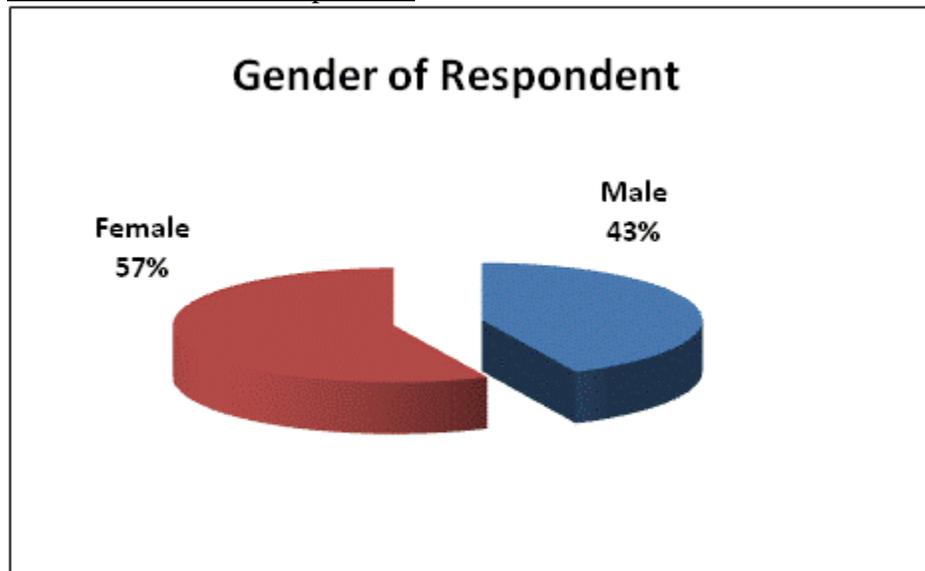
## **Findings**

### **Demographics**

Before launching into a summary of the findings, the reader would benefit from an understanding of who responded to the survey and how the responding sample compares to the known demographics of Charles County.

The responding sample reported that more females (57%) completed the survey than males (42%). The 2010 Census finds 52% of Charles County residents are female.

Chart 1 - Gender of Respondent



One out of every five respondents (21%) decided not to indicate their race. Sixty-two percent (62%) of respondents indicated being White and 13% were African American. These are also the two most represented groups in the census for Charles County. Three percent (3%) of survey respondents reported being Hispanic/Latino, which is consistent with the Census at 5%. Additionally, Asian, American Indian, and Bi-racial were also represented in the survey and reported in at less than 1%.

Respondents were asked to indicate their highest level of education. While 12% chose not to respond to this question, of those that responded, 1% had not completed high school, 30% were high school graduates, 17% had some college or an associate's degree, 30% held a four-year college degree, and 21% had attended college beyond a four-year degree.

Ninety-three percent (93%) of respondents own a home and 7% indicated renting. Thirty-eight percent (38%) reported having children under 18 living at home.

On average, respondents had lived in Charles County for 29 years. The average household income based on the responding sample, which was 57% of those that completed the survey, was \$110,834. The most frequent response was \$100,000. Income can be a sensitive question. Forty-three percent (43%) of respondents chose not to answer this question.

Respondents to the survey were also asked to indicate their age and 84% did so. The average age was 57 years old and the age range of respondents was 21 to 92 years of age.

### Cable Television Service

Of the 583 respondents, 43% indicated that they subscribe to cable television service from Comcast in Charles County. If we initially just consider Comcast cable television subscribers, this percentage is lower than the national average. If, however, we include all cable television subscribers in Charles County, including those who have Verizon FIOS, then Charles County's average cable television subscriber rate (65%) is higher than the national average. As of December 2014, the National Cable Telecommunications Association (NCTA) reports that 54 million households subscribe to cable television service<sup>3</sup>, reflecting 47% of Nielsen television's estimate of households in the United States.

Additionally, statistics from the cable companies indicate that Verizon has a larger market share at the current time. Because the survey was largely focused on resident's experiences with Comcast, and not cable television in general, it is likely that those with the specific service under review were more inclined to respond.

### Non-Subscribers of Comcast Cable Television Service

Of those residents that indicated they did not currently subscribe to Comcast cable television service, 22% indicated that they had another cable television provider (Verizon FIOS), 27% indicated that they were satellite television subscribers and 8% indicated that they did not subscribe to either cable television service or satellite television.

Residents who did not subscribe to Comcast cable television (57%) were asked why they did not currently subscribe. The most frequent reason residents gave (respondents could check more than one response) was because of cost (36%). This was followed by 29% who indicated that they had Comcast cable at one time, but had chosen to disconnect. These previous subscribers to Comcast no longer subscribed primarily due to "cost of service" (59%) and "service issues" (47%). The third most common reason for not subscribing to Comcast cable television was that it was not available in their area (25%)<sup>4</sup>. This was followed by Service Issues (23%), Never Subscribed (11%), Don't want cable TV (6%), Object to programming (5%), and Don't watch TV (2%).

Twenty-two percent (22%) of non-subscribers also indicated "other" reasons for not subscribing to Comcast cable television and wrote comments describing "other". The wide majority of these were comments related to poor customer service, specific channels not being available, service-related issues, outages, programming issues, the cost to get Comcast in their area (having to pay per foot for installation), the cost of cable service, equipment issues, and billing issues.<sup>5</sup>

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<sup>3</sup> National operating metrics are found on the NCTA's website at <http://www.ncta.com/StatsGroup/OperatingMetric.aspx>.

<sup>4</sup> The locations of respondents who indicated that Comcast Service was not available are provided in Exhibit A.1.

<sup>5</sup> A full list of "other" reasons for not subscribing can be found in Exhibit A.1.

Comcast Cable non-subscribers were also asked if they subscribed to other services from Comcast. Eleven percent (11%/N=32) of responding non-Comcast subscribers indicated that they were High-Speed Internet Service subscribers, while 70% of respondents indicated that they had Verizon (N=196) or another Internet service provider. Another 16% of respondents indicated that they used their mobile provider for internet access and 3% indicated that they still used dial-up.

Three percent (3%) of responding Comcast cable non-subscribers also reported being Comcast telephone subscribers, while 77% of respondents indicated that they subscribed to Verizon (N=237) or another phone provider. Another 16% of respondents indicated that they used their cell phone provider and another 4 % of respondents indicated that they don't have a home phone service.

### Comcast Cable Television Subscribers in Charles County, Maryland

Responding subscribers were asked how long they had subscribed to Comcast cable television in Charles County. The range of responses was from 4 months to 40 years and the mean was 13.5 years. The majority indicated they had a digital cable subscription (68%), with 9% indicating digital starter TV service and 59% indicating a level of digital preferred service or higher tier of service. Thirty-six percent (36%) indicated they subscribed to a premium channel, like HBO.

The next most frequent type of service was the limited basic (28%). This is a higher limited basic service subscription rate than we see in other communities where CBG has done needs assessments. As the lowest cost tier offered by Comcast, it will be critical to consider the assets included in that service level as Charles County begins franchise negotiations.

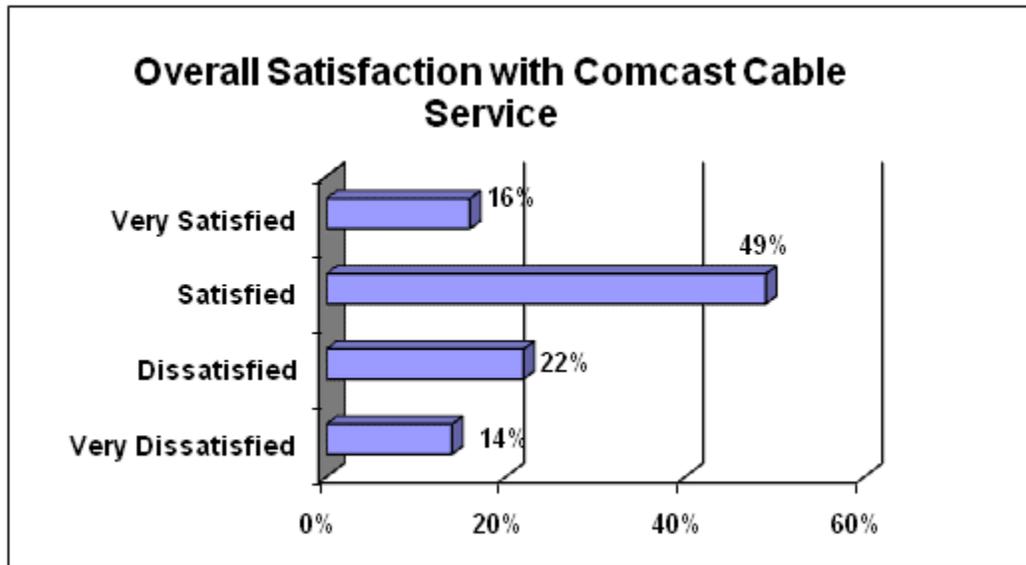
Cable television subscribers were also asked if they subscribed to Internet and telephone service from Comcast. Fifty-one percent (51%) indicated that they subscribed to Xfinity home telephone service, and 89% indicated that they had Xfinity High-speed Internet service. When considering non-subscribers of video services that do subscribe to Comcast's Internet service, the overall Comcast cable-based Internet subscription rate in Charles County is 44%.

The average monthly bill of a Comcast cable television subscriber (including all services) was \$181.39. The range of responses to this question from Comcast cable television subscribers was from \$28 to \$350, with the most common reported monthly billing of \$200.

Subscribers were asked if there were any cable programs or types of programs that are not available on the cable system that they would like to see added. One in five (22%) indicated "yes" to this question. When asked to indicate that channel or programming, the subscribers provided a description of the programs that they would like to see. The majority of these included such channels and programs as: NFL Network/Channels, Soapnet, OWN, Baltimore Channels/Stations, Cricket, Soccer, European programs, British programs, Fitness Channel, Country Music Shows, and more Sports Channels. A full list of mentioned channels and programs (N=54) is available in the Exhibit A.1.

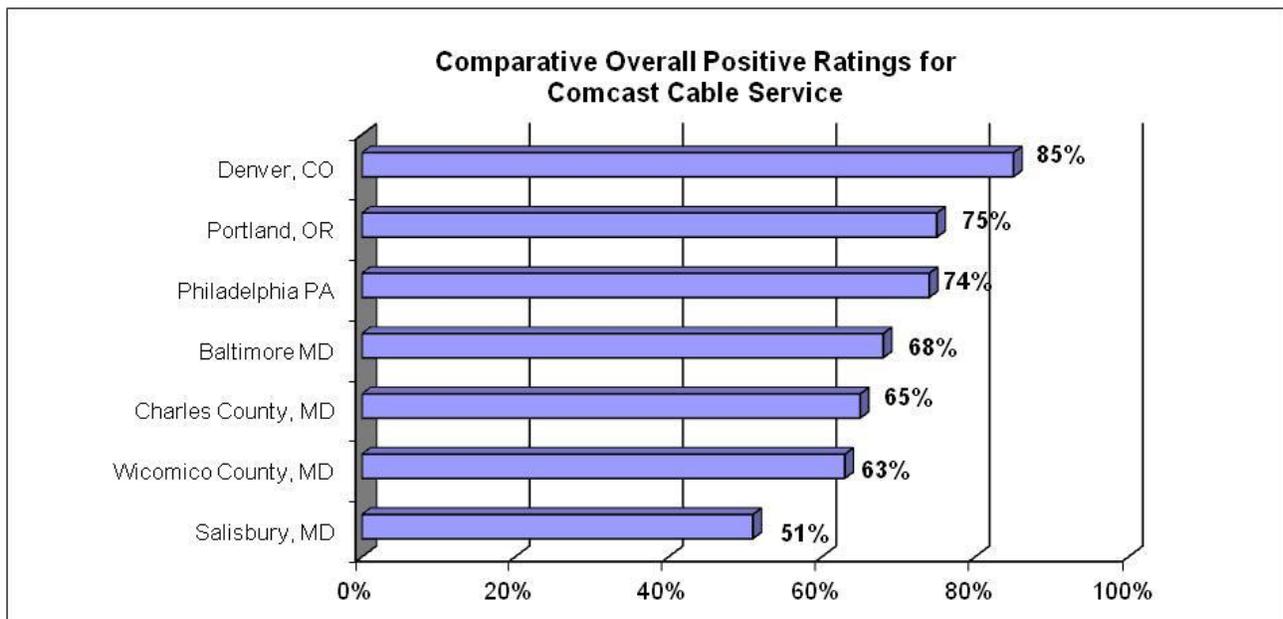
When asked to rate their overall level of satisfaction with their cable television service, 16% said they were very satisfied, 49% indicated satisfied, 22% indicated dissatisfied and another 14% very dissatisfied. In other words, 65% of subscribers indicated some level of satisfaction and 36% indicated some level of dissatisfaction.

Chart 2 - Overall Satisfaction with Cable Service



The following chart demonstrates how Charles County ranks against other cities in recent ratings of cable service during community needs assessments. Positive overall ratings of cable service are compared against each other. Charles County residents are more positive than nearby Salisbury, Maryland and Wicomico County; but less positive than several other cities tested by CBG Communications including, Baltimore, MD.

Chart 3 -Comparative Overall Positive Ratings for Comcast Cable Service



Charles County respondents that indicated anything less than “very satisfied” were asked if there was anything that Comcast could do to **improve** their level of satisfaction with its cable services (N=184). The top five responses were: offer lower costs (N=85), provide better reception (N=18), improve

customer service (N=9), offer a la carte channels (N=7), and have more competition (N=6). These are the leading challenges facing satisfaction with Comcast cable television in Charles County.

Table 1 - Top 5 Ways to Improve “Satisfaction” with Comcast Cable Service

1. Offer lower costs (N=85)
2. Need better reception (N=18)
3. Improve customer service (N=9)
4. Offer a la carte channels (N=7)
5. Provide more competition (N=6)

### Cable Service Features

A series of questions was posed related to various features of Comcast cable service in regard to picture and sound quality, the variety of cable programming packages offered, location of the cable company’s office, and hours the cable office is open. Respondents were asked to indicate their level of satisfaction on a 4-point scale from very satisfied to very dissatisfied. The respondent was also provided the option of responding, “don’t know” or that the question was “not applicable.” Special attention was paid to service issues that received a greater than 20% “very dissatisfied” and “dissatisfied” combined score.

The one tested area that received the lowest marks was related to the variety of cable programming packages offered with 16% reporting being “dissatisfied” and 12% reporting being “very dissatisfied.” Combined, 28% of respondents reported dissatisfaction with the variety of programming packages offered.

The hours the cable company’s office is open and the location of the cable company’s office also had some dissatisfaction expressed, with 10% and 9% indicating a combined “very dissatisfied” and “dissatisfied” respectively.

Comcast cable subscribers reported satisfaction with sound and picture quality at 93% and 92% respectively, with 6% and 7% respectively dissatisfied with both of these characteristics.

Table 2: Satisfaction with Characteristics of Comcast Cable Television Service

Comcast Service Characteristics	Very Satisfied	Satisfied	Dissatisfied	Very Dissatisfied	Don't Know/ Not Applicable
Quality of the picture	43%	49%	3%	4%	1%
Quality of the sound	40%	53%	1%	5%	2%
Variety of cable programming packages offered	25%	45%	16%	12%	2%
Location of the cable company office	34%	48%	5%	4%	9%
Hours the cable company office is open	29%	50%	6%	4%	11%

### Customer Service

The wide majority of Comcast cable subscribers had called the cable office in the last year (81%); 4 out of 5 subscribers. The main reason for calling was poor reception (44%), followed by billing issues (11%), a call to discuss an equipment issue (9%), that they were experiencing an internet problem (9%), or that they had an outage/signal interruption (4%).

When calling Comcast, 9% indicated that they received a busy signal. Additionally, when asked if their call had been answered by a customer service representative, including the time they were left on hold, within 30 seconds, 59% indicated that it had not.

Both of these scores are significantly higher than both the Charles County Cable Ordinance and the Federal Communications Commissions' (FCC) Customer Service Standards that set busy signals at a less than 3% occurrence and hold times greater than 30 seconds at less than 10%.<sup>6</sup> It is notable that more than half the issues resulting in phone calls reported by Comcast cable television customers in Charles County are operational issues, principally service, equipment and outages. This versus the reason for calling being a billing issue at 11% of callers.

When the phone call resulted in reporting a problem, 41% indicated that it was resolved within 24 hours, 26% said it was resolved within 1-2 days, 19% said it took more than two days and 4% said the problem was still unresolved.

### Outages and Technical Difficulties

Twenty-four percent (24%) of Comcast subscribers indicated that they had experienced an outage in the past year that had lasted 12-hours or more while they still had electricity. Subscribers were asked to estimate how many times they had experienced outages in the last year that lasted 12-hours or more. The range was 1-6 times with the average customer reporting 2 outages of this type while still having electricity.

Of those that had experienced outages, 81% indicated that they called the cable operator's office. Clearly, outages are an issue driving call volume for Comcast in Charles County. Once the respondent was able to speak to a cable television company representative, 74% described the cable operator's responsiveness as "responsive" or "very responsive" to the outages. Another 16% indicated that they were not responsive to the outage.

Seventeen percent (17%) indicated that they had received a refund or credit from the cable company if the cable television outage had lasted for more than 12-hours.

When asked about any other technical difficulties, 38% of Comcast subscribers indicated that they had experienced some type of technical difficulty. When describing those (N=106), subscribers most frequently mentioned technical difficulties with reception (N=66), sound (N=8) and problems with equipment/cable boxes/DVR (N=19). Reception problems were most frequently described as freezing or pixelating pictures, along with key channels being offline. The channels that were mentioned most often where this occurred, include: over-the-air broadcast networks such as ABC, CBS and NBC. Some comments concerned problems with the reception of these channels in HD. Problems with On Demand and Premium channels were also mentioned. Sound was described as absent or coming in and out. Cable box problems were associated with "cutting out" and "channels aren't available". A full summary of technical difficulties and channel problems reported by Comcast subscribers is included in the Exhibit A.1.

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<sup>6</sup> The federal customer service standards for cable television can be found at <http://www.fcc.gov/guides/customer-service-standards>, and the Charles County Cable Ordinance can be found at <http://ecode360.com/26905388> Retrieved December 8, 2015.

## Service and Installation Issues

Those Comcast subscribers with a service call in the last year (63%/N=158) were asked to provide feedback on the experience they had with the cable company during the service call or installation process.

Using the same scale in rating the other features and services, the majority of Comcast subscribers were positive about their service or installation experiences, but there were some significant areas of dissatisfaction. Specifically, the most dissatisfaction expressed was not with the technician's professionalism and the respect the technician demonstrated for their property, but rather the dissatisfaction was around the ability of the technician to explain subscribing options; the technical ability of the service technician to set up service, configure equipment and troubleshoot problems; the arrival time of the technician; and the available times for service. These all can be related to the number of employees available and trained to do the work at hand. In other words, the service experience can be directly related to the investment being made by Comcast in the number of staff and the training the staff receive.

Table 3: Satisfaction with Characteristics of Service Calls

<b>Service Issues</b>	<b>Very Satisfied</b>	<b>Satisfied</b>	<b>Dissatisfied</b>	<b>Very Dissatisfied</b>	<b>Don't Know/ Not Applicable</b>
The available times for service	26%	44%	13%	5%	12%
The arrival time of the service technician	27%	41%	11%	7%	14%
The ability of the technician to explain your subscribing options	26%	35%	12%	8%	19%
The technical ability of the service technician to set up service, configure equipment and troubleshoot problems	29%	37%	12%	7%	15%
The professionalism of the technician	34%	44%	6%	4%	12%
Respect for your property demonstrated by the service technician	36%	40%	5%	5%	14%

## Communication Issues

Comcast cable subscribers were asked to evaluate their cable television experience as it related to communication issues. Cable subscribers had the highest dissatisfaction (38%), concerning the communication from Comcast related to rate changes. Subscribers also had dissatisfaction (26%) with the cable operator's ability to troubleshoot technical problems via the telephone. This was followed by dissatisfaction (23%) with the cable operator's communications regarding programming changes, and dissatisfaction (20%) with the cable operator's ability to explain and address billing questions.

Table 4: Satisfaction with Cable Operator’s Communications

Communication Issues	Very Satisfied	Satisfied	Dissatisfied	Very Dissatisfied	Don't Know/ Not Applicable
The cable operator’s ability to explain and address billing questions	19%	42%	13%	7%	19%
The cable operator’s ability to troubleshoot technical problems via the phone	19%	41%	19%	7%	14%
The cable operator’s communication with you regarding programming changes	15%	34%	16%	7%	28%
The cable operator’s communication with you regarding rate changes	15%	26%	24%	14%	22%

**Public, Educational and Government (PEG) Access Programming**

Respondents were asked about their viewership of local access programming currently made available on the Comcast cable system on Channels 95, 96, 98 and 99. The local programming includes County Commissioners meetings, local announcements of community events, coverage of Charles County public school events and programs provided by local individuals and churches and many others more specifically described in the table below.

Subscribers report combined, unduplicated viewing of local access programming (PEG programming) appearing on channels 95, 96, 98 and 99 on a weekly basis, including daily, at 12%. When measuring how frequently all PEG programming is viewed, 2% of respondents reported that they watched on a daily basis, 10% on a weekly basis, and another 3% described themselves as monthly viewers and 42% indicated that they were occasional viewers.

Individual channels were also assessed for viewership and these numbers are reported in the chart below.

Table 5: Public, Educational and Governmental Channel Viewership

Channel	Daily	Weekly	Monthly	Occasionally	Never
<b>95 – CCGTV – Charles County Government TV</b> – programming includes: live meeting coverage of the County Commissioners, Planning Commission, Board of Appeals, Fire and Rescue Board, and Liquor Board, a bulletin board of County events, and programs that highlight County services.	2%	8%	2%	34%	54%
<b>96 – CCPS Television – Charles County Public Schools</b> - programming includes: School Board meetings, School News, special programs, Musical Reviews, School Events, and more.	2%	5%	3%	28%	63%
<b>98 – CSM TV – College of Southern Maryland (CSM)</b> -Educational Access Channel – programming includes: educational and informational programs that showcase the College of Southern Maryland. CSM TV also produces original shows, including shows produced by CSM students, and public interest programs.	1%	4%	2%	25%	68%
<b>99 – Public Access Channel - Charles County’s Local Public Access Channel</b> – programming includes: local community programs provided by individuals, organizations or institutions in the Charles County area.	2%	4%	2%	31%	61%

These numbers, while on their face may seem low; in fact, indicate a significant level of viewership for local access programming and generally for most cable networks. Specifically, when considering the viewership of the access channels, it is useful to apply some standard principles of viewing television audience measurement.

The Nielsen Company is the primary measurer of media engagement in the United States. One of the numbers generated by Nielsen is referred to as CUME. CUME is an acronym that represents “cumulative audience.” It is defined by the television industry as the total, non-duplicated audience for a program or channel over a given time period. CUME is expressed as a percentage of the total television household universe. When measuring weekly CUME for commercial cable channels, Nielsen counts any household that chose the channel for at least a minute. Additionally, a viewing household is counted only once no matter how many times the channel or program is viewed during that week by that household.

In Charles County, the weekly CUMEs reported by cable subscribers in our study of the public, education and government access channels varies from 5% to 10% (combining the reported daily and weekly viewership for each channel tested). In other words, 5% to 10% of cable subscribers report at least viewing one of the PEG channels at some point in a given week. While the numbers may not, on the surface, seem like a considerable number of viewers, when one compares it against the weekly CUME of many well known cable networks, one can see that in a universe of more than 300 channels, having 5% to 10% report they viewed your channel at some point during the week has significant meaning. Moreover, when combining the unduplicated daily and weekly viewership for all 3 PEG channels, the weekly “PEG CUME” rises to 12% as indicated above.

Many cable networks have a weekly average viewership rating of 2% or less. Well known examples include channels owned by Comcast such as the NBC Sports Network (NBCSN), the Golf Channel, CNBC, the Weather Channel and the Sprout Network. Even the top networks have weekly CUMEs of approximately 1/5 to 1/3 of the total viewing audience. As an example, the USA Network, one of the most popular cable networks on television, has a weekly average CUME of 21%. Accordingly, it will be only rarely that one of the 300 niche cable networks will have a majority of the viewers. In cable television’s history, the industry has never had a majority of American television households watching one of its networks. In fact, the industry’s strength is its ability to tailor to niche interests like golf and business/market information.<sup>7</sup>

As another example, in January 2014, the Bravo Network issued a press release when it hit a record high in the network’s 33-year history with the viewership of the show *Desperate Housewives of Atlanta*. That show’s rating was reported as 4.5 million, or a rating of 5% of the potential audience.<sup>8</sup>

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<sup>7</sup> NBCSN, September 20, 2013 at 75,000 a day. <http://www.multichannel.com/content/nbcnsn-scoring-big-total-day-gains-premier-league/145588>. Golf Channel, 120,000 day. <http://www.broadwayworld.com/bwwtv/article/Golf-Channel-Reigns-as-Fastest-Growing-Network-on-Television-20121004>. USA Network, August 24, daily viewership of 2.91 million <http://tvbythenumbers.zap2it.com/2013/08/21/usa-is-the-1-cable-network-for-the-8th-consecutive-summer/198761/>. CNBC, <http://variety.com/2013/tv/news/cnbc-the-profit-in-the-red-after-week-two-ratings-tumble-1200575819/>.

Weather Channel, <http://www.buzzfeed.com/passantino/storm-breeds-as-the-weather-channel-launches-campaign-against>. Sprout Network, <http://www.cynopsis.com/files/4113/4624/5396/SPROUT.pdf>

<sup>8</sup> Coverage of the press release can be found at <http://tvbythenumbers.zap2it.com/2014/01/07/bravo-media-shatters-ratings-records-sunday-with-its-best-night-in-network-history/227413/>

The press release didn't state the average weekly viewership of the network, but since the 5% was a 33-year record high, it is likely that the weekly average is much lower.

Accordingly, the weekly viewing percentages for Charles County Access channels coupled with the niche nature of cable television, where the vast majority of cable networks have relatively small, weekly CUMEs, show substantial viewership.

### Other Local Programming Interests

Comcast subscribers were asked what type of programming they would like to see more of on the Comcast cable system. Community News had the most interest with 39% of all subscriber respondents indicating they would like to see "more" of this type of programming. The other top categories of local programming of interest to respondents included Health/Wellness Programs (36%), Local Historical Programming (30%), Special Events (29%), Local Senior Citizens Programs and Public Safety Information, both at 22%; Local Sports (20%), Higher Education Programs (17%), K-12 School Events & Activities and Public/Community Events & Activities, both at 14%; Government Meetings and Local Arts, both at 13%; and Local Business Programming (12%). In the "Other" category (4%), subscribers mentioned a desire for programs concerning Charles County. Civil court coverage; Church/Religion programs, hobbies/crafts/skills programs, K-12 Events for homeschoolers, Local stock car races, Local weather, National historical programming, the NFL Ticket, Non-profit efforts to help community, and Weather map from satellite.

Table 6: Top 13 "See More Of" Local Programming Rank Ordered by Interest

<b>Categories of Local Programming</b>	<b>Needs More Of</b>
Community News	39%
Health/Wellness Programs	36%
Local Historical Programming	30%
Special Events	29%
Local Senior Citizen Programs	22%
Public Safety Information	22%
Local Sports	20%
Higher Educational Programs	17%
K-12 School Events and Activities	14%
Public/Community Events & Activities	14%
Local Arts	13%
Government Meetings	13%
Local Business Programming	12%

### Distribution Features for Local Access Programming

Comcast Cable subscribers were also asked to value the availability of certain distribution features for local PEG access channels that they currently receive for other cable channels on the cable system. Almost two-thirds (62%) of cable subscribers indicated local community programming information being provided on the current program guide/menu would have value (including 17% Very Valuable and 25% Valuable). Over half of Comcast subscribers (52%) also placed value on having local community programming provided On-Demand (including 11% Very Valuable and

23% Valuable). Additionally, 45% of Comcast subscribers placed value on having local community programming provided in High Definition (HD).

Table 7: Value of Local Community Programming Distribution Features.

Local Community Programming	Very Valuable	Valuable	Somewhat Valuable	Not at all Valuable	Don't Know/ Not Applicable
Local Community programming in High Definition (HD).	9%	14%	22%	23%	31%
Local Community programming provided On-demand.	11%	23%	18%	20%	28%
Local Community program information provided on the program guide/menu.	17%	25%	20%	12%	26%

### [Awareness and Use of Access Facilities and Equipment](#)

Twenty-three percent (23%) of survey respondents were aware that the Public Access Channel operates a local community access studio at CSM's La Plata Campus, for television program production and provides media training for County residents.

Those that were aware of the Public Access studio were also asked if they had ever used the Public Access studio, portable equipment or taken part in training or an access program. Of those that were aware (N=122), 3% said that they had.

### [Online Access in Charles County](#)

All survey respondents were asked if they had Internet Access at home. Ninety-two percent (92%) indicated that they did.

Those that indicated that they did not have internet access at home (8%/N=43) were asked to indicate why. The most common categories were: cost/cost too much/too expensive, have no computer, not offered in our area/unavailable, and don't want/don't need.<sup>9</sup>

Almost one in ten Charles County residents report not having Internet service at home. This finding is lower than the national tracking data which finds that “No Internet access at home” is currently at 28%.

### [Additional Comments](#)

When all respondents were asked to provide any final comments about Comcast cable service in Charles County, 41% (N=240) used additional space provided at the end of the survey to do so. The comments were collapsed into categories. The top 10 first responses included:

<sup>9</sup> A full list of responses can be found in Exhibit A.1.

Top 10 Responses - Rolled up into Categories<sup>10</sup>

1. Lower cost N=76
2. Bad customer service N=42
3. Monopoly N=40
4. Please make available to all areas N=37
5. A la carte N=13
6. Stop raising the price N=12
7. Senior discounts N=12
8. Reception N=8
9. Loyalty discounts N=8
10. Good job to Comcast N=8

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<sup>10</sup> A full list of Comment Categories can be found in Exhibit A.1.

## **Residential Survey Conclusions and Recommendations**

The following series of recommendations were developed from concepts and issues that emerged during the residential survey of cable television needs and interests in Charles County.

- 1. Subscriber Satisfaction with Comcast cable television services** – Sixty-five percent (65%) of cable subscribers are satisfied with cable service, with 16% indicating being “very satisfied” and 49% “satisfied”. This means that the other 36% are “dissatisfied” or “very dissatisfied”. In other words, over 1 in 3 Comcast cable customers report overall dissatisfaction with their cable television service.

Those that described lower satisfaction with cable television service were most likely to indicate that the primary reason was related to high rates or cost too high (N=85). This response and associated comments suggest that negative attitudes have a lot to do with subscribers’ perceptions of the price/value relationship concerning their current service. With the prevalence of “over the top” programming increasing in the marketplace (i.e., HBO, Netflix, application driven television, online distribution of network programming and internet capable televisions), the concern over rates indicates these disruptive innovations are challenging the cable television landscape and will require innovative responses from the cable industry, including more locally responsive programming, to adapt their cable television business model to increasingly provide more value to subscribers.

Lower reported satisfaction was followed by concerns about reception of channels. This was also found to be true when describing technical difficulties that Comcast cable television subscribers were facing in Charles County. In open-ended comments related to cable television satisfaction, several subscribers (N=18) indicating they would be more satisfied if they had more reliable reception and better picture quality. An additional nine subscribers (N=9) indicated that improvements in customer service would increase their satisfaction level. All of these areas are deserving of attention by Comcast and would likely drive higher customer satisfaction with the service. These issues are within Comcast’s ability to immediately address and would likely help to counter the dissatisfaction reported by nearly 1 in 3 cable subscribers.

- 2. Non-Subscribership of Comcast cable television services** – Of those currently not subscribing to Comcast (N=332), the majority, 47% of non-Comcast subscriber respondents, reported the reason was because they subscribe to satellite services, 39% of non-Comcast subscriber respondents reported the reason was because they subscribed to another cable television provider in the area, followed by 14% who indicated that they did not subscribe to either satellite nor cable television.

Non-subscribers further indicated reasons as to why they did not subscribe to Comcast cable television. The number one reason was cost (36%), which was then followed by had, but disconnected (29%), *cable television service not being available at their home* (25%), and service issues (23%). The street, road or neighborhood location information for those respondents indicating it was unavailable was collected and is available in the Exhibit A.1. Comcast could immediately engage subscribers in Charles County through further construction, creating a greater build-out of their system than is currently available in the

area. These findings also suggest that to further engage subscribers as Comcast moves into franchise renewal, it would need to compete more effectively on cost to compare with satellite offerings and design new, enhanced or alternative programming package options, as well as address service issues.

3. **Technical Issues** – A substantial number of cable television subscribers, 38%, indicated that they had experienced some type of technical difficulty. When describing these “technical difficulties,” the most common response was related to reception (N=66). This was followed by more descriptive elements of “channels out” or “picture freezes” and “picture scrambles.” Several comments were made about “sound” problems as well (N=8). Lastly, subscribers indicated having problems with their cable boxes/DVRs (N=19, and these were often coupled with "channel not available"). This was further described as “needing to reboot”, "Box acting up" and/or “box stopped working”, and "channel won't play on DVR."

Added to this, the primary reason for calling the cable company within the last year, which 81% of subscribers did, was related to a problem with poor reception (accounting for 44% of calls made). Clearly, the cycle of poor reception and outages (discussed further below) are accounting for call volume to the cable television company that creates hold times that are 200% greater than allowed under the federal customer service guidelines. The prompt and successful correction of these customer service problems was reported by cable subscribers as a solution for increasing their overall rating of cable television service. *Addressing cable television service problems and the resulting telephone response to those issues is clearly a critical area of needed improvement in the next franchise.*

4. **Customer Service** – While cable television subscribers generally are satisfied with Comcast’s service, there are certain areas that need enhancement, and areas where subscribers’ responses indicate non-compliance with Federal Communications Commission (FCC) Customer Service Standards and the Charles County Cable Ordinance. These are:
  - a. Telephone Answering Standards – Eighty-one percent (81%) of cable television subscribers had called Comcast in the last year and the primary reason for calling was a service issue. Nine percent (9%) of subscribers indicated that they received a busy signal when calling the company, which is 200% greater than the three percent (3%) level specified by the FCC as the desirable customer service standard. Additionally, 59% indicated that their call had not been answered within thirty (30) seconds, including the time left on hold, which is almost 500% greater than the 10% allowed under the FCC Customer Service Standards. Primary reasons for calling, other than poor reception, were related to billing issues, equipment issues and internet problems -- all controllable customer service issues.
  - b. Outages and Restoration of Service – Twenty-four percent (24%) of Comcast subscribers reported they had experienced an outage in the last year lasting a period of 12-hours or more while they continued to have electricity -- suggesting these were normal operating conditions. Eighty-one percent (81%) of those experiencing an outage called the cable company to report the problem, and while 74% were positive about the cable company’s response to the outage, 16% were not. Of those experiencing an outage, 17% received a refund or credit for the

down time. Important to franchise renewal proceedings are two customer service issues around restoration of service -- the satisfaction level that subscribers have with the length of time it takes to restore service and credit for down periods on the cable system. Credits on subscriber bills should be a proactive process and not a reactive process for only those subscribers calling.

- c. Billing Issues – Twenty percent (20%) of subscriber respondents indicated they were “dissatisfied” or “very dissatisfied” with Comcast’s response to billing questions.
- d. Service Calls – Fifty-six percent (56%) of subscriber respondents indicated they had a service call or installation in the last year. These subscribers were asked a series of questions about that experience and the findings are worth noting again here. Of those that had an experience with Comcast service personnel at their home, most were positive about the technician’s professionalism and the respect the service technician demonstrated toward their property. They were generally less satisfied with the ability of the technician to explain their subscribing options and the technical ability of the service technician to set up service, configure equipment and troubleshoot problems. There was also less dissatisfaction expressed with available times for installation, and arrival time of the technician. These are all staffing-related issues and may reflect directly on the number of technicians assigned to work in Charles County and the training these employees received. *Improvements in these areas are likely to improve overall satisfaction with cable television service and are important discussion points during franchise renewal.*
- e. Communications with Subscribers – Thirty-eight percent (38%), almost 2 in 5, of responding subscribers were dissatisfied with Comcast’s communication with them regarding rate changes. This was followed with over 1 in four subscribers being dissatisfied with Comcast's ability to troubleshooting technical problems via the phone. Additionally, 23% of subscribers were dissatisfied with Comcast's communication with them regarding programming changes.

As part of franchise renewal negotiations, we recommend that Comcast provide an overview of how notice was provided to cable customers, how troubleshooting and problem escalation is handled, and their strategy for improvement going forward. As Comcast responds to these concerns, we encourage the County to consider notification and problem resolution requirements as part of customer service standards that can be measured and benchmarked at regular intervals during the course of the next franchise and that penalties for non-compliance be clearly articulated.

Each of these are areas that we recommend as focus areas with Comcast in franchise renewal to see what improvements can be made to resolve the concerns indicated by subscribers and to work to enhance the means of monitoring these issues during the next franchise term.

- 5. Access Channels and Viewership** – Five to ten percent (5 - 10%) of subscribers reported watching each channel on a daily or weekly basis, and combined PEG Channel viewership

shows a weekly CUME (unduplicated weekly cumulative audience) of 12%. While these percentages may at first appear low, it is important to keep in mind that cable television's business model is rooted in niche channels rather than mass appeal channels. As an example, many well known cable channels have weekly CUME's of 2% or less and one of the most popular overall cable networks, USA, typically has a weekly cumulative audience of approximately 21% of all television households. While not a direct comparison because of the different measurement basis (national multichannel video subscribers weekly viewership versus local cable television subscribers weekly viewership), the 5 - 10% of Charles County subscribers that report watching each local access channel on a weekly basis should be seen as viable and healthy cable television viewership and a valuable part of Comcast's cable service.

Additionally, 52% of subscribers favored local access programming be made available via the "On-Demand" features of the cable system and over six in ten subscribers indicated value for robust program information to be available via the on-screen menu/guide. Additionally, forty-five percent (45%) of subscribers also expressed value in receiving the access channels in high definition on the Comcast cable system in Charles County.

Overall, the results from the survey show a high level of interest in local access programming, indicating that a renewed franchise should have strong support for continuation and enhancement of access programming and distribution. Such enhancements should occur in a variety of areas, most specifically better television guide information about the channels, ensuring the channels are integrated into the system in a way that puts them on a level playing field with other channels and enabling the generation and provision of greater amounts of programming in the categories specified.

These concluding remarks and recommendations are not meant to be a comprehensive reflection of the needs assessment findings as a whole, but rather are an important part of the analysis. Other data presented in sections of this narrative may also be of value to the County as it moves forward with the franchising process. An understanding of the needs and interests in the community can serve to continue to improve cable service in Charles County.

## **SECTION B**

### **REVIEW OF CABLE-RELATED PUBLIC, EDUCATIONAL AND GOVERNMENTAL (PEG) ACCESS NEEDS AND INTERESTS**

## **PUBLIC, EDUCATIONAL AND GOVERNMENTAL ACCESS NEEDS ASSESSMENT**

### **Introduction and Methodology**

As part of its overall assessment of the cable television related needs and interests of the Charles County community, CBG Communications, Inc. (CBG) and its Team Partners, Dr. Constance Book (President, Telecommunications Research Corp.) and Carson Hamlin (Media Integration Specialist), conducted an assessment of the Charles County community's needs and interests regarding Public, Educational and Governmental (PEG) Access channels and programming.

Individual residents of the County and key stakeholders in Charles County's PEG community were contacted for the PEG Access Needs Assessment, via written surveys, focused discussions, in-person interviews, and physical site surveys of facilities and equipment. Specifically, information and opinions about PEG Access needs and interests were obtained from: a random sample of County residents who participated in a written survey of the community's cable-related needs and interests (see Section A of this Report ), Governmental Access staff and other stakeholders involved in the operation of Charles County's Government Access Channel 95 (CCGTV - Charles County Government TV), and other County departments and agencies; the staff and other stakeholders affiliated with Charles County Public Schools' K-12 Educational Access Channel (CCPS Television - Channel 96); the staff and other stakeholders affiliated with the College of Southern Maryland's Higher Educational Access Channel (CSM TV - Channel 98); and the staff, program producers and program providers that facilitate and utilize Public Access Channel 99 - Charles County's local Public Access Channel.

The PEG Needs Assessment included a request for, and reviews of, documentation from the operators of the PEG channels. Requested documentation included:

- Annual production and programming statistics;
- Technology plans for future development;
- Facilities layout;
- Master control signal flow diagrams;
- Programming signal origination transport information;
- Equipment inventories;
- Operating rules and procedures;
- Operating and capital budgets;
- Staffing levels;
- Channel programming schedules;
- Programming samples;
- Website usage statistics, and
- Other documentation depicting current and planned operations.

Along with analysis of this information, CBG conducted facilities surveys and focused discussions and interviews with channel management and a variety of program producers and other production personnel.

Specifically regarding Governmental Access, CBG toured the production areas at the Charles County Government Center utilized by CCGTV. Facilities and equipment were reviewed and current needs, as well as needs that will arise in the next 10 years, were identified and documented during these site visits. Additionally, interviews were conducted with County staff concerning their perspectives on Governmental Access production and programming content development. A focused discussion was also held with County Governmental Access television staff, representatives from other County agencies and other stakeholders, that focused on the state of current County video production facilities, equipment and programming, projected equipment and facilities needs for the future, and program content development, production and distribution, including live meeting coverage of the County Commissioners, Planning Commission, Board of Appeals, Fire and Rescue Board and Liquor Board, as well as program content covering County initiatives, programs and services.

Regarding K-12 Educational Access, CBG toured the studio, editing and post production facilities, as well as the School Board's Meeting Room production facility, of the Charles County Public Schools (CCPS) related to CCPS Television, Channel 96. CBG held interviews with CCPS staff responsible for the channel, and conducted a focused discussion with a variety of CCPS department representatives. These interviews and focused discussions, similar to those for Governmental Access described above, focused on current and projected facilities and equipment needs related to the continued development and enhancement of K-12 Educational Access programming, as well as current and future program content development, production and distribution, including coverage of School Board meetings, activities at individual schools, special programs and CCPS events.

Regarding Higher Educational Access, CBG toured the College of Southern Maryland (CSM) studio, editing and post production facilities and related CSM facilities. We also held interviews with CSM staff concerning the operation of CSM TV, Channel 98, and conducted a focused discussion with CSM TV staff and CSM representatives from various College departments that contribute, or could contribute in the future, to CSM TV's programming development and distribution. The interviews and focused discussion concerned the state of current CSM TV video production facilities, equipment and programming, as well as the projected equipment and facilities needs going forward. The information obtained also included participants' perspectives on program content development, production and distribution related to educational and informational programs that showcase CSM, as well as original shows including shows produced by CSM students.

Regarding Public Access, as CBG reviewed the CSM facilities and equipment, special attention was paid to the equipment that has a dual use in support of Public Access Channel 99. Additional information was gained from CSM staff that facilitate the operation of the Public Access Channel and those that utilize the facilities, equipment and channel for development and distribution of programming. CBG further conducted a focused discussion that included staff as well as independent producers, producers representing nonprofit organizations and student interns that facilitate Public Access programming development. In both the interviews and focused discussions, Public/Community Access representatives were asked questions concerning current and projected facilities and equipment needs to continue to develop and enhance Public/Community Access programming, including their vision related to future program content development, production and distribution.

Findings concerning the PEG Access channel operators and stakeholders were used to develop facility, equipment, capacity, and distribution needs and associated funding projections. These are described in the Conclusions and Recommendations at the end of this Section. They are the basis for phasings and priorities for equipment and facility upgrades and further replacement that PEG operators will need over a projected 10-year timeframe. Detailed discussion of the PEG Access Needs Assessment and CBG's findings follows.

## **Findings – Governmental Access**

### **Overview of Charles County’s Governmental Access Channel - CCGTV, Channel 95**

CCGTV is Charles County’s Governmental Access channel. The channel provides live broadcasts of County Commissioner, Planning, Board of Appeals, Fire and Rescue Board, Liquor Board and other public meetings, as well as rebroadcast of those meetings at various times throughout the television viewing week. It also provides a bulletin board of County events when video programming is not otherwise on the channel. It further provides programs that highlight the services, initiatives, activities and programs of a variety of County agencies. CCGTV also creates public service announcements (PSAs) that provide important governmental information to Charles County residents about services provided by, and activities occurring within, the County.

Recent programming, for example, beyond the live and rebroadcast meetings has included a series of *Charles County Update* programs concerning such topics as the Christmas budget, the Library, Small Business Saturday, Anti-Litter Month and Domestic Violence Awareness Month. The program *Safety Matters* has focused on issues such as heroin addiction and shingles, as well as home safety. Other programs have included the *Winter 2016 Recreation Report*, *Get Fit at the Clark Center*, *Point of Change* (provided in Spanish), and programs about daycare, recycling, bus ridership and many others.

CCGTV also provides a digital library where programs can be accessed over the internet on demand, as well as a live stream called *CCGTV Live*. Additionally, promotional announcements, public service announcements and other original programming can be found on the County’s YouTube channel.

From 2011 through 2014, CCGTV annually produced up to 67 live Board of Commissioners meetings, up to 70 other types of live meetings, up to 44 original half hour and other programs and up to 44 promotional and public service announcements, equating to hundreds of hours of original programming. Statistics through July of 2015 indicate that CCGTV is on pace to again equal or exceed these totals.

CCGTV produces programming within a variety of locations in the La Plata, Maryland Charles County Government Center, as well as remotely in the field throughout the County. Locations in the Government Center include the Commissioners Meeting Room, the CCGTV studio and the “Blue Room” (the former Commissioners Meeting Room, which is now a conference and caucus room). These areas and the equipment utilized for production are further detailed later in this Section.

Regarding staffing, CCGTV currently has three full-time (3 FTE) positions and one part-time (half FTE) position. This includes the station manager, the two video production specialists and a digital librarian. CCGTV normally also has interns during the summer months.

## Interviews and Focused Discussion with CCGTV Staff and Government Agency Representatives

During the PEG Access Needs Assessment project, CBG held interviews and a focused discussion with CCGTV staff and representatives from other government agencies and organizations, such as the Public Information Officer from the Sheriff's Office. Topics discussed included the current strong points, attributes or other characteristics that make CCGTV useful to Charles County's mission; areas that need improvement; opportunities to enhance CCGTV in the future; and challenges that need to be overcome to meet future needs and interests. Other topics included the need for live program origination from remote locations, the use of video on demand, the need for high definition production and delivery, program listings on the electronic program guide (EPG)/digital menu and the importance of cable service drops at Charles County agency, department and office locations.

Key findings from the focused discussion included:

- **CCGTV provides critical information to Charles County residents** -- Participants indicated that CCGTV was seen as a dependable way for County residents to get critical, timely and necessary information. For example, participants discussed how viewers looked to the County when there was a threat of hurricane or other severe and inclement weather. Viewers know that they can get emergency and other time-sensitive information from CCGTV. CCGTV staff noted that they can remotely connect into the server and create immediate emergency information as a crawl across the lower third of the picture. In this way, they can quickly update the community with important facts and information.

CCGTV also works to reach the widest possible audience with such information. For example, Commissioners' meetings are closed captioned for the hearing impaired in post production when they are rebroadcast.

- **CCGTV helps promote transparency in government** -- CCGTV provides live coverage and multiple rebroadcasts of Commissioners' meetings as well as a variety of other Board and related public meetings. In this way, citizens can look to CCGTV to observe and participate in the workings of their local government. CCGTV gets requests from citizens for access to meeting coverage, and when there is an issue with the broadcast occurring on-time, they hear from residents so they know that people are watching.<sup>11</sup>
- **CCGTV covers events and topics of high interest to the community** -- CCGTV covers a number of activities and events that occur in the community, including focusing on certain special events such as the Breast Cancer Walk, a shredder event that also encouraged recycling, Town Hall meetings and many others. CCGTV also runs a

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<sup>11</sup> Substantial viewership for CCGTV was also evidenced in the quantitative residential community survey. See Section A of this Report, p.17-19 and Exhibit A.1.

number of promotional spots to promote County events and encourage participation by the community.

- **CCGTV covers issues of high importance** -- CCGTV has run programs on teen safety, access to the services of the Center for Abused Persons, many programs on the activities of the Sheriff's Office, programs focusing on animals available from the Animal Shelter, programs that promote Parks and Recreation services and activities, and coverage of the activities of the Commission for Women, tourism and economic development within the County.

CCGTV also produces agency profiles and other government service-related programming.

- **CCGTV needs facility and equipment enhancements in order to continue to enhance and expand its programming** -- Participants noted a number of facility and equipment enhancements that will be necessary in both the near and longer term in order to keep up with technology and meet programming needs both now and in the future. Regarding facilities, participants indicated:

- Additional regular storage space is needed.
- The studio continues to face noise, heat and humidity issues. It would be useful to have a new, bigger space in a more ideal location for the entire production facility (perhaps as a new addition somewhere on the Government Center campus). This would allow not only for an increase in square footage but also an increase in studio ceiling height to a more appropriate height for lighting fixtures.

Regarding equipment, participants indicated that they continue to ramp up the quality of the productions from a content and production values point of view, but need continual advancements in the technological capabilities of the equipment to fully support higher quality productions. This, for example means:

- Migration of all equipment from SD to HD and further to HD 4K.
- Integration of more automated systems and robotics to in the future establish central control for the three main production areas (Commissioners' Meeting Room, the studio and the Blue Room [caucus and conference room area]).
- Additional field equipment is needed, including mobile van capabilities. Portable equipment should include small but highly capable video recording devices such as DSLRs. This would enable CCGTV to cover more Town Hall meetings, live press conferences and other live events anywhere in the Charles County community.
- Additional audio reinforcement capabilities for the Commissioners' Meeting Room.
- Additional storage to provide for increased storage capacity.

All in all, participants indicated that it was very important that they continually be able to upgrade and "keep up with technology" so that they could "stay ahead of the curve."

- **CCGTV needs to expand its delivery methods to again help ensure the widest possible provision of, and access to, County Government programming --** This would include increased streaming and on-demand access, including cable-based on demand access. It also means ensuring transport in high definition as the technology moves to support complete production and distribution in high definition. It further means having substantial programming description detail in the Electronic Program Guide.
- **CCGTV also is looking toward some operational enhancements in the future to help support expanded content creation --** This includes additional program production personnel, as well as having dedicated hours from a video/IT engineer to support the technology. It also includes having personnel devoted to provide script writing and pre-production support. What these operational enhancements would enable would include expanding existing programs such as *Safe and Secure* and adding *Crime Watch* programs related to public safety, developing a weekly news show focusing on the Charles County community, covering more weekend events and providing more support for Town Hall meeting coverage as well as programs to enhance economic development.
- **The provision of cable service to County Government locations and other public facilities continues to be critical --** Participants in the focused discussion noted that it was very important to continue to have access to cable service, especially channels that provide news and information and CCGTV. It was noted that there are some agencies that don't have access to cable, including some locations of the Health Department, Public Safety, Recreation and community centers. It would also be helpful for certain nonprofits that work in conjunction with the County to have access to cable service.

## **Facilities and Equipment**

### **Equipment Baseline Definitions**

CBG's assessment established certain "baseline requirements" that apply to CBG's needs assessment and equipment projections for all PEG production facilities. The goal of the Baseline Definitions is to define core requirements for these organizations as they continue to transition from their current video production environments to the industry standard of high-definition and other associated digital technologies, and to successor digital technology as it becomes industry standard, in order to meet the needs assessed by this report. The Government, Educational and Public/Community Access Upgrade and Replacement spreadsheets<sup>12</sup> include a description of the type and range of equipment needed in order to function adequately at the HD digital level. Some equipment that is not related to digital transition, but is still critical for video production, is also included in the spreadsheets. Items such as tripods, light stands, and microphones are generic to the facility, and are not format dependent. Considerations for support of legacy equipment in a phased transition are critical to ensure continued operations as the facility moves into the HD world.

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<sup>12</sup> See Exhibit B.1, B.2 and B.3.

All new equipment purchased by the Access organizations should be High Definition. Standard Definition (SD) equipment can either be a 4x3 or 16x9 aspect ratio (in a digital format, not analog). SD equipment can be anything from consumer grade to broadcast (professional) quality equipment, whereas HD always has a 16x9 aspect ratio and produces video with a much higher, professional level, quality than SD. As the television production world has moved over time from black and white to color, VHS to DVD and Blu-ray, and from analog to standard definition digital, it is now moving rapidly to a fully high-definition digital environment. This means that eventually little or no standard definition digital production and post-production equipment will be available in the marketplace, nor will replacement parts to repair existing SD equipment be available. Additionally, the cost for high-definition equipment continues to fall, making it available at a reasonable cost during the term of a renewed franchise. These two factors together make it far more cost effective for PEG Access organizations to acquire HD equipment in all of their new equipment purchases.

The broadcast, cable and satellite industries have moved to HDTV because of the obviously better picture quality and sound quality, which viewers now demand. The percentage of American households outfitted with HDTVs has increased substantially over the past five years: 77% have at least one and 46% have multiple HDTVs, according to a report from the Leichtman Research Group (LRG).<sup>13</sup> That compares to 34% and 11%, respectively, five years ago. According to the research, the percentage of HDTV homes continues to grow. Although statistics are difficult to obtain on the exact amount of programming available in HD, it is CBG's experience that in order for television providers to remain competitive and expand viewership, they must deliver programming in HD. This applies to PEG Access organizations as much as to commercial cable channels.

Accordingly, based on the assessed needs of the PEG channel operators described in this report, CBG recommends that all new equipment purchases be HD, but in some cases still SD-compatible based on integration with existing equipment. This allows access to past programs or applications that could only be retrieved by utilizing legacy equipment.

### Virtual Set Technology

CBG recommends virtual set technology be installed in the main production studios of Charles County Government (CCGTV), Charles County Public Schools, College of Southern Maryland (CSM TV) and Public Access. This technology uses computer generated environments to create the illusion of a physical set in which subjects perform, substantially reducing the expense and logistics of managing physical sets. Sets can be generated live or subjects can be videotaped against a "green screen" and the virtual set added in post-production. The technology permits a variety of sets for different program types, at little cost, and allows for more efficient use of limited studio space.

PEG Access channels, like commercial channels, continue to have more and more competition from other video services while their viewership and user community demand increased program offerings. In the current environment of constrained budgets all content providers, including Charles County PEG Providers, must have faster and more economical ways to deliver a greater

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<sup>13</sup> <http://www.telecompetitor.com/lrg-hdtv-penetration-u-s-households-reaches-nearly-60/>

range of programs. Virtual set technology meets this demand to produce and deliver more with less by substantially eliminating the time and cost of building, taking down and managing physical sets, with no loss in production quality. It permits use of a variety of video environments to keep programming fresh and creative, bringing viewers back to the channel, at a fraction of the cost and time required for multiple physical sets.

CBG recommends use of a chromakey curtain in each entity's studio space that can be pulled in place as needed, as opposed to a static green wall. This will add flexibility to sets, is easy to maneuver and use, and creates the illusion of increased depth, giving the viewer the sense of a larger space.

### Ancillary Equipment

This spreadsheet category includes basic items such as microphones, teleprompter equipment, PA, miscellaneous stands, tripods, recorders, workstations, fixtures, and the like, plus their upgrades and replacements. It is necessary for any PEG production facility and must be replaced, upgraded and added to, over the term of a renewed franchise.

### CCGTV Governmental Access Facility and Equipment Needs

Based on the information gathered from site reviews, interviews and focused discussions, an analysis was made by CBG to determine the cable-related needs of Charles County Government's access operation, CCGTV, using our expertise, experience, comparisons with other similarly situated PEG Access operations and understanding of capital and operating funds needed to meet the needs. We then made pertinent facility and equipment projections for Charles County, including specifications and costs for recommended equipment. Key projections are detailed below.

### Production Studios/Studio Control

Production studios, along with studio control (control room and equipment for the main studio), is considered the nerve center of a video production facility, typically requiring a large commitment of resources and funds. During our visit to the Charles County Government facilities, CBG identified a number of studio needs and recommend the following to meet needs of the studio at CCGTV.

### Studio

The cameras in the studio are high quality and are capable of shooting 4K resolution. We recommend that the main studio continue to be equipped with cameras that are HD capable or more advanced, and that studio video monitoring equipment be upgraded with new equipment.

We recommend virtual set technology be installed in the main studio. As discussed earlier, this technology uses computer generated environments to create the illusion of a physical set in which subjects perform, reducing the expense and logistics of managing physical sets. Sets can be generated live or subjects can be videotaped against a "green screen" (variously, a screen,

wall or curtain) and the virtual set added in post-production. The technology permits a variety of sets for different program types, at little cost, and allows for more efficient use of CCGTV's limited studio space.

New lighting technology is also recommended to include both dimmable LED fixtures as well as a new lighting grid and the ability to change color temperatures.

### **Blue Room**

The Blue Room is a multi-purpose room used for various meetings by both the Commissioners and County staff. For example, it is used for training and occasional Commissioner work sessions. CBG has recommended updates to all of the existing equipment which includes: cameras, microphones, monitoring and the projection system.

### **Studio/Blue Room Control**

“Studio control” refers to the equipment, usually located in a separate walled area of the studio, from which camera feeds can be controlled and switched, graphics are created and mixed, and lighting, audio and other production elements are controlled.

A review of the current and projected equipment in main Studio and Blue Room control indicates how critical it is to CCGTV's program production. This results in programming with high production values that all agree, and we concur, are necessary for a professional level of production that is well regarded by viewers.

It was noted during the site visit that the current Studio/Blue Room control lacks the equipment necessary to switch and record live camera feeds from the studio and that equipment is so outdated that it is causing drop-outs in video productions. Recently, the County has moved to replace the production switcher with an advanced, HD capable system (the prior production switcher was no longer supported by the manufacturer due to its age). A high priority is considered to be upgrading the other equipment in the Studio/Blue Room control room as well.

### **Charles County Government Hearing Room and Hearing Room Control**

The Hearing Room at the Charles County Government facility is the central location for public meetings, Commissioner work sessions and hearings, and any other gatherings for County business.

The accompanying spreadsheet details the equipment to be used in this space which include; cameras, microphones, monitors, a projection system, digital recorders and all the necessary supporting equipment to record the events in the Hearing Room. CBG has noted from staff interviews that audio speakers need to be replaced in the Hearing Room and have accounted for this replacement in the Ancillary cost projections.

## Field Acquisition

Field Acquisition is one of the simpler functional areas to transition to modern HD digital because it is an independent process that does not rely on the other functional areas. Current HD cameras offer many capabilities and are cost-effective, lightweight, and easy to use.

CCGTV currently has three camera field packages that have been purchased within the last 5 years. Two field packages are more traditional XD Cams and one is a more modern DSLR camera. The camera field packages recommended going forward all include one HD camera, one tripod and two channels of wireless audio and accessories and have been recommended to be implemented as upgrades in Year 2 and Year 5.

Flypacks are portable units that enable the users to produce a complete multi-camera production in the field or indoors, and allow for staff to be flexible and mobile for events from different remote locations. The location shoots are an ideal use for combining the flypack with the mobile production vehicle discussed later in this report. The price range varies greatly on flypacks depending on the flexibility needed.

We recommend purchasing one new flypack system, specifically for remote production at various, changeable locations in the field, as shown in the equipment spreadsheet. This flypack system will be capable of multi-camera live switching of three robotic pan, tilt, zoom (PTZ) cameras as well as insertion of live graphics. It should be HD capable. Generally, flypacks are used for indoor purposes, such as coverage of sporting events, meetings, and special events. When coverage of outdoor events is needed, it is generally better to use the flypack in tandem with a mobile production vehicle for the protection of the equipment. Additionally, the temperature around the equipment can be better regulated and it provides a more ergonomic environment for the production crew. We have recommended a sprinter-type vehicle for mobile production use combined with this equipment. More details will be given about the mobile production recommendations in the section below.

## Post Production

Post Production lends itself to ease in transitioning to HD due to the fact that it can be done as an independent process that does not depend on the functional areas in the rest of the facility. In post-production, raw footage of video and audio are edited to create a finished program. Graphics and other creative additions can also be inserted to create a more professional product.

The major types of equipment involved in the baseline post production category are for ingestion (loading video into servers for processing), monitoring, digital audio mixing, video editing, and video recording (portable solid-state recorders for preference).

CBG has determined that four new edit systems should be procured to replace the current systems, which are aging and have older technology.

## Infrastructure

“Infrastructure” includes equipment necessary for all functions in a video production facility, such as encoders/decoders, optical transmitters/receivers, routers, signal converters, and high capacity cabling throughout the facility, sufficient to produce and distribute high-quality HD signals. Audio and video routing is the ability to interconnect signals throughout the facility. This means that content from an edit suite or a studio can be routed to playback or to another production area, making it possible to share content among producers and productions with the touch of a button. Since the infrastructure is the backbone for all existing and new equipment needed to communicate throughout the facility and to transport the channel to the cable operator, it is essential that infrastructure components be upgraded to handle both the existing equipment and new equipment we have recommended. For example, it is important to have adequate infrastructure in place to support the conversion of legacy SD video to HD, which requires high bandwidth network connections.

The audio/video routing system recommended for Charles County government access infrastructure should be capable of complete HD routing that will enable the movement of HD video and digital audio signals simultaneously through the facility. We are recommending a router with 16 inputs by 16 outputs.

The number of optical transmitters and receivers recommended in the spreadsheet reflects the channel CCGTV has now and the aggregate transport of the channels from CSM via the County to Comcast.

## Archival/Storage

As Charles County’s production facilities grow, produce and provide programming in HD requiring greater storage and archival capacity, the need for more archival/storage space will increase as well. Storage and archiving is important because it enables staff to save and share their work, such as standard shots of community scenes, collaborate in projects where elements are similar in nature, and store programs that can be used in an “evergreen” fashion.

Archiving and storage is also used to house finished programs that can be accessed by residents for on-demand viewing of programs. Not only can programs be archived, but they can be categorized by subject, producer, event type, or date and can be stored in various file types. Television viewers are also demanding the ability to view programs online via computers or mobile devices. Storing categorized programs is necessary for such access to programming.

Even though Charles County has some of this technology in place, we have included costs for significant upgrades and growth throughout the 10-year projected timeframe, based on necessary increases in the amount and type of programming that is being, and will be, produced and distributed across multiple platforms. Specifically, CBG’s review shows that Charles County needs an additional 96 terabytes of storage over the 10-year equipment upgrade and replacement schedule. This has been calculated based on our estimation of the current and future programming projections against the storage requirements needed for HD content (approximately 35 gb per hour of programming).

### Production Servers/Playback

Production servers must have the capability for both standard and HD playback, moving to all HD in the future, must have the ability to have programs transferred to them over the network (real-time ingestion), and must have a robust scheduling capability to enable a well-rounded playback resource.

Charles County's current playback system is standard definition. CBG has recommended the upgrade of the current playback system to be fully HD and compliant with the above capabilities.

### Headend/Character Generator

A requirement we identified for the Charles County's headend/playback capability is a character generator (CG) capable of 24/7 playback of on-air bulletin board information. This allows for additional programming features that are of interest to residents. The character generator will enable the playback of video sources as well as the bulletin board information required.

Moving into the future, CBG has allowed for use of a stand-alone system or CG capabilities could also integrate into the playback server if desired.

### On Demand/Streaming

Both Internet streaming and Video on Demand (VOD) streaming have become an integral part of many production facilities' outreach to the public, especially consumers without cable television services. With this in mind, video streaming equipment needs to be capable of handling signals within the facility, be HD compatible and in most cases, capable of running 24/7 so that the facility is running at full HD capacity and viewers can access information and programming "on demand". The equipment should also include both live streaming and VOD capability and is included in the cost for the type of playback system we are recommending.

This system should be robust enough to enable the simultaneous encoding of multiple feeds for both internet and cable-based linear and VOD delivery thus saving time and increasing efficiency for staff and the turnaround time for distribution of access programming.

Encoders are also included and recommended in the attached spreadsheets for future replacement.

### Mobile Production Vehicles

A Mobile Production vehicle is a valuable and flexible resource for any video production staff. Because of this, it is important that the equipment be state of the art and its capabilities match the capabilities used throughout the facility.

Based on our review of facilities and equipment needed to support Charles County's plans to increase the nature and types of programs produced in the field, we are recommending a mobile production vehicle for CCGTV (that would also be shared with CSM, Public Access and Charles

County Public Schools). For example, the mobile production van will allow for efficient coverage of more community events. Such coverage will increase responsiveness to, and involvement with, the community at large, while also increasing visibility, thus promoting both increased viewership and civic engagement. Consistent with this, we recommend that the Mobile Production vehicle be a sprinter-type van that is capable of housing and transporting the HD flypack and have patch panels and a climate control system. This enables multicamera productions to be produced in both indoor and outdoor venues, where the truck can also serve as a mobile control room when needed.

### **Production Facility Expansion**

As noted in the interviews, focused discussion and our site visit, CCGTV's production facilities are split into various locations and are smaller than needed, especially in consideration of future content development needs and plans. In light of this, CBG has projected space allocation and associated funding requirements for a consolidated, expanded production facility to be developed early in any renewed franchise. These projections are found in Exhibit B.4, attached to this Report.

## **Findings – K-12 Educational Access**

### **Overview of Charles County Public Schools CCPS TV Channel 96**

CCPS TV is the K-12 Educational Access channel operated by Charles County Public Schools. Before 2007, CCPS TV aired a variety of educational programs provided by outside sources. Since that time, CCPS has substantially upgraded its television programming, including a variety of programs produced in its own television production facility, programs produced in the field in conjunction with the various schools and live and rebroadcast coverage of Charles County Board of Education (BOE) meetings.

CCPS TV is headquartered in the Public Schools' Annex 2 Building and includes the television studio, storage and post production areas and offices. Live broadcasts of Board of Education meetings come from the BOE Meeting Room across Radio Station Road from the Annex 2 in the Jesse L. Starkey Administration Building.

The CCPS TV studio is used to produce various television programs including *NewsBreak*, which is a biweekly show produced in conjunction with CCPS students. *NewsBreak* uses student anchors that focus on stories developed and produced by Department of Communications staff. The show centers on activities, events and issues occurring within the various schools. Examples of other CCPS TV programs include school play previews and shows that showcase teacher and student accomplishments, programs such as the Judy Center and JROTC, plus initiatives like *Code.org* and the *Hour of Code*. There is also a variety of special programming that highlights staff and student achievements, as well as *On Air*, a program which provides an in-depth look at CCPS programs and offerings. In fact, 193 original programs were produced in the three-year period from June 15, 2012 to June 16, 2015.

CCPS TV also includes a variety of instructional and educational programs that come from such sources as Maryland Public Television, Star Step Network, NASA, Visual Learning Company and the National Gallery of Art.

CCPS TV has a strong presence accessible via the internet. This includes placement of all original content on demand on the CCPS TV portion of CCPS's website. CCPS TV also provides content through a YouTube channel, which is being shifted to Vimeo. Additionally, CCPS TV live streams a large portion of its content. A tracking program named Google Analytics tracked CCPS TV access through CCPS's main website during the most recent completed school year (2014-2015). There were 21,345 video views during that time.

CCPS TV is part of the Communications Department. The Communications Department has five full-time communications professionals (5 FTE), and one FTE, a videographer editor, is assigned to the operation of the station full time. The videographer editor is supported by a communications specialist that edits scripts and television copy; a communications assistant who creates slides for the bulletin board that runs when videos are not otherwise provided, as well as assisting in recording *NewsBreak* and live meetings; and a web specialist that assists with the use

of certain technology and recording activities. Volunteer students provide additional support for the *NewsBreak* production and college interns sometimes are available during summer hours.

### Interviews and Focused Discussion with CCPS Staff

As part of the overall PEG Needs Assessment, CBG held interviews and a focused discussion with CCPS TV staff, as well as other staff members from the Communications Department and other CCPS department representatives. Participants included the CCPS TV station manager, representatives from the IT Department and a variety of other Communications Department personnel, including the Director, those assigned to assist with script writing and others. Key findings from the interviews and focused discussion were:

- **CCPS TV provides a wide diversity of programming to the Charles County community** -- Focused discussion participants noted that all School Board meetings were carried live and then rebroadcast at different times of the week. There is also a biweekly student news program and a program entitled *On Air* which features students and scholastic activities and includes an in-depth look at programs, initiatives and events within the schools. Special events such as the Excellence Awards are also covered as well as School Board work sessions. Additionally, documentaries are produced from time to time, and there is a significant push to develop original programming along the lines of STEM (Science, Technology, Engineering and Math). In between video programming, slides are played which provide news and information about CCPS. The channel is also available to broadcast emergency information.
- **CCPS TV works to provide outreach to the Charles County community and engage the public** -- Participants noted that a recent survey showed that one-third of cable subscriber households with children found the channel to be an essential part of the way they sought communications from the School District. CCPS indicates that longer form video enables the District to tell a story with much more depth and encourage a greater amount of understanding by the viewing public. It enables the Charles County community to connect with the District in ways that benefit both the residents and the School District.
- **CCPS TV involves students in many phases of the channel's operation** -- Specifically, participants noted that students anchor the student news program as well as interview guests and those involved in the particular issue that they are covering. They help develop public service announcements and are instrumental in the development of programming to help fellow students. CCPS has noted that students that become interested in careers in communications and technology are more apt to go to college. Accordingly, CCPS TV has set up an apprenticeship program where students come in to help develop programming and assist the professional staff. It thus becomes an instructional tool and has become, for magnet-type schools, a recruitment tool.
- **CCPS TV needs a variety of upgrades in order to continue to expand its programming and continue to be a critical resource for Charles County residents** -- Participants noted that coverage of events is a critical part of CCPS TV programming, but

additional equipment is needed in order to increase that type of programming. Participants also noted:

- The School Board Room needs an upgrade to HD equipment.
  - The lighting in the Board Room needs to be improved and augmented.
  - A new production facility needs to be developed with additional space and upgraded equipment.
  - Better multi-camera equipment is needed.
  - More live capability needs to be developed around the School District.
- **CCPS needs to keep up with the forms and formats of delivery that will allow it to continue to expand and reach its diverse audience --** Participants noted that HD channel capacity is needed to ensure that CCPS TV reaches an increasing number of viewers that focus their viewing in HD tiers. Additionally, it provides a higher quality signal, consistent with the continuing upgrades and equipment quality that CCPS TV is pursuing, which would enable higher quality video to be accessed by CCPS TV viewers.

CCPS TV works to provide live stream and internet-based on demand but also needs to have access to the cable-based video on demand platform to ensure that, no matter what a viewer's viewing habits are, they are able to reach CCPS TV programming. CCPS TV would also like to investigate and explore interactive television (iTV) opportunities, knowing that two-way video/audio helps increase the benefits received from instructional and educational programs.

- **CCPS TV needs to expand its staffing levels --** Participants noted that this especially centers on engineering assistance. Since this is an issue for other PEG entities in the County, perhaps some shared engineering resources would be the most beneficial and cost-effective way to proceed.
- **Cable services are still utilized in the schools, but CCPS wants to explore different ways of providing those services --** Focused discussion participants noted that while some teachers throughout the public school system utilize the cable services provided by the cable connections from Comcast, because there are only three DTA units provided per building, it is difficult to distribute it to all classrooms that would desire it. Participants noted that there may be other ways of receiving the cable service, and then redistributing it over the CCPS network. For example, cable services could be delivered to CCPS's central office, re-encoded as IP video and sent across the network to any user within the public school system. Participants indicated that this should be explored with Comcast during franchise renewal negotiations.

## **Charles County Public Schools (CCPS) Facility and Equipment Needs**

Much like CCGTV, Charles County Public Schools (CCPS) has a mission to communicate valuable content to the citizens of Charles County. As noted in the focused discussion, in the summer of 2015, CCPS completed a survey to the households with children in the public schools. Eighty-one percent of the households surveyed indicated that they subscribed to cable

television services and of that percentage, 33% viewed the station to obtain information regarding Charles County Public Schools.

As stated above, because of the move toward HD technology, it is important for Charles County Public Schools to grow its technology to keep pace with industry standards and support the vision and goals of the CCPS TV management and staff. Future goals of CCPS TV include televising a homework help program and high school sporting events. The equipment that CBG is recommending will allow CCPS TV the ability to support these goals.

### Virtual Set Technology

CBG is also recommending the use of Virtual Set Technology for Charles County Public Schools. We have recommended this technology to be included in their production chain to enable live virtual set and chromakey in studio productions. This will allow the staff, faculty and students to have greater flexibility with their productions and video environments at a fraction of the cost and time required for multiple physical sets.

### Ancillary Equipment

Identical to CCGTV, this spreadsheet category includes basic items such as microphones, teleprompter equipment, PA, miscellaneous stands, tripods, recorders, workstations, fixtures, and the like, plus their upgrades and replacements. It is necessary for any PEG production facility and must be replaced, upgraded and added to, over the term of a renewed franchise.

During the focus group meetings with staff, a need was identified regarding the lighting in the School Board meeting room. This is a difficult room to light properly and would benefit from additional enhancements to the current lighting system. This has been addressed in the accompanying spreadsheet.

### Production Studio/Studio Control/School Board Room

CCPS TV currently has one studio and one control room that also serves as the control room for the School Board meeting room.

During our site visit and talking with staff, it was noted that much of the equipment in these areas needs to be updated to meet the HD baseline. The equipment CBG has identified is listed below.

#### Production Studio:

- HD Studio Cameras
- Studio Monitoring
- LED Studio Lighting
- Virtual Set Technology

#### Studio and School Board Control:

- Video Production Switcher

- Robotic Camera Control
- Character Generator
- Digital Audio Mixer
- Multi-viewer Monitoring
- Solid-state Recorder
- Distribution Amplifiers and cabling
- Engineering/Confidence Monitor

#### School Board Room

- Four Robotic HD cameras
- Twenty gooseneck style wired microphones (with mute functions)
- Seven wireless microphone systems (for public input)
- One monitor (65" monitor for staff and audience to view presentations)
- Digital Audio Mixing System
- Assisted Listening Device for the hearing impaired
- Augmented Lighting System

### Field Acquisition

The recommendation to meet the needs assessed for camera field packages for CCPS TV is for five high-end camera field packages that include 2 channels of wireless audio along with a full HD camera, tripod, lighting package, audio and accessories.

CBG has described the flypack system and its benefits in the CCGTV portion of this report. Additionally, as described above, a flypack system is usually recommended for use with a Mobile Production vehicle. We recommend that CCGTV and CCPS share the production vehicle along with the College of Southern Maryland and Public Access to obtain the most efficient use of the vehicle as a shared resource.

### Post Production

As referenced in the CCGTV portion of this report, Post Production lends itself to ease in transitioning to HD due to the fact that it can be done as an independent process that does not depend on the functional areas in the rest of the facility. In post-production, raw footage of video and audio are edited to create a finished program. Graphics and other creative additions can also be inserted to create a more professional product.

The major types of equipment involved in the baseline post production category are for ingestion (transferring video into servers for processing), monitoring, digital audio mixing, video editing, and video recording (portable solid-state recorders for preference).

### Infrastructure

Infrastructure includes all equipment such as, Encoders/Decoders, Routers, Optical Transmitters/Receivers, Signal Converters, wiring and cabling needed throughout the facility to distribute high-quality HD signals. Since the infrastructure is the backbone for all existing and

new equipment needed to communicate throughout the facility, it is essential that this functional area be upgraded with the ability to handle the new and existing equipment. It is important to have the right infrastructure in place to support the conversion of SD to HD.

The audio/video routing system recommended for CCPS TV's infrastructure should be capable of complete HD routing that will enable the movement of HD video and digital audio signals simultaneously through the facility. We are recommending a router with 16 inputs by 16 outputs.

### Archival/Storage

CBG has discussed the importance of the need for storage space in CCGTV's portion of this Report. It is equally important for CCPS. HD requires greater storage and archival capacity due to the size of the files that are created. Storage and archiving is important because it enables staff to save and share their work, such as standard shots of community scenes, collaborate in projects where elements are similar in nature, and store programs that can be used in an "evergreen" fashion.

CBG has recommended 48 terabytes of additional storage space to continue the ability to store and access programming.

### Production Servers/Playback

Knowing the need of HD playback in the future, CCPS has acquired an updated playback system that is capable of HD playback with the anticipation of having an HD channel on the cable systems. This new system gives them the ability to have programs transferred to them over the network (real-time ingestion) and have a robust scheduling capability to enable a well-rounded playback resource.

In the accompanying spreadsheet, CBG has accounted for this updated system by looking to replace it in Year 4 of the franchise with a further updated system.

### On Demand/Streaming

As stated earlier, both Internet streaming and Video on Demand (VOD) streaming have become an integral part of many production facilities' outreach to the public, especially consumers without cable television services. The equipment should include both live streaming and VOD capability and is included in the cost for the type of playback system we are recommending.

This system should be robust enough to enable the simultaneous encoding of multiple feeds for both internet and cable-based linear and VOD delivery thus saving time and increasing efficiency for staff and the turnaround time for distribution of access programming.

Encoders are also included and recommended in the attached spreadsheets for future replacement. It should be noted that CCPS is currently streaming programming 24/7. Upgrades to this streaming capability should include migrating from SD to HD and accounted for in the accompanying spreadsheet.

### Mobile Production Vehicles

A Mobile Production vehicle is a valuable and flexible resource for any video production staff. Because of this, it is important that the equipment be state of the art and its capabilities match the capabilities used throughout the facility. As stated above, we recommend that CCPS share the production vehicle with CCGTV, College of Southern Maryland and Public Access as an efficient cost saving measure.

The mobile production van, will allow for efficient coverage of more events occurring throughout the Public Schools. Such coverage will increase responsiveness to, and involvement with, the Charles County community at large, while also increasing visibility, thus promoting both increased viewership and engagement.

### New Production Facility

CCPS TV is located in an old building, where the television production facility needed to be tailored to fit the available space. Accordingly, CCPS is in need of a new production facility that can accommodate both current and planned productions throughout the term of any renewed franchise. The space and associated funding for this facility is projected in Exhibit B.4.

### Overview of The College of Southern Maryland's (CSM) Higher Educational Access Channel, CSM TV Channel 98

CSM TV is the Higher Educational Access channel operated by the College of Southern Maryland. It serves a variety of purposes for the College, including providing outreach and educational programming for the citizens of Charles County, instruction in a variety of subject areas for college students and a training ground for CSM students in news, media and digital video production.

Locally produced programming includes *CSM Beat*, a program about activities, occurrences and topics related to CSM's multiple campuses in Southern Maryland; the CSM graduation; *Heroes Campaign*, *The Golf Classic*, *Robotics Challenge* and coverage of the first day of school on each of the CSM campuses. Beyond this, informational slides related to a number of CSM events, activities and opportunities are shown between video programming. Various student-generated programming is also provided over the channel.

The studio is also used by CSM to develop programs of interest to the campus community, such as CSM Emergency Preparedness, voiceover work for CSM's online student loan tutorial and other types of training and instructional programming.

Programming procured from other sources and provided over the channel to the Charles County community includes STEM (Science, Technology, Engineering and Math) educational programs, global news, arts programming and entertainment programming.

CSM TV operations are fully supported by the College and include a full-time executive producer/station manager (who also runs the Public Access Channel, as further described below), student assistants and interns. This provides approximately 2 FTE for each of the channels.

### Interviews and Focused Discussion with CSM Representatives

As part of the overall PEG Access Ascertainment, interviews were held with the College President and CSM TV staff, as well as representatives from a variety of CSM departments. Interviewees and focused discussion participants included the CSM TV Station Manager and associated College staff; the College of Southern Maryland President; the Safe Community Center Project Coordinator; the College's Photography Coordinator; staff and management from the Community Relations Department; the Marketing Coordinator; technical support representatives; the Assistant Vice President of Enrollment; the Director of Student Athletics; the Chair of CAH (Communication, Arts and Humanities Division); and an English professor who has been involved in CSM TV program production.

The topics discussed were similar to those discussed in the other PEG Access focused discussion groups, except with a specific Higher Educational Access focus. Topics included examples of how interviewees and focused discussion participants have been involved with CSM TV; the importance of having local higher education programming available to the Charles County community; the needs for the future related to various types of Higher Educational Access content; the needs for the future related to specific types of video and audio production facilities and equipment; the need for live and remote signal origination; the need for detailed programming information to be available on the digital menu/Electronic Program Guide (EPG); and the need for various types of delivery methods and methodologies, such as HD, video on demand and interactive television (iTV). Key findings from the interviews and focused discussion included:

- **CSM TV is beneficial to the College because it both involves and attracts students --** CSM's digital media program is growing, and the sophisticated equipment that is available to CSM TV attracts students. It helps with part of their mission to provide education and training in today's technology. The quality of the facilities and the digital media program provides opportunities for students that aren't available in other places.

Additionally, CSM TV serves as an overall recruitment tool in that it connects to and attracts future students. It provides outreach and makes all the programs and activities at CSM accessible to those that may enroll at the College. It provides information on what it is like to take a class and other orientation activities. It helps orient parents as well as students.

- **CSM TV connects the College to the Charles County community at large --** Besides current and prospective students, their families and friends, CSM TV makes the College accessible to the community at large. This serves another part of the College's mission to be involved with and integrated into the community in Charles County and Southern Maryland as a whole. Part of this is accomplished through the Public Access operation that CSM supports which is further detailed in the next sub-Section. Another part of this

is accomplished by the types of information provided to the community such as continuing education programming; news and information about campus activities that the community is encouraged to take advantage of and participate in; programming that provides intersections with the community at large such as the recent focus on Hispanic heritage activities on campus; programs on job fairs, career services, preparing resumes and preparing for interviews; and programming on health issues. All of this is programming which is beneficial to both CSM students and the community at large.

- **CSM TV's programming diversity continues to grow and is forecast to expand substantially over time** -- Participants noted that as the Channel's capabilities grow, so will the amount and type of programming. For example, more college athletics can be covered. The plan is to involve CSM TV and digital media productions in faculty lesson plans, and provide an outlet not just for student-generated programming, but for faculty-generated programming as well. This can include instruction, documentaries, panel discussions and other programs where faculty members will bring their expertise to the program content development process.

Another area is fine arts. A focus on fine arts programming not only is attractive to the audience, but will also help recruit future students.

Additionally, beyond the nonprofit organizations that make use of Public Access, the Nonprofit Institute on campus, which supports a number of nonprofit initiatives, also can engage nonprofits in program development on a variety of issues and topics of great interest to the community at large.

- **Facilities and equipment enhancements are needed for CSM TV in order for it to continue to assist the College in meeting its mission** -- Focused discussion participants noted that the CSM TV facility needs to expand its space, especially in the amount of production space, office area, editing space for an audio booth and space for set storage. This will benefit both CSM TV and the Public Access operation. Regarding equipment, the following was noted as needed by participants:
  - Upgraded editing equipment.
  - Additional field equipment, especially multi-camera field equipment that can be shared between CSM TV and Public Access. This should include remote transport equipment as well as audio mixing and video switching equipment.
  - Robotics for cameras in the studio, so that they can be operated by a smaller crew.
- **CSM TV needs to be delivered in a variety of formats, beyond its current SD linear channel** -- Interviewees and focused discussion participants noted that CSM TV needs to have access to the cable-based on demand platform, for non-real time access to certain important and evergreen programming by viewers. This could include, for example, job fairs and workshops, programs produced by the Small Business Development Center, recent college athletic events, how-to and other instructional programs, and others.

Also, participants noted that with much of the facility already being in high definition (including some in HD 4K), as well as others that are planned for migration to HD, it would be important to have HD capacity on the cable system, again in order to reach the widest possible audience.

Participants also noted an interest in the use of interactive television (iTV) since interactive content could help engage the viewing public more and provide for greater diversity of programming.

Additionally, focused discussion participants indicated that it was important to have detailed program listings on the system, which again would help attract more viewer interest and selection of CSM TV programming.

- **CSM envisions a future where CSM TV is an integral part of student and faculty experiences at the College and provides a wide array of programming covering every part of the College experience --** For example, participants noted that it would be beneficial one day for every student to produce some sort of content for the Channel, for every faculty member to provide at least a half-hour lecture program on their area of expertise, and for coverage of every speaker on campus and other activities to appear on the Channel.

Participants noted that CSM TV's facilities and support from the College should be such that students graduating with digital media production experience would be "top notch" as entrants into careers in digital media.

Overall, focused discussion participants and interviewees noted that CSM TV is and will continue to be very important to the College in all the areas they noted.

### **Facilities and Equipment Projections for CSM TV**

Because CSM TV and the local Charles County Public Access Channel share equipment and a production facility, the facility and equipment projections for both can be found after the next sub-Section on the local Public Access Channel.

## **Findings – Public/Community Access**

### **Overview of Charles County’s Local Public Access Channel (LPACC-TV), Channel 99**

The College of Southern Maryland also operates Local Public Access of Charles County, LPACC-TV, Channel 99. It is co-located with CSM TV and shares many of the same studio, post production and remote production facilities. LPACC-TV is available to all residents of Charles County, as well as nonprofit organizations. It provides a variety of locally produced programming, as well as programming cross-provided from other access channels and imported programming.

Examples of programming produced by Charles County residents cablecast over LPACC-TV include *Civil Rights Tour*, *Chautauqua: Emily Dickinson*, *Piscataway Conoy Tribal Dancers and Drum*, *Remembering the Holocaust: Bob Behr*, *Unity In Our Community*, *Vet Talks* and *The Talk Show with DJ Gatsby*. Organizations have also produced PSAs including the *Clothesline Project*, *Diversity Forum* and the *Big Give Campaign*. From July, 2012 to June, 2015, the Public Access studio and facilities have been booked annually varying from 17 to 56 times, with up to 104 new programs aired on the channel annually. Beyond this, a variety of community information slides are produced and aired when video programming is not otherwise available.

Programming is provided by County nonprofit organizations, including program sponsors and producers like the Humane Society of Charles County, the Maryland Veterans Memorial Museum at Charles County, United Way of Charles County and others. State organizations also provide programming, including the Maryland State Police and the Maryland State Transportation Authority. Additional community programming is provided by Charles County Government, the College and the Towns of Indian Head and La Plata. The Comcast local origination program, *Comcast Newsmakers*, is also provided over the channel.

The College supports the operation of LPACC-TV. It has a 10-hour course that trains students in the operation of the facility, who in turn provide facilitation support and assistance for members of the Charles County community.

### **Interviews and Focused Discussion with LPACC-TV Staff and Program Producers and Providers**

As part of the overall PEG Access Ascertainment, CBG held interviews with LPACC-TV’s staff, as well as a focused discussion with LPACC-TV staff, student facilitators and Public Access program producers and providers. Interviewees included the College of Southern Maryland President and the Station Manager, and focused discussion participants included production assistants from the College, as well as local program producers including the founder of the nonprofit organization Point of Change, the president of a local veterans’ organization and the founder of Taste of Southern Maryland.

Topics discussed included: the importance of the availability of Public Access programming in Charles County; the importance of the Public Access Channel in supporting individual speakers and nonprofits; Public Access programming diversity; the response from the community related to Public Access; and technical issues related to the Channel. Additional topics included the successful areas of current Public Access programming production and distribution; improvements that are needed; facilities and equipment needs; the ability to interconnect with other public access entities; the importance of different delivery formats and methods including HD and video on demand; the importance of program guide listings; and visions for both the short-term and long-term future of Public Access.

Key findings from the interviews and focused discussion included the following:

- **The Public Access Channel in Charles County provides effective outreach opportunities for both individual producers and nonprofit organizations** -- Participants in the focused discussion and interviews indicated that the Public Access Channel is an effective outreach tool for those that use it. It allows a producer to “get your name out” as well as provide important local information. One participant indicated that PSAs related to veterans’ issues have been very helpful to their organization’s mission. Another indicated that it provides another important outlet and that they “love being able to have the Public Access Channel as an outreach option.” It was noted that the Channel allows organizations to “highlight themselves” and their missions and services.
- **CSM sees Public Access as an important part of its overall mission of serving the educational and informational needs of the Charles County community** -- It was noted by interviewees and participants that Public Access enhances the relationship between the College and the Charles County community, because it not only provides opportunities to serve the community by making available production resources, but also opens up possibilities for community organizations to work with the College and its Nonprofit Institute in better serving the educational and informational needs of the Charles County community overall. It was noted that modern production facilities were being provided to individuals and organizations, as well as training and facilitation provided by production assistants who are also students at the College. Participants noted that the use of high definition cameras and other technologies enabled “high production values” for both independent producers and nonprofit organizations’ programs. It also helps facilitate effective programming production for those with small budgets, since the production resources are supported by the College. Participants noted that it was a full-service facility that now needs (as discussed further below) some additional resources to grow.
- **The Public Access Channel in Charles County provides a great diversity of programming** -- Participants noted that local productions included shows about veterans, services such as counseling, fitness programs, book talks by authors and other local enrichment programming.

Additionally, programming produced outside of the facility but of interest locally was also very beneficial, including the local Economic Development Summit and programs produced by Comcast's local origination staff via the *Comcast Newsmakers* production.

- **Additional facilities and equipment are needed to continue to enhance the opportunities provided to, as well as the programming produced by, Charles County residents and organizations** -- Discussion participants noted that some additional equipment and facilities, as well as continual updates, are needed both now and in the future. Equipment enhancements, for example, include:
  - Additional Public Access editing.
  - Additional field equipment resources, focusing on consumer-friendly cameras and recording equipment.
  - Additional audio equipment.
  - More curtain options.
  - Additional both virtual and actual sets.

Regarding facilities enhancements, participants noted the need for:

- Additional production space.
  - Additional edit room space.
  - Additional storage space.
- **Some operational enhancements are needed to best support Public Access** -- Participants in the focused discussion noted that some operational modifications and enhancements were needed:
    - Additional time is needed for Public Access production and post production activities. Participants noted that there are occasional conflicts between student/CSM TV use of the facility and Public Access use, and either additional time scheduled for Public Access or additional facility space would help resolve these conflicts.
    - An enhanced, online scheduling system is needed which would enable more efficient use of existing facilities.
    - Additional promotion is needed to heighten awareness of both the opportunities for Public Access production, and of the programs themselves. Participants noted, especially, that greater use of social media would be helpful.
    - Detailed program guide listings that are searchable would enhance awareness and viewership of Public Access programming.
  - **The Public Access Channel also needs to be available in advanced delivery formats** -- Interviewees and participants noted that for the Channel to continue to grow in both capabilities and viewership, it would need to be able to "jump to HD" to meet the current viewing habits of television viewers, and would also need to be available for non-real time viewing through on demand access.

- **The Public Access Channel should continue to grow, such that it becomes an integral part of the fabric of community communications** -- Interviewees and focused discussion participants noted that the Public Access Channel was beginning to meet its mission of providing important production opportunities for residents and nonprofit organizations and helping support their outreach goals and missions. Through enhanced facilities, equipment, operations and awareness, this service to the community would only continue to expand in its importance and impact.

## **CSM TV/LPACC-TV Facilities and Equipment Projections**

The College of Southern Maryland (CSM TV) has a unique operation. Not only does it support the CSM TV production needs, but also the Public Access operation. Both functions operate out of the same location. CBG has recommended upgrades to the facility as a whole, but has also identified some separate equipment for both CSM TV and Public Access.

As a part of the local educational access cable system, CSM TV produces original shows and acquires a vast array of public interest programming. Additionally, the channel provides an outlet for programming produced by students enrolled in CSM's Digital Media Production program of study.

CSM TV is cablecast on Comcast Channel 98 in Charles County. Charles County's Local Public Access Channel is made available through funding from the Charles County Government to residents of Charles County on a non-discriminatory basis. Public Access programming airs on Comcast Channel 99 in Charles County.

It was noted in our discussion that Comcast Cable services are not available on campus which has created the inability for students and faculty to view CSM TV programming. This is due to the lack of cable boxes on campus. CBG is recommending that the County and CSM TV work with the cable provider to make these services available for greater use of programming at CSM.

### **Virtual Set Technology**

CBG is also recommending the continued use of Virtual Set Technology for CSM TV/Public Access as with CCGTV and CCPS. We have recommended upgrades to this technology to be included in their production to enable live virtual set and chromakey into studio productions. This will allow the faculty and students to have greater flexibility with their productions and video environments at a fraction of the cost and time required for multiple physical sets.

### **Ancillary Equipment**

Similar to that for CCGTV and CCPS, this spreadsheet category includes basic items such as microphones, teleprompter equipment, PA, miscellaneous stands, tripods, recorders, workstations, fixtures, and the like, plus their upgrades and replacements. It is necessary for any PEG production facility and must be replaced, upgraded and added to, over the term of a renewed franchise.

## Production Studio/Studio Control

During CBG's site visit, it was noted that the studio space is large and functional. The studio is capable of both classroom use and use of talk show and other sets as well as green screen and virtual set-type shoots. The lighting grid is relatively new and the cameras are capable of HD and are also relatively new.

Because of CSM's focus on these studio implementations and updates in the recent past, CBG has recommended replacement in Year 5 for the lighting grid and in Year 3 for all other equipment.

The equipment CBG has identified for upgrade and replacement is listed below.

### Production Studio:

- HD Robotic Cameras
- Studio Monitoring
- LED Studio Lighting
- Virtual Set Technology

### Studio Control:

- Video Production Switcher
- Robotic Camera Control
- Character Generator
- Digital Audio Mixer
- Multi-viewer Monitoring
- Solid-state Recorder
- Distribution Amplifiers and cabling
- Engineering/Confidence Monitor

## Field Acquisition

For CSM TV, the recommendation to meet the needs assessed for camera field packages is three high-end camera field packages that include 2 channels of wireless audio along with a full HD camera, tripod, lighting package, audio and accessories. Along with this, CBG has included one Engineering/Confidence monitor.

For Public Access, the recommendation is for three prosumer grade field camera packages that also include 2 channels of wireless audio along with a full HD camera, tripod, lighting package, audio and accessories. An Engineering/Confidence monitor has also been recommended.

CBG has described the flypack system and its benefits in the CCGTV portion of this report. CSM TV and Public Access will be sharing a flypack system as an efficient, cost saving measure. Additionally, as described above, a flypack system is usually recommended for use with a Mobile Production vehicle. It is recommended that Charles County PEG entities share the production vehicle which is included in the CCGTV accompanying spreadsheet.

## Post Production

As already mentioned, Post Production lends itself to ease in transitioning to HD due to the fact that it can be done as an independent process that does not depend on the functional areas in the rest of the facility. In post-production, raw footage of video and audio are edited to create a finished program. Graphics and other creative additions can also be inserted to create a more professional product.

The major types of equipment involved in the baseline post production category are for ingestion (loading video into servers for processing), monitoring, digital audio mixing, video editing, and video recording (portable solid-state recorders for preference).

CBG has recommended four post production systems for CSM TV and one system for Public Access. This should be sufficient for both entities for their needs over the length of the 10-year projections.

## Infrastructure

Infrastructure includes all equipment such as, Encoders/Decoders, Routers, Optical Transmitters/Receivers, Signal Converters, wiring and cabling needed throughout the facility to distribute high-quality HD signals. Since the infrastructure is the backbone for all existing and new equipment needed to communicate throughout the facility, it is essential that this functional area be upgraded with the ability to handle the new and existing equipment. It is important to have the right infrastructure in place to support the conversion of SD to HD.

The audio/video routing system recommended for CSM TV/Public Access infrastructure should be capable of complete HD routing that will enable the movement of HD video and digital audio signals simultaneously through the facility. We are recommending a router with 16 inputs by 16 outputs.

The number of optical transmitters and receivers recommended in the spreadsheet reflects the number needed to connect the two channels to the cable system, via the PEG headend at the Charles County Government Center.

## Archival/Storage

CBG has discussed the importance of the need for storage space in CCGTV's portion of this report. It is equally important for CSM TV/Public Access. HD requires greater storage and archival capacity due to the size of the files that are created. Storage and archiving is important because it enables producers and staff to save and share their work, such as standard shots of community scenes, collaborate in projects where elements are similar in nature, and store programs that can be used in an "evergreen" fashion.

CBG has recommended 48 terabytes of additional storage space to continue the ability to store and access programming.

### **Production Servers/Playback**

The production servers need to have the capability for both standard and HD playback, moving to all HD in the future, have the ability to have programs transferred to them over the network (real-time ingestion) and have a robust scheduling capability to enable a well-rounded playback resource. This functionality is utilized at CSM TV and will continue to be shared with Public Access.

### **On Demand/Streaming**

At this current time, neither CSM TV nor Public Access has on demand streaming capability. Current programming is posted to YouTube for viewing.

Internet streaming and Video on Demand (VOD) streaming have become an integral part of many production facilities' outreach to the public, as it makes it possible to get real-time programming to viewers without delay of recorded events posted to internet services. The equipment should include both live streaming and VOD capability and is included in the cost for the type of playback system we are recommending.

This system should be robust enough to enable the simultaneous encoding of multiple feeds for both internet and cable-based linear and VOD delivery thus saving time and increasing efficiency for staff and the turnaround time for distribution of access programming.

Encoders are also included and recommended in the attached spreadsheets for future replacement.

### **Mobile Production Vehicles**

As stated above, we recommend that CSM TV/Public Access share the production vehicle with CCGTV and Charles County Public Schools as an efficient, cost saving measure.

The mobile production van, will allow for efficient coverage of more community and college events. Such coverage will increase responsiveness to, and involvement with, the community at large, while also increasing visibility, thus promoting both increased viewership and membership.

### **Production Facility Renovation/Expansion**

Based on information obtained from interviews, the focused discussions and our on-site review, as both CSM TV's and LPACC-TV's video production activities grow, the combined entities will need an expanded production facility. The space allocation, along with associated funding requirements, is shown in Exhibit B.4, attached to this Report.

### Provision of Complimentary Cable Services

The County and CCPS currently have a number of Comcast connections to government and school facilities throughout the County that provide basic and expanded basic cable service to these locations. They are used for a variety of applications, most notably at government locations for news, information and weather, as well as the provision of the government access channel so that it can be watched by residents at County facilities. For the public schools, CCPS uses it largely for the receipt of programming of an informational or educational nature and further distribution to administrators, faculty and classrooms. Since Comcast moved to an all-digital transport, and encrypted its channels, digital terminal adapters (DTAs) have had to be used to enable reception and monitoring of this programming. This is unlike when the prior analog system was in place and these channels could be viewed through any “cable ready” television.

Comcast provides three DTAs per facility, which in some facilities is adequate, but in other facilities, such as schools, three DTAs cannot facilitate the widespread distribution of programming. Accordingly, some cable operators, including Comcast, have started to distribute the programming to a central public facility location, where it is decoded and then re-encoded to be provided over the data network as IP video streams. This allows it to be viewed over the network via computer monitors. Based on the needs assessed concerning the best way to distribute programming to public institutions throughout the County, we believe it would be fruitful to consider and implement this concept. This should be explored by the County with Comcast during franchise negotiations.

## **PEG ACCESS NEEDS ASSESSMENT CONCLUSIONS AND RECOMMENDATIONS**

After review and analysis of all the data and information gathered from the focused discussions, interviews, follow-up phone calls, onsite facility reviews, related web-based and written documents and materials and the written residential survey, during the PEG Access Needs and Interests Assessment portion of the Overall Needs Ascertainment Project, CBG has developed the following conclusions and recommendations (along with others noted in other sections of the Needs Ascertainment Report). CBG's recommendations on how these needs should be fulfilled are detailed below and should be pursued with Comcast during franchise renewal negotiations.

1. **Access Channel Capacity** -- CBG recommends that the present Access Channels be preserved and that capacity be expanded to provide for all the Access Channels to be cablecast in HD as well as provision of Access Channel programming on demand, as further described below. This includes continued delivery of:
  - a. One (1) channel for Charles County Government's CCGTV for Government Access programming, including live meeting coverage of the County Commissioners, Planning Commission, Board of Appeals, Fire and Rescue Board and Library Board as well as other public meetings, programs that highlight County services and a bulletin board of County events, among others.
  - b. One (1) Educational Access Channel for Charles County Public Schools' CCPS TV, focusing on coverage of School Board meetings, school news, school events, musical reviews, other types of special programs and more.
  - c. One (1) Educational Access Channel for the College of Southern Maryland's CSM TV for programming that includes educational and informational programs that showcase the College, original shows including shows produced by CSM students and a variety of public interest programs.
  - d. One (1) Public Access Channel for LPACC TV that includes local community programs produced by individuals, organizations and institutions in Charles County as well as other public interest programming.

Over the course of any renewed cable franchise, as the amount of HD programming continues to increase for all the PEG Access Channels profiled herein, HD capacity will be needed for each of the aforementioned PEG Access Channels. Comcast must also provide each of these channels in an SD version until the entire system is converted to HD so that every subscriber, regardless of their tier of cable service, will always be able to receive all of the Access Channels. It will be equally important to ensure that HD channels are provided in successor formats (such as HD4K) so that the quality of the Access Channels is always at least equal to the best quality of commercial channels on the system. As noted further herein, equipment upgrades and replacements will be needed to support all of the channels to ensure that the Access Channels are able to

continue migrating to the then current television production industry standard, and that they are provided without noticeable degradation or deterioration in quality, from the point of origination at the Access Channel origination site to delivery to the subscriber.

As time shifted viewing continues to increase, it will also be important to ensure that enough cable-based video on demand capacity is available for PEG Access Channel programming that is both time sensitive and evergreen so that PEG Access programming can have the highest possible accessibility to subscribers by being available through multiple distribution methods. This will require average allocations for each PEG Channel entity, estimated at 10 hours of video on demand capacity per channel. This should also include the necessary equipment to provide VOD programs to Comcast in the format that it requires, with an ongoing requirement to upgrade such equipment if Comcast changes its standards. The programming submitted for VOD distribution should be able to be updated and refreshed on at least a monthly basis, as needed.

All PEG Access programmers should also have access to Comcast's electronic program guide (EPG)/digital menu for both real time (linear) and video on demand program content descriptions. These descriptions should be detailed, and enable viewers to select and record specific programs based on accessing them through the EPG/digital menu.

As additional advanced platforms of video delivery continue to be provided on the cable system, it will be important to make these platforms available to PEG Access Channel program providers, producers and users, again, to facilitate the widest possible delivery to the Charles County community and the greatest accessibility by viewers and content users. This may include, for example, programming provided via interactive television (iTV) services, especially for governmental and educational programmers, as discussed herein.

2. **Access Equipment** -- New, upgraded and replacement equipment for the Governmental, Educational and Public Access Channels needs to be provided consistent with the projections shown in the Exhibits to this Report. Equipment category projections have been made from the information provided by the PEG Channel operators and associated stakeholders, as well as that obtained through onsite review of equipment amounts, types and conditions, along with the projections for expansions in the nature and level of Access Channel content development. Our review indicates that the following Access equipment funding is required to meet the needs assessed over the course of a projected 10-year timeframe:
  - a. *Charles County Governmental Access* -- To provide new, upgraded and replacement equipment for the County's Governmental Access Channel, CCGTV, to produce programming at the County Government Center, as well as through portable and remote operations, \$1,889,290 (\$1,453,300 base cost, plus \$435,990 installation/training/warranty cost) will be needed during the projected 10-year timeframe, in order to support the government programmatic initiatives indicated by our Assessment findings.

- b. *Charles County Public Schools K-12 Educational Access* -- To provide new, upgraded and replacement equipment for CCPS's K-12 Educational Access Channel, CCPS TV, to produce programming at the CCPS TV production facilities as well as at the Charles County Board of Education (CCBOE) Administration Building, and through portable and remote operations in the field and at schools throughout Charles County, \$1,425,320 (\$1,096,400 base cost, plus \$328,920 installation/training/warranty cost) will be needed during the projected 10 year timeframe, in order to support the K-12 educational programmatic initiatives indicated by our Assessment findings.
        - c. *College of Southern Maryland Higher Educational Access and Local Public Access* -- To provide new, upgraded and replacement equipment for the College's CSM TV Higher Educational Access operation and the local Charles County Public/Community Access television operation supported by the College, \$1,261,260 (\$970,200 base cost, plus \$291,060 installation/training/warranty cost) is needed in order to support both the Higher Educational and local Public/Community Access programmatic initiatives indicated by our Assessment findings.
3. **Access Facilities** -- As indicated herein, additional facilities space through renovation, new build and expansion is needed for each of the PEG Access entities. For Charles County Government Access, \$1,090,750 is needed in facility expansion costs. For Charles County Public Schools K-12 Educational Access, \$926,750 is needed in facility new build and expansion costs. For the College of Southern Maryland Higher Educational Access and local Public/Community Access, \$935,750 is needed for new build, expansion and renovation costs. Together, this totals \$2,953,250 in needed facility costs over the 10-year projected timeframe.
4. **Capital Support for Facilities and Equipment** -- As indicated above, for equipment, the total dollar figure needed for a 10-year period equals \$4,575,870 (\$3,519,900 base cost, plus \$1,055,970 in installation/training/warranty cost) to support the four (4) forms of Public, Educational and Governmental Access currently provided in the County. Added to this, is the need for \$2,953,250 facility expansion, renovation and new build costs, again to support the (4) PEG Access entities in the County across a 10-year period. Together, this equates to \$7,529,120 in needed facilities and equipment support over a 10-year period.

Comcast in Charles County is currently providing 1% of its gross revenues, facilitated by a subscriber pass-through, in support of Public, Educational and Governmental Access. Verizon is doing likewise. Between the two entities, over a 10-year period, if subscribership holds steady at existing levels for both companies combined, and the 1% of gross revenues for both systems is factored in, the sum projected will be approximately \$5.5 Million. This is significantly lower than what is needed to support the PEG Access equipment and facilities detailed herein. Accordingly, the 1% of gross revenues amount needs to be increased for PEG Access equipment and facilities support.

Note that this does not take into account any continued capital support for the I-Net. This is discussed separately in the Institutional Network Needs Assessment Section of the overall Needs Ascertainment Report, and the amount of funding required is described in that Section. Accordingly, the percentage of gross revenues would need to be increased further as described in the I-Net Needs Assessment Report Section to account for both PEG and I-Net needs going forward.

**5. Provision of Complimentary Cable Services** -- The County and CCPS should work with Comcast during franchise renewal negotiations to develop a system to provide basic and expanded basic cable services to County facilities that receives the programming at a central location and then redistributes it as IP video streams through the County's and CCPS's networks.

## **SECTION C**

### **REVIEW OF INSTITUTIONAL NETWORK-RELATED NEEDS AND INTERESTS**

## **INSTITUTIONAL NETWORK NEEDS ASSESSMENT**

### **Introduction**

CBG, as part of the needs ascertainment process, has performed a review of the current design and utilization of the Comcast-constructed Institutional Network (I-Net) serving government, educational and allied institutional entities in Charles County (County)<sup>14</sup>. The I-Net is a critical and large component of the County's overall wide-area network (WAN). The WAN not only includes the I-Net (which serves as its backbone), it also includes fiber constructed as part of the connections made within the County by the Maryland Broadband Network, and the County's wireless connections between and among its towers (the Tower Data Network-TDN) and TDN users throughout the County, including the Fire Department and the Sherriff's Office. It is also connected to County-owned fiber that was developed for critical sites to interconnect with the I-Net and the overall WAN. There are also interconnections between the I-Net and fiber established by the Maryland Department of Information Technology (MD DOIT). The I-Net interconnects the County to other institutions such as Charles County Public Schools (CCPS), and the College of Southern Maryland (CSM). Further, the I-Net provides nearly all of CCPS's wide-area network and is therefore critical to both its administrative operations and its provision of educational services. It also provides, as further detailed herein, critical connections for CSM.

CBG's review was designed to gain an understanding of the network's overall usefulness and functionality for the end users. In addition, CBG engaged in interviews and held an I-Net user work group meeting, as well as follow-up discussions, and reviewed a variety of documents, information and other materials to understand the users' experiences and the perceptions of the various public agencies concerning the network's ability to fulfill their needs today and into the future, as part of the broader cable-related Needs Assessment.

A work group meeting was held in mid-September 2015 and included representatives from the County's IT staff, the Charles County Public Schools (CCPS) IT staff, and the technology and networking personnel at the College of Southern Maryland (CSM). Questionnaire responses were received from County agencies as well as CCPS.

### **Findings**

#### **Network Overview**

As part of the existing Franchise between Comcast and the County, an I-Net has been provided and made available for use by the County government and allied public agencies, the Charles County Public Schools (CCPS), and allied educational entities, to provide video, voice and data communications between and among the end users. CBG worked with the County, CCPS and I-Net Users to gain an understanding of the current state of the I-Net, how it is performing, what changes may need to be made in the future and the perceived value of the network.

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<sup>14</sup> The original walkout and design of the I-Net was a collaborative effort of Charles County Government, Comcast and their consultants and subcontractors.

The I-Net, as described throughout this Report, is the network made available related to the Franchise Agreement. Additional locations, throughout the County, are at times referenced in this Report to describe the entirety of the County's WAN, and are connected via network connections outside of the scope of this Report.

The current I-Net serving the governmental and educational end users in the County is comprised primarily of a dark fiber optic-based network. It currently provides dark fiber optic-based connectivity to 89 sites (two of these sites have been deactivated as of the date of this Report). The I-Net also has a number of cable modem connections, as provided for in the franchise. Five I-Net sites are connected by business class cable modem service from Comcast. Three of these cable modem sites have a fiber optic primary connection and use the cable modems as backups.

In addition to this, the County has a number of connections that it brings into the County's total wide area network by wireless communications and these are interconnected into the fiber optic and cable modem I-Net.

A full list of I-Net and WAN locations can be found in Exhibit C-1. The equipment to activate the dark fiber network is provided by the County and CCPS. It consists of core switches at the County's and CCPS's data centers and the Comcast headend, and edge switches at each User location, as well as substantial network monitoring and management hardware and software. Characteristics of this equipment are described further below in the "Flexible and Reliable Operations" Section.

The initial I-Net was developed as provided for in the franchise, in Appendix 1 to the June 2002 Comcast franchise agreement. This Appendix details the original sites to be connected and the number of fibers per site.

### **Fiber Optic I-Net**

The I-Net is connected to I-Net user locations today on a network comprised of approximately 107 miles of fiber optic cable. The network is primarily comprised of 6 fiber strands to each location with other connections comprised of anywhere from 2 fibers to others that are 36 fiber connections. As noted above, specific connectivity for each of the original sites is described in Appendix 1 to the 2002 Comcast franchise agreement. The initial sites are described in detail in Appendix 1 and include many governmental facilities and agencies covering Public Safety, Charles County Government administration, the Public Library, the Department of Utilities, the Department of Emergency Services, senior centers, Police, Sheriffs and Fire stations, most CCPS elementary, middle and high schools as well as administrative facilities, and connections from core County government and educational centers to the Comcast headend in Waldorf.

Additionally, since the initial build, a number of facilities have been added to the fiber optic I-Net or relocated from the location listed in the Franchise. These include the following:

<b>Title</b>	<b>Address</b>
CCSO Waldorf Station District 3	3670 Route 5, Waldorf
Diggs ES	2615 Davis Rd., Waldorf
Davis MS	2495 Davis Rd., Waldorf
CSM Truck Driving Center	5825 Radio Station Rd., La Plata
District 3 Sheriff	11110 Mall Circle, Waldorf
WPGC Golf Course	1015 St. Charles pkwy., White plains
Mary Burgess Neal ES.	12105 St. Georges Dr., Waldorf
CCG Landfill	12305 Billingsley Rd., Waldorf
CPV Power Plant	12205 Billingsley Rd., Waldorf

### Applications Running on the Fiber Optic I-Net

As part of the findings from work group meetings, interviews and evaluation of the I-Net Users' questionnaire responses, CBG determined that the applications made possible and running on the I-Net are numerous and varied among users. These applications include the distribution of internet access for all entities, voice over IP services and a variety of video applications.

In fact, the I-Net is critical to the County as part of its overall WAN. Specifically, it uses the I-Net for internet access, voice over IP applications, security and surveillance camera video interconnections, and access origination video connections, both directly to Comcast and interconnected with CSM and the BOE. The I-Net is also used for training video, video conferencing and other kinds of live video streaming. As one work group participant put it, "everything is on the I-Net".

Specific examples of County department, agency and organization use of the I-Net indicate how critical it is to their operations. For example, the Fire Department and Emergency Medical Services (EMS) use the I-Net for secure high speed communication between stations for sharing information. They also use it for their CAD Alert applications, which are used to take the data that is sent out from the computer aided dispatch (CAD) system, analyze it, format it, and send it out to all the Fire Stations and EMS locations. They indicate that this improves emergency response times and situational awareness during incidents.

Public Safety communications are further enhanced by the Sherriff's Office's I-Net connections which facilitate high capacity communications from Headquarters to the District 2 and District 3 stations.

The I-Net is also used for monitoring and receiving information from surveillance cameras placed at government and school facilities throughout the County.

The I-Net also facilitates certain high capacity fiber backhaul connections and consequently interconnections between the County's communications towers, which further expand the reach of public safety communications as well as a variety of other governmental communications applications.

The Charles County Public Libraries currently use the I-Net for inter-branch connections and for a backup connection to the internet. This enables highly efficient and reliable administrative operations, as well as facilitates high quality services to library patrons.

The Utilities Department utilizes its I-Net connections for aggregating SCADA (System Control And Data Acquisition) data for monitoring and control of pumping stations and well sites.

As described in the Introduction, the I-Net is a critical part of the County's overall wide-area network. It serves to interconnect a variety of State communications into the County's network and to users that depend on such communications. Specifically, the County is a hub for the Statewide Government Intranet (SwGI). Information such as criminal justice databases are provided through the Statewide network and then distributed to Charles County Public Safety personnel through the I-Net.

For CCPS, video applications include: video streaming, distance learning and other instructional video, as well as video conferencing. Some of the video is linked from the State of Maryland's networks. It also includes the access origination video which is transported from the CCPS media center location to the County Building and then to the Comcast Waldorf headend. It is also used for interconnecting security cameras at all CCPS locations.

During the work group discussion, CCPS noted requirements to perform a number of functions real-time online including student testing. This requires reliable, high capacity connections to the internet and these have been facilitated by the existing institutional network.

Regarding CSM, the I-Net benefits CSM by providing connectivity between their main LaPlata campuses, and the UMUC (University of Maryland University College)/CSM Waldorf Center for Higher Education, and between the main campus and the CSM Center for Transportation Training. It further provides a redundant link to the Network Maryland Point of Presence (POP) through CSM's I-Net based interconnect to the POP in the Charles County Government Center.

CSM indicates that it depends on the I-Net for all of these connections and, as detailed further below, without the I-Net it would have to obtain other connections that project to be lower capacity at a higher cost. That would substantially inhibit a number of instructional activities and opportunities currently provided by CSM.

The I-Net is additionally used to provide Wi-Fi for public and scholastic use at a variety of locations.

In summary, the I-Net as currently operated by the County, and provided by Comcast through the franchise, is essential to nearly all of the County's video, voice and data communications that support all of the County's operations and provide the backbone for the provision of services to residents and businesses.

## Flexible and Reliable Operations

County and CCPS representatives stressed that since the I-Net provides dark fiber connections, it allows I-Net Users significant flexibility. The County and CCPS continue to increase the signal transport capacity of the network by simply changing out one or more sets of equipment. For instance, at given locations as capacity needs increase, the end user switch at that facility can be replaced with a switch with higher capacity, and the switch it communicates with at another location or in the core, can be changed out or upgraded to also provide higher capacity. The County and CCPS both have performed such upgrades over time. Then, depending on the age of the replaced equipment, it can be placed on the shelf as spares or repurposed at another new or existing location on the network.

This flexibility has allowed the County and CCPS to continually adapt to their changing network needs in a cost effective and efficient manner. For example, CCPS notes that they expect to require a 2 Gbps internet link within the next 2 years. The I-Net currently interconnects their network operations center with the Network Maryland POP (Point of Presence) location that provides internet access. To facilitate a 2 Gbps connection on the I-Net will simply mean an upgrade in their equipment to facilitate that higher capacity.

Many of the County's' current links are at 1 Gbps, with CCPS having a variety of connections from 800 Mbps to 2 Gbps. I-Net Users forecast that they will need to move to 10 Gbps connections on some of their links in the near future and more after that. Again, the dark fiber network will enable easy upgrades to these transport rates by simply adjusting the equipment at the end User and core locations. Over the next 10 years, the projected cost to upgrade the core switches and edge devices is approximately \$685,000. Regarding the current level of fiber strand capacity, it is also sufficient, and where needed, wavelength division multiplexing (DWDM) has already been and can be further enabled over the network to provide higher capacity transport per fiber strand.

The dark fiber network also provides a high level of reliability and network availability (up-time). Other than a fiber being cut along the route, there are few reasons for the dark fiber network to fail. Therefore, most issues with reliability occur more as a result of equipment placed on the network by the County and CCPS. If a higher level of reliability is needed at a given site, the equipment placed on the network can be designed with fault tolerant components such as dual power supplies in the switches. Wherever greater levels of reliability are desired, an additional fiber optic path that is physically separate from the primary path can be constructed so that it can be used in the event of primary fiber optic connection malfunction or cut. There is anticipation that some redundant infrastructure is needed and this is discussed further below.

Regarding current experience, I-Net Users indicated that a fiber cut on average has occurred between 2 and 4 times a year and has always been responded to quickly, consistent with the standards provided for in the franchise. Comcast has stated that they do not maintain records on I-Net outages and the reliability of the Network. Therefore, the County must rely on its knowledge of system reliability when considering the operation of the system.

## Cable Modem I-Net Connections

As prescribed in the franchise, there are a number of cable modem sites on the I-Net. These connections provide business class cable modem service to a variety of locations including: emergency services, fire stations, and other facilities listed in Exhibit C-1. These sites were designed to initially have cable modem service because of their lower capacity connection requirements, as well as the cost of developing fiber optic connections to them at that time. The cable modem sites have been mostly reliable in their operation (at least one failure has been noted), but there is a desire to upgrade some of these connections to capacity that can be enabled by fiber optic connectivity. These are described further below.

## Additional Facilities

During our network review and discussions with I-Net users, it became clear that additional facilities will need to be connected to the I-Net going forward. Our review indicates that a number of I-Net connections (9) and WAN connections (34) (43 in all) were constructed after the initial implementation of the I-Net. Some connections were done at no cost to the County or the I-Net User agency organization, because they were done as barter arrangements where the County and Comcast were able to work together to fulfill both governmental and commercial needs. For example, the County worked together with Comcast to get a high capacity connection to the Landfill, while also facilitating a critical commercial communications connection to the CPV (Competitive Power Venture) power plant. Specifically, the County enabled Comcast to use some excess fiber capacity that it had along certain routes to go from Comcast's existing infrastructure to the CPV and, in exchange, received fiber from Comcast to facilitate its connection to the Landfill. Essentially, without this cooperative effort, it would have been much more difficult and costly to get high capacity communications infrastructure to facilitate critical communications applications for the CPV.

A number however, were constructed with the County, the Board of Education, Libraries or the College of Southern Maryland paying all or a portion of the cost, ranging from a few thousand dollars to \$271,209 for connection of the Mary Burgess Neal Elementary School in September, 2007. Under the franchise, Comcast has a requirement to notify the County when it is extending plant so that institutional network infrastructure can be included for the County, CCPS or other I-Net user agencies.

Beyond this, the County sees the need to develop a redundant, diverse path link to the headend. Right now, for most of their length, the County and CCPS's main connections to the core switches at the headend, follow the same path to the Waldorf headend. It will be important to look at the development of diverse path connections, so that there will be an alternate, truly redundant path from the headend to the County and CCPS.

Additionally, while the College of Southern Maryland has substantial connectivity through State-wide networks, it is in the process of developing a new campus in Hughesville. This new campus will need to be interconnected with the main CSM Campus in La Plata for video, voice and data communications, including the potential for origination of public or educational access programming. Interconnection with this new campus should be taken into account when considering future developments of the I-Net.

Additionally, there is substantial amount of regional communications that happen between Charles County and Calvert County. An interconnect with the Calvert County network through Comcast's infrastructure would be highly beneficial to the County and other users of the I-Net.

Going forward, while no user anticipated relocation of any facilities during the foreseeable future, some new facilities were noted that will need to be provided for in any renewed franchise agreement.

For Charles County Public Schools, this includes a new elementary school location to be added in the next couple of years (the exact location is not currently known, and will be determined at a later date).

The County has also noted six additional locations that need to be connected to the fiber optic I-Net, including:

<b>New Location</b>	<b>Address</b>	<b>Approximate footage to tie-in point</b>
Gilbert Run Park	13140 Charles Street Charlotte Hall, MD	Approximately 28,500 feet to Splice Point at Charles St & Bel Alton Newtown Rd Estimated Cost = \$220,000.
Cobb Island VFD	13290 Main St Cobb Island, MD 20625	TBD
Benedict VFD	18210 Hyatt Avenue Benedict, MD 20612	TBD
Charles County Dive Rescue	P.O. Box 13 Pomfret, MD 20675	TBD
Dentsville EMS	12135 Charles St La Plata, MD 20646	TBD
Ironsides Rescue Squad	6120 Port Tobacco Rd Ironsides, MD 20643	TBD

The preceding list of locations needing fiber optic connectivity is not all inclusive, but rather a representation of locations identified during the Needs Assessment process. Similar to the network growth that has occurred since the initial development of the I-Net, there may well be unforeseen additional facilities over the course of a 10 or 15-year franchise term. A renewed franchise needs to address how expansion of the network will occur during the term of the franchise.

### **I-Net Valuation**

Interviewees, work group participants and questionnaire respondents, all indicated that the network has been extremely valuable in meeting, especially the County's and CCPS's networking needs, since its inception back in the early 2000's. To demonstrate and work to quantify the value of the network to users, several measures were utilized. First, based on the approximately 107 miles of fiber infrastructure, we estimate the value to the County and CCPS, to be approximately \$4.8 million. This is consistent with the cost to develop the original 80 sites on the institutional network

(cost circa 2002) that was estimated to be \$3.3 million when projected in 2002 plus the cost of the additional sites.

Then, if you were to look at replacing the network at \$45,000 per mile, plus \$4,000 per facility to install the fiber to a communications room that is in each of the facilities, at this point in time (2016) we believe that this would equate to \$5.2 million.

Another way to value the network is, instead of utilizing dark fiber and placing their own activated equipment if the County and CCPS were required to procure activated service at the current transport levels. These are, 47 locations at 1 Gbps, 36 locations at 2 Gbps and 2 locations at 10 Gbps. Using these 85 active locations, the network would be worth \$1.1 million on an annual basis plus approximately \$20,000 for the 2 locations that are not activated (at 1 Gbps) at this time for an approximate total of \$1.13 million per year. Over the course of a 10-year agreement, this equates to approximately \$11.3 million. It should be noted that this number would be higher when the 6 new sites are added.

Over the course of a ten-year agreement the County will need to increase the capacity of many of the network connections in place today. This would increase the cost of activated or managed services significantly above the estimated ten-year cost of \$11.3 million described above.

Additionally, it should be noted that the County would still have substantial human resources cost even in a managed service environment. Specifically, while managed services would provision and maintain the edge switches at each location and the core switches at the headend and the central data center locations of the user organizations, the County would still be responsible for all the applications that run over the network, as well as now interfacing with an additional party (Comcast) when the applications fail or are not running optimally, since most issues are equipment-driven. The County currently diagnoses and reacts to these issues themselves, making it fast and efficient to troubleshoot and restore network operations. County staff also would continue to be responsible for the project management, coordination and implementation of new sites under any scenario.

All and all, then, the value of the I-Net to the County, CCPS, and other allied I-Net users is great, and its continuation in the future under the current franchise terms and conditions, is the most beneficial and cost effective way to meet the County's and CCPS's demonstrated needs going forward.

### Network Standards

In the franchise, there are a variety of standards related to the development of, and service, support and repair for, the institutional network contained in Section 4 (g). These include construction and installation standards, such as optical signal loss for fiber, splices and connectors; co-location requirements for space and powering in the headend (for the "Headend I-Net Service Area") for County and CCPS core equipment; Headend I-Net Service Area access requirements; and maintenance, service and repair response requirements, including outage definitions, preventive and routine maintenance requirements, and required response times to critical outages, major outages, minor outages, as well as restoration of service requirements.

There are also requirements for the cable modem service provided as part of the Institutional Network to certain sites, including transfer rate requirements, noise, distortion and other performance parameters for both upstream and downstream communications, and signal level requirements.

Discussions with work group participants, interviewees and I-Net users in general, indicate that the network has performed very well and has achieved an exemplary up-time (network availability) to-date throughout the term of the franchise. Accordingly, it will be important to continue to provide in a renewed franchise, the standards incorporated in the current franchise to ensure that this high level of I-Net maintenance, repair and service response continues and that the network continues to have exemplary up-time.

Additionally, although the response times required in the current Franchise are strong and sufficient going forward, a standard for network up-time should be included in a renewed franchise to ensure network availability remains a priority. Specifically, network availability for I-Net fiber should be equal to or better than 99.999% averaged across all locations on an annual basis. The network is considered unavailable if the fiber infrastructure, exclusive of County furnished equipment, causes a reduction in network performance below reasonable (and agreed) County standards, such as for throughput, jitter and latency, for any reason.

In addition, any renewed Franchise should allow for changes to the specifications as network parameters change over time that would be beneficial to I-Net users. This will eliminate the potential to have obsolete specifications or standards in place over the duration of the franchise agreement.

### Disaster Recovery

An important issue to consider, which is currently partially covered in the franchise under the heading of network restoration, is the concept of disaster recovery. At this point, based on the substantial reliance of the County and CCPS on the dark fiber institutional network provided by Comcast, consideration should be given to implementing a more detailed Disaster Recovery Plan (DRP).

A Disaster Recovery Plan (DRP) is a documented written set of procedures, processes and steps to be taken to recover from a catastrophic network failure. A number of natural or manmade events can cause these failures, such as flooding, widespread storms, fire, freezing rain, civil unrest, terrorism, network sabotage, etc... Regardless of the cause, a DRP will ensure that all parties involved in the operation of the I-Net, including Comcast and the I-Net users, are prepared to react to the disaster and take the proper steps, in the proper order, to get the network running again. The following actions must be taken to create a DRP:

- Obtain commitment by all users and Comcast.
- Establishment of a DRP Committee to develop and regularly update the DRP.
- Perform an initial and regularly scheduled Risk Assessments.
- Establish a backup facility list
  - Back-up County Data Center location
  - Back-up CCPS Data Center location
- Establish priorities for a recovery situation.

- Site priorities
- Application priorities
- Establish potential equipment needs in the event of a disaster.
- Ensure spare equipment is on hand and multiple (local and non-local) equipment suppliers are identified prior to needing additional equipment.
- Assign specific responsibilities for oversight and implementation of the recovery process. Ensure that personnel are not assigned other, non-I-Net responsibilities that will compete with the recovery process during a disaster, by their organizations. Develop multiple layers of personnel for each potential task; assume some personnel and organizations will not be able to perform tasks during the recovery. It should be assumed that, during the development of the DRP, key personnel who are highly qualified and dependable during normal operations may not be available during a disaster recovery.
- Create a highly descriptive well documented DRP.
- Test the Plan regularly and update the plan as needed but at least on an annual basis.
- Get final buy-in and approval from all users and entities. Renew the buy-in as the plan changes.

Without a DRP in place, when a disaster occurs, Comcast, and various users will have different, and perhaps opposing, ideas of what needs to be done to get the network back on line and what the priorities are. In addition, necessary equipment and personnel may not be available or may be assigned to repair or recover other non-I-Net facilities without the requirements of a DRP in place. Creating a DRP should be a very high priority for inclusion in franchise renewal negotiations.

## Institutional Network Needs Assessment Conclusions and Recommendations

Based on meetings with I-Net users, County IT staff, CCPS IT staff and review of a wealth of documentation, **it is clear that the existing I-Net provides invaluable connections that enable critical services and applications for the Users utilizing the network, which includes nearly every public institution location.** There is overwhelming support from the various users to continue to utilize the I-Net for a wide variety of video, voice and data communications, as well as expand the dark fiber network over time in order to fully accommodate both current applications and services, as well as those envisioned over the network in the future.

1. **Fiber Optic I-Net** -- The fiber optic I-Net is currently utilized at 87 sites by the County, CCPS and other allied entities for transporting a wide array of data, voice and video services. This is in addition to two that are not currently active for a total of 89 I-Net sites. This network is critical to the current and future operations of the County and CCPS. The value of the I-Net to the Users is extremely high, no matter how such value is calculated. For example,
  - The original cost of the I-Net (80 sites) as reported by Comcast was \$3.3 million.
  - The estimated cost to replace the fiber optic infrastructure, including the additional sites connected after the initial facilities required by the Franchise were connected, using today's dollars equates to an approximate \$5.2 million.
  - The estimated cost to the County and CCPS of using activated or managed services for all sites from a provider such as Comcast is estimated to be almost \$1.13 million per year over the course of a renewed Franchise Agreement. Assuming a 10-year franchise term, this equates to approximately \$11.3 million.

All and all, this means that the dark fiber I-Net needs to be maintained and expanded in order to provide the functionality, flexibility and affordability necessary to meet the needs assessed both now and going forward.

The continued need for this network was projected during the development of the existing franchise and the network is designed to continue operating under the current scenario because of the County's indefeasible right of use that survives the initial franchise, termination of the franchise or any renewal of the franchise. It will be important to move forward with the I-Net under this IRU in the next franchise.

2. **Interconnection** -- Three types of interconnection were noted going forward in order to connect the current I-Net and allied networks to each other for efficient and cost effective operations. This includes a diverse path, redundant connection to the headend, to ensure that the core data centers of the County and the CCPS continue unimpeded connection to the core data equipment at the Comcast Waldorf headend.

Additionally, the entities in Charles County are involved in regional operations with like entities in Calvert County. Interconnection between the Charles County I-Net and networks

utilized by Calvert County government and educational entities, would promote more efficient and cost effective, collaborative and cooperative efforts between the counties.

Third, as the College of Southern Maryland (CSM) develops its new campus in Hughesville, the ability to interconnect high capacity video, voice and data communications, including access origination video, will be extremely important going forward. An institutional network connection should be developed for this purpose.

3. **Cable Modem Services** - For those sites where dark fiber cannot at this time be implemented to provide institutional network services, cable modem services should continue to be provided at these locations under the standards contained in the existing franchise, including taking advantage of continued advancements in cable modem technology for those sites.
4. **Network Standards** -- The network standards embodied in the existing franchise have worked well in delineating responsibilities for development, maintenance and service and repair on both sides, related to the I-Net. Accordingly, these should continue to be provided in a renewed franchise. In addition, a standard should be put in place for overall network availability or uptime. The dark fiber I-Net should be maintained to provide for a 99.999% uptime or reliability averaged across all locations on an annual basis. The network should be considered unavailable if the fiber infrastructure, exclusive of User furnished equipment, causes a reduction in network performance below reasonable (and agreed) County standards for any reason.

The franchise should also allow for changes to the specifications as network parameters may change over time if such changes are beneficial to I-Net users. This will eliminate the potential to have obsolete specifications or standards in place throughout the term of any renewed franchise agreement.

5. **Additional Facilities** -- The initial dark fiber I-Net and the County's WAN has been expanded multiple times, including to 43 new sites (9 are I-Net sites; 34 are County WAN sites), since the institutional network's inception in the early 2000's. This has allowed the I-Net to continue to meet the County's and CCPS's needs as new facilities are brought online. Continuing with this trend, there are several additional facilities that will need to be connected to the fiber optic I-Net in the future. This includes a new elementary school, at a location yet to be determined, Gilbert Run Park, Cobb Island VFD, Benedict VFD, Charles County Dive Rescue, Dentsville EMS and the Ironsides Rescue Squad. Connections to these 7 facilities should be anticipated as an expansion to the I-Net consistent with development of any renewed franchise. Additionally, over the duration of a renewed franchise, it is likely that some additional facilities will be constructed or leased by either the County or CCPS. These facilities will require network connections via the dark fiber I-Net in order to realize the same benefits that current I-Net user's experience. This means that language, consistent with what is in the existing franchise, needs to be included in any renewed franchise outlining the procedures and cost for the expansion of the dark fiber network.
6. **Disaster Recovery Plan** -- The Institutional Network's value has been demonstrated through its operation during the term of the last franchise. The applications performed over the network are myriad. Accordingly, a more detailed plan needs to be created that can be

deployed to recover the network in the event of a disaster. Specifically, a detailed plan needs to be developed so that each I-Net user understands how and when the network will be made available to them in the event of a disaster that affects the institutional network's connections to their facilities. Putting a detailed DRP in place prior to a disaster for priority repair or replacement of Comcast's fiber optic infrastructure so requirements and expectations are well-known, eliminates the need to create a plan during a time that may have numerous competing priorities for staff.

## **SECTION D**

# **SYSTEM TECHNICAL REVIEW OF THE COMCAST RESIDENTIAL CABLE TELEVISION NETWORK**

## **SYSTEM TECHNICAL REVIEW OF COMCAST'S RESIDENTIAL CABLE TELEVISION NETWORK**

### **SYSTEM TECHNICAL REVIEW**

#### **Introduction**

As part of the past performance review and needs assessment conducted by Charles County, Maryland ("County"), CBG Communications, Inc. ("CBG") has completed our technical review evaluating Comcast's residential cable television network.

CBG's overall goals were to evaluate Comcast's compliance with the County's franchise documents, and applicable laws and regulations, and to determine the condition of Comcast's equipment and infrastructure and the operation of this infrastructure. CBG conducted evaluation tasks, document review, system driveout, and discussions with Comcast staff, and other processes to determine the existing condition of Comcast's residential network.

The network review included the headend, fiber optic and coaxial infrastructure and their ability to deliver services to residents of the County reliably and in a safe manner; consistent with the requirements of the franchise and applicable laws and regulations.

The major findings and recommendations of CBG's review and evaluation are outlined below in this Report.

#### **Findings related to Comcast's Residential Network**

The beginning of a technical audit or system review is to seek various information from the cable TV system operator in order to establish a baseline and make informed determinations related to the system's performance. This request is in the form of a "Request For Information" ("RFI") and was sent to Comcast on August 19, 2015. On October 16, 2015, Comcast sent an e-mail stating the information was prepared and ready to be sent but a Non-Disclosure Agreement (NDA) would need to be in place prior to providing the information. This began a lengthy process in order to get Comcast's approval and signatures on an NDA.

CBG reviewed the NDA provided by Comcast and made redline changes to make it more consistent with previous NDAs between Comcast and CBG. This document was sent back to Comcast on October 30, 2015. Comcast responded on December 1, 2015 that the NDA was sent to "Division and Corporate." After more back and forth, the final signed version of the NDA was sent by CBG to Comcast on January 17, 2016 for Comcast's signature and was then to be sent to the County. Comcast's signatures were not added until the NDA was sent to the County on March 1, 2016. After the County signatures were added to the NDA on March 7<sup>th</sup>, Comcast was prepared to deliver the documents and did so on or about March 10, 2016.

## System Design and Architecture

Comcast is operating a Hybrid Fiber Coaxial cable (“HFC”) network that is designed to provide video (Cable TV), Internet and data services and telephone services to the addresses within the County’s service area.

Comcast’s system architecture begins at the headend located in Waldorf, MD. The headend is the aggregation point for most signals that are transmitted to, and received from, subscribers in the County and surrounding areas. From the headend, Comcast uses fiber optic infrastructure to send and receive signals to/from nodes located in neighborhoods, throughout the County’s service area, where forward (or downstream) signals are transformed from light, on the fiber optic infrastructure, to Radio Frequencies (RF) for insertion onto the coaxial cable infrastructure for ultimate transmission and distribution to residents and businesses served by the particular node. Forward (or downstream) services include all standard definition (“SD”) digital and high definition (“HD”) digital channels including Video-On-Demand (“VOD”). Additionally, Internet data, traveling from Comcast’s headend to subscribers, and telephone or voice service to subscribers is carried on the forward/downstream portion of the network. The nodes also receive RF signals from subscribers via the coaxial cable infrastructure which feeds these signals into the node. These return signals include upstream data, ordering information for VOD and other video services as well as telephone and home security traffic. The node converts these signals to light for transmission, via the fiber optic infrastructure, to Comcast’s headend.

The total spectrum utilized by a system dictates the level of services that can be provided by the network. System spectrum can also be described as the bandwidth of the system which is important to understand. Comcast’s system, as designed and operated today, has a total usable spectrum of 5 MHz to 860 MHz (5 million to 860 million Hertz). Simply stated, the system is an 860 MHz system. Further defined, the return (or upstream) system is designed for signals between 5 MHz and 42 MHz, while the forward system is capable of transmitting signals between 52 MHz and 860 MHz.

The system spectrum described above translates into system bandwidth or capacity. It is difficult, even with this information, to describe the maximum number of channels, or services that can be provided on the subscriber network, as the bandwidth utilized for specific channels and services can be determined at the system level. For instance, compression technologies allow for Standard Definition digital TV channels (SD) to commonly utilize one 6 MHz channel to transmit between 7-12 SD channels. Furthermore, 2-3 High Definition digital channels occupy a one 6 MHz channel. In addition, the system is configured and used to provide non-cable TV services, including telephone and Internet service which occupy a portion of the system’s bandwidth.

As subscriber needs and desires change and increase, and as more services become available, particularly the bandwidth intensive services subscribers increasingly demand, such as High Definition video programming and the yet-to-be rolled out Ultra High Definition Television (4K HD, which will use as much as twice the bandwidth of current HD technologies) Comcast may need to upgrade its current system, depending on the length of any franchise renewal term, to gain additional bandwidth in order to provide these new services. Such upgrades could include using new electronic equipment to increase the system capacity to 1,000 MHz (1 gigahertz or 1 GHz), deploying fiber to the premises or home (FTTP or FTTH) as well as utilizing technologies that

conserve bandwidth such as Switched Digital Video (SDV). The County should, in a renewed Franchise with Comcast, at a minimum, require a Triennial review of the system to determine if it is still capable of meeting the community's cable-related needs and interests, and providing the needed bandwidth for new services that become available in the future.

### Serviceability and Density

CBG has, as part of the technical review, examined availability of cable TV service throughout the County. During previous discussions and as part of this project CBG's initial discussions with County staff, it was made clear that service availability throughout the County is among the top concerns of the staff and residents alike.

This was confirmed through the Cable Television-Related Residential Community Needs and Interests Ascertainment performed by CBG and in particular the residential survey completed in July 2015.

In the survey, residents were asked if they currently subscribe to cable TV service. For those who responded that they do not subscribe, they were asked why not? The third most common response was that Comcast cable TV service is not available to their residence (25% of those who do not subscribe).

A further validation for the level of concern for non-serviceable homes is illustrated by the findings of the system driveout and inspection where the findings show potentially as many as 13,803 addresses in the County cannot receive service from Comcast because of their geographical location.

The existing "Cable Television Franchise Agreement" between the County and Comcast, under Section 3(b) states:

***(b) Line Extension Requirements.***

***(1) The Franchisee must extend its cable system upon request to provide service to any residence in the County upon request, without charging such person more than the standard installation charges, subject to the provisions of paragraphs 3(b)(2) and 3(b)(3), unless the Franchisee demonstrates to the County's satisfaction that extraordinary circumstances justify a waiver of this requirement.***

***(2) For areas within the County that are unserved on the effective date of its franchise, the Franchisee shall extend its cable system within a reasonable time (but not to exceed ninety (90) days) to provide service to any residence upon request at no charge other than any applicable installation fees for the individual Subscriber's drop, as long as the following conditions are satisfied, unless the Franchisee demonstrates to the County's satisfaction that extraordinary circumstances justify a waiver of this requirement:***

***(A) the new Subscriber requesting service is located 225 feet or less from the subscriber network distribution plant, and***

*(B) the number of potential Subscribers to be passed by the extension necessary to serve such subscriber is equal to or greater than twenty homes per mile measured from the subscriber network distribution plant.*

*(3) Cost sharing. In the event that the requirements set forth in Section 3(b)(2) are not met, the Franchisee shall extend its cable television system to serve a Subscriber if the Subscriber (who may recruit other affected Subscribers to help bear the cost) is willing to share the cost of the extension, according to the following formula: The percentage by which the actual number of homes per mile on the extension falls short of the twenty homes per mile specified in Section 3(b)(2)(B) is the percentage of the total construction costs that must be borne by the Subscriber.*

Simply stated, this means that for every potential customer in the County, Comcast is not obligated, by the Franchise, to build to them if more than 264 feet of new mainline infrastructure is required. Therefore, if a single house is more than 264 feet, plus the standard 225-foot drop, from existing Comcast cables, Comcast is not obligated to connect the house.

Based on this information, CBG, during the system driveout, looked for areas of the County where cable TV service is not available and also looked to determine if the density in those areas would require Comcast to build out its system to feed additional residences. This was further reviewed in comparing areas with residential units to the maps supplied by Comcast to determine if service is required based on the density of homes and the distance from existing Comcast infrastructure. CBG's findings are that there are not instances, that we are aware of, that meet the density requirement and therefore don't believe Comcast is in default of the Franchise in a large scale manner. However, it must be noted that individual cases may exist where one or more residences do qualify to be connected, if the residents so desire, because they are within the 20 residences (264 feet per home) requirement. Each case must be evaluated individually to be certain of whether the density requirement obligates Comcast to build infrastructure to feed the residence(s).

Furthermore, there is language in the Franchise under Section 3 that provides that persons in the County can share the cost of expansion of the system where the above described density numbers are not within the required build parameters. Although this may become an expensive proposition for many homeowners that may be thousands of feet away from Comcast's current system, some cases may well exist where only a few hundred feet of new cable would be required, above the 264 feet per address, where the potential customer(s)' contribution for construction would not be prohibitive to the homeowner(s).

Based on the findings described below, between 13% and 29% of all County addresses are not serviceable by Comcast. That equates to between 6,099 and 13,803 homes and businesses in the County that cannot receive service from Comcast without paying a portion of the construction costs which could be extremely expensive.

## System Facilities

As indicated above, Comcast serves the County from its headend located in Waldorf, MD. CBG toured the headend facility in April, 2016. In addition, Comcast provided information describing the headend and discussions were held with Comcast personnel as additional data or information was

required. Our findings are that the overall condition of this facility was clean, well-kept and with sufficient space for future expansion without having to compromise spacing needs for cooling and maintenance functions. Grounding of equipment in various locations throughout the headend is more than adequate for protection of the equipment and personnel having to perform maintenance. Fire suppression systems are professionally installed throughout the facility and appeared to be sufficient to protect the building and its contents from fire.

### Standby Power

Standby power provides the system with the capability to remain operational when commercial power is lost for any period of time. Comcast employs several backup power methodologies, from the headend to the power supplies located on the distribution system in the field.

Comcast has a large backup generator located at the headend capable of backing up the headend if a commercial power failure occurs. This generator is designed to provide enough power to keep the headend operational for several days without refueling, in the event of a power outage at this location. In addition, Comcast utilizes -48volt DC powering in the headend with this equipment operating off of banks of batteries that are continually being charged by commercial power. This provides conditioned power and protects the equipment from brownouts or power surges that can occur on commercial power. Furthermore, this bank of batteries provides power to inverters that produce conditioned 120 Volt AC power to equipment designed to operate on AC voltage with additional Uninterruptible Power Supplies (UPS) installed to back up the powering needs of equipment that operates on AC voltage. An additional benefit of these battery banks is that of backup powering. In the event of a commercial power outage, these batteries will provide enough power to keep the headend operating for several hours and certainly long enough for the backup generator to come up to speed and produce power for the headend

Comcast has power supplies located on the distribution plant to provide power to the nodes and amplifiers used in the field. These power supplies are equipped with batteries that provide backup power in the event of a commercial power outage in much the same way the headend backup battery power is provided. Based on information provided by Comcast, these power supplies are capable of running, without commercial or other power sources, for four hours at normal load conditions. This run time will increase based on lower power needs at some power supply locations. The power supplies should be maintained on a regular basis.

### Status Monitoring

Comcast has deployed numerous tools to monitor the operation of the network in real-time. These tools monitor various components throughout the system showing areas of the system that are not operating as designed or that are experiencing an outage. For instance, the signal to noise or carrier to noise ratio (C/N) and other distortions can be measured and monitored throughout the system via cable modems at subscribers' homes and businesses. Other monitoring tools can measure the health of power supplies in the system and alert Comcast when issues arise that need further troubleshooting and repair. These tools can provide Comcast with data showing where problems occur and often times staff can react to, and repair, problems before the network user knows of the problem.

As stated above, Comcast employs several tools to perform ongoing monitoring of its residential network. These tools are at least comparable to monitoring systems in place in other cable systems we have reviewed throughout the country.

### Outages and Outage Documentation

CBG, as part of the August 2015, Request for Information sent to Comcast, asked for documentation showing outages between August, 2014 and July, 2015 with associated down-time, response time, problem resolution times and resolutions. Comcast sent the Outage Reports with all of the other information provided, in March, 2016.

Overall, the outage numbers are not abnormally high for a system of this size. An area of concern related to outages is that of system outages related to loss of commercial power. As stated above, Comcast reports that the power supplies used in the distribution system have batteries which provide power in the event of loss of commercial power. Additionally, Comcast monitors these power supplies and knows when they have gone into standby mode and also how long the batteries should last. This should allow Comcast staff to connect electrical generators to the power supplies when the potential exists that the batteries will run out of power before commercial power is restored. However, Comcast's Outage Report shows a high number of outages labeled as "Residential Power Restored" and "Residential Power Outage Verified". In total, more than 40% of all outages were commercial power related. These outages lasted anywhere from a few minutes in duration to more than 20 hours long. The average duration of these power related outages is between 1.5 hours and 2 hours long. This indicates that either the batteries didn't perform as designed, the system monitoring didn't notify staff of the pending power failure of the batteries or staff did not adequately respond to the monitoring alarms. Regardless, based on the number of outages of this type, Comcast should describe why the power supply problems are as numerous as they are.

### Digital System Performance

CBG historically began its analysis of cable systems by reviewing a system's most recent Federal Communication Commission (FCC) Proof-of-Performance (POP) test documents. These documents reflect the results of tests the FCC requires to determine compliance with standards for analog channels and were required to be stored in an operator's Public File, and to be available for inspection by the Federal Communications Commission or the local franchising authority. However, because Comcast has removed all analog channels from its system and became an all-digital system, the tests and documentation are no longer required and Comcast no longer performs these tests.

The FCC also requires that operators of digital cable systems comply with certain technical standards for their systems. (See Title 47, Section 76.640 of the Code of Federal Regulations (47 C.F.R. § 76.640). However, the FCC's rules do not prescribe how, where on the system, or how often testing must be performed to determine compliance. Additionally, FCC regulations have no requirement for cable providers to document results of tests to determine compliance. Comcast representatives indicated Comcast has not performed or documented tests for compliance with these FCC standards as their system testing has not been specifically implemented for the digital performance parameters specified by the FCC. The County should require Comcast to provide documentation of this testing in the future and that they provide the results on a bi-annual basis, consistent with previously mandated FCC Proof of Performance testing.

As part of CBG's site visits, CBG observed Comcast personnel performing tests at four locations throughout the County to determine compliance with the FCC standards. Comcast provided the results of its tests to CBG. In addition, CBG viewed a system spectrum trace showing the response of the system which provides a snapshot of the overall system electronics' and cable infrastructure's performance. The results of these tests were all within federal specifications.

### Subjective Viewing of SD and HD Channels on the System

As part of CBG's testing, CBG subjectively viewed analog, SD and HD channels at four locations within the County where the above mentioned observation of testing was performed, to identify signal quality problems currently existing on the system. Digital signals are typically either on or off with few if any distortions added by the network other than undesired attributes that can be introduced as a result of significant compression of channels to conserve bandwidth. When distortions and noise are significant enough, pixelation and picture freeze-ups can occur, whether the cause is compression or network-caused distortions.

CBG observed substandard operation at the first testpoint. Comcast replaced the tap plate and made other minor corrections to the drop and this cleared up all problems at the testpoint. This does however show the importance of regular testing, outside of the system monitoring in place, as the system monitoring cannot see every small section of the system.

CBG's observations of the SD and HD channels on the system found that, in general, the HD channels on the system are very crisp with little, if any, pixelation or other undesired attributes noted. CBG's observation of the SD channels showed a varying degree of unwanted attributes that appear as noise in the pictures. Because pictures often include action or moving images, these reductions in quality aren't always seen by customers on their TV sets. This type of distortion is frequently due to problems that some television receivers have dealing with the compression in digital signal transmissions. In addition, this distortion is more readily observed on TV sets of 40 inches or larger and appears less objectionable on older picture tube screens (which also tend to be smaller than 40 inches) and Plasma screens compared to LCD and LED televisions. This distortion is most often referred to as "mosquito noise" and is easily seen around graphics or bugs (small digital graphics often in the lower corner of the screen used to identify the channel being watched) appearing on the TV screen, but it becomes more apparent throughout the TV picture as it becomes more severe. It is CBG's experience that although we performed our subjective viewing at four locations, these results will likely be seen throughout the system. This problem is often overlooked by most subscribers and is likely explained in part by the fact that people who have larger TV sets are more likely to have HD service and therefore watch programs in the High Definition format where mosquito noise is far less prevalent. Furthermore, people with smaller SD or analog TVs will likely not see mosquito noise as it does not become evident on smaller TV screens.



<sup>15</sup>The white arrows point to “Mosquito Noise” in a Digital TV picture. This photo is a generic photo from the website [www.embedded.com](http://www.embedded.com). It is included only for purposes of illustrating Mosquito Noise and is not intended to depict or reflect the picture quality of any Comcast channel.

### Compliance with the National Electrical Code (NEC) and National Electrical Safety Code (NESC)

CBG performed an independent system drive-out to note any problems with the system plant and drops to residences and businesses pertaining to the condition of underground and aerial appurtenances, grounding and bonding, as well as clearance and attachment issues. If a system is not properly maintained, problems will arise with the aesthetics of the system, but more important, such issues result in potential safety problems. In addition to appearance and safety issues, the integrity of the cable plant is important for proper operation of the network and its ability to deliver high quality signals in a reliable manner.

Comcast needs to regularly inspect and repair problems that arise on its system in order to maintain a network that is safe to the public and Comcast employees working on or around the system, as well as personnel from other tenants of the Right of Way in the County who must work in close proximity to Comcast’s facilities. Furthermore, NESC Code 214 requires that “lines and equipment shall be inspected at such intervals as experience has shown to be necessary.”

CBG performed an inspection of a representative, random sampling of areas throughout the County. It must be noted that this driveout should be viewed as a representation of issues that exist

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<sup>15</sup> <http://www.embedded.com/design/embedded/4013028/Video-compression-artifacts-and-MPEG-noise-reduction>

throughout the system. The list of issues and code violations attached to this Report as Exhibits D.1 and D.2 are not to be viewed as all-inclusive lists of issues throughout the County's service area.

Exhibit D.1 includes all of the randomly selected addresses and the findings at each address. These findings are used to estimate the number of issues County-wide. Exhibit D.2 only includes issues found that are not related to one of the 150 random addresses. These are issues that were spotted while driving from location to location and while performing inspections of addresses in Exhibit D.1. These issues are noted, for repair by Comcast, but do not impact the random sample findings or the estimations of issues County-wide. Furthermore, the findings in Exhibit D.2 are not referenced in this portion of the Report in order to minimize confusion as to the findings at the random sample addresses.

### Methodology used to estimate the total number of physical plant violations Countywide

The following paragraphs explain and illustrate how CBG utilized the results from the random sample inspection to project the condition of the physical plant and code violations present throughout Comcast's cable plant countywide.

CBG worked with the County to create a database of all addresses that were in the Unincorporated areas of the County that could be served by Comcast. We started with the entire database of addresses in the Unincorporated County and removed addresses that were likely to customers of Comcast if service were available such as properties that would not have a building to be served. The County staff pulled all residential and business addresses that had "Improvements" on them. This eliminates vacant lots and lots that would not have a home or business that could be served by Comcast.

The Project goal was to visit 150 addresses in the County and perform an inspection of the cable TV infrastructure where it exists and where access to the drop and hardline cables was possible. To this end, the County IT staff pulled 250 addresses (100 extra addresses to allow over sampling if needed to account for any potential address problems encountered) from the Universe of 48,150 addresses. We then pulled a subset of 150 randomly selected addresses from the 250 randomly selected addresses<sup>16</sup>.

For violations at the pole, pedestal or vault itself, CBG made adjustments to reflect the fact that such violations were linked to more than one address. For instance, if a pedestal, vault or pole with a violation is on the property line between 101 and 103 First Street, then both addresses are affected by the violation. If, as typically is the case, a pole, pedestal or vault carries facilities serving drops to multiple addresses, then a violation affecting facilities mounted on or in it could affect service to premises at each of the multiple addresses served. CBG did not, however, record violations at poles, pedestals or vaults serving multiple addresses as violations at each served address. Rather, CBG proceeded as follows to extrapolate, based on the random sample of addresses inspected, the number of violations with poles and pedestals county-wide:

In the responses to the RFI from Comcast we have the total number of homes passed by Comcast, and the numbers of poles and pedestals used by Comcast. These numbers are considered

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<sup>16</sup> Inspections occurred in 2015 between September 14<sup>th</sup> and 18<sup>th</sup> and in 2016 between April 4<sup>th</sup> and 8<sup>th</sup>.

confidential by Comcast and therefore we do not include them in this Report. However, based on these numbers, we can determine that each pole, pedestal or vault in the County serves an average of 2.5 homes passed (Note that this is not the number of active customers per pole or pedestal).

This subset number was then used to project the number of poles/pedestals with that violation countywide, in the same manner as for service drops: For every pole/pedestal with a violation found, we divided 1 by 150 for the corresponding percentage of the sample of inspected addresses represented by that violation. This percentage was then applied to the 2.5 homes passed per pole, pedestal or vault to project such violations countywide.

Conditions that affected the application of our methodology include:

- Where CBG found a building but no drop in place, (40 instances), the location was recorded as not having a drop. The hardline cables were still inspected and any issues were noted.
- Where CBG found no building at the address (1 instance), the location was recorded as “no house”.
- When CBG could not gain access to a yard (4 instances) and therefore could not inspect the drop, the drop (address) was documented as a “No Access” address. No access addresses include properties where no one was home and a gate prevented inspection or some cases where gated communities and secure facilities exist.
- Where no cable TV infrastructure was near enough to an address to serve it, and therefore no hardline or drop exists, (31 instances or 21% of the entire Random Sample) these addresses were labeled as “No cable in area”.

**Hypothetical examples, in a system where 150 locations were randomly selected for inspection and the total number of addresses is 100,000, to explain the process.**

A drop problem at 30 addresses divided by 150 locations inspected would equal 20.0% of inspected addresses having the same or similar problem. This applied across the entire system would equate to 20.0% times 100,000 addresses for an estimated 20,000 similar problems system-wide. It must be noted, with a sample of the size of Charles County’s, the error rate is  $\pm 8\%$ . Further explained, this would mean if the survey were redone with a new random sample of addresses throughout the system, the findings should be the same as found in this sample  $\pm 8\%$ .

Taking the above Hypothetical example, this is mathematically shown as  $20.0\% \pm 8\%$  or 12,000 (12%) to 28,000 (28%) similar issues projected system-wide. This example is shown in Table 1 below.

Total Universe of addresses	100,000
Number of locations inspected	150
Number of problems found	40
Percentage of inspected addresses with a problem	20%
Percentage applied system-wide	20,000
Margin of error	± 8%
Margin of error applied to glean the projection of problems system-wide	12,000 to 28,000

As indicated previously, some problems found during the driveout can be linked to more than one address. For instance, if a pedestal, vault or pole, with a problem, is on the property line between 101 and 103 1<sup>st</sup> Street, both addresses have a problem but it cannot be shown as two separate problems based on the two addresses. Therefore, we have used the following methodology to derive a good faith estimate of the number of problems system-wide:

- Each pedestal/pole/vault passes or potentially serves an average of 2.5 addresses based on many pedestals in front yards serving 1-2 addresses. However, some pedestals in backyards serve 2 to 4 addresses and some pedestals, such as at multiple dwelling units, serve from 2 to upwards of 20 residential units. This aligns with numbers of homes passed and poles and pedestals in the system.

Therefore, if a problem is found at a pedestal or pole, it equates in the following manner to estimate the number of similar problems system-wide:

- 50 similar problems found at pedestals/vaults (underground) and poles (aerial) serving the 200 random sample addresses, divided by 200 locations inspected equates to 25.0% if all addresses had their own pedestal or pole.
- Since we estimate that each pedestal or pole serves an average of 2.5 addresses, we take 25% divided by 2.5 or 10.0% of the pedestals and poles County-wide are projected to have a similar problem.
- Taken across the entire system this equates to 10.0% times 40,000 poles equaling 4,000 pedestals or poles projected system-wide with a similar problem if every pole served only one address.
- Applying the margin of error, as shown above, this results in 2% to 18% of all hypothetical pedestals, vaults or poles with a similar problem or 800 to 7,200 similar pedestal or pole problems in the projected system-wide.

The following 14 inspections and observations were made at each location:

- Can the address be definitively determined?
- Is the hardline (also known as mainline cable. This is the cable system up to, but not including, the drop) constructed and maintained as required by the NESC?
  - Are proper clearances maintained to the ground, roadways and other occupants on a pole?
  - Are pedestals secure and installed in a workman like manner?

- Are down guys and lashing wire properly maintained?
- Are power supplies grounded and locked?
- Is there a cable TV drop?
- Is the drop installed and maintained as required by the NESC and NEC?
  - Are proper clearances maintained to the ground, roadways, decks and windows of adjacent buildings, and other occupants on a pole?
  - Is the drop properly grounded and bonded at the premises?
  - Is the drop attached to the premises correctly?
    - Not hanging in front of windows or doors
    - Not laying in front of doorways
    - Secure attachment

During this sampling, we identified approximately **65 issues**, at the randomly selected addresses, that are either violations of NEC or NESC codes or are simply outside of good engineering practices.

Examples of our findings are included below, but one of the more serious situations we have found in recent audits must first be described. CBG, during the driveout of the County, observed a power supply location and found that several problems existed. This location was not a part of the Random Sample described herein, but was noted during this project. The most obvious issues were an uncompleted pole transfer, power supplies that were not locked, cables hanging off of the poles and although not outside of codes, two power supplies on poles less than 20 feet apart (this is a rarity at best).

Any of these issues should be identified by the technicians working in the field and then put on a list to be remediated in a short timeframe. In addition, there is an obsoleted meter box and cables that are cut coming out of the top of the power supply that warrant investigation by technicians just driving by. Furthermore, regularly scheduled power supply maintenance would identify this issue if not otherwise identified.

As the situation was further reviewed and inspected by CBG, it was determined a live electrical wire with an uninterrupted path back to a transformer was hanging to within 4.5 to 5 feet above the ground. This voltage and current is easily significant enough to injure or fatally harm a person coming into contact with the wire that had a bare, uninsulated end. In addition, with no breaker or fuse between the wire and transformer, if grabbed by a person, there would not be a fault in the line (such as in place in facility breaker boxes), significant to shut down power until it was likely too late.

CBG immediately called Comcast staff and a Supervisor came to the scene. A technician then confirmed power was present on the wire by touching it with a stray voltage detector. Comcast then contacted the power company and they arrived within a couple of hours and cut the wire from the power company's secondary and dropped the, now disabled, wire to the ground.



██████████ – Hazardous situation with live electrical wire 4.5 to 5 feet above the ground.



██████████ – Hazardous situation with live electrical wire 4.5 to 5 feet above the ground.

## System Grounding and Bonding

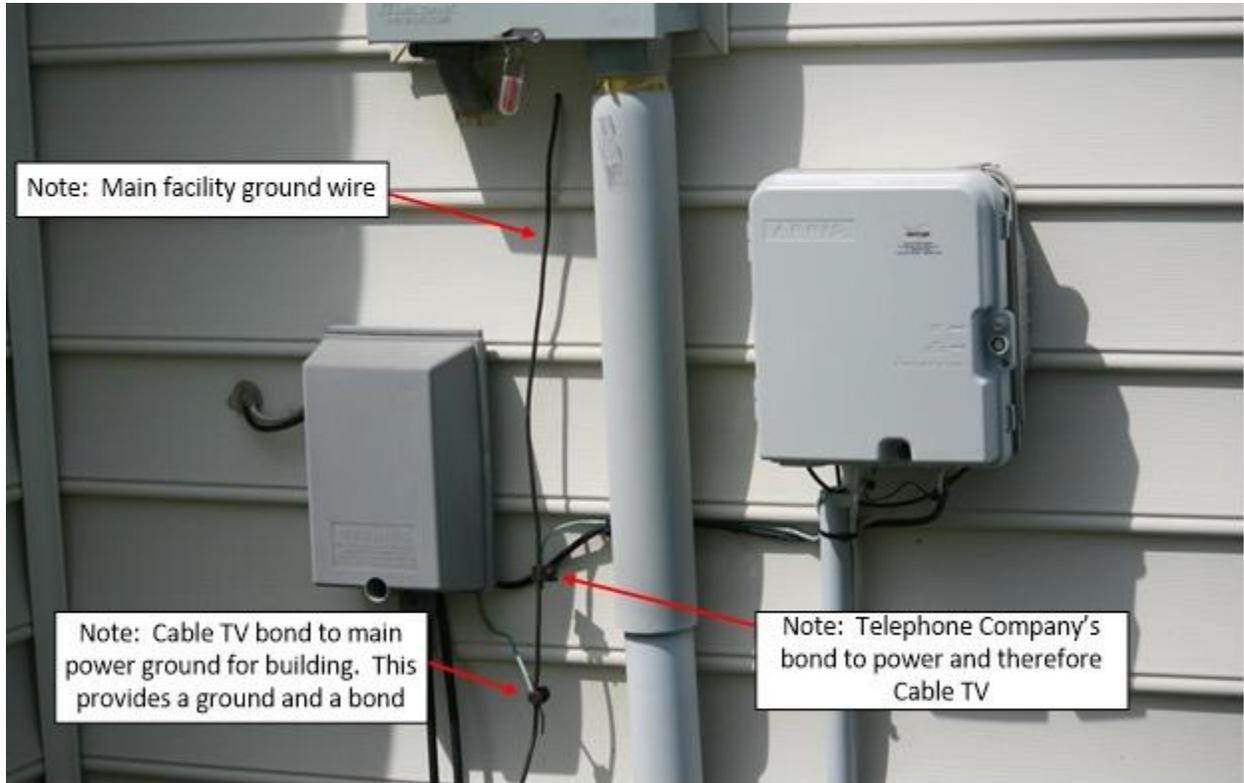
The cable system must be grounded properly to provide a path to ground for stray voltages such as lightning or power conductors coming into contact with the cable system. In a similar manner, the distribution system and service drops must be bonded to other utilities in order to ensure that there is not a voltage difference between them. If they are not properly bonded, there will likely be a difference in electrical potential between the systems, thereby producing a shock hazard to anyone coming into physical contact with both utilities at the same time. Code requirements for grounding and bonding of cable TV networks and service drops are provided in the NEC and NESC and provide that a communication system can be grounded effectively by attaching or bonding to the building's electrical ground and to other communication and utility systems, such as telephone networks and water pipes. Bonding the service drop to other utilities that are themselves properly grounded is acceptable, as is bonding to the building's **interior** cold water pipes, **within 5 feet from its point of entrance** to the building<sup>17</sup> but only if the cold water pipes are connected or bonded to an electrode (grounding rod)<sup>18</sup>. However, bonding to water pipes cannot occur outside the building and an inspection must be performed on the water pipe to ensure there is not a break in the electrical path from the service drop to ground (such as would be introduced by plastic or non-metallic pipes or valves in the building plumbing or in water softeners<sup>19</sup>). The most significant violations found during the random sample driveout were that of missing grounds and/or bonds (to other utilities), faulty or incorrectly installed bonds or grounds in service drops, including drops where no bond/ground was made on the outside of the building and, if it exists, inside grounding/bonding that could not be verified. In the random sample of addresses selected for inspection (and used for countywide projections), CBG observed **25 instances** of such problematic bonds/grounds at residences and businesses.

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<sup>17</sup> National Electrical Code Section 820.40.(B).(1).(2),

<sup>18</sup> National Electrical Code Section 250.53(D)(2),

<sup>19</sup> National Electrical Code Section 250.53(D)(1),



*The above picture shows an example of proper grounding and bonding. The cable TV ground wire connects to the power conduit which provides a ground and bond to the Power Company's ground.*



**██████████** – Cable enters and exits the house box but there is not a ground/bond wire to power and phone.



– Cable TV is using a water pipe outside of the building. This does not meet the NEC Codes.

*Pedestals that are smashed, open or are not secured properly.* – Pedestals that house cable television equipment such as amplifiers, splitters, taps and distribution and drop cables, should be secured to ensure the public cannot easily open the pedestal and thus have access to the equipment and cables. When there is power on the equipment, such as when an amplifier is within the pedestal or when the cable plant downstream of the pedestal has an amplifier needing power, failure to secure the pedestal is a violation of the NESC Code Section 380. When power is not present within a pedestal, good engineering practice would still provide that the pedestal be secured to minimize theft of service and vandalism to the plant and drops within the pedestal, therefore reducing the likelihood of outages due to unauthorized access to the equipment within the pedestal. We found **18 locations** where a pedestal was smashed or open.



*– Smashed pedestal that has been taped together over time.*



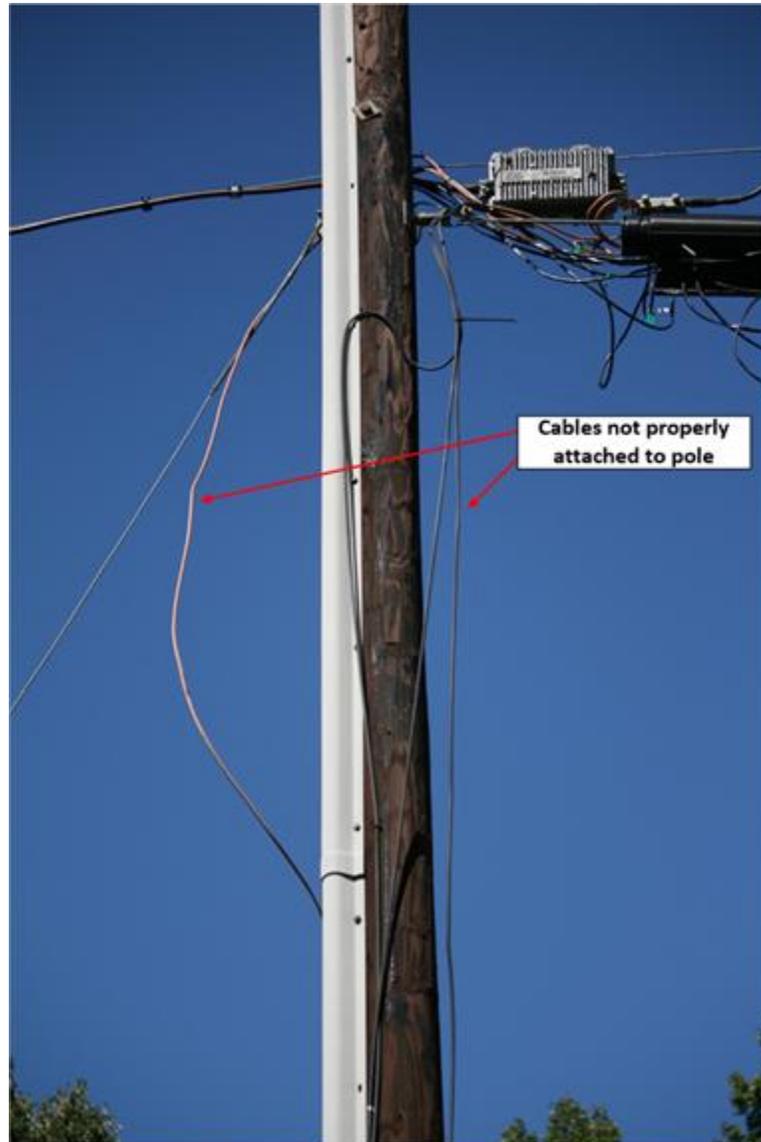
**[REDACTED]** – Pedestal cover is open and numerous drops are sticking out and need to be buried.



██████████ – *Missing pedestal cover (Note: Google maps dated October, 2012 shows this pedestal cover missing).*

**Service drops and hardline cables not properly attached to poles and hanging low from the strand between poles**

Cable drops that are not properly attached to poles, such as drops hanging away from the pole, in some cases several feet, can create a tripping or entanglement hazard to the general public or a property owner as they come in contact with the cables. Additionally, these not-to-code drops create aesthetic problems. These cables often times are in what is referred to as the climbing area or climbing space of the pole. This area is to remain clear in order to provide a safe area of the pole for cable TV and other technicians to climb up to equipment fastened to the pole. Having this clear area on the pole is a safety concern and also a performance issue as someone climbing the pole can become entangled in the cables causing the person to fall and/or causing them to damage the drop. We found **8 instances** of drops that were not properly attached to the pole.



**[REDACTED]** – Drops are not properly attached to the pole, creating a climbing hazard.



██████████ – *Drops are not properly attached to the pole creating an entanglement or tripping hazard.*

*Underground drop cables exposed above ground* – When an underground drop is first put into service, often times it is not immediately buried. Prior to burying the drop, other utilities must locate their facilities and a crew must be engaged to perform the task of burying the drop. These delays in burying drops are understandable. However, there appears to be a number of drops that are not completely buried in the County.

Having drops lying above ground creates a tripping hazard for people walking in the area. In addition, if the drop is caught on a person's leg or is tangled in a lawnmower or snow thrower, the customer fed by the drop will likely lose service until the drop is repaired. Furthermore, where a

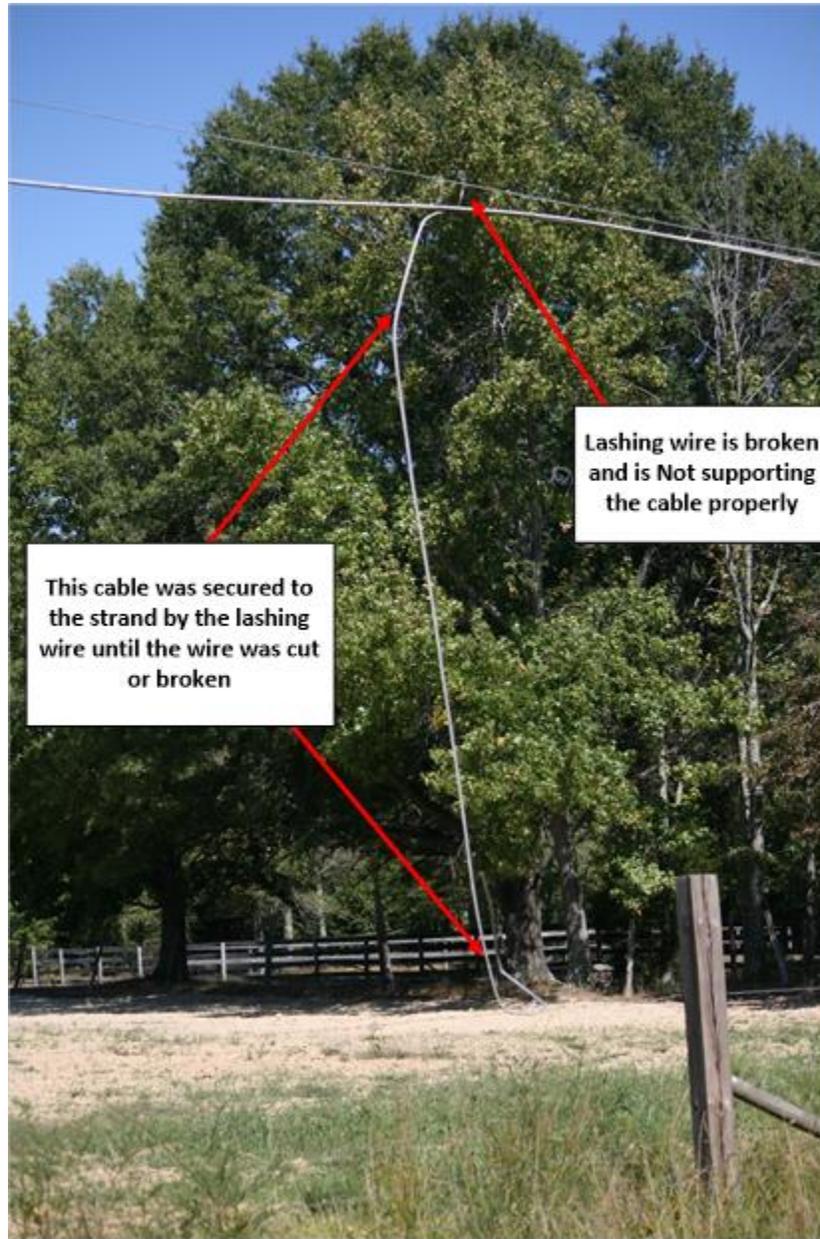
drop is exposed in an area that gets foot and machine traffic the drop will likely fail over time as the cable becomes crushed. We found 4 **instances** of drops that were not buried or partially exposed.



██████████ – Drops going from the pedestal to the pole (becoming aerial drops) are not buried.

**Broken lashing wire and down guys that are missing, loose or dangling from the pole** - Aerial (overhead) cable TV infrastructure is constructed by attaching a messenger strand cable from pole to pole, attaching it to the poles with heavy duty bolts, nuts and other hardware components. Once the messenger cable is in place, the cable television coaxial and fiber optic cables are strapped (lashed) to the messenger cable by wrapping a thin wire or multiple wires around both the coaxial/fiber cables and the messenger cable. The lashing wire is then secured or tied off at each pole by using a “bug nut” that is fastened to the messenger cable. We found **3 instances** of broken lashing wire, or down guy issues as part of the Random Sample, along with significantly more found and included in Exhibit D.2.

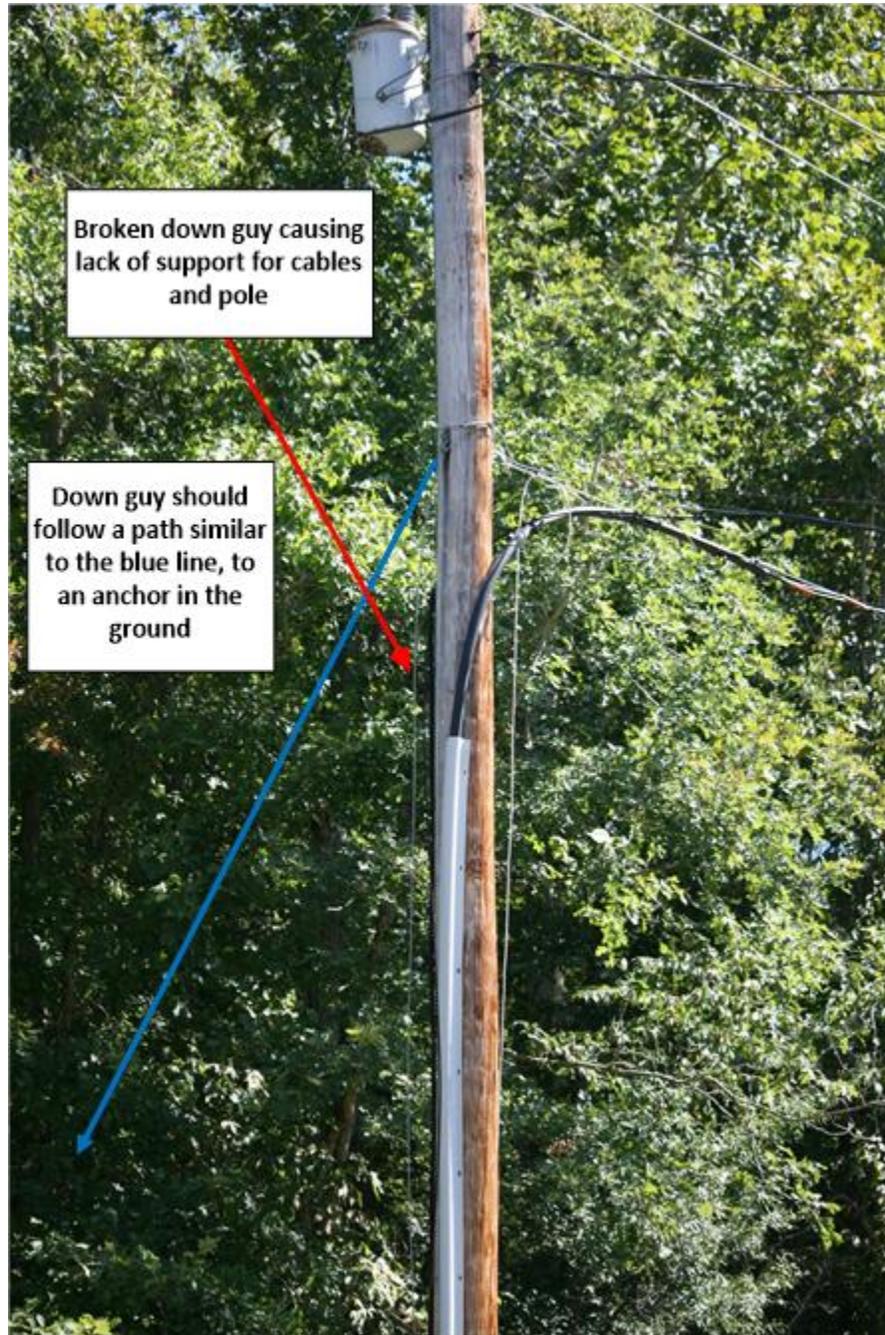
When lashing wire breaks it must be repaired before the cables become damaged by sagging into telephone or other low voltage facilities, or the weight of the cables pulls them out of their connectors. If the cables sag enough, they will violate NESC requirements for minimum clearance between the TV cables and other facilities, and minimum clearance between the cables and the ground.



— Broken lashing wire, cable is hanging nearly to the ground.

Poles at the end of a series of poles, or where the cables and wires angle off, such as around a curve in the road, must have a guy wire (down guy) to help support the poles and cables, keep the poles perpendicular to the ground, and maintain tension in the cables. Failure to install or properly maintain down guys places additional stress on the poles, leads to early failure of the pole(s), and can cause poles to fall into the right-of-way, dragging cables with them. In addition, if additional stress is applied to the cable or wire run, such as a pole being hit by a vehicle or ice loading on the cables and wires, one or more poles that would otherwise handle the added stress may fail without the additional support that would have been supplied by the missing or loose down guy. These conditions can jeopardize the safety of vehicles and pedestrians using the right-of-way. Down guys not properly attached to the pole or not properly anchored to the ground can lead to safety risks if the poles become stressed more than usual because the tension placed on the poles is not carried to the

ground. Failure of the poles also creates the potential for failure of the cable system, and can damage and cause failure in systems of electricity, communications, and other providers occupying the poles.



*Mason Springs Road, 1 span south of 244 - Broken down guy not supporting pole and the weight from the cables.*

**Power supply and service boxes not locked** – All power supplies and the service boxes (fuse or breaker boxes) must be locked. Comcast has a significant number of power supplies and their corresponding service boxes that do not have permanent built-in locks. Some of these are not locked as is required by code. One purpose of having power supplies enclosed in a cabinet is to keep water

and debris out. In addition, these cabinets keep unauthorized people out of harm's way by blocking access to power that is harmful or fatal if a person comes in contact with it. Furthermore, the batteries housed in the power supplies are very costly and are prone to theft, which also "invites" people not qualified or authorized into a potentially hazardous situation. Providing locks on the access doors further deters people from accessing the potentially dangerous contents of the power supply. It should be noted that some power supplies, and their service boxes, are locked throughout the system. Therefore, Comcast is aware of the requirement to lock these facilities.



**██████████ – Power supply and breaker box are not locked. This example is at ground level making it more attractive to unauthorized persons to open.**

There are other, less frequent violations of codes that are listed and described in Exhibits D.1 and D.2 of this Report. It is important for the County to require regular system inspections by Comcast and timely repair of issues and code violations that are found.

## Projection of Physical Plant Issues County-wide

*Issues with drops as they leave the pole or pedestal up to the side of the residence or business* – During the driveout and inspection of Unincorporated Charles County, at the 150 randomly chosen addresses, CBG found a **total of 28 issues or Code violations related to the drop** from where it leaves the pole or pedestal up to and including the side of the house. Some of these issues are explained above and all of these issues are listed in Exhibit D.1 to this Report. Based on statistical probability and the margin of error at 95% confidence, **we estimate that there are between 5,136 to 12,840 issues or code violations relating to drops system-wide**. Specifically:

- 28 problems found from the building up to the pedestals or poles serving one of the 150 random sample addresses, divided by 150 locations inspected, equates to 19% of all addresses having a drop related problem.
- Taken across the entire Unincorporated area of the County, this equates to 19% times 48,150 addresses, equals 8,988 addresses projected system-wide with a drop related problem.
- Applying the margin of error, this results in 11% to 27% of all addresses with a drop related problem or 5,136 to 12,840 drop related problems projected system-wide.

*Issues at the pedestal, vault or pole* – During our driveout inspection at the 150 randomly selected addresses in the system, **CBG documented issues or code violations at 38 poles or pedestals at the sample addresses**. Some of these issues are explained above and all of these issues are listed in Exhibit D.1 to this Report. **We estimate that there are between 1,300 to 2,500 issues or code violations at a pole or pedestal system-wide**. Specifically:

- 38 problems found at pedestals and vaults (underground) or poles (aerial) serving the 150 random sample addresses, divided by 150 locations inspected equates to 25%, if all addresses had their own pedestal or pole.
- We approximate, based on information provided by Comcast and the County, that each pedestal, pole or vault serves an average of 2.5 serviceable addresses. Note that this is not the same as active customers in the Unincorporated areas of the County. This includes potential customers, or all homes passed.
- Because the findings are based on calculations that use numbers considered by Comcast to be confidential, we only provide the projection of approximately 1,300 to 2,500 issues or code violations at poles, pedestals or vaults used by Comcast to serve addresses in the County.

The County as the overseer of the public rights-of-way, should require Comcast to provide a detailed inspection and repair plan which addresses these and all issues and code violations in the County service area. Specifically, Comcast must be required to address the bonding and grounding issues and provide the County with a detailed plan to inspect for grounding and bonding at all addresses in the County. Each address, where a problem exists, should be brought up to code, in a timely manner, including all active and disconnected drops. Where the resident is a non-subscriber to Comcast provided services, the drop can be removed in order to eliminate the code violation that may exist. In addition, the system should be regularly inspected for, but certainly not limited, to:

- Drops properly buried in a timely manner (all the way from the pedestal to the home or business)
- Hardline cables properly attached to the pole and protected
- Down guys and guys over roads properly installed and tensioned
- Power supplies locked
- Pedestals in good condition, properly placed and secure from unauthorized entry, replace faulty doors, smashed covers, etc.
- Proper grounding and bonding at the poles and pedestals
- Proper grounding and bonding at the residence or business
- Proper clearances between facilities and providers on poles and from the pole to the residence
- Proper clearance of aerial cables to the ground
- Drops properly attached to poles

Documentation of these inspections and repairs needs to be provided to the County on a regular basis; perhaps quarterly.

## **System Technical Review and Evaluation of Comcast's Residential Cable Television Network - Conclusions and Recommendations**

**Outages** – Comcast should be required to describe why it is having a high number of outages that should be averted by back-up power supplies with properly functioning and administered status monitoring. Comcast should describe how it intends to minimize these types of outages going forward and provide the County with outage reports on a quarterly basis. The County should review these reports as they are received and further address any systemic problems that appear.

**System Reach** – The County should work with Comcast to find ways to serve more County residents that desire cable TV service. The County should explore reducing the minimum number of residential units per mile required to obligate Comcast to build to new and existing unserved addresses. The density requirement should more closely reflect the County's density outside of the more urban areas of the County.

Additionally, the County and Comcast should work together to identify less traditional methods to extend the cable TV system to reach more County residents and potential customers. These methods may include finding grant funds or public/private partnerships that would help expand the system into less dense areas of the County. This could also include lowering the contribution required by a resident(s) to expand the system when the minimum density requirements are not met.

**Regular Inspection of Infrastructure** - Comcast must be required to maintain its system infrastructure in a safe manner and ensure it protects the public as well as technicians and others that must enter the areas around cable TV infrastructure. Comcast should first respond to and resolve all the problems noted in Exhibits D.1 and D.2. Then the County should require a maintenance program designed to regularly inspect all cable TV infrastructure from the headend location, up to and including at the subscribers' residences or business locations. Documentation should be provided to the County detailing problems found, dates found and repaired and the ultimate resolution. These inspections and repairs should include, but not be limited to:

- Drops properly attached to poles
- Drops properly buried in a timely manner (all the way from the pedestal to the home or business)
- Hardline cables properly attached to the pole and protected
- Down guys and guys over roads properly installed and tensioned
- Power supplies locked
- Pedestals in good condition, replace faulty doors, smashed covers, etc.
- Proper grounding and bonding at the poles and pedestals
- Proper grounding at the residence or business
- Proper clearances between facilities and providers on poles
- Proper clearance of aerial cables to the ground

In addition, the County should perform spot checks on a regular basis to determine if the system is being maintained as required by both the NESC and NEC and as required in the current and future

franchises. These checks could, for example, be performed by Public Works employees that are in the field performing their current tasks.

**Digital System Performance** - The County should require testing of digital channels to ensure they meet the specifications required by Title 47, Section 76.640 of the Code of Federal Regulations. This testing would replace the previously required Proof of Performance testing that evaluated the quality of analog channels on the system. These test should be performed at random locations twice per year in the same manner as the Proof of Performance tests were.

**SECTION E**  
**FRANCHISE COMPLIANCE AND PAST PERFORMANCE  
REVIEW**

## **FRANCHISE COMPLIANCE AND PAST PERFORMANCE REVIEW**

### **Introduction**

This Section of the Report is devoted to a review of the past performance of Comcast Cablevision of Maryland, Inc. (Comcast), and compliance with its current Franchise with Charles County (County). It is based on a review and analysis of compliance with key provisions and requirements contained in Section 226, Cable Communications, of the Charles County Code, as amended, and the June 5, 2002 Cable Television Franchise Agreement (Franchise) between the County and Comcast. Applicable provisions are identified below, followed by an assessment of compliance by Comcast. This assessment is then followed at the end of this Report Section by recommendations on addressing issues of potential non-compliance, requiring compliance under the existing Franchise or County Code, where lack of compliance has been determined to exist, and/or addressing such issues with new Franchise provisions going forward. Note that some Franchise compliance issues involving system technical considerations are contained in the System Technical Review Section of this Report, and compliance with Franchise Fee, PEG Fee and I-Net Fee considerations are contained in the Franchise Fee Audit Section of this Report.

### **Assessment of Key Cable Television Franchise and Ordinance Provision Compliance**

As part of our assessment, CBG reviewed the existing Franchise, Section 226 of the County Code and various County documents concerning the provisions under review. CBG also reviewed various Comcast documents, including Comcast's June 2, 2016 response to the County's May 3, 2016 letter concerning potential non-compliance issues found and a request for documentation. After these reviews, as well as other investigation and analysis activities, we find the following, detailed below, concerning compliance by Comcast with certain provisions of the existing Franchise and the County Code.

Please note that our past performance assessment is based on the review of the information provided to us during the course of our review. Any additional information which is brought to CBG's or the County's attention subsequent to the date of this Report, would need to be similarly reviewed to determine its affect on our findings to date.

#### **Franchise Agreement**

**Section 6(a)(1) - Performance Bond** - Comcast is required under this provision to provide a continuing performance bond in the County's favor to ensure Comcast's faithful performance of its continuing obligations under the Franchise. The most recent copy of the Performance Bond on file with the County was dated 2006 and was not signed by Comcast.

Comcast, in its June 2, 2016 letter, filed a copy of its original performance bond signed by Comcast and noted that this performance bond has been automatically renewed annually and has remained in

full force and effect since that date. Comcast additionally provided the latest assurance by the surety, dated March 22, 2016 that the performance bond continues in effect.

We recommend that the County ensure that it receives, each year, documentation that the bond has been annually renewed.

**Section 6(a)(3) - Letter of Credit** - Comcast is required to maintain a \$20,000 Letter of Credit on file with the County. A review of the County's records indicates that the Letter of Credit had an expiration date of September 13, 2003.

Comcast's July 2, 2016 letter responded that the original Letter of Credit was still in full force and effect. Specifically, Comcast stated that as a condition of the Letter of Credit, it was deemed to be automatically extended without amendment for a period of one year from the present or any future expiration date. The only exception to automatic renewal would be if the County was notified 60 days prior to the expiration date that the Letter of Credit issuer, Bank of America, elected not to extend the Letter of Credit.

Sixty days prior to the expiration date of the existing extension would have been July 11, 2016. If the County did not receive notice from Bank of America by July 11, 2016, then the Letter of Credit will continue to be in full force and effect through the end of the franchise on June 4, 2017, or if the Franchise is extended, at least through September 13, 2017.

### County Cable Ordinance – Chapter 226. Cable Communications

**Section § 226-9.C(3) - Telephone Answering Requirements** – Comcast's required 3rd and 4th quarter 2015 reports show that total calls answered<sup>20</sup> within normal business hours fell below the 90% call answering time standard.

Comcast, in its June 2, 2016 letter, indicated that there was a change with how the telephone answering statistics were displayed in the monthly report for Charles County. As a result of this change, Comcast indicated that an inadvertent error occurred resulting in the report showing incorrect data to the County. Comcast indicated that they have corrected this error and attached revised 3rd and 4th quarter call center reports.

A review of the 4th quarter statistics and the revisions show that calls answered during normal business hours met the standard 93.5% of the time, (noted in the original report at 87.9%, below the 90% standard), and now total calls answered 24/7 fell to 90.7 % (down from 97.1% in the initial report), but also still met the 90% standard.

We believe there continues to be a problem with the 3rd quarter statistics, though, even in the revision. Specifically, while normal business hour statistics rose substantially from 80.6% compliance to 92.6% compliance (now above the 90% standard), those answered within the required time when considering all calls answered 24/7, dropped from 92.6% to 85.9% (below the 90% standard).

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<sup>20</sup> "Total Calls Answered" includes not only calls from County residents, but also calls from residents of Anne Arundel County and Calvert County.

In that, according to Comcast's revised 3rd quarter 2015 report, 147,900 calls were taken from residents in the Charles, Anne Arundel and Calvert County area after normal business hours, this drop in performance below the standard is a cause for concern. Our understanding, as well, is that after normal business hours is when many people have the opportunity to call Comcast, and that, after normal business hours is also when the largest portion of television viewing occurs.

A review of the monthly 3rd Quarter 2015 statistics shows that the biggest problems occurred in August and September. Specifically, in July, performance for all calls answered 24/7 was within the standard at 90.7%, while in August it fell to 82.5% and in September 83.7%, providing a quarterly total of 85.9%.

This standard must be met under normal operating conditions. We recommend that the County further investigate this potential non-compliance situation with Comcast by determining whether there were operating conditions outside the norm which caused the substandard performance in August and September 2015.

**Section § 226-11.F(1) - Telephone Statistics Report** – Comcast is required to provide telephone answering statistics "in a form sufficient for the County to be able to determine whether the standards specified in this Chapter are being met". Comcast provides call center statistics that include calls received from Charles County, as well as Anne Arundel County, and Calvert County. Because multiple counties are aggregated, it is possible that the statistics just for Charles County residents may not be compliant with telephone answering standards.

In the County's May 3, 2016 letter, it indicated to Comcast that it "must immediately provide the last two quarters of 2015 broken down into statistics only for Charles County residents. Additionally, for the quarters going forward, Comcast must continue to provide the statistics for Charles County residents only".

Comcast, in its June 2, 2016 response, indicated that a change to provide call center statistics received from all three (3) counties was made in February 2013 and indicated that it has resulted in an "improved customer experience". It does not, however, explain what the "improved customer experience" is. Comcast further indicated "as a result of this change, we are no longer able to isolate call volumes specific to Charles County". Comcast goes further to indicate that Comcast and the County discussed this matter prior to the filing of the 1st Quarter 2013 report.

Without isolating the calls just to Charles County, a review of the statistics provided is not able to determine whether Comcast, is, in fact, in compliance with County-specific standards.

We recommend that the County determine from Comcast whether and how Charles County customers have experienced "an improved customer experience", and in light of that, whether it is important to carry over the existing requirement for specific reporting related to Charles County, concerning telephone answering statistics into any renewed franchise.

**Section § 226-11. E(1) - Quarterly Report** – Comcast lists under its Summary of Service Requests - Non-Serviceable category: 7 invalid requests in the 1st quarter of 2015; 4 invalid requests in the 2nd quarter of 2015; and 5 "other invalid/collections, commercial, address correction" in the 4th quarter of 2015. Knowing that service requests, especially in areas where service is desired but may have

lower density than provided for in the Franchise, the County in its May 3, 2016 letter indicated that "Comcast must provide details explaining what makes these requests invalid".

Comcast's responded that certain serviceability requests were identified as "invalid" for one of three reasons:

- "there is already an existing account related to a particular address in (Comcast's) system";
- "an insufficient address was provided from the customer"; or
- "there are duplicate requests for serviceability from the same address within a six-month period"

In that the County has not received complaints from citizens indicating that they were told that they had an invalid request when they believed that it was a valid request, we believe that Comcast's answer is sufficient to this particular inquiry. However, we understand from the County's records that some residents are told that their address is not serviceable, but are not provided any reason regarding such. This situation should be remedied in any renewal franchise with a requirement that anyone who is denied service be given a specific explanation that is consistent with franchise allowances.

## **Franchise Compliance and Past Performance Conclusions and Recommendations**

After analyzing the information provided to us and acquired through our research, we have determined that while Comcast appears to be largely in compliance with the requirements of its Cable Television Franchise Agreement with Charles County and Chapter 226, Cable Communications, of the County Code, there remain some critical issues described above and summarized below. Again, system technical compliance issues are discussed in the System Technical Review Section of this Report and compliance with Franchise Fee, PEG Fee and I-Net Fee considerations are contained in the Franchise Fee Audit Section of this Report.

1. ***Performance Bond*** -- The County should ensure that each year it receives a signed and notarized affirmation (similar to what was provided by Comcast in its June 2, 2016 letter) that the required performance bond remains in full force and effect.
2. ***Letter of Credit*** - The County should ensure that the required Letter of Credit, continues in full force and effect without the need of an amendment, through both the end of the current franchise and any renewal or extension.
3. ***Telephone Answering Requirements*** - In Comcast's revised reports submitted with its June 2, 2016 correspondence, 3rd Quarter of 2015 telephone answering statistics still do not meet the required 90% standard for calls received 24/7. The only mitigating factor could be that calls were received outside of normal operating conditions. Comcast should provide the County with an explanation as to why the 90% standard was still not being met for that quarter. This explanation must be consistent with Franchise requirements, or Comcast will remain in non-compliance for the 3rd Quarter of 2015.
4. ***Telephone Statistics Reports*** - Comcast does not provide call center statistics just for Charles County residents, as required by the Franchise. Comcast should explain how the grouping of call center statistics for Charles, Anne Arundel and Calvert Counties results in "an improved customer experience" for Charles County subscribers. If the County determines that this change is not beneficial, then Comcast should be required to comply with the Franchise and provide call answering statistics specific to only Charles County.
5. ***Valid Reasons for Not Providing Service*** – Comcast should be required to provide any resident requesting service with a valid reason, consistent with franchise allowances, if their request for service is denied.



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## **EXHIBITS**

# **REPORT ON CABLE TELEVISION-RELATED NEEDS AND INTERESTS ASCERTAINMENT FOR CHARLES COUNTY, MARYLAND**

By

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**Prepared: September 2, 2016**

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**EXHIBIT A.1**

**CABLE TELEVISION RESIDENTIAL**  
**SUBSCRIBER/NON-SUBSCRIBER RANDOM SAMPLE**  
**WRITTEN SURVEY MARKUP**

## EXHIBIT A.1 CHARLES COUNTY CABLE TELEVISION RESIDENTIAL SURVEY MARKUP

### Dear Charles County Resident:

Charles County (County) wants your input regarding Comcast cable television service – whether or not you are a current subscriber. Comcast Cable has applied for renewal of its franchise. Understanding your needs and interests, as they relate to cable television services, is important to the County so that we can make the best decision for our citizens in this matter. Please have the person in the household who makes, or equally shares in, the decision to subscribe or not to subscribe to cable television take a few minutes to let us know how members of your household feel about these issues. Please return the survey by Tuesday, July 28, 2015, in the enclosed pre-paid envelope. Your specific responses will remain anonymous. If you have any questions, please contact Mary Goddard at 301-396-5837 or GoddarMa@CharlesCountyMD.gov.

1. What sentence best describes television services in your home? (N=583)

- 43% I subscribe to **Comcast** cable television (**GO TO Q.3**) (N=251)
- 22% I subscribe to cable television, but with another cable television service. (**Continue**) (N=129)  
**Please specify:** N=127 indicated Verizon or FIOS
- 27% I subscribe to satellite television (DirecTV or Dish Network) (**Continue**) (N=157)
- 8% **I do not subscribe to any of the services above (Continue)** (N=46)

2. For what reasons are you not currently subscribing to **Comcast** cable television service? (**Mark all that apply**)

(Total Non-Subscribers N=332)

- |     |   |     |                       |
|-----|---|-----|-----------------------|
| 36% | Cost  | 6%  | Don't want cable TV   |
| 2%  | Don't watch TV  | 29% | Had, but disconnected |
| 5%  | Object to programming   | 23% | Service issues        |
| 11% | Never subscribed  |     |                       |
| 25% | Not available (please indicate your Street, Road or Neighborhood) (N=79)<br>(Please see list at end of Mark-up) |     |                       |
| 22% | Other: ( <b>describe</b> ) (N=95)<br>(Please see list at end of Mark-up)  |     |                       |

**QUESTIONS FOR COMCAST CABLE TELEVISION SUBSCRIBERS; NON-SUBSCRIBERS GO TO Q.25**

3. How long have you subscribed to Comcast cable service in Charles County? (Years) (N=250)

Range (4 mos. - 40 years)                      Mode= 20 years                      Average=13.5 years

4. What services do you currently receive from Comcast? (**Mark all that apply**) (Out of Total Subscribers (N=251))

- 28% Comcast Limited Basic TV Service
- 9% Xfinity Digital Starter TV Service
- 59% Xfinity Digital Preferred TV or higher tier of service
- 36% Premium channels (HBO, Showtime, etc.)
- 13% Other: (**Describe**) (N=50)
  - Comcast/Xfinity Internet (20)
  - Comcast/phone and Internet (12)
  - Triple play: Phone, PC, Cable (6)
  - Xfinity Bundle Service (5)
  - Comcast Phone Line (2)
  - Comcast with HBO

- GB8, CH22 and 26, Local WETA access
- Internet and home alarm and phone
- Business paid by employer
- X-1 System

5. Are there any cable programs or types of programs that are not available from Comcast that you would like the cable operator to add?

22% Yes  
78% No (**GO TO Q.6**)

5a. If "Yes," please indicate: (N= 54) (Please see list at end of Mark-up)\_\_\_\_\_

6. Overall, how would you describe your **level of satisfaction** with your current Comcast cable service(s)? (**Circle #**)

Very Satisfied	Satisfied	Dissatisfied	Very Dissatisfied
16%	49%	22%	14%

7. If you indicated anything less than Very Satisfied, is there anything Comcast could do to improve your level of satisfaction with its cable services? (N=184)

Top 5 First Responses (Collapsed Categories):

1. Lower Cost (N=85)
2. Better Reception (N=18)
3. Improve Customer Service (N=9)
4. A La Carte Channels (N=7)
5. Competition (N=6)

7a. How much do you pay each month for Comcast services (including all services, taxes and fees?)

Range (\$28 - \$350)                      Mode= \$200                      Average= \$181.39

**Customer Service**

8. How satisfied have you been with each of the following characteristics of your cable service during the last year? (**Circle #**)

Comcast Service Characteristics	Very Satisfied	Satisfied	Dissatisfied	Very Dissatisfied	Don't Know/ Not Applicable
Quality of the picture	43%	49%	3%	4%	1%
Quality of the sound	40%	53%	1%	5%	2%
Variety of cable programming packages offered	25%	45%	16%	12%	2%
Location of the cable company office	34%	48%	5%	4%	9%
Hours the cable company office is open	29%	50%	6%	4%	11%

9. In the last year, have you had occasion to call Comcast?

81% Yes  
19% No (**Go to Q.14**)

10. Why did you place the call? \_\_\_\_\_N=204

Top 5 First Responses (Collapsed Categories):

1. Poor Reception (N=90)
2. Billing (N=22)
3. Equipment Issue (N=18)
4. Internet out (N=18)
5. Cable went out (N=9)

11. When calling, did you receive a busy signal?

9% Yes  
91% No

12. Was your call answered by a Comcast customer service representative, including the time you were left on hold, within 30 seconds?

24% Yes  
59% No  
17% Don't Know

13. Was the reason you called resolved in:

41% Less than 24 hours  
26% 1-2 days  
19% More than 2 days  
4% The problem is still unresolved

14. The next few questions are about cable signal **outages**. During the **past year**, have you ever **lost** your **entire** cable signal (all channels) for a period of **12-hours or more** when you still had electricity?

24% Yes  
76% No (**Go to Q.19**)

15. Estimate **how many times** you've lost your entire cable signal for a period of **12-hours or more**? (N=67)

Range (1 - 6 times)                      Mode = 2 times                      Average = 2 times

16. Did you **contact** the cable operator's office to notify them of the outage(s)?

81% Yes  
19% No

17. Rate the cable operator's responsiveness to the outage: (**Circle #**)

Very Responsive	Responsive	Unresponsive	Very Unresponsive	Don't Know/Not Applicable
18%	56%	10%	6%	9%

18. Did you receive a **refund or credit** from Comcast for the period of time your cable television service was out?

17% Yes  
83% No

19. Has your household had any other technical difficulties with your cable service (e.g., picture quality, audio problems, overall reception)?

38% Yes  
62% No (**GO TO Q.20**)

**19a. If Yes**, please explain and note specific channels:

First Response - Explanation (N=106) - (See List at end of Mark-up)

First Response - Specific Channels

1, 3, 4, 5, 7, 9, 22, 26, 34, 200, 204,  
MASN, Discovery, FOX, HBO, Premium, HD, Local, OnDemand, All

**20.** If you have had a service call in the past **year**, please indicate a rating of Very Satisfied, Satisfied, Dissatisfied or Very Dissatisfied for the following service issues. **(Circle #) If not, GO TO Q.21**

<b>Service Issues</b>	<b>Very Satisfied</b>	<b>Satisfied</b>	<b>Dissatisfied</b>	<b>Very Dissatisfied</b>	<b>Don't Know/ Not Applicable</b>
The available times for service	26%	44%	13%	5%	12%
The arrival time of the service technician	27%	41%	11%	7%	14%
The ability of the technician to explain your subscribing options	26%	35%	12%	8%	19%
The technical ability of the service technician to set up service, configure equipment and troubleshoot problems	29%	37%	12%	7%	15%
The professionalism of the technician	34%	44%	6%	4%	12%
Respect for your property demonstrated by the service technician	36%	40%	5%	5%	14%

**21.** The next few questions are about your satisfaction level with how well Comcast communicates with you, either via written or phone communication. Overall, how would you rate the following aspects of communication provided by the cable operator? Please indicate a rating of Very Satisfied, Satisfied, Dissatisfied, or Very Dissatisfied. **(Circle #)**

<b>Communication Issues</b>	<b>Very Satisfied</b>	<b>Satisfied</b>	<b>Dissatisfied</b>	<b>Very Dissatisfied</b>	<b>Don't Know/ Not Applicable</b>
The cable operator's ability to explain and address billing questions	19%	42%	13%	7%	19%
The cable operator's ability to troubleshoot technical problems via the phone	19%	41%	19%	7%	14%
The cable operator's communication with you regarding programming changes	15%	34%	16%	7%	28%
The cable operator's communication with you regarding rate changes	15%	26%	24%	14%	22%

**Community Programming (also known as Public, Educational and Government Access Programming)**

Community programming is made available on local Public, Educational and Government (PEG) access channels. Comcast cable subscribers are currently provided local public, government and educational programming on Channels 95, 96, 98 and 99. Programming includes County Commissioners meetings, local announcements of community events, coverage of Charles County public school events and programs provided by local individuals and churches.

**22. How often do you watch the programming that appears on: (Check appropriate box)**

Channel	Daily	Weekly	Monthly	Occasionally	Never
<b>95 – CCGTV – Charles County Government TV –</b> programming includes: live meeting coverage of the County Commissioners, Planning Commission, Board of Appeals, Fire and Rescue Board, and Liquor Board, a bulletin board of County events, and programs that highlight County services.	2%	8%	2%	34%	54%
<b>96 – CCPS Television – Charles County Public Schools -</b> programming includes: School Board meetings, School News, special programs, Musical Reviews, School Events, and more.	2%	5%	3%	28%	63%
<b>98 – CSM TV – College of Southern Maryland (CSM) -</b> Educational Access Channel – programming includes: educational and informational programs that showcase the College of Southern Maryland. CSM TV also produces original shows, including shows produced by CSM students, and public interest programs.	1%	4%	2%	25%	68%
<b>99 – Public Access Channel - Charles County's Local Public Access Channel –</b> programming includes: local community programs provided by individuals, organizations or institutions in the Charles County area.	2%	4%	2%	31%	61%

**23. What kind of local programming would you like to see more of on Comcast's cable TV system? (Check all that apply)**

(Out of Total Subscribers N=251)

22%	Public Safety Information	17%	Higher Education Programs
13%	Local Arts	12%	Local Business Programming
14%	Public/Community Events & Activities	39%	Community News
14%	K-12 School Events & Activities	13%	Government Meetings
20%	Local Sports	22%	Local Senior Citizen Programs
30%	Local Historical Programming	29%	Special Events
36%	Health/Wellness Programs		
4%	Other: <b>(Please explain)</b> _(N=12)_____		

- Charles Co. Civil court coverage
- Church/Religion (2)
- Hobbies/crafts/skills
- K-12 Events for homeschoolers
- Local stock car races
- Local weather
- National historical programming
- NFL Ticket
- Non-profit efforts to help community
- Want to cancel Comcast and sign up with Warner Cable
- Weather map from satellite

24. How valuable would it be to you for the local community channels described above (see Q.22) to have the following features on the cable system? Please indicate a rating of Very Valuable, Valuable, Somewhat Valuable, or Not at all Valuable. **(Circle #)**

Local Community Programming	Very Valuable	Valuable	Somewhat Valuable	Not at all Valuable	Don't Know/ Not Applicable
Local Community programming in High Definition (HD).	9%	14%	22%	23%	31%
Local Community programming provided On-demand.	11%	23%	18%	20%	28%
Local Community program information provided on the program guide/menu.	17%	25%	20%	12%	26%

**QUESTIONS FOR EVERYONE**

25. The Public Access Channel operates a local community access studio (at CSM's La Plata Campus) for television program production and provides media training for County residents. Are you aware of these opportunities?

23% Yes  
77% No **(If No, please go to Q.27)**

26. Have you ever used the Public Access studio, portable equipment, or taken part in access training or an access program?

3% Yes  
97% No

If Yes, how have you used the Public Access facility? (N=3)

1. Informational spot for Health Partners, Inc.
2. When I had a friend employed at CSM
3. By addressing the need for financially assisting volunteers for meals on wheels, Inc.

27. Which of the following home phone services do you subscribe to? **(Check all that apply)** (N=549 respondents)

25% Xfinity home telephone service (N=138)  
58% Other home phone service **(please indicate your provider):** (N=324)

Top 3 Responses

1. Verizon - 294
2. AT&T - 10
3. MagicJack - 5

13% I don't have home phone service, I have a mobile provider. **My mobile provider is:** (N=75)

Top 3 Responses

1. Verizon - 40
2. Sprint - 12
3. AT&T - 10

4% I don't have home phone service (N=24)

**28. Do you have Internet access at home?**

92% Yes  
8% No

**28a. If No, please indicate why: (N=41)**

1. Comcast or Verizon not available in our neighborhood (we want them to service our community Please)
2. Cricket stopped providing service when bought by Sprint
3. It's not offered in our area/unavailable (3)
4. Nothing available at reasonable rate.
5. Cost (3)
6. Cost outweighs necessity
7. Cost too much (3)
8. Too Expensive (3)
9. Too expensive through Comcast or Verizon
10. Cost not within my budget
11. Cost, no competition
12. Live on Fixed income! See no need to spend money for this
13. Wi-Fi Hotspot Verizon
14. Only AT&T hot Spot
15. Only Wifi internet, not strong enough to connect to TV
16. Use Wifi or Library
17. Waiting for Comcast to complete installation
18. Don't use it much. I go to the library when I need to.
19. Don't want it (2)
20. Never/Don't need it (3)
21. No Cable Service
22. No computer (6)
23. Not interested
24. Too Old: 10-18-29

**28b. If Yes, to which of the following high-speed Internet services do you subscribe to? (Check all that apply) (N=502 Survey Respondents)**

44% Xfinity high-speed Internet service (N=224)  
45% Other high-speed Internet provider (*please indicate your provider*): (N=229)

Top 2 Responses

1. Verizon - 196
2. HughesNet - 13

9% I use my mobile provider to access the Internet at home (**Please indicate mobile provider**): (N=48)

Responses

1. Verizon - 29
2. Sprint - 2
3. AT&T - 2
4. Air Card
5. Tablet

2% I use dial-up to access the Internet (N=11)

## **Demographics**

While **your specific responses will remain anonymous**, we would like to be able to consider your opinions with others like you. Please indicate the following:

### **29. Zip Code (N=548)**

#### Top 5 Zip Codes:

20%	20602
13%	20637
12%	20601
9%	20640
9%	20695

**30. (N=533) Own 93% Rent 7%**

**31. (N=522) Female 57% Male 43%**

### **32. Race**

13%	African American/Black
62%	Caucasian/White
3%	Hispanic/Latino
0.5%	Asian
0.5%	American Indian
0.4%	Bi-Racial
0.2%	Human
0.2%	Indian
21%	No Response

**33. How long have you lived in Charles County? (Years)**  
Range (9 mos. - 85 years); Mode - 30 years; Average - 29 years

### **34. Highest Grade/Degree Completed (N=516)**

1%	Some High School
30%	High School
2%	Technical School
17%	Some College
30%	College
17%	Masters
1%	Lawyer/JD
2%	Doctorate
1%	MD/DMD

**35. How old were you on your last birthday? (N=489)**  
Range (21 - 92 years); Mode - 55 years old; Average - 57 years old

**36. Do you have children in the home? (N=528) 38% Yes 62% No**

**37. Estimated Annual Household Income: (N=330)**  
Range \$1 - \$600,000; Mode - \$100,000; Average - \$110,834

**Other Comments**

**38.** If you have any additional comments regarding Comcast and its services, please include them in the space provided below: (240 survey respondents provided 403 comments)

Top 10 Responses - Rolled up into Categories (All Comment Categories are listed at the end of Mark-up)

1. Lower cost N=76
2. Bad customer service N=42
3. Monopoly N=40
4. Please make available to all areas N=37
5. A la carte N=13
6. Stop raising the price N=12
7. Senior discounts N=12
8. Reception N=8
9. Loyalty discounts N=8
10. Good job to Comcast N=8

Open Codes and Comments:

2. Areas where Service is Not Available (please indicate your Street, Road or Neighborhood) (N=79)

- Newburg MD
- Corinthian Ct. Hughesville, MD
- Jessies Place
- 5th St. Bel Alton
- Poynton Manor Farm Place, Welcome
- Chapel Point Rd
- Alex St. Herbert Fields
- Banks O'dee Rd
- Blossom Point Rd, Welcome
- Bonifant Pl, off of Edelen Rd.
- Branchville Rd. Newburg
- Breyer Pl, Stoneleigh Neighborhood
- Brunswick Rd. Faulkner, MD.
- Brvantown Dr. Brvantown MD (2)
- Bryans Rd, MD 20616
- Bullit Neck Rd
- Burnt Store Rd, Hughesville, MD (2)
- Charleston Estates, Hatton Landing Dr, Newburg MD
- Coatbridge Place, Willow Creek
- Cooke Sweetney PL, Hughesville, MD
- Corinthian Court
- Doncaster Dr, Smallwood Estates
- Evening Star Ct, Hughesville, MD
- Fenwick Rd, Bryans Rd, MD
- Fire Tower Rd, Welcome, MD (2)
- Forest PL, Hughesville, MD
- Foxburrow Place
- Gunstown Rd, Welcome
- Highland Farm Ct, La Plata
- Hunters Creek Place, Hughesville, MD
- James Lee Drive, Hughesvill, MD
- Lake Jameson
- Lake Jameson, Pale Morning Ct
- Langley Rd
- Lomar Road, Faulkner
- Lomax Rd, Faulker, MD (3)
- Marshall Hall Road
- Maryland Point Rd, Nanjemoy
- Maxwell Dr. Maxwell Hall
- Maxwell Hall Place
- Maxwell Hall, Hughesville, MD
- Maxwell Hall, Stoney's place, Hughesville
- Meadow Court, Hughesville
- Mt. Victoria
- Nanjemoy, MD (2)
- Pale Morning Ct, Lake Jameson

- Pale Morning G. Hughesville
- Peggy's Place Marbury
- Persimmon Point PL
- Pope's Creek Rd, Newburg
- Popes Creek Road, Faulkner MD
- Post Tobacco Rd or Grace Place, Charlotte Hall
- Ridge Place, Hughesville, MD
- River Road, Bryans Road
- Riverside Run Drive
- Royal Coachman PL
- Royal Coachman PI, Lake Jameson
- Sandy Bottom CT, Willow Creek
- Sankston PI, Newbury MD
- Scout Camp Rd. Hughesville
- Serenity Woods
- Simmons Place, Bryans Rd, MD (2)
- So Busy Place, Hughesville
- Sparkling PL, Whisper Creek
- Steinhauser Rd. Newbury MD
- Stoneleigh Crt
- Tuckerfarm Place
- Waverly Point Rd, Newburg MD (3)
- West Circle Bryantown, MD
- Wilmers Place

2. Other reasons for not subscribing to Comcast Cable Television: (N=95)

1. A rooftop antenna is all I need and it is free
2. Already with Verizon, bundle, phone internet cable package to save money
3. Asked told never coming to my house Simms Landing RD
4. Bad Customer Service
5. Bad Service, Terrible Customer Service, Billed me for three months after I terminated.
6. Because it is the only provider for my area besides satellite. It's a monopoly and I can't stand Comcast
7. Better cable speed, bundled phone, cell phone, TV and internet
8. Better selection, less cost when first selecting service
9. Billing issues, Crappy service, inconsistencies on Billing and Service
10. Bundled with phone, etc. Too connected to democratic party
11. Cancelled July 1, 2015 due to high cost; lack of deals
12. Cannot get internet, cost of it too much
13. Changed from FIOS due to cost...sorry we went to DirectTV, should have done more research before changing
14. Choice of premium channels
15. Comcast Customer Service is terrible
16. Comcast disconnected for no reason
17. Comcast does not offer all the channels we want to watch
18. Comcast does not offer some channels we like
19. Comcast refused to repair their equipment external to the house
20. Comcast refuses to carry RFD TV
21. Comcast wanted to charge us thousands of dollars (2k?) to run cable up own driveway. We went with satellite and now with FIOS

22. Comcast was charging \$5 per foot to put in new cable. It is 1000 feet from box.
23. Cost: the excessive charge to run cable to our home
24. Costs continue to increase for no added value
25. Customer Service is horrible, horrible, horrible
26. Customer Service is terrible
27. Customer Service Issues
28. Customer service worst in industry
29. Desired programming not available on Comcast
30. Didn't offer channels we wanted to watch
31. DirectTV is bundled with Verizon
32. Doesn't have ME-TV or Antenna TV
33. Doesn't offer NFL Sunday Ticket
34. Don't have all the channels I currently have
35. DVR Services
36. Every time it rained or snowed, it would knock trees down on the cable wires and lose service for 1-3 days (early 90s)
37. Expensive rates
38. Experience too much interruptions in system in PG county so never checked into it in Charles
39. Experienced too many outages
40. FIOS
41. For years we were stuck with Comcast, Changed to Verizon at 1st opportunity, service with Comcast was horrible
42. Had Verizon in my previous home
43. Hate Verizon
44. Have Satellite
45. Have Verizon, had Direct TV
46. Heard of too many customer service issues
47. Horrible customer service
48. Husband wants Sunday ticket, only available in DirectTV
49. I don't like a monopoly in cable, it would be nice to have choice in cable co. not just one.
50. I have no available funds after food, shelter, and federal taxes, state taxes, county taxes, and rain taxes
51. I haven't heard good things from Comcast neighbors
52. I love Comcast!
53. I object to Comcast's operations as a whole, their policies and practices
54. I was happy with Comcast but was forced to use Verizon because Comcast wasn't available
55. If available, would subscribe to Verizon FIOS
56. In the process of changing from DirectTV to Comcast
57. Internet was unreliable
58. Lost service, daily for hours at a time
59. Lousy Service and Internet very slow
60. Love streaming
61. Mohr Oak Lane
62. More choices/channels
63. No other choice
64. Not home enough to enjoy it
65. Not interested in using Comcast again
66. Nothing of interest to watch
67. Phone problem constantly
68. Poor Customer Service (3)
69. Poor Customer Service for product support after the sell and installation
70. Poor Customer Service, cost of extra boxes
71. Poor Customer Service, phone reps unprofessional and rude

72. Poor Customer Service, Random channels added to bill
73. Poor service, poor customer service. I was excited to have another option to change from Comcast when Verizon came to town
74. Preferred FiOS and Verizon's service is more reliable
75. Several Comcast Service phone people not truthful about service, prices, etc.
76. Signed up for bundled services. Two years ago was \$99.95 has increased to \$175.13.
77. Subscribe to Dish, also for PPV option Comcast doesn't offer
78. Subscribe to Verizon (2)
79. Sunday NFL Ticket is exclusive to DirectTV
80. Telemarketers
81. Terrible Customer Service
82. Too much inappropriate programming on TV
83. Too much profanity, vulgarity, nudity, blasphemy, impiety and mockery
84. Verizon FiOS offers more channels and viewing packages
85. Very Bad Services
86. Very unhappy with customer service from Comcast, switched as soon as something else became available
87. Wanted NFL Sunday Ticket
88. Wanted phone, TV, and internet all in one bill. I was very pleased with Comcast when I had it for TV and internet
89. Was charged for pornography that I didn't order, no really!
90. We had Comcast for 10 years. Verizon was a better value for our needs. So we switched to Verizon FiOS about five years
91. We want the NFL Package, and better quality and better customer service
92. When I was entertaining the thought of using Comcast, it was very unreliable

5a. Are there any cable programs or types of programs that are not available from Comcast that you would like the cable operator to add? **If Yes, describe.** (N=54)

1. 24 hr 1/2 hour sitcoms -I Love Family Affair, My little Margie, etc.
2. A channel for On Demand exercise at home
3. All history, Discovery
4. An anime channel
5. Baltimore Channels
6. Baltimore Stations
7. Boomerang
8. Cricket for ALL countries
9. Cricket Games
10. Fitness Channel
11. Fox Sports News Network
12. GAIAMTV
13. Grand Ole Opry
14. HBO as part of limited basic, no additional charge
15. I would like to order a la carte
16. Local Channels
17. Lower my bill
18. Military without all the extras
19. More country music shows
20. More Standard Sports Channels
21. My basic service is quite limited
22. NASA Channel, more educational channels
23. National Geographic
24. NESN
25. NFL Football, PK

26. NFL Network, Centric
  27. NFL Package Like DirectTV
  28. NFL Sunday Ticket
  29. NFL Ticket
  30. Not charge so much for premium channels
  31. Not sure pay too much now to check
  32. Ones that do not have commercials
  33. Only another reason to increase cost
  34. OWN, MSNBC, UP, Centric
  35. OWN, TVLand should have HD Service
  36. PAC 12 Network
  37. PPV monthly subscription to "Eastenders" a British series that Dish offers
  38. RED-TV
  39. Service that works
  40. Slueth Network
  41. Soap Channel
  42. Soapnet, Showtime, More movie channels
  43. Soapnet
  44. Soapnet, without having to pay extra and CMT.
  45. Some Baltimore broadcast channels
  46. Some craft shows like "Create"
  47. SPEED Channel, Rugby, The Soccer Channel
  48. SunLife, SBN (Jimmy Swaggert)
  49. Tennis, Golf
  50. The Maryland lottery we live in MD get DC, VA, No MD, how funny
  51. Verizon FIOS
  52. Vintage Cartoon Channel (Boomerang Channel)
  53. Wish more channels were available on basic service
  54. World Soccer, more European Programs
19. Has your household had any other technical difficulties with your cable service (e.g., picture quality, audio problems, overall reception)? **If Yes**, please explain and **note specific channels: (N=106) (specific channels mentioned are in bold)**
1. **A few channels** have low signal strength
  2. A lot of problems with internet, cable boxes not working
  3. **All channels**
  4. **All High Def. Channels**, usually not at a specific time of day. Still not fixed.
  5. Audio on TV hooked to Comcast is inferior to audio on TVs hooked to Dish (but it may be the TVs problem and not the cable)
  6. Bad Picture sometimes
  7. Bedroom not receiving higher channels
  8. Blinks in and out
  9. Box is constantly acting up
  10. Boxes don't work with each other-programs don't record
  11. Cable Boxes
  12. Cable cord was defective "fried" - Comcast tech came out and replaced
  13. Cable was not working when first set up
  14. Cable wires were never hooked up correctly from the street.
  15. **Channel 204** goes in and out on occasion for a few seconds (approx. 30 secs)
  16. **Channel 5** won't play on a certain DVR box
  17. Computer/Phone out
  18. Couldn't get **Channel 200** on kitchen TV, technician came out and replaced black push wire. It was no good.
  19. **Discovery and other stations not available in HD** or poor quality

20. Distance of outside Cable Box to furthest TV location
21. Distorted picture
22. Doesn't connect well with one of the TV's
23. DVR will lock up on occasion and I have to unplug to reset
24. DVR was not recording shows but it was not a faulty box, it was a system wide issue
25. Error codes on box reset
26. **Fox channel** sounds, intermittent outages
27. Freeze and garble of **all channels**
28. Freezing of screen on **Channel 34**
29. **HBO and on Demand** sometimes won't work which I pay \$10 extra a month for that one channel and I have to call and get it resolved
30. **HD Channel** Breaking up
31. **HD Channels** not available after power outage
32. Hesitation in picture appeared in small signals
33. Internet Issues
34. Internet Only
35. Internet reception (this is part of the package we pay for yet the signal at night and throughout day is weak. They said we could pay more to fix it. That's crazy)
36. It freezes up when we try to change channels
37. **Local Channels** are scrambled for about a year they were not before
38. Loss of internet connection is a frequent problem
39. Loss of picture, Often.
40. Lost service
41. Lost signal, poor signal
42. My cable is very old, 30+ years old. All the tech's that's ever been here tell me that my cable wires are very old.
43. No signal, about 1 time/week
44. No signal, had to reset
45. Noise or outages on a random set of channels
46. Occasions when picture freezes
47. Often signals to the TVs that do not have the main box will go completely out and have to be unplugged repeatedly to regain service.
48. Ongoing picture smaller than screen
49. **OnDemand**
50. OnDemand not always loading up. Slow internet connect times
51. OnDemand programming does not work the times I want to view. Have to keep trying to get it to work
52. Overall reception (2)
53. Overall reception, **numerous channels**
54. Phone Out, cable to internet always out!
55. Picture and sound "break up" only get three channels on bedroom TV.
56. Picture freezes and scrambled
57. Picture freezes when going to OnDemand, it often shows an error message
58. Picture Quality
59. Picture seems to scramble or still pause
60. Picture wasn't working. I was told it was my HDMI cord (it wasn't) then my television HDMI connection (it wasn't)
61. Picture will break up time to time, channel will freeze
62. Picture will go out unexpectedly; look like signal was lost
63. Pixelating, especially on weekends
64. Pixelating, Freezing
65. Pixelation (2)
66. **Premium Channels**
67. Reception, internet service
68. Reset cable box
69. Scrambled video due to not enough signal

70. Seemed to be receiving signal at near or below strength
  71. Set top box went out
  72. Shaky picture, search feature not working
  73. Signal sometimes weak
  74. Single strength
  75. Some stations would not come in on TV
  76. Sometimes the digital box loses its signal and Comcast has to restart
  77. Sound
  78. Sound went out on several channels, and channels I subscribed to were unavailable
  79. Sporadic brief outages
  80. Static, bad reception
  81. Tape gets broken, cuts off and goes back on and does it again
  82. The audio part becomes static after a certain period on TV and telephone
  83. The reception on one box is extremely spotty
  84. Too many to go into
  85. Upstairs cable box don't get all the channels that the main one downstairs gets
  86. We have constant problems with our internet connection, even after we upgraded to their modem
  87. Weak signal on multiple occasions
  88. When Comcast installed, cable connection was not tighten or placed right
  89. When storms come through many channels are scrambled or completely out.
  90. Added filters that are reducing pic quality
  91. Comcast is a blocked monopoly-get rid of Comcast
  92. Digital converter on local channels freezes and I have to change channel and go back to original channel for it to work
  93. Dread calling Comcast again. Waste of my life!
  94. Dropped service
  95. HD no sound, didn't put phone cord near wall in back of furniture
  96. Loss of signal and being sent
  97. MASN
  98. Multiple calls to office and each tech that comes out only does a temporary fix.
  99. Picture is scrambled, creates small squares
  100. Signal strength problems, still waiting for new phone modem (over a year)
  101. **Some channels** show intermittent pixels
  102. Sometimes **the guide** doesn't work.
  103. Unable to access OnDemand
  104. Upstairs connections could not be set up for digital cable and they were not going to install new cables
38. If you have any additional comments regarding Comcast and its services, please include them in the space provided below: (240 survey respondents provided 403 comments)

First Responses/Total Responses Rolled up into Categories

1. Lower cost (Total=76)
2. Bad customer service (Total=42)
3. Monopoly (Total=40)
4. Please make available to all areas ( Total=37)
5. A la carte (Total=13)
6. Senior discounts (Total=12)
7. Stop raising the price (Total=12)
8. Good job to Comcast (Total=8)
9. Loyalty discounts (Total=8)
10. Reception (Total=8)
11. Do not like Comcast (Total=7)
12. FiOS is better (Total=6)
13. Have heard bad things about Comcast (Total=5)

14. Don't renew franchise (Total=5)
15. Comcast is bad at installation (Total=4)
16. Better Programming (Total=4)
17. Don't outsource customer service (Total=4)
18. Switching once my contract is over (Total=4)
19. Clearer communication from company (Total=4)
20. We really want internet in our area (Total=4)
21. Lower Taxes (Total =3)
22. Terrible and dishonest company (Total=3)
23. Will never go back to Cable (Total=3)
24. Can the County allow FIOS to come? (Total=3)
25. Billing must be monitored for unexplained added fees (Total=3)
26. Why pay for something you can get for free? (Total=2)
27. Don't like Phone menu (Total=2)
28. Comcast reps are not trustworthy (Total=2)
29. Lower Density requirement (Total=2)
30. Slow internet (Total=2)
31. Don't want to pay extra for cable/internet boxes (Total=2)
32. Renew franchise (Total=2)
33. Only want internet (Total=2)
34. More knowledgeable technicians (Total=2)
35. Comcast added a service without my asking for "free" and then began charging me. I called to cancel it and they wanted to bill me for a month. Never do this again.
36. Suggest you broadcast on DirectTV
37. Shorten contract with County, should not be more than four years
38. Comcast Internet is bad
39. Charles County needs its own news segment and programming.
40. I made a mistake when I left Comcast.
41. Very poor service from our County
42. Satellite is not fast
43. The service techs that work for Comcast, not the contractors seem to be the best employees
44. Thinking about getting satellite.
45. Satellite is better
46. Want mid-size packages
47. I left when they raised the price
48. I have called twice and they won't remove me from their mailing list.
49. Customer Service needs to be current with same information, do not like getting different answers to the same question
50. AirCard and cell phone coverage in Spring Haven Woods West is very poor
51. Want Time Warner to come
52. Love streaming
53. Also have Xfinity home service
54. If you didn't allow your telemarketing company to harass me. I would still be with Comcast (another MD. Co.)
55. Comcast will not maintain their curbside box's in my neighborhood, again Verizon, doesn't either. You Charles County need to enforce this!
56. Refunds are too small
57. Want Baltimore Channels
58. Simpler help instructions
59. Builders told us cable was available, but it was not
60. Apparently Comcast customer service is improving now that they have competition
61. Charles County needs to update equipment
62. Government only cares about money and politics. No change will happen.

63. Do not like paying for services I don't use
64. Need to publish their rates for each service without a contract
65. Don't mess it up Charles County
66. Are you sure you don't want ss# or bank acct too?
67. Would subscribe if ME-TV are Antenna TV were offered.
68. Takes too long for repair people to show up
69. Local channels should not be scrambled
70. Local channels should be available on any digital ready television
71. Comcast is the most economical
72. Verizon is too expensive
73. Stop charging so much for installation
74. Why isn't COX available?
75. Survey is a waste of money
76. Stop cutting channels and raising the bill
77. Customer service is inaccessible.
78. Pricing should be reduced for what you get
79. Fix the problem the FIRST time
80. Should give more time before adding a late fee on a late payment
81. Not interested in anyone contacting me or anyone in my home.
82. Prefer them to FiOS
83. Improve infrastructure
84. Came to repair and never knew where the problem was located.
85. Said they were available and they weren't
86. Hidden fees
87. We used to get television for free!
88. Bad basic package
89. Less HD options at better price points
90. Fax and phone line still mixed up
91. Low lying phone line
92. It doesn't really matter does it!
93. City needs to update service for the citizens
94. You do a disservice to not let past customers answer the whole survey
95. The person this survey was addressed to does not live here.
96. Even though I only have a high school degree, I am well read and a graduate of the Naval EOD School. I am second to nobody.
97. Rental devices are too costly.
98. Internet and phone through Comcast
99. Easier to reach customer service
100. I want WOW to come to Charles County
101. They intentionally make billing confusing

**EXHIBITS B.1, B.2, B.3, B.4 AND B.5**

**CHARLES COUNTY GOVERNMENTAL,  
EDUCATIONAL AND PUBLIC ACCESS  
EQUIPMENT UPGRADE AND REPLACEMENT  
SPREADSHEETS**

## **Governmental, Educational and Public Access Equipment Upgrade and Replacement and Facility Development Projections Overview**

The following spreadsheets provide equipment replacement and upgrade projections over a ten-year period for various categories of equipment needed by the Governmental, Educational and Public Access facilities reviewed. These projections were created from a review of facility inventories as well as physical walkthroughs.

Additional information was obtained through interviews with staff and focused discussions with pertinent stakeholders. The upgrade and replacement schedules and facility development projections were constructed to meet the needs and interests identified, taking into account the typical useful life of the equipment specified and the type of facility needed.

It should be noted that technology tends to change quickly and programmatic initiatives shift over time, so actual usage and replacement costs may vary from year to year. This upgrade and replacement schedule is meant as a guide for budgetary and PEG Access funding development purposes and will need to be periodically updated so that the Access facilities can stay current with technology.

All projections included in this matrix are based on 2016 equipment prices.

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All projections included in this matrix are based on 2016 equipment prices.

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>Charles County Government</b>				
<b>Field Acquisition</b>				
Camera Field Packages	One HD camera, one tripod, 2 channels wireless audio and accessories. A 10 year replacement schedule indicates replacement of this equipment be a 5-year replacement as opposed to a 7-year because of anticipated wear and tear.	\$12,000	3	\$36,000
Flypack (Studio in a Box)	Includes 3 stand-alone, robotic cameras, portable switcher capable of switching live camera feeds, computer inputs and includes a CG, robotic camera controller, 8-input audio mixer, 32" multiviewer monitor, fiber encoder and tapeless recorder. Housed in a flight case.	\$95,000	1	\$95,000
Engineering/Confidence Monitor	Used for monitoring video output signal. Should incorporate built-in waveform/vector scope. Capable of analyzing digital signals including HD.	\$1,000	1	\$1,000
<b>Sub Total-Field Acquisition</b>				<b>\$132,000</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>Post Production</b>				
Ingestion	The editing ingestion process needs to match the Field Acquisition technology. The price reflects the cost for ingestion needed for editing.	\$1,000	4	\$4,000
Digital Audio Mixing Consoles	Price for adding stereo digital audio mixing. Digital audio conversion is not necessary immediately, but should be considered for migration during the life of the franchise. This cost reflects the price of a digital mixing console of 8-10 inputs.	\$1,000	4	\$4,000
Monitoring	Capable of at least SDI/HD, or SDI/HDMI inputs. Includes multi-standard, multi-format digital waveform monitor. Prices are per monitor.	\$500	4	\$2,000
Edit Equipment	Price is for a turnkey (including both hardware and software) "state of the art" computer with I/O card with dual monitors. Performance will be slower when trying to edit HD on older computers. Turnkey systems can vary in cost depending on storage, graphics cards, I/O cards and system RAM needed. Should also include network capability.	\$4,000	4	\$16,000
Solid-State Recorder	Capable of multi-format type recording and consistent with entire facility workflow.	\$1,000	4	\$4,000
<b>Sub Total-Post Production</b>				<b>\$30,000</b>
<b>Total Field Acquisition and Post Production</b>				<b>\$162,000</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>Whole Facility</b>				
<b>Mobile Production Vehicle</b>				
Mobile Production Van	Customized Sprinter-type van used for housing Flypack (Studio in a Box). Van should include cellular transport system, heating and cooling for equipment during productions and also to include cabling pass-through or internal/external patching. Van should also include a generator.	\$75,000	1	\$75,000
<b>Sub Total-Mobile Production Van</b>				<b>\$75,000</b>
<b>Infrastructure</b>				
Video over Ethernet Encoder/Decoder Pair	Capable of transmitting HD-SDI video and audio over IP networks. Capable of supporting multi-channel.	\$10,000	1	\$10,000
Optical Transmitters/Receivers	One per channel. Used for receiving and transmitting encoded signals over fiber optic connection; should include transmitters/receivers.	\$2,000	3	\$6,000
SDI cabling	Price range is per foot and for regular shielding or plenum (fire-retardant) shielding. Cabling should be able to accept both SD-SDI and HD-SDI signals. Actual costs are dependent on lengths needed, and should be quoted from an integrator. Cost includes cabling and installation.	\$2.50	1000	\$2,500
SDI routing	Routing and cabling need to have bandwidth capable of HD. Costs vary widely depending on number of inputs and outputs needed. This baseline should provide a 16X16 HD router.	\$20,000	1	\$20,000
SDI patching	Costs are per patch bay and final costs could vary widely depending on number of patch bays needed. Standard configuration is usually 24 inputs per bay and should be wired in at the same time as the router install.	\$1,500	1	\$1,500
Signal Converters	For up-converting any legacy equipment that is analog or down-converting any newer equipment such as HD to SD. We recommend signal converters that work as "Swiss Army knives", i.e. have the ability to up-convert and down-convert any signal from HD to analog to VGA and even HDMI.	\$1,500	1	\$1,500
<b>Sub Total-Infrastructure</b>				<b>\$41,500</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>Archival/Storage</b>				
Storage Server	Budgets should account for increased storage costs for HD. Costs on storage can vary widely depending on the number of users, the amount of storage needed, speed, etc. Price per terabyte decreases with the number of terabytes purchased. This price reflects roughly 96 terabytes of storage assuming \$1000/terabyte to be distributed through the life of the franchise. Should also have redundant power supplies and be RAID protected.	\$96,000	1	\$96,000
<b>Sub Total- Archival/Storage</b>				<b>\$96,000</b>
<b>Headend/Playback</b>				
Server-based Playback System	Replacement headend/playback equipment should be HD or HD compatible. Minimum bit rates should be 20 Mb/sec for HD.	\$30,000	1	\$30,000
Bulletin Board System/Character Generator	This bulletin board system which may not be needed if it is a part of the playback system. Prices can vary depending on turnkey solution	\$10,000	1	\$10,000
<b>Sub Total- Headend/Playback</b>				<b>\$40,000</b>
<b>On Demand/Streaming</b>				
Encoders	Need one encoder per channel for streaming live 24/7 content. Price varies depending on format and performance. Price represents a professional turnkey single-channel encoder system, which includes hardware and software capable of running 24/7. Could be used as part of the playback system.	\$2,000	1	\$2,000
<b>Sub Total-On Demand Streaming</b>				<b>\$2,000</b>
<b>Total-Whole Facility</b>				<b>\$254,500</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>County Facility Building</b>				
<b>Studio Acquisition</b>				
Cameras	These cameras are HD robotic cameras capable of panning and zooming. Should include camera, lens and robotic head.	\$8,000	4	\$32,000
Studio Monitoring	Capable of HD signal. Prices are per monitor. To be used for confidence and on-set.	\$800	2	\$1,600
LED Studio Lighting System	Includes multiple LED fixtures capable of multi-colored lighting, and dimmer control and capable of upgradable emitter technology.	\$15,000	1	\$15,000
Virtual Set Technology	Includes digital sets, backdrops for chromakey/green screen; HD versions, with greater depth and camera motion compensation. Could also include a full cyc wall capable of full body shots.	\$20,000	1	\$20,000
<b>Sub Total-Studio Acquisition</b>				<b>\$68,600</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>Studio Control</b>				
Switcher	Capable of HD production. Includes one M/E capable of upstream and downstream keying, file storage, virtual set technology and multi-viewer output.	\$20,000	1	\$20,000
Robotic Camera Control	Controller should be capable of controlling multiple cameras with the ability of stored presets and camera setup capability	\$2,500	1	\$2,500
Character Generator	Prices vary greatly depending on features, I/O, and single/multi-channel systems. System could include built-in stillstore, 3D graphics, and motion clip playback.	\$20,000	1	\$20,000
Digital Audio Mixing Consoles	Price for adding stereo digital audio mixing. Digital audio conversion is not necessary immediately, but should be considered for migration during the life of the franchise. This cost reflects the price of a digital mixing console of 32 inputs.	\$2,000	1	\$2,000
Multiviewer Monitoring	Monitors to be used to display multiviewer images. Assuming 2- 48" monitors.	\$1,000	2	\$2,000
Engineering/Confidence Monitor	Used for monitoring video output signal. Should incorporate built-in waveform/vector scope. Capable of analyzing digital signals including HD.	\$1,000	1	\$1,000
Misc. HD D/A's and cabling	This is for miscellaneous distribution of signals from the HD equipment	\$5,000	1	\$5,000
Solid State Recorder	Recorder should be capable of multiple SD, compact flash cards, or solid state and should integrate with entire facility workflow.	\$1,000	1	\$1,000
<b>Sub Total-Studio Control</b>				<b>\$53,500</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>County Hearing Room</b>				
Cameras	These cameras are HD robotic cameras capable of panning and zooming. Should include camera, lens and robotic head.	\$8,000	5	\$40,000
Audio Microphones (Wired)	Wired microphones with Mute functions and lectern microphones.	\$175	10	\$1,750
Audio Microphones (Wireless)	Wireless microphones that can be configured as handheld or lapel. System should include transmitter and receiver	\$800	2	\$1,600
Digital DSP Audio Mixing System	System includes all DSP audio functions. Complete with gating limiting and automatic audio mixing of all microphone inputs. 16 channels of input	\$3,000	1	\$3,000
TV Monitors	65 inch	\$1,000	2	\$2,000
Assisted Listening Device	System designed to aid the hearing impaired listen to meetings. Wireless assistive listening system designed to accommodate up to 5 users. Includes wireless transmitters and 5 belt-pack receivers with headphones.	\$1,000	1	\$1,000
<b>Sub Total County Hearing Room</b>				<b>\$49,350</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>County Hearing Room Control</b>				
Switcher	Capable of HD production. Includes one M/E capable of upstream and downstream keying, file storage, virtual set technology and multi-viewer output.	\$20,000	1	\$20,000
Robotic Camera Control	Controller should be capable of controlling multiple cameras with the ability of stored presets and camera setup capability	\$2,500	1	\$2,500
Character Generator	Prices vary greatly depending on features, I/O, and single/multi-channel systems. System could include built-in stillstore, 3D graphics, and motion clip playback.	\$5,000	1	\$5,000
Digital Audio Mixing Consoles	Price for adding stereo digital audio mixing. Digital audio conversion is not necessary immediately, but should be considered for migration during the life of the franchise. This cost reflects the price of a digital mixing console of 16 inputs.	\$1,500	1	\$1,500
Multiviewer Monitoring	Monitors to be used to display multiviewer images. Assuming 2- 48" monitors.	\$1,000	2	\$2,000
Engineering/Confidence Monitor	Used for monitoring video output signal. Should incorporate built-in waveform/vector scope. Capable of analyzing digital signals including HD.	\$1,000	1	\$1,000
Misc. HD D/A's and cabling	This is for miscellaneous distribution of signals from the HD equipment	\$5,000	1	\$5,000
Solid State Recorder	Recorder should be capable of multiple SD, compact flash cards, or solid state and should integrate with entire facility workflow.	\$1,000	1	\$1,000
<b>Sub Total-County Hearing Room Control</b>				<b>\$38,000</b>
<b>Blue Room</b>				
Cameras	These cameras are HD robotic cameras capable of panning and zooming. Should include camera, lens and robotic head.	\$8,000	5	\$40,000
Audio Microphones (Wired)	Wired microphones with Mute functions and lectern microphones.	\$175	12	\$2,100
Studio Monitoring	Capable of HD signal. Prices are per monitor. To be used for confidence and on-set.	\$1,200	2	\$2,400
Projection System	High end HD projector. Capable of displaying HD video & multiple computer inputs.	\$2,500	1	\$2,500
<b>Sub Total Blue Room Meeting</b>				<b>\$47,000</b>
<b>Total County Facility</b>				<b>\$256,450</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>Ancillary Equipment</b>				
<b>Ancillary Equipment**</b>				
Ancillary Equipment	Ancillary/ Support Equipment such as microphones, teleprompters, stands, tripods, portable production accessories, racks, batteries, cards, physical sets, office equipment, etc. will be an aggregated total in the summary spreadsheet.	\$20,000	1	\$20,000
<b>Sub Total-Ancillary Equipment</b>				<b>\$20,000</b>
<b>Total-Ancillary Equipment</b>				<b>\$20,000</b>
<b>SubTotal One Time Implementation &amp; Upgrade Cost</b>				<b>\$692,950</b>
<b>30% Installation/Training/Warranty</b>				<b>\$207,885</b>
<b>Total One Time Implementation &amp; Upgrade Cost</b>				<b>\$900,835</b>
* Description of type of equipment needed for each major item in a functional area, and brief purpose. Longer form discussion is included in the narrative report. HD costs are based on 1080p format.				
** This is included as a unit cost in the one-time transition cost calculation to ensure that it is reflected. In actuality, the one time cost for ancillary equipment will likely be higher until it reflects the next replacement of each item. The maximum extended costs would be the 10 year total of \$200,000 (plus 30% Installation/ Training/Warranty)				

Functional Area	Unit Cost	Quantity	Extended Costs	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	10 Year Total
<b>Charles County Government</b>														
<b>Field Acquisition</b>														
Camera Field Packages	\$12,000	3	\$36,000		\$36,000					\$36,000				\$72,000
Flypack	\$95,000	1	\$95,000	\$95,000							\$95,000			\$190,000
Engineering/Confidence Monitor	\$1,000	1	\$1,000	\$1,000							\$1,000			\$2,000
<b>Sub Total-Field Acquisition</b>			<b>\$132,000</b>											
<b>Post Production</b>														
Ingestion	\$1,000	4	\$4,000			\$4,000							\$4,000	\$8,000
Digital Audio Mixing Consoles	\$1,000	4	\$4,000			\$4,000							\$4,000	\$8,000
Monitoring	\$500	4	\$2,000			\$2,000							\$2,000	\$4,000
Edit Equipment	\$4,000	4	\$16,000			\$16,000							\$16,000	\$32,000
Solid State Recorder	\$1,000	4	\$4,000			\$4,000							\$4,000	\$8,000
<b>Sub Total-Post Production</b>			<b>\$30,000</b>											
<b>Total Field Acquisition/Post Production</b>			<b>\$162,000</b>	<b>\$96,000</b>	<b>\$36,000</b>	<b>\$30,000</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$36,000</b>	<b>\$96,000</b>	<b>\$0</b>	<b>\$30,000</b>	<b>\$324,000</b>

Functional Area	Unit Cost	Quantity	Extended Costs	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	10 Year Total
<b>Whole Facility</b>														
<b>Mobile Production Vehicle - All PEG</b>														
Mobile Production Van	\$75,000	1	\$75,000			\$75,000							\$75,000	\$150,000
<b>Sub Total-Mobile Production Vehicle</b>			\$75,000											
<b>Infrastructure</b>														
Video over Ethernet Encoder/Decoder Pair	\$10,000	1	\$10,000	\$10,000							\$10,000			\$20,000
Optical Transmitters/Receivers	\$2,000	3	\$6,000	\$6,000							\$6,000			\$12,000
SDI cabling	\$2.50	1000	\$2,500	\$2,500							\$2,500			\$5,000
SDI routing	\$20,000	1	\$20,000	\$20,000							\$20,000			\$40,000
SDI patching	\$1,500	1	\$1,500	\$1,500							\$1,500			\$3,000
Signal Converters	\$1,500	1	\$1,500	\$1,500							\$1,500			\$3,000
<b>Sub Total-Infrastructure</b>			\$41,500											
<b>Archival Storage</b>														
Storage Server	\$96,000	1	\$96,000	\$48,000		\$12,000		\$12,000		\$12,000		\$12,000		\$96,000
<b>Sub Total-Archival Storage</b>			\$96,000											

Functional Area	Unit Cost	Quantity	Extended Costs	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	10 Year Total
<b>Headend-Playback</b>														
Server-based Playback System	\$30,000	1	\$30,000		\$30,000							\$30,000		\$60,000
Bulletin Board System/Character Generator	\$10,000	1	\$10,000		\$10,000							\$10,000		\$20,000
<b>Sub Total-Headend-Playback</b>			\$40,000											
<b>On Demand Streaming</b>														
Encoders	\$2,000	1	\$2,000	\$2,000							\$2,000			\$4,000
<b>Sub Total-On Demand Streaming Whole Facility</b>			\$2,000											
<b>Total-Whole Facility</b>			\$254,500	\$91,500	\$40,000	\$87,000	\$0	\$12,000	\$0	\$12,000	\$43,500	\$52,000	\$75,000	\$413,000

Functional Area	Unit Cost	Quantity	Extended Costs	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	10 Year Total
<b>County Facility</b>														
<b>Studio Acquisition</b>														
Cameras	\$8,000	4	\$32,000		\$32,000					\$32,000				\$64,000
Studio Monitoring	\$800	2	\$1,600		\$1,600							\$1,600		\$3,200
LED Studio Lighting System	\$15,000	1	\$15,000		\$15,000							\$15,000		\$30,000
Virtual Set Technology	\$20,000	1	\$20,000		\$20,000							\$20,000		\$40,000
<b>Sub Total-Studio Acquisition</b>			<b>\$68,600</b>											
<b>Studio Control</b>														
Switcher	\$20,000	1	\$20,000					\$20,000					\$20,000	\$40,000
Robotic Camera Control	\$2,500	1	\$2,500		\$2,500							\$2,500		\$5,000
Character Generator	\$20,000	1	\$20,000		\$20,000							\$20,000		\$40,000
Digital Audio Mixing Consoles	\$2,000	1	\$2,000		\$2,000							\$2,000		\$4,000
Multiviewer Monitoring	\$1,000	2	\$2,000		\$2,000							\$2,000		\$4,000
Engineering\ Confidence Monitor	\$1,000	1	\$1,000		\$1,000							\$1,000		\$2,000
Misc. HD D/A's and cabling	\$5,000	1	\$5,000		\$5,000							\$5,000		\$10,000
Solid State Recorder	\$1,000	1	\$1,000		\$1,000							\$1,000		\$2,000
<b>Sub Total-Studio Control</b>			<b>\$53,500</b>											
<b>County Hearing Room</b>														
Cameras	\$8,000	5	\$40,000	\$40,000							\$40,000			\$80,000
Audio Microphones (Wired)	\$175	10	\$1,750	\$2,450							\$2,450			\$4,900
Audio Microphones (Wireless)	\$800	2	\$1,600	\$1,600							\$1,600			\$3,200
Digital DSP Audio Mixing System	\$3,000	1	\$3,000	\$3,000							\$5,000			\$8,000
TV Monitors	\$1,000	2	\$2,000	\$2,000							\$2,000			\$4,000
Assisted Listening Device	\$1,000	1	\$1,000	\$1,000							\$1,000			\$2,000
<b>Sub Total-County Hearing Room</b>			<b>\$49,350</b>											

Functional Area	Unit Cost	Quantity	Extended Costs	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	10 Year Total
<b>County Hearing Room Control</b>														
Switcher	\$20,000	1	\$20,000	\$20,000							\$20,000			\$40,000
Robotic Camera Control	\$2,500	1	\$2,500	\$2,500							\$2,500			\$5,000
Character Generator	\$5,000	1	\$5,000	\$5,000							\$5,000			\$10,000
Digital Audio Mixing Consoles	\$1,500	1	\$1,500	\$1,500							\$1,500			\$3,000
Multiviewer Monitoring	\$1,000	2	\$2,000	\$2,000							\$2,000			\$4,000
Engineering/Confidence Monitor	\$1,000	1	\$1,000	\$1,000							\$1,000			\$2,000
Misc. HD D/A's and cabling	\$5,000	1	\$5,000	\$5,000							\$5,000			\$10,000
Solid State Recorder	\$1,000	1	\$1,000	\$1,000							\$1,000			\$2,000
<b>Sub Total-County Hearing Room Control</b>			<b>\$38,000</b>											
<b>Blue Room</b>														
Cameras	\$8,000	5	\$40,000			\$40,000							\$40,000	\$80,000
Audio Microphones (Wired)	\$175	12	\$2,100			\$2,100							\$2,100	\$4,200
Studio Monitoring	\$1,200	2	\$2,400			\$2,400							\$2,400	\$4,800
Projection System	\$2,500	1	\$2,500			\$2,500							\$2,500	\$5,000
<b>Sub Total-Blue Room</b>			<b>\$47,000</b>											
<b>Total County Facility</b>			<b>\$256,450</b>	<b>\$88,050</b>	<b>\$102,100</b>	<b>\$47,000</b>	<b>\$0</b>	<b>\$20,000</b>	<b>\$0</b>	<b>\$32,000</b>	<b>\$90,050</b>	<b>\$70,100</b>	<b>\$67,000</b>	<b>\$516,300</b>

Functional Area	Unit Cost	Quantity	Extended Costs	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	10 Year Total
<b>Ancillary Equipment</b>														
Ancillary Equipment	\$20,000	1	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$200,000
<b>Sub Total- Ancillary Equipment</b>			\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$200,000
<b>Total-Ancillary Equipment</b>			\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$200,000
<b>Yearly Equipment Totals</b>				\$295,550	\$198,100	\$184,000	\$20,000	\$52,000	\$20,000	\$100,000	\$249,550	\$142,100	\$192,000	\$1,453,300
<b>30% Inst/Train/Warranty</b>				\$88,665	\$59,430	\$55,200	\$6,000	\$15,600	\$6,000	\$30,000	\$74,865	\$42,630	\$57,600	\$435,990
<b>TOTAL</b>				\$384,215	\$257,530	\$239,200	\$26,000	\$67,600	\$26,000	\$130,000	\$324,415	\$184,730	\$249,600	\$1,889,290
<b>Sub-Total One Time Implementation &amp; Upgrade Cost</b>			\$692,950											
<b>30% Inst/Train/Warranty</b>			\$207,885											
<b>Total One Time Implementation &amp; Upgrade Cost</b>			\$900,835											

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>Charles County Public Schools</b>				
<b>Field Acquisition</b>				
Camera Field Packages	One HD camera, one tripod, lighting package, 2 channels wireless audio and accessories. A 10 year replacement schedule indicates replacement of this equipment be a 5-year replacement as opposed to a 7-year because of anticipated wear and tear.	\$12,000	5	\$60,000
Flypack (Studio in a Box)	Includes portable switcher capable of switching live camera feeds, computer inputs and includes a CG, 32" multiviewer monitor, fiber encoder and tapeless recorder. Housed in a flight case and be integrated with camera field packages.	\$95,000	1	\$95,000
Engineering/Confidence Monitor	Used for monitoring video output signal. Should incorporate built-in waveform/vector scope. Capable of analyzing digital signals including HD.	\$1,000	1	\$1,000
<b>Sub Total-Field Acquisition</b>				<b>\$156,000</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>Post Production</b>				
Ingestion	The editing ingestion process needs to match the Field Acquisition technology. Also needs to be capable of dual ingestion supporting legacy equipment. The price reflects the cost for ingestion needed for editing.	\$1,000	3	\$3,000
Digital Audio Mixing Consoles	Price for adding stereo digital audio mixing. Digital audio conversion is not necessary immediately, but should be considered for migration during the life of the franchise. This cost reflects the price of a digital mixing console of 8-10 inputs.	\$1,000	3	\$3,000
Monitoring	Capable of at least SDI/HD, or SDI/HDMI inputs. Includes multi-standard, multi-format digital waveform monitor. Prices are per monitor.	\$500	3	\$1,500
Edit Equipment	Price is for a turnkey (including both hardware and software) at minimum, a state-of-the art computer with I/O card and dual monitors. Performance will be slower when trying to edit HD on older computers. Turnkey systems can vary in cost depending on storage, graphics cards, I/O cards and system RAM needed. Should also include network capability.	\$4,000	3	\$12,000
Solid-State Recorder	Capable of multi-format type recording and consistent with entire facility workflow.	\$1,000	3	\$3,000
Portable Edit System	Portable laptop computer system with card reader configured for non-linear editing.	\$3,000	1	\$3,000
<b>Sub Total-Post Production</b>				<b>\$25,500</b>
<b>Total-Field Acquisition and Post Production</b>				<b>\$181,500</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>Whole Facility</b>				
<b>Mobile Production Vehicle</b>				
Mobile Production Van	Customized Sprinter-type van used for housing Flypack (Studio in a Box). Van should include cellular transport system, heating and cooling for equipment during productions and also to include cabling pass-through or internal/external patching. Van should also include a generator (Shared with other PEG entities. See County Government Projections).	\$0	1	\$0
<b>Sub Total-Mobile Production</b>				<b>\$0</b>
<b>Infrastructure</b>				
Video over Ethernet Encoder/Decoder Pair	Capable of transmitting HD-SDI video and audio over IP networks.	\$5,000	1	\$5,000
Optical Transmitters/Receivers	One per channel. Used for receiving and transmitting encoded signals over fiber optic connections; should include transmitters/receivers.	\$2,000	1	\$2,000
SDI cabling	Price range is per foot and for regular shielding or plenum (fire-retardant) shielding. Cabling should be able to accept both SD-SDI and HD-SDI signals. Actual costs are dependent on lengths needed, and should be quoted from an integrator. Cost includes cabling and installation.	\$2.50	1000	\$2,500
SDI routing	Routing and cabling need to have bandwidth capable of HD. Costs vary widely depending on number of inputs and outputs needed. This baseline should provide a 16x16 HD router.	\$20,000	1	\$20,000
SDI patching	Costs are per patch bay and final costs could vary widely depending on number of patch bays needed. Standard configuration is usually 24 inputs per bay and should be wired in at the same time as the router install.	\$1,500	1	\$1,500
Signal Converters	For up-converting any legacy equipment that is analog or down-converting any newer equipment such as HD to SD. We recommend signal converters that work as "Swiss Army knives", i.e. have the ability to up-convert and down-convert any signal from HD to analog to VGA and even HDMI.	\$1,500	1	\$1,500
<b>Sub Total-Infrastructure</b>				<b>\$32,500</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>Archival/Storage</b>				
Storage Server	Budgets should account for increased storage costs for HD. Costs on storage can vary widely depending on the number of users, the amount of storage needed, speed, etc. Price per terabyte decreases with the number of terabytes purchased. This price reflects roughly 48 terabytes of storage, assuming \$1000/terabyte. Should also have redundant power supplies and be RAID protected.	\$48,000	1	\$48,000
<b>Sub Total-Archival/Storage</b>				<b>\$48,000</b>
<b>Headend/Playback</b>				
Server-based Playback System	Replacement headend/playback equipment should be HD or HD compatible. Minimum bit rates should be 20 Mb/sec for HD.	\$30,000	1	\$30,000
Bulletin Board System	This bulletin board system which may not be needed if it is a part of the playback system. Prices can vary depending on turnkey solution	\$5,000	1	\$5,000
<b>Sub Total-Headend/Playback</b>				<b>\$35,000</b>
<b>On Demand/Streaming</b>				
Encoders	Need one encoder per channel for streaming live 24/7 content. Price varies depending on format and performance. Price represents a professional turnkey single-channel encoder system, which includes hardware and software capable of running 24/7. Could be used as part of the playback system.	\$2,000	1	\$2,000
<b>Sub Total-On Demand Streaming</b>				<b>\$2,000</b>
<b>Total-Whole Facility</b>				<b>\$117,500</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>Charles County Public Schools Studio/School Board Room</b>				
<b>Studio Acquisition</b>				
Cameras	These cameras are HD robotic cameras capable of panning and zooming. Should include camera, lens and robotic head.	\$8,000	3	\$24,000
Studio Monitoring	Capable of HD signal. Prices are per monitor. To be used for confidence and on-set.	\$800	2	\$1,600
LED Studio Lighting System	Includes multiple LED fixtures capable of multi-colored lighting, and dimmer control and capable of upgradable emitter technology.	\$15,000	1	\$15,000
Virtual Set Technology	Includes digital sets, backdrops for chromakey/green screen; HD versions, with greater depth and camera motion compensation. Could also include a full cyc wall capable of full body shots.	\$20,000	1	\$20,000
<b>Sub Total-Studio Acquisition</b>				<b>\$60,600</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>Studio Control</b>				
Switcher	Capable of HD production. Includes one M/E capable of upstream and downstream keying, file storage and multi-viewer output. Should include single channel character generator integrated into the switcher.	\$20,000	1	\$20,000
Robotic Camera Control	Controller should be capable of controlling multiple cameras with the ability of stored presets and camera setup capability	\$2,500	1	\$2,500
Character Generator	Prices vary greatly depending on features, I/O, and single/multi-channel systems. System could include built-in stillstore, 3D graphics, and motion clip playback.	\$5,000	1	\$5,000
Digital Audio Mixing Consoles	Price for adding stereo digital audio mixing. Digital audio conversion is not necessary immediately, but should be considered for migration during the life of the franchise. This cost reflects the price of a digital mixing console of 32 inputs.	\$2,000	1	\$2,000
Multiviewer Monitoring	Monitors to be used to display multiviewer images. Assuming 2- 48" monitors.	\$1,000	2	\$2,000
Engineering/Confidence Monitor	Used for monitoring video output signal. Should incorporate built-in waveform/vector scope. Capable of analyzing digital signals including HD.	\$1,000	1	\$1,000
Solid-State Recorder	Recorder should be capable of multiple SD, compact flash cards, or solid state and should integrate with entire facility workflow.	\$1,500	1	\$1,500
Misc. HD D/A's and cabling	This is for miscellaneous distribution of signals from the HD equipment	\$5,000	1	\$5,000
<b>Sub Total- Studio Control</b>				<b>\$39,000</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>School Board</b>				
<b>School Board Room</b>				
Cameras	These cameras are HD robotic cameras capable of panning and zooming. Should include camera, lens and robotic head.	\$8,000	4	\$32,000
Audio Microphones (Wired)	Gooseneck style wired microphones with Mute functions.	\$175	20	\$3,500
Audio Microphones (Wireless)	Wireless microphone systems with transmitter and receiver. Hand-held.	\$800	7	\$5,600
Monitoring	65 inch	\$1,000	2	\$2,000
Digital DSP Audio Mixing System	System includes all DSP audio functions. Complete with gating limiting and automatic audio mixing of all microphone inputs. 32 channels of input	\$4,500	1	\$4,500
Assisted Listening Device	System designed to aid the hearing impaired listen to meetings. Wireless assistive listening system designed to accommodate up to 5 users. Includes wireless transmitters and 5 belt-pack receivers with headphones.	\$1,000	1	\$1,000
Augmented LED Lighting System	Used to enhance the existing lighting system and improve facial recognition. Includes lighting fixtures and controller.	\$20,000	1	\$20,000
<b>Sub Total School Board</b>				<b>\$68,600</b>
<b>Total Public Schools Studios/School Board Room</b>				<b>\$168,200</b>
<b>Ancillary Equipment</b>				
<b>Ancillary Equipment**</b>				
Ancillary Equipment	Ancillary/ Support Equipment such as microphones, teleprompters, stands, tripods, portable production accessories, racks, batteries, cards, physical sets, office equipment, etc. will be an aggregated total in the summary spreadsheet.	\$20,000	1	\$20,000
<b>Sub Total-Ancillary Equipment</b>				<b>\$20,000</b>
<b>Total-Ancillary Equipment</b>				<b>\$20,000</b>
<b>SubTotal One Time Implemenation &amp; Upgrade Cost</b>				<b>\$487,200</b>
<b>30% Installation/Training/Warranty</b>				<b>\$146,160</b>
<b>Total One Time Implementation &amp; Upgrade Cost</b>				<b>\$633,360</b>
* Description of type of equipment needed for each major item in a functional area, and brief purpose. Longer form discussion is included in the narrative report. HD costs are based on 1080p format.				
** This is included as a unit cost in the one-time transition cost calculation to ensure that it is reflected. In actuality, the one time cost for ancillary equipment will likely be higher until it reflects the next replacement of each item. The maximum extended costs would be the 10 year total of \$200,000 (plus 30% Installation/ Training/Warranty)				

Functional Area	Unit Cost	Quantity	Extended Costs	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	10 Year Total
<b>Charles County Public Schools</b>														
<b>Field Acquisition</b>														
Camera Field Packages	\$12,000	5	\$60,000	\$24,000		\$36,000			\$24,000		\$36,000			\$120,000
Flypack	\$95,000	1	\$95,000	\$95,000							\$95,000			\$190,000
Engineering/Confidence Monitoring	\$1,000	1	\$1,000	\$1,000							\$1,000			\$2,000
<b>Sub Total-Field Acquisition</b>			<b>\$156,000</b>											
<b>Post Production</b>														
Ingestion	\$1,000	3	\$3,000	\$3,000							\$3,000			\$6,000
Digital Audio Mixing Consoles	\$1,000	3	\$3,000	\$3,000							\$3,000			\$6,000
Monitoring	\$500	3	\$1,500	\$1,500							\$1,500			\$3,000
Edit Equipment	\$4,000	3	\$12,000	\$12,000							\$12,000			\$24,000
Solid State Recorder	\$1,000	3	\$3,000	\$3,000							\$3,000			\$6,000
Portable Edit Equipment	\$3,000	1	\$3,000	\$3,000							\$3,000			\$6,000
<b>Sub Total-Post Production</b>			<b>\$25,500</b>											
<b>Total-Field Acquisition/Post Production</b>			<b>\$181,500</b>	<b>\$145,500</b>	<b>\$0</b>	<b>\$36,000</b>	<b>\$0</b>	<b>\$0</b>	<b>\$24,000</b>	<b>\$0</b>	<b>\$157,500</b>	<b>\$0</b>	<b>\$0</b>	<b>\$363,000</b>

Functional Area	Unit Cost	Quantity	Extended Costs	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	10 Year Total
<b>Whole Facility</b>														
<b>Mobile Production Vehicle</b>														
Mobile Production Vehicle	\$0	1	\$0											\$0
<b>Sub Total-Mobile Production</b>			\$0											
<b>Infrastructure</b>														
Video over Ethernet Encoder/Decoder Pair	\$5,000	1	\$5,000	\$5,000						\$5,000				\$10,000
Optical Transmitters/Receivers	\$2,000	1	\$2,000	\$2,000						\$2,000				\$4,000
SDI Cabling	\$2.50	1000	\$2,500	\$2,500						\$2,500				\$5,000
SDI Routing	\$20,000	1	\$20,000	\$20,000						\$20,000				\$40,000
SDI Patching	\$1,500	1	\$1,500	\$1,500						\$1,500				\$3,000
Signal Converters	\$1,500	1	\$1,500	\$1,500						\$1,500				\$3,000
<b>Sub Total-Infrastructure</b>			\$32,500											
<b>Archival Storage</b>														
Storage Server	\$48,000	1	\$48,000	\$12,000			\$12,000			\$12,000			\$12,000	\$48,000
<b>Sub Total-Archival Storage</b>			\$48,000											
<b>Headend-Playback</b>														
Server-based Playback System	\$30,000	1	\$30,000				\$30,000						\$30,000	\$60,000
Bulletin Board System	\$5,000	1	\$5,000				\$5,000						\$5,000	\$10,000
<b>Sub Total-Headend-Playback</b>			\$35,000											
<b>On Demand Streaming</b>														
Encoders	\$2,000	1	\$2,000	\$2,000							\$2,000			\$4,000
<b>Sub Total-On Demand Streaming</b>			\$2,000											
<b>Total-Whole Facility</b>			\$117,500	\$46,500	\$0	\$0	\$47,000	\$0	\$0	\$44,500	\$2,000	\$0	\$47,000	\$187,000

Functional Area	Unit Cost	Quantity	Extended Costs	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	10 Year Total
<b>Charles County Public Schools Studio/School Board Room</b>														
<b>Public Schools Studio</b>														
Cameras	\$8,000	3	\$24,000		\$24,000							\$24,000		\$48,000
Studio Monitoring	\$800	2	\$1,600		\$1,600							\$1,600		\$3,200
LED Studio Lighting System	\$15,000	1	\$15,000		\$15,000							\$15,000		\$30,000
Virtual Set Technology	\$20,000	1	\$20,000		\$20,000							\$20,000		\$40,000
<b>Sub Total- Studio</b>			<b>\$60,600</b>											
<b>Public Schools Studio Control</b>														
Switcher	\$20,000	1	\$20,000		\$25,000							\$25,000		\$50,000
Robotic Camera Control	\$2,500	1	\$2,500		\$2,500							\$2,500		\$5,000
Character Generator	\$5,000	1	\$5,000		\$5,000							\$5,000		\$10,000
Digital Audio Mixing Consoles	\$2,000	1	\$2,000		\$2,000							\$2,000		\$4,000
Multiviewer Monitoring	\$1,000	2	\$2,000		\$2,000							\$2,000		\$4,000
Engineering/Confidence Monitoring	\$1,000	1	\$1,000		\$1,000							\$1,000		\$2,000
Solid-State Recorder	\$1,500	1	\$1,500		\$1,500							\$1,500		\$3,000
Misc. HD D/A's and cabling	\$5,000	1	\$5,000		\$5,000							\$5,000		\$10,000
<b>Sub Total-Studio Control</b>			<b>\$39,000</b>											

Functional Area	Unit Cost	Quantity	Extended Costs	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	10 Year Total
<b>School Board</b>														
<b>School Board Room</b>														
Cameras	\$8,000	4	\$32,000	\$32,000					\$32,000					\$64,000
Audio Microphones (Wired)	\$175	20	\$3,500	\$3,500							\$3,500			\$7,000
Audio Microphones (Wireless)	\$800	7	\$5,600	\$5,600							\$5,600			\$11,200
Studio Monitoring	\$1,000	2	\$2,000	\$2,000							\$2,000			\$4,000
Digital DSP Audio Mixing System	\$4,500	1	\$4,500	\$4,500							\$4,500			\$9,000
Assisted Listening Device	\$1,000	1	\$1,000	\$1,000							\$1,000			\$2,000
Augmented Lighting System	\$20,000	1	\$20,000	\$20,000							\$20,000			\$40,000
<b>Sub Total-School Board Room</b>			<b>\$68,600</b>											
<b>Total Public Schools Studios/School Board Room</b>			<b>\$168,200</b>	<b>\$68,600</b>	<b>\$104,600</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$32,000</b>	<b>\$0</b>	<b>\$36,600</b>	<b>\$104,600</b>	<b>\$0</b>	<b>\$346,400</b>
<b>Ancillary Equipment</b>														
Ancillary Equipment														
Ancillary Equipment	\$20,000	1	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$200,000
<b>Sub Total-Ancillary Equipment</b>			<b>\$20,000</b>											
<b>Total-Ancillary Equipment</b>			<b>\$20,000</b>	<b>\$20,000</b>	<b>\$20,000</b>	<b>\$20,000</b>	<b>\$20,000</b>	<b>\$20,000</b>	<b>\$20,000</b>	<b>\$20,000</b>	<b>\$20,000</b>	<b>\$20,000</b>	<b>\$20,000</b>	<b>\$200,000</b>
<b>Yearly Equipment Totals</b>														
<b>30% Inst/Train/Warranty</b>				<b>\$84,180</b>	<b>\$37,380</b>	<b>\$16,800</b>	<b>\$20,100</b>	<b>\$6,000</b>	<b>\$22,800</b>	<b>\$19,350</b>	<b>\$64,830</b>	<b>\$37,380</b>	<b>\$20,100</b>	<b>\$328,920</b>
<b>TOTAL</b>				<b>\$364,780</b>	<b>\$161,980</b>	<b>\$72,800</b>	<b>\$87,100</b>	<b>\$26,000</b>	<b>\$98,800</b>	<b>\$83,850</b>	<b>\$280,930</b>	<b>\$161,980</b>	<b>\$87,100</b>	<b>\$1,425,320</b>
<b>Sub-Total One Time Implementation &amp; Upgrade Cost</b>			<b>\$487,200</b>											
<b>30% Inst/Train/Warranty</b>			<b>\$146,160</b>											
<b>Total One Time Implementation &amp; Upgrade Cost</b>			<b>\$633,360</b>											

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>College of Southern Maryland (CSM)/Public Access - Charles County</b>				
<b>Field Acquisition</b>				
Camera Field Packages- CSM	One HD camera, one tripod, lighting package, 2 channels wireless audio and accessories. A 10 year replacement schedule indicates replacement of this equipment be a 5-year replacement as opposed to a 7-year because of anticipated wear and tear.	\$12,000	3	\$36,000
Engineering/Confidence Monitor CSM	Used for monitoring video output signal. Should incorporate built-in waveform/vector scope. Capable of analyzing digital signals including HD.	\$1,000	1	\$1,000
Camera Field Packages- Public Access	One HD prosumer grade camera, one tripod, lighting package, 2 channels wireless audio and accessories. A 10 year replacement schedule indicates replacement of this equipment be a 5-year replacement as opposed to a 7-year because of anticipated wear and tear.	\$6,000	3	\$18,000
Engineering/Confidence Monitor Public Access	Used for monitoring video output signal. Should incorporate built-in waveform/vector scope. Capable of analyzing digital signals including HD.	\$1,000	1	\$1,000
Flypack (Studio in a Box) (Shared)	Includes portable switcher capable of switching live camera feeds, computer inputs and includes a CG, 32" multiviewer monitor, fiber encoder and tapeless recorder. Housed in a flight case and be integrated with camera field packages.	\$95,000	1	\$95,000
<b>Sub Total-Field Acquisition</b>				<b>\$151,000</b>
<b>Post Production</b>				
Ingestion CSM	The editing ingestion process needs to match the Field Acquisition technology. Also needs to be capable of dual ingestion supporting legacy equipment. The price reflects the cost for ingestion needed for editing.	\$1,000	4	\$4,000
Digital Audio Mixing Consoles CSM	Price for adding stereo digital audio mixing. Digital audio conversion is not necessary immediately, but should be considered for migration during the life of the franchise. This cost reflects the price of a digital mixing console of 8-10 inputs.	\$1,000	4	\$4,000
Monitoring CSM	Capable of at least SDI/HD, or SDI/HDMI inputs. Includes multi-standard, multi-format digital waveform monitor. Prices are per monitor.	\$500	4	\$2,000

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
Edit Equipment CSM	Price is for a turnkey (including both hardware and software) at minimum, a state-of-the art computer with I/O card and dual monitors. Performance will be slower when trying to edit HD on older computers. Turnkey systems can vary in cost depending on storage, graphics cards, I/O cards and system RAM needed. Should also include network capability.	\$4,000	4	\$16,000
Solid-State Recorder CSM	Capable of multi-format type recording and consistent with entire facility workflow.	\$1,000	4	\$4,000
Ingestion Public Access	The editing ingestion process needs to match the Field Acquisition technology. Also needs to be capable of dual ingestion supporting legacy equipment. The price reflects the cost for ingestion needed for editing.	\$1,000	1	\$1,000
Digital Audio Mixing Consoles Public Access	Price for adding stereo digital audio mixing. Digital audio conversion is not necessary immediately, but should be considered for migration during the life of the franchise. This cost reflects the price of a digital mixing console of 8-10 inputs.	\$1,000	1	\$1,000
Monitoring Public Access	Capable of at least SDI/HD, or SDI/HDMI inputs. Includes multi-standard, multi-format digital waveform monitor. Prices are per monitor.	\$500	1	\$500
Edit Equipment Public Access	Price is for a turnkey (including both hardware and software) at minimum, a state-of-the art computer with I/O card and dual monitors. Performance will be slower when trying to edit HD on older computers. Turnkey systems can vary in cost depending on storage, graphics cards, I/O cards and system RAM needed. Should also include network capability.	\$4,000	1	\$4,000
Solid-State Recorder Public Access	Capable of multi-format type recording and consistent with entire facility workflow.	\$1,000	1	\$1,000
<b>Sub Total-Post Production</b>				<b>\$37,500</b>
<b>Total-Field Acquisition and Post Production</b>				<b>\$188,500</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>Whole Facility</b>				
<b>Mobile Production Vehicle</b>				
Mobile Production Van	Customized Sprinter-type van used for housing Flypack (Studio in a Box). Van should include cellular transport system, heating and cooling for equipment during productions and also to include cabling pass-through or internal/external patching. Van should also include a generator (Shared with other PEG entities. See County Government Projections).	\$0	1	\$0
<b>Sub Total-Mobile Production</b>				<b>\$0</b>
<b>Infrastructure</b>	Shared CSM/Public Access			
Video over Ethernet Encoder/Decoder Pair	Capable of transmitting HD-SDI video and audio over IP networks.	\$5,000	2	\$10,000
Optical Transmitters/Receivers	One per channel. Used for receiving and transmitting encoded signals over fiber optic connections; should include transmitters/receivers.	\$2,000	2	\$4,000
SDI cabling	Price range is per foot and for regular shielding or plenum (fire-retardant) shielding. Cabling should be able to accept both SD-SDI and HD-SDI signals. Actual costs are dependent on lengths needed, and should be quoted from an integrator. Cost includes cabling and installation.	\$2.50	1000	\$2,500
SDI routing	Routing and cabling need to have bandwidth capable of HD. Costs vary widely depending on number of inputs and outputs needed. This baseline should provide a 16x16 HD router.	\$20,000	1	\$20,000
SDI patching	Costs are per patch bay and final costs could vary widely depending on number of patch bays needed. Standard configuration is usually 24 inputs per bay and should be wired in at the same time as the router install.	\$1,500	1	\$1,500
Signal Converters	For up-converting any legacy equipment that is analog or down-converting any newer equipment such as HD to SD. We recommend signal converters that work as "Swiss Army knives", i.e. have the ability to up-convert and down-convert any signal from HD to analog to VGA and even HDMI.	\$1,500	1	\$1,500
<b>Sub Total-Infrastructure</b>				<b>\$39,500</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>Archival/Storage</b>				
Storage Server	Budgets should account for increased storage costs for HD. Costs on storage can vary widely depending on the number of users, the amount of storage needed, speed, etc. Price per terabyte decreases with the number of terabytes purchased. This price reflects roughly 48 terabytes of storage, assuming \$1000/terabyte. Should also have redundant power supplies and be RAID protected.	\$48,000	1	\$48,000
<b>Sub Total- Archival/Storage</b>				<b>\$48,000</b>
<b>Headend/Playback</b>				
Server-based Playback System	Replacement headend/playback equipment should be HD or HD compatible. Minimum bit rates should be 20 Mb/sec for HD. Capable of supporting 2 channels	\$30,000	1	\$30,000
Bulletin Board System CSM	This bulletin board system which may not be needed if it is a part of the playback system. Prices can vary depending on turnkey solution	\$5,000	1	\$5,000
Bulletin Board System Public Access	This bulletin board system which may not be needed if it is a part of the playback system. Prices can vary depending on turnkey solution	\$5,000	1	\$5,000
<b>Sub Total- Headend/Playback</b>				<b>\$40,000</b>
<b>On Demand/Streaming</b>				
Encoders	Need one encoder per channel for streaming live 24/7 content. Price varies depending on format and performance. Price represents a professional turnkey multi-channel encoder system, which includes hardware and software capable of running 24/7. Could be used as part of the playback system.	\$3,000	1	\$3,000
<b>Sub Total-On Demand Streaming</b>				<b>\$3,000</b>
<b>Total-Whole Facility</b>				<b>\$130,500</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>College of Southern Maryland/Public Access Studio</b>				
<b>Studio Acquisition</b>				
Cameras	These cameras are HD robotic cameras capable of panning and zooming. Should include camera, lens and robotic head.	\$8,000	3	\$24,000
Studio Monitoring	Capable of HD signal. Prices are per monitor. To be used for confidence and on-set.	\$800	2	\$1,600
LED Studio Lighting System	Includes multiple LED fixtures capable of multi-colored lighting, and dimmer control and capable of upgradable emitter technology.	\$15,000	1	\$15,000
Virtual Set Technology	Includes digital sets, backdrops for chromakey/green screen; HD versions, with greater depth and camera motion compensation. Could also include a full cyc wall capable of full body shots.	\$20,000	1	\$20,000
<b>Sub Total-Studio Acquisition</b>				<b>\$60,600</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>Studio Control</b>				
Switcher	Capable of HD production. Includes one M/E capable of upstream and downstream keying, file storage and multi-viewer output. Should include single channel character generator integrated into the switcher.	\$20,000	1	\$20,000
Robotic Camera Control	Controller should be capable of controlling multiple cameras with the ability of stored presets and camera setup capability	\$2,500	1	\$2,500
Character Generator	Prices vary greatly depending on features, I/O, and single/multi-channel systems. System could include built-in stillstore, 3D graphics, and motion clip playback.	\$5,000	1	\$5,000
Digital Audio Mixing Consoles	Price for adding stereo digital audio mixing. Digital audio conversion is not necessary immediately, but should be considered for migration during the life of the franchise. This cost reflects the price of a digital mixing console of 8-10 inputs.	\$1,000	1	\$1,000
Multiviewer Monitoring	Monitors to be used to display multiviewer images. Assuming 2- 48" monitors.	\$1,000	2	\$2,000
Engineering/Confidence Monitor	Used for monitoring video output signal. Should incorporate built-in waveform/vector scope. Capable of analyzing digital signals including HD.	\$1,000	1	\$1,000
Solid-State Recorder	Recorder should be capable of multiple SD, compact flash cards, or solid state and should integrate with entire facility workflow.	\$1,500	1	\$1,500
Misc. HD D/A's and cabling	This is for miscellaneous distribution of signals from the HD equipment	\$5,000	1	\$5,000
<b>Sub Total- Studio Control</b>				<b>\$38,000</b>
<b>Total Studio/Studio Control</b>				<b>\$98,600</b>

Functional Area	Comments*	Unit Cost	Quantity	Extended Costs
<b>Ancillary Equipment</b>				
<b>Ancillary Equipment**</b>				
Ancillary Equipment	Ancillary/ Support Equipment such as microphones, teleprompters, stands, tripods, portable production accessories, racks, batteries, cards, physical sets, office equipment, etc. will be an aggregated total in the summary spreadsheet.	\$20,000	1	\$20,000
<b>Sub Total-Ancillary Equipment</b>				<b>\$20,000</b>
<b>Total-Ancillary Equipment</b>				<b>\$20,000</b>
<b>SubTotal One Time Implementation &amp; Upgrade Cost</b>				<b>\$437,600</b>
<b>30% Installation/Training/Warranty</b>				<b>\$131,280</b>
<b>Total One Time Implementation &amp; Upgrade Cost</b>				<b>\$568,880</b>
* Description of type of equipment needed for each major item in a functional area, and brief purpose. Longer form discussion is included in the narrative report. HD costs are based on 1080p format.				
** This is included as a unit cost in the one-time transition cost calculation to ensure that it is reflected. In actuality, the one time cost for ancillary equipment will likely be higher until it reflects the next replacement of each item. The maximum extended costs would be the 10 year total of \$200,000 (plus 30% Installation/ Training/Warranty)				

Functional Area	Unit Cost	Quantity	Extended Costs	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	10 Year Total
<b>College of Southern Maryland (CSM)/Public Access - Charles County</b>														
<b>Field Acquisition</b>														
Camera Field Packages CSM	\$12,000	3	\$36,000		\$36,000					\$36,000				\$72,000
Engineering/ Confidence Monitoring CSM	\$1,000	1	\$1,000		\$1,000							\$1,000		\$2,000
Camera Field Packages Public Access	\$6,000	3	\$18,000		\$18,000					\$18,000				\$36,000
Engineering/ Confidence Monitoring Public Access	\$1,000	1	\$1,000		\$1,000							\$1,000		\$2,000
Flypack	\$95,000	1	\$95,000		\$95,000							\$95,000		\$190,000
<b>Sub Total-Field Acquisition</b>			<b>\$151,000</b>											
<b>Post Production</b>														
Ingestion CSM	\$1,000	4	\$4,000	\$4,000							\$4,000			\$8,000
Digital Audio Mixing Consoles CSM	\$1,000	4	\$4,000	\$4,000							\$4,000			\$8,000
Monitoring CSM	\$500	4	\$2,000	\$2,000							\$2,000			\$4,000
Edit Equipment CSM	\$4,000	4	\$16,000	\$16,000							\$16,000			\$32,000
Solid State Recorder CSM	\$1,000	4	\$4,000	\$4,000							\$4,000			\$8,000
Ingestion Public Access	\$1,000	1	\$1,000	\$1,000							\$1,000			\$2,000
Digital Audio Mixing Consoles Public Access	\$1,000	1	\$1,000	\$1,000							\$1,000			\$2,000
Monitoring Public Access	\$500	1	\$500	\$500							\$500			\$1,000
Edit Equipment Public Access	\$4,000	1	\$4,000	\$4,000							\$4,000			\$8,000
Solid State Recorder Public Access	\$1,000	1	\$1,000	\$1,000							\$1,000			\$2,000
<b>Sub Total-Post Production</b>			<b>\$37,500</b>											
<b>Total-Field Acquisition/Post Production</b>			<b>\$188,500</b>	<b>\$37,500</b>	<b>\$151,000</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$54,000</b>	<b>\$37,500</b>	<b>\$97,000</b>	<b>\$0</b>	<b>\$377,000</b>

Functional Area	Unit Cost	Quantity	Extended Costs	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	10 Year Total
<b>Whole Facility</b>														
<b>Mobile Production Vehicle</b>														
Mobile Production Vehicle	\$0	1	\$0											\$0
<b>Sub Total-Mobile Production</b>			\$0											
<b>Infrastructure</b>														
Video over Ethernet Encoder/Decoder Pair	\$5,000	2	\$10,000	\$5,000							\$5,000			\$10,000
Optical Transmitters/Receivers	\$2,000	2	\$4,000	\$2,000							\$2,000			\$4,000
SDI Cabling	\$2.50	1000	\$2,500	\$2,500							\$2,500			\$5,000
SDI Routing	\$20,000	1	\$20,000	\$20,000							\$20,000			\$40,000
SDI Patching	\$1,500	1	\$1,500	\$1,500							\$1,500			\$3,000
Signal Converters	\$1,500	1	\$1,500	\$1,500							\$1,500			\$3,000
<b>Sub Total-Infrastructure</b>			\$39,500											
<b>Archival Storage</b>														
Storage Server	\$48,000	1	\$48,000	\$12,000			\$12,000			\$12,000			\$12,000	\$48,000
<b>Sub Total-Archival Storage</b>			\$48,000											
<b>Headend-Playback</b>														
Server-based Playback System	\$30,000	1	\$30,000	\$30,000							\$30,000			\$60,000
Bulletin Board System Community Colleege	\$5,000	1	\$5,000	\$5,000							\$5,000			\$10,000
Bulletin Board System Public Access	\$5,000	1	\$5,000	\$5,000							\$5,000			\$10,000
<b>Sub Total-Headend-Playback</b>			\$40,000											
<b>On Demand Streaming</b>														
Encoders	\$3,000	1	\$3,000	\$3,000							\$3,000			\$6,000
<b>Sub Total-On Demand Streaming</b>			\$3,000											
<b>Total-Whole Facility</b>			\$130,500	\$87,500	\$0	\$0	\$12,000	\$0	\$0	\$12,000	\$75,500	\$0	\$12,000	\$199,000

Functional Area	Unit Cost	Quantity	Extended Costs	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	10 Year Total
<b>College of Southern Maryland/Public Access Studio</b>														
<b>Studio Acquisition</b>														
Cameras	\$8,000	3	\$24,000			\$24,000							\$24,000	\$48,000
Studio Monitoring	\$800	2	\$1,600			\$1,600							\$1,600	\$3,200
LED Studio Lighting System	\$15,000	1	\$15,000					\$15,000						\$15,000
Virtual Set Technology	\$20,000	1	\$20,000			\$20,000							\$20,000	\$40,000
<b>Sub Total- Studio</b>			<b>\$60,600</b>											
<b>Studio Control</b>														
Switcher	\$20,000	1	\$20,000			\$25,000							\$25,000	\$50,000
Robotic Camera Control	\$2,500	1	\$2,500			\$2,500							\$2,500	\$5,000
Character Generator	\$5,000	1	\$5,000			\$5,000							\$5,000	\$10,000
Digital Audio Mixing Consoles	\$1,000	1	\$1,000			\$2,000							\$2,000	\$4,000
Multiviewer Monitoring	\$1,000	2	\$2,000			\$2,000							\$2,000	\$4,000
Engineering/Confidence Monitoring	\$1,000	1	\$1,000			\$1,000							\$1,000	\$2,000
Solid-State Recorder	\$1,500	1	\$1,500			\$1,500							\$1,500	\$3,000
Misc. HD D/A's and cabling	\$5,000	1	\$5,000			\$5,000							\$5,000	\$10,000
<b>Sub Total-Studio Control</b>			<b>\$38,000</b>											
<b>Total Studio/Studio Control</b>			<b>\$98,600</b>	<b>\$0</b>	<b>\$0</b>	<b>\$89,600</b>	<b>\$0</b>	<b>\$15,000</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$89,600</b>	<b>\$194,200</b>

Functional Area	Unit Cost	Quantity	Extended Costs	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	10 Year Total
<b>Ancillary Equipment</b>														
Ancillary Equipment														
Ancillary Equipment	\$20,000	1	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$200,000
<b>Sub Total- Ancillary Equipment</b>			\$20,000											
<b>Total-Ancillary Equipment</b>			\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$200,000
<b>Yearly Equipment Totals</b>				\$145,000	\$171,000	\$109,600	\$32,000	\$35,000	\$20,000	\$86,000	\$133,000	\$117,000	\$121,600	\$970,200
<b>30% Inst/Train/Warranty</b>				\$43,500	\$51,300	\$32,880	\$9,600	\$10,500	\$6,000	\$25,800	\$39,900	\$35,100	\$36,480	\$291,060
<b>TOTAL</b>				\$188,500	\$222,300	\$142,480	\$41,600	\$45,500	\$26,000	\$111,800	\$172,900	\$152,100	\$158,080	\$1,261,260
<b>Sub-Total One Time Implementation &amp; Upgrade Cost</b>			\$437,600											
<b>30% Inst/Train/Warranty</b>			\$131,280											
<b>Total One Time Implementation &amp; Upgrade Cost</b>			\$568,880											

<b>Charles County Government Access Facility Expansion/Build Plan</b>					
<b>Area</b>	<b>Length</b>	<b>Width</b>	<b>Area</b>	<b>Cost per Sq Ft</b>	<b>Total Cost</b>
Waiting/Reception	15	15	225	\$250	\$56,250
Garage	31	20	620	\$250	\$155,000
Equipment Storage	15	15	225	\$250	\$56,250
Bathroom 1	8	8	64	\$250	\$16,000
Bathroom 2	8	8	64	\$250	\$16,000
Playback	9	9	81	\$250	\$20,250
Studio Control	10	14	140	\$250	\$35,000
Set Storage	25	20	500	\$250	\$125,000
Studio	40	40	1600	\$250	\$400,000
Breakroom/Kitchen	25	12	300	\$250	\$75,000
Office 1	10	10	100	\$250	\$25,000
Office 2	10	10	100	\$250	\$25,000
Office 3	10	10	100	\$250	\$25,000
Office 4	10	10	100	\$250	\$25,000
Edit 1	6	6	36	\$250	\$9,000
Edit 2	6	6	36	\$250	\$9,000
Edit 3	6	6	36	\$250	\$9,000
Edit 4	6	6	36	\$250	\$9,000
<b>Total</b>			<b>4363</b>		<b>\$1,090,750</b>

<b>K-12 Public Schools Educational Access Facility Build Plan</b>					
<b>Area</b>	<b>Length</b>	<b>Width</b>	<b>Area</b>	<b>Cost per Sq Ft</b>	<b>Total Cost</b>
Waiting/Reception	15	15	225	\$250	\$56,250
Equipment Storage	15	15	225	\$250	\$56,250
Bathroom 1	8	8	64	\$250	\$16,000
Bathroom 2	8	8	64	\$250	\$16,000
Playback	9	9	81	\$250	\$20,250
Studio Control	10	14	140	\$250	\$35,000
Set Storage	25	20	500	\$250	\$125,000
Studio	40	40	1600	\$250	\$400,000
Breakroom/Kitchen	25	12	300	\$250	\$75,000
Office 1	10	10	100	\$250	\$25,000
Office 2	10	10	100	\$250	\$25,000
Office 3	10	10	100	\$250	\$25,000
Office 4	10	10	100	\$250	\$25,000
Edit 1	6	6	36	\$250	\$9,000
Edit 2	6	6	36	\$250	\$9,000
Edit 3	6	6	36	\$250	\$9,000
<b>Total</b>			<b>3707</b>		<b>\$926,750</b>

<b>College of Southern Maryland/Public Access Facility Renovation/Expansion/Build Plan</b>					
<b>Area</b>	<b>Length</b>	<b>Width</b>	<b>Area</b>	<b>Cost per Sq Ft</b>	<b>Total Cost</b>
Waiting/Reception	15	15	225	\$250	\$56,250
Equipment Storage	15	15	225	\$250	\$56,250
Bathroom 1	8	8	64	\$250	\$16,000
Bathroom 2	8	8	64	\$250	\$16,000
Playback	9	9	81	\$250	\$20,250
Studio Control	10	14	140	\$250	\$35,000
Set Storage	25	20	500	\$250	\$125,000
Studio	40	40	1600	\$250	\$400,000
Breakroom/Kitchen	25	12	300	\$250	\$75,000
Office 1	10	10	100	\$250	\$25,000
Office 2	10	10	100	\$250	\$25,000
Office 3	10	10	100	\$250	\$25,000
Office 4	10	10	100	\$250	\$25,000
Edit 1-CSM	6	6	36	\$250	\$9,000
Edit 2-CSM	6	6	36	\$250	\$9,000
Edit 3-CSM	6	6	36	\$250	\$9,000
Edit 4-CSM	6	6	36	\$250	\$9,000
Edit 5 -Public Access	6	6	36	\$250	\$9,000
<b>Total</b>			<b>3779</b>		<b>\$935,750</b>

Entity Description	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	10 Year Total
Charles County Government Access	\$384,215	\$257,530	\$239,200	\$26,000	\$67,600	\$26,000	\$130,000	\$324,415	\$184,730	\$249,600	\$1,889,290
Charles County Government Access Facility		\$1,090,750									\$1,090,750
Charles County K-12 Public Schools Educational Access	\$364,780	\$161,980	\$72,800	\$87,100	\$26,000	\$98,800	\$83,850	\$280,930	\$161,980	\$87,100	\$1,425,320
Charles County K-12 Public Schools Educational Access Facility				\$926,750							\$926,750
College of Southern Maryland/Public Access	\$188,500	\$222,300	\$142,480	\$41,600	\$45,500	\$26,000	\$111,800	\$172,900	\$152,100	\$158,080	\$1,261,260
College of South Maryland/Public Access Facility						\$935,750					\$935,750
<b>Total</b>	<b>\$937,495</b>	<b>\$1,732,560</b>	<b>\$454,480</b>	<b>\$1,081,450</b>	<b>\$139,100</b>	<b>\$1,086,550</b>	<b>\$325,650</b>	<b>\$778,245</b>	<b>\$498,810</b>	<b>\$494,780</b>	<b>\$7,529,120</b>

## **EXHIBIT C.1**

# **WAN/I-NET LOCATIONS SPREADSHEET**

Site#	Entity	Address	Connection Type	Speed	Fiber Footage	Comcast Fiber Count	Comcast I-Net Sites	County WAN (Non - I-Net)	Original Franchise Obligation	Non-Original Franchise Obligation (Funded by)	Notes
1	CCSO New HQ La Plata Office	6855 Crain Hwy.	Fiber	1 gīg	1,038	6	✓		✓		
2	Charles City Communications Ctr.	Radio Station Rd.	Fiber	1 gīg	2,248	72	✓		✓		
3	Dept. of Public Facilities	1001 Radio Station Rd.	Fiber	1 gīg	248	18	✓		✓		
4	Dept. of Utilities	5310 Hawthorne Rd.	Fiber	10 gīg	5,564	78	✓		✓		
5	CCSO - Old Detention Center	6915 Crain Hwy.	Fiber	1 gīg	484	6	✓		✓		
6	Charles County Public Library	2 Garret Ave.	Fiber	1 gīg	537	36	✓		✓		
7	College of Southern MD	8730 Mitchell Rd.	Fiber	1 gīg	14,536	24	✓		✓		
8	Charles County Gov't Center	200 Baltimore St.	Fiber	1 gīg	550	180	✓		✓		Comcast Business Class Modem connection as well
9	Board of Education Admin Bldg	5980 Radio Station Rd.	Fiber	10 gīg	4,428	96	✓		✓		
10	Election Board	201 East Charles St, La Plata	Fiber	1 gīg	389			✓		Charles County Government	Comcast Business Class Modem connection as well/CCG paid for relocation and new fiber, designed & built by CCG contractor
11	Dept. of Social Services	200 Kent Ave.	Fiber	1 gīg	591	6	✓		✓		
12	Dept. of Community Services	8190 Port Tobacco Rd.	Fiber	1 gīg	21,150	6	✓		✓		
13	Health Dept	4545 Crain Hwy.	Fiber	1 gīg	1,321	12	✓		✓		
14	Dept. of Human Svs.Partnership	6 Garret Ave.	Fiber	NA	350	6	✓		✓		No longer in this building; not sure where fiber terminates now.
15	Clark Senior Center	1210 Charles St.	Fiber	1 gīg	1,127	6	✓		✓		
16	CC Courthouse/Circuit Court	200 East Charles St.	Fiber	1 gīg	988	30	✓		✓		
17	CC Courthouse Bldg. 2	New City. Courthouse/Same	Fiber	1 gīg	1,703	6	✓		✓		
18	CCSO District 1 (old CCSO HQ)	6855 Crain Hwy.	Fiber	1 gīg	3,529	48	✓		✓		
19	CCSO Indian Head District 2	3145 Marshall Hall Road Bryans Road	Fiber	1 gīg	7,936	2		✓		Charles County Government	County paid for relocation, designed & built by CCG contractor
20	CCSO Waldorf Station Dist. 3	3670 Rt 5 Waldorf	Fiber	1 gīg	8,356	2	✓			Charles County Government	County paid for relocation
21	Crime Lab	100 Kent Ave.	Fiber	1 gīg	108	12	✓		✓		
22	Judicial Services Bldg. (Old Detention Ctr.)	6845 Crain Hwy.	Fiber	1 gīg	352	6	✓		✓		
23	CCSO - New Detention Ctr.	6905 Crain Hwy (New Bldg.)	Fiber	1 gīg	754	6	✓		✓		
24	CCFD Company 1 La Plata VFD	911 Washington Ave.	Fiber	1 gīg	13,401	6	✓		✓		
25	CCFD Company 8 10th Dist. VFD	7035 Poor House Rd.	Fiber	1 gīg	23,210	6	✓		✓		
26	CCFD Company 2 Hughesville VFD	15245 Prince Fredrick Rd.	Fiber	1 gīg	17,812	0		✓		ARRA Funds	Comcast Business Class Modem connection as well

Site#	Entity	Address	Connection Type	Speed	Fiber Footage	Comcast Fiber Count	Comcast I-Net Sites	County WAN (Non - I-Net)	Original Franchise Obligation	Non-Original Franchise Obligation (Funded by)	Notes
27	CCFD Company 3 Waldorf VFD	3245 Old Washington Rd.	Fiber	1 gīg	5,532	6	✓		✓		
28	CCFD Company 5 Benedict VFD	18210 Hyatt Ave.	Cable Modem		0	0	✓		✓		
29	CCFD Company 6 Cobb Island VFD	13290 Main St.	Cable Modem		0	0	✓		✓		
30	CCFD Company 7 Potomac Hgts. VFD	73 Glynmont Rd.	Fiber	1 gīg	19,398	6	✓		✓		
31	CCFD Company 9 Indian VDF	4095 Indian Head Hwy.	Fiber	1 gīg	4,018	6	✓		✓		
32	CCFD Company 10 Bel Alton VFD	B9765 Bel-Alton Rd.	Fiber	1 gīg	32,034	4	✓		✓		
33	CCFD Company 11 Bryans Rd. VFD	3099 Livingston Rd.	Fiber	1 gīg	7,654	2	✓		✓		
34	CCFD Company 12 Waldorf VFD (Westlake)	7000 Floridian Dr.	Fiber	1 gīg	1,233	2	✓		✓		
35	CC EMS Company 3 Waldorf EMS	1069 St. Ignatius Dr.	Fiber	1 gīg	6,822	6	✓		✓		
36	CC EMS Company 51 La Plata EMS	CC VRS Calvert St 20646.	Fiber	1 gīg	588	4	✓		✓		
37	CC EMS Company 60 CC MICU	10700 Billingsley Rd.	Fiber	1 gīg	6,160	6	✓		✓		
38	CC EMS Co. 61 Newburg VRS	12265 Rock Point Rd.	Fiber	1gīg	14,390	6	✓		✓		
39	CSM Waldorf Center	3261 Old Wash. Rd.	Fiber	1 gīg	10,756	6	✓		✓		
40	CC Library Potomac Branch	3225 Ruth B. Swan Dr.	Fiber	1 gīg	7,498	6	✓		✓		
41	CC Library P.D. Brown Memorial Branch	50 Village St.	Fiber	1 gīg	1,423	6	✓		✓		
42	C. Paul Barnhart ES	5800 Lancaster Cir.	Fiber	2 gīg	3,450	6	✓		✓		
43	Berry ES	10155 Berry Rd.	Fiber	2 gīg	1,712	2	✓		✓		
44	Dr. Gustavus Brown ES	421 University Dr.	Fiber	2 gīg	8,445	6	✓		✓		
45	Dr. James Craik ES	7725 Marshall Corner. Rd.	Fiber	2 gīg	4,070	4	✓		✓		
46	Gale-Bailey ES	4740 Pisgah-Marbury Rd.	Fiber	2 gīg	14,836	6	✓		✓		
47	Dr. Thomas L Higdon ES	12872 Rock Point Rd.	Fiber	2 gīg	17,346	2	✓		✓		
48	Indian Head ES	4200 Indian Head Hwy.	Fiber	2 gīg	5,398	4	✓		✓		
49	Daniel of St. Thomas Jennifer ES	2820 Jenifer School Ln.	Fiber	2 gīg	3,256	6	✓		✓		
50	Malcolm ES	14760 Poplar Hill Rd.	Fiber	2 gīg	10,340	6	✓		✓		
51	Eva Turner ES	1000 Bannister Cir.	Fiber	2 gīg	12,756	6	✓		✓		
52	William B. Wade ES	2300 W. Smallwood Dr.	Fiber	2 gīg	6,094	6	✓		✓		

Site#	Entity	Address	Connection Type	Speed	Fiber Footage	Comcast Fiber Count	Comcast I-Net Sites	County WAN (Non - I-Net)	Original Franchise Obligation	Non-Original Franchise Obligation (Funded by)	Notes
53	TC Martin ES	6315 Oliver Shop Rd.	Fiber	2 gīg	13,662	6	✓		✓		
54	Mary H. Matula ES	6025 Radio Station Rd.	Fiber	2 gīg	2,522	6	✓		✓		
55	Arthur Middleton ES	1109 Copley Ave.	Fiber	2 gīg	15,168	6	✓		✓		
56	Walter J. Mitchell ES	400 Willow Ln.	Fiber	2 gīg	2,961	3	✓		✓		
57	Dr. Sam A. Mudd ES	820 Stone Ave.	Fiber	2 gīg	6,062	6	✓		✓		
58	JC Parks ES	3505 Livingston Rd.	Fiber	2 gīg	2,318	2	✓		✓		
59	JP Ryon ES	12140 Vivian Adams Dr.	Fiber	2 gīg	2,824	2	✓		✓		
60	John Hanson MS	12350 Vivian Adams Dr.	Fiber	2 gīg	1,966	4	✓		✓		
61	Matthew Henson MS	3535 Livingston Rd.	Fiber	2 gīg	7,048	4	✓		✓		
62	General Smallwood MS	4990 Indian Head Hwy.	Fiber	2 gīg	9,018	6	✓		✓		
63	Milton M. Somers MS	300 Willow Ln.	Fiber	2 gīg	3,194	3	✓		✓		
64	Mattawoman MS	10145 Berry Rd.	Fiber	2 gīg	7,946	6	✓		✓		
65	Piccowaxen MS	12834 Rock Pt. Rd.	Fiber	2 gīg	4,396	4	✓		✓		
66	Benjamin Stoddert MS	2040 St. Thomas Dr.	Fiber	2 gīg	886	6	✓		✓		
67	La Plata HS	6035 Radio Station	Fiber	2 gīg	1,498	6	✓		✓		
68	McDonough HS	7165 Marshall Corner Rd.	Fiber	2 gīg	24,932	6	✓		✓		
69	Lackey HS	3000 Chicamuxen	Fiber	2 gīg	23,128	6	✓		✓		
70	Thomas Stone HS	3785 Leonardtown Rd.	Fiber	2 gīg	17,986	12	✓		✓		
71	Westlake HS	3300 Middletown Rd.	Fiber	2 gīg	11,295	4	✓		✓		
72	North Point HS	2500 Davis Rd, Waldorf	Fiber	1 gīg	8,344	12	✓		✓		
73	CCPS Academy	Radio Sta. Rd.	Fiber	2 gīg	611	6	✓		✓		
74	CCPS Maintenance Shop	5965 Radio Station Rd.	Fiber	2 gīg	744	6	✓		✓		
75	CCPS Career and Tech Ctr.	7775 Marshall Corner Rd.	Fiber	2 gīg	811	2	✓		✓		
76	CCPS Gwynn Ctr.	5988 Radio Station Rd.	Fiber	2 gīg	25,014	6	✓		✓		
77	CCPS Thomas Stone Annex	3795 Leonardtown Rd.	Fiber	2 gīg	387	8	✓		✓		
78	Civista Medical Ctr.	701 E. Charles St.	Fiber	NA	1,151	6	✓		✓		

Site#	Entity	Address	Connection Type	Speed	Fiber Footage	Comcast Fiber Count	Comcast I-Net Sites	County WAN (Non - I-Net)	Original Franchise Obligation	Non-Original Franchise Obligation (Funded by)	Notes
79	Town of La Plata Police Dept.	101 La Grange Ave, La Plata	Fiber	1 gīg	2,262'	8	✓		✓		
80	Univ. of MD Fire Service Ext.	5975 Radio Station Rd.	Fiber	1 gīg	75'	6	✓		✓		
81	Waldorf Jaycees Senior Center	3090 Crain Hwy.	Fiber	1 gīg	2,156'	6	✓		✓		
82	Elite Gym Center (Waldorf Gymnastics)	2745 Old Washington Rd.	Fiber	1 gīg	5,408'	6	✓		✓		
83	Diggs ES	2615 Davis Rd. 20603	Fiber	1 gīg	1944'	2	✓			Charles County Board of Education	Comcast installed
84	Davis MS	2495 Davis Rd. 20603	Fiber	1 gīg	1132'	2	✓			Charles County Board of Education	Comcast installed
85	Waldorf West Library	10405 O'Donnell Place Waldorf	Fiber	1 gīg	191'	2		✓		Charles County Libraries	Designed & built by CCG contractor
86	Dare Building SAO Child Support	200 East Charles St La Plata	Fiber	1 gīg	955'	2		✓		Charles County Government	Designed & built by CCG contractor
87	Charles County Economic Dev	10665 Stanhaven Place, Suite 206	Fiber	1 gīg	2004'	2		✓		Charles County Government	Designed & built by CCG contractor
88	Capitol Clubhouse	3033 Waldorf Market Place 20603	???			0		✓		Charles County Government	Not currently active
89	Dentsville EMS Co 15	12135 Charles St. 20646	Wireless			0		✓		Charles County Government	
90	Nanjemoy Vol FD & EMS Co 4	4260 Port Tobacco Rd. 20662	Fiber	1 gīg		0		✓		ARRA Funds	
91	Ironsides Vol Rescue Squad Co 58	6120 Port Tobacco Rd. 20646	Wireless			0		✓		Charles County Government	
92	Tri County Animal Shelter	6707 Animal Shelter Rd.	Fiber	1 gīg	1,321'	0		✓		ARRA Funds & Charles County Government	
93	Gilbert Run Park Tower	13140 Charles Street 20622	Wireless			0		✓		Charles County Government	
94	Mt. Hope Elementary School	9275 Ironsides Rd, Nanjemoy	Fiber	1 gīg		0		✓		ARRA Funds	
95	CSM Truck Driving Center	5825 Radio Station Rd. 20646	Fiber	1 gīg	688'	2	✓			College of Southern Maryland	
96	District 3 Sheriff	11110 Mall Circle Waldorf	Fiber	1 gīg	1132'	2	✓			Charles County Sheriff's Office	
97	Indian Head Senior	1000 Cornwallis Sq Indian Head	Fiber	1 gīg	2003'	2		✓		Charles County Government	Designed & built by CCG contractor
98	Nanjemoy Community Center	4375 Port Tobacco Rd.	Fiber	1 gīg	3,000'	0		✓		ARRA Funds	
99	Welcome Center	12480 Crain Highway, Newburg	Verizon MiFi			0		✓		Charles County Government	
100	WPGC Golf Course	1015 St. Charles Pkwy, White Plains	Fiber	1 gīg	579'	6	✓			Charles County Government	Comcast installed
101	Mary Burgess Neal ES.	12105 St. Georges Dr. Waldorf	Fiber	2 gīg	6344'	12	✓			Charles County Board of Education	Comcast installed
102	Rockefeller Tower	3470 Rockefeller Ct.	Fiber	1 gīg	3,400'	12		✓		Charles County Government	Designed & built by CCG contractor
103	Bryans RD Water Tower	3099 Livingston Rd. Bryans Road	Fiber	1 gīg	468'	2		✓		Charles County Government	Designed & built by CCG contractor
104	Swan Point WWTP	12100 Swan Point Rd.	Fiber	1 gīg	2,050'	2		✓		Charles County Government	Designed & built by CCG contractor

Site#	Entity	Address	Connection Type	Speed	Fiber Footage	Comcast Fiber Count	Comcast I-Net Sites	County WAN (Non - I-Net)	Original Franchise Obligation	Non-Original Franchise Obligation (Funded by)	Notes
105	Charles Co Landfill	12305 Billingsley Rd.	Fiber	1 gīg	14,552	12	✓			Charles County Government	Comcast installed
106	Stagg Hall (Port Tobacco Courthouse)	8450 Commerce Street, Port Tobacco	Fiber	1 gīg	2545'	0		✓		Charles County Government	Designed & built by CCG contractor
107	Bel Alton WWTP	9225 Twinberry Dr.	Fiber	1 gīg	5,100	0		✓		Charles County Government	Designed & built by CCG contractor
108	VanGO Park & Ride	Smallwood Rd & RT 301	Fiber	1 gīg	2,650	0		✓		Charles County Government	Designed & built by CCG contractor
109	3B Pump Station	1724 St.Charles Parkway Waldorf	Fiber	1 gīg	389'	0		✓		Charles County Government	Designed & built by CCG contractor
110	St. Charles High School	5305 Piney Church Rd, Waldorf	Fiber	10 gig	9504'	0		✓		Charles County Board of Education	Designed & built by CCG contractor
111	Breeze Farm Tower	15970 Cobb Island Road, Newburg	Fiber	Not Lit	248'	0		✓		Charles County Government	Designed & built by CCG contractor
112	Breeze Farm WWTP	15970 Cobb Island Road, Newburg	Fiber	Not Lit	3341'	0		✓		Charles County Government	Designed & built by CCG contractor
113	Breeze Farm Recycling Center	15950 Cobb Island Road, Cobb Island	Fiber	Not Lit	248'	0		✓		Charles County Government	Designed & built by CCG contractor
114	Hill Rd Pump Station	13250 Hill Rd. Newburg	Fiber	Not Lit	3401'	0		✓		Charles County Government	Designed & built by CCG contractor
115	Cobb Island Rd Pump Station	15255 Potomac River Dr. Cobb Island	Fiber	Not Lit	3788'	0		✓		Charles County Government	Designed & built by CCG contractor
116	CPV Power Plant	12205 Billingsley Rd, Waldorf	Fiber	1 gīg	4892'	2	✓			Charles County Government	Comcast installed
117	301/Health Dept SCADA Vault	4545 Crain Hwy, White Plains	Fiber	1 gīg	477'	0		✓		Charles County Government	Designed & built by CCG contractor
118	Mt Carmel WWTP	9235 Mitchell Rd, La Plata	Fiber	not lit	6,250	0		✓		Charles County Government	Designed & built by CCG contractor
119	Mt Carmel Well	9235 Mitchell Rd, La Plata	Fiber	not lit		0		✓		Charles County Government	Designed & built by CCG contractor
120	Nanjemoy EMS Tower	4375 Port Tobacco Rd.	Fiber		468	0		✓		Charles County Government	Designed & built by CCG contractor
121	Animal Shelter Tower	6707 Animal Shelter Rd.	Fiber		289	0		✓		Charles County Government	Designed & built by CCG contractor

**Currently unused locations that still have fiber**

	CCSO Indian Head District 2	4401 Indian Head Hwy.	Fiber	1 gīg	7,936	2	✓		✓		Not currently active
	CCSO Waldorf Station Dist. 3	3220 Old Wash. Rd.	Fiber	1 gīg	8,356	2	✓		✓		Not currently active

**EXHIBIT D.1**

**COMCAST PHYSICAL PLANT RANDOM SAMPLE  
AUDIT FINDINGS SPREADSHEETS**

ID	ADDRESS	CITY	At Residence or Facility up to the pole or pedestal/vault	At Pole, Pedestal/Vault or Right of Way	Comments	NESC CODES	NEC CODES
1		ISSUE	No problem found	Amplifier not grounded in pedestal		Section 9	
2		HUGHESVILLE	No apparent bond	Amplifier not grounded in pedestal			820.100
3		BEL ALTON	No problem found	Amplifier not grounded in pedestal, power supply not locked		Section 9	
4		INDIAN HEAD	No access	Broken lashing wire		214	
5		WALDORF	No drop	Broken lashing wire		214	
6		COBB ISLAND	No problem found	Drop(s) not properly attached to pole		239D3	
7		INDIAN HEAD	No drop	Drop(s) not properly attached to pole		239D3	
8		COBB ISLAND	No apparent bond	Drop(s) not properly attached to pole		239D3	820.100
9		MARBURY	No problem found	Drop(s) not properly attached to pole		239D3	
10		INDIAN HEAD	Not properly attached to house	Drop(s) not properly attached to pole		239D3	820.24
11		INDIAN HEAD	No problem found	Incomplete pole transfer		214	
12		INDIAN HEAD	No apparent bond	Incomplete pole transfer		214	820.100
13		INDIAN HEAD	No problem found	Missing down guy		264	
14		LA PLATA		No cable in area			
15		INDIAN HEAD		No cable in area			
16		CHARLOTTE HALL		No cable in area			

ID	ADDRESS	CITY	At Residence or Facility up to the pole or pedestal/vault	At Pole, Pedestal/Vault or Right of Way	Comments	NESC CODES	NEC CODES
17		NANJEMOY		No cable in area			
18		CHARLOTTE HALL		No cable in area			
19		WELCOME		No cable in area			
20		CHARLOTTE HALL		No cable in area			
21		BRYANTOWN		No cable in area			
22		INDIAN HEAD		No cable in area			
23		NEWBURG		No cable in area			
24		INDIAN HEAD		No cable in area			
25		NEWBURG		No cable in area			
26		BRYANTOWN		No cable in area			
27		NANJEMOY		No cable in area			
28		NEWBURG		No cable in area			
29		NANJEMOY		No cable in area			
30		CHARLOTTE HALL		No cable in area			
31		CHARLOTTE HALL		No cable in area			
32		WELCOME		No cable in area			
33		LA PLATA		No cable in area			

ID	ADDRESS	CITY	At Residence or Facility up to the pole or pedestal/vault	At Pole, Pedestal/Vault or Right of Way	Comments	NESC CODES	NEC CODES
34		NANJEMOY		No cable in area			
35		HUGHESVILLE		No cable in area			
36		BRANDYWINE		No cable in area			
37		LA PLATA		No cable in area			
38		WELCOME		No cable in area			
39		LA PLATA		No cable in area			
40		INDIAN HEAD		No cable in area			
41		NEWBURG		No cable in area			
42		WELCOME		No cable in area			
43		WELCOME		No cable in area			
44		BRYANS ROAD	Cut ground wire	No problem found			820.100
45		NEWBURG	No apparent bond	No problem found			820.100
46		BRYANTOWN	No access	No problem found			
47		WALDORF	No drop	No problem found			
48		LA PLATA	Improper ground	No problem found			820.100.B.2.(2)
49		LA PLATA	No drop	No problem found			
50		WALDORF	No drop	No problem found			

ID	ADDRESS	CITY	At Residence or Facility up to the pole or pedestal/vault	At Pole, Pedestal/Vault or Right of Way	Comments	NESC CODES	NEC CODES
51		INDIAN HEAD	No problem found	No problem found			
52		INDIAN HEAD	No drop	No problem found			
53		HUGHESVILLE	No apparent bond	No problem found			820.100
54		BRYANS ROAD	No problem found	No problem found			
55		LA PLATA	No drop	No problem found			
56		WALDORF	No problem found	No problem found			
57		WALDORF	No drop	No problem found			
58		WALDORF	No problem found	No problem found			
59		INDIAN HEAD	No apparent bond	No problem found			820.100
60		NEWBURG	No problem found	No problem found			
61		PORT TOBACCO	No problem found	No problem found			
62		BRYANS ROAD	No apparent bond	No problem found			820.100
63		LA PLATA	No problem found	No problem found			
64		BRYANS ROAD	No problem found	No problem found			
65		NEWBURG	No problem found	No problem found			
66		BRYANTOWN	No drop	No problem found			
67		BRYANS ROAD	No problem found	No problem found			

ID	ADDRESS	CITY	At Residence or Facility up to the pole or pedestal/vault	At Pole, Pedestal/Vault or Right of Way	Comments	NESC CODES	NEC CODES
68		BRYANS ROAD	No problem found	No problem found			
69		COBB ISLAND	No problem found	No problem found			
70		INDIAN HEAD	No drop	No problem found			
71		BEL ALTON	No problem found	No problem found			
72		PORT TOBACCO	No problem found	No problem found			
73		WALDORF	No drop	No problem found			
74		BRYANS ROAD	No drop	No problem found			
75		BEL ALTON	No problem found	Open pedestal		381 & Good engineering practice	
76		BRYANS ROAD	No drop	Unburied drop - at pole		Section 3	
77		WALDORF	House box is broken	Drop(s) not properly attached to pole	Need a new box and clean-up at house	239D3	820.24
78		WHITE PLAINS	No ground	Smashed pedestal		381 & Good engineering practice	820.100
79		WHITE PLAINS	No problem found	No problem found			
80		WALDORF	No drop	No problem found	Reset pedestal		
81		WALDORF	No problem found	No problem found			
82		WALDORF	No drop	No problem found	Reset pedestal		
83		WALDORF	No ground	Open pedestal	Drops hanging out of pedestal	381 & Good engineering practice	820.100

ID	ADDRESS	CITY	At Residence or Facility up to the pole or pedestal/vault	At Pole, Pedestal/Vault or Right of Way	Comments	NESC CODES	NEC CODES
84		WALDORF	No apparent bond	No problem found	Ground rod is in place but no bond. Entire complex is likely the same as this one.		820.100
85		WALDORF	No problem found	No problem found	Need a new box cover at house		
86		WALDORF	No ground	Open (unlocked) amplifier pedestal	No ground in amplifier pedestal	Section 9	820.100
87		WALDORF	No drop	Amplifier not grounded in pedestal		Section 9	
88		WALDORF	No drop	No problem found			
89		WHITE PLAINS	No problem found	No problem found			
90		WHITE PLAINS	No drop	Open pedestal	Drops hanging out of pedestal, mature weeds grown around drops	381 & Good engineering practice	
91		BRYANS ROAD	No access	No problem found			
92		WALDORF	No problem found	Amplifier not grounded in pedestal		Section 9	
93		WHITE PLAINS	No problem found	No problem found			
94		WALDORF	No problem found	Smashed pedestal		381 & Good engineering practice	
95		BRYANS ROAD	No drop	No problem found			
96		WALDORF	No drop	No problem found			
97		WALDORF	Improper ground	No problem found			820.100.B.2.(2)
98		WALDORF	No drop	No problem found			
99		WALDORF	No access	No problem found			

ID	ADDRESS	CITY	At Residence or Facility up to the pole or pedestal/vault	At Pole, Pedestal/Vault or Right of Way	Comments	NESC CODES	NEC CODES
100		WALDORF	No problem found	No problem found			
101		WALDORF	No drop	No problem found			
102		POMFRET	No drop	Open pedestal	Ped cover laying on ground, weeds growing through cover	381 & Good engineering practice	
103		WALDORF	Improper ground	No problem found	No ground clamp and improper gauge wire for ground		820.100.B.2.(2)
104		WALDORF	No problem found	Open pedestal	Drops hanging out of pedestal and unburied	381 & Good engineering practice	
105		WHITE PLAINS	No house	No problem found			
106		LA PLATA	No drop	No problem found			
107		WALDORF	No drop	No problem found			
108		WALDORF	No problem found	No problem found			
109		WHITE PLAINS	No problem found	Open pedestal	Ground not connected to plant	381 & Good engineering practice	
110		WALDORF	No problem found	Unburied drop			
111		WALDORF	No drop	No problem found			
112		WHITE PLAINS	No drop	No problem found			
113		WALDORF	No problem found	No problem found			
114		WALDORF	No problem found	Smashed pedestal		381 & Good engineering practice	
115		WHITE PLAINS	No problem found	Open (unlocked) amplifier pedestal	Ground wire is loose	Section 9	
116		WALDORF	No problem found	No problem found			

ID	ADDRESS	CITY	At Residence or Facility up to the pole or pedestal/vault	At Pole, Pedestal/Vault or Right of Way	Comments	NESC CODES	NEC CODES
117		WALDORF	No ground	No problem found			820.100
118		BRYANS ROAD	No ground	Plant not grounded in pedestal, ground rod is in place	Pedestal cover was off, CBG replaced cover	Section 9	820.100
119		WALDORF	No ground	No problem found			820.100
120		BRYANS ROAD	No drop	No problem found			
121		WALDORF	No drop	Open pedestal		381 & Good engineering practice	
122		WALDORF	No drop	No problem found			
123		WALDORF	No drop	No problem found			
124		BRYANS ROAD	No problem found	No problem found			
125		WALDORF	No problem found	Unburied drop	Drop not buried at house	Section 3	
126		WALDORF	No ground	Unburied drop	Drop not buried at pedestal, reset pedestal	Section 3	820.100
127		WALDORF	No ground	Amplifier not grounded in pedestal		Section 9	820.100
128		WALDORF	Improper ground	Amplifier not grounded in pedestal	Ground is broken at house		820.100.B.2.(2)
129		WALDORF	No ground	Open pedestal		381 & Good engineering practice	820.100
130		WALDORF	No problem found	No problem found			
131		WALDORF	No drop	No problem found			
132		WHITE PLAINS	House box is broken	Open pedestal	Wrong Pedestal cover for base	381 & Good engineering practice	820.24
133		WALDORF	No drop	No problem found			

ID	ADDRESS	CITY	At Residence or Facility up to the pole or pedestal/vault	At Pole, Pedestal/Vault or Right of Way	Comments	NESC CODES	NEC CODES
134		WALDORF	No ground	No problem found			820.100
135		WALDORF	No drop	Open pedestal	Drops hanging out of pedestal	381 & Good engineering practice	
136		WALDORF	No drop	No problem found			
137		WALDORF	No problem found	No problem found			
138		WALDORF	No problem found	No problem found			
139		WALDORF	No drop	Open pedestal	Pedestal cover doesn't fit over contents	381 & Good engineering practice	
140		WHITE PLAINS	No drop	No problem found			
141		WALDORF	No drop	Open pedestal	Drops hanging out of pedestal	381 & Good engineering practice	
142		WALDORF	No problem found	No problem found			
143		WALDORF	No problem found	No problem found			
144		WHITE PLAINS	No drop	Open pedestal		381 & Good engineering practice	
145		WALDORF	No problem found	No problem found			
146		WALDORF	No problem found	No problem found			
147		WALDORF	No apparent bond	No problem found			820.100
148		WALDORF		No cable in area			
149		WHITE PLAINS	No drop	No problem found			
150		WALDORF	Grounded to outside water	No problem found			820.100.B.2.(2)

## **EXHIBIT D.2**

# **COMCAST PHYSICAL PLANT NON-RANDOM SAMPLE AUDIT FINDINGS SPREADSHEETS**

ID	ADDRESS	CITY	At Residence or Facility up to the pole or	At Pole, Pedestal/Vault or Right of Way	Comments	Codes	
						NESC	NEC
B-1		White Plains	Not Inspected	Missing pedestal cover		381 & Good engineering practice	
B-2		White Plains	Not Inspected	Open (unlocked) amplifier pedestal	Unburied drop at pedestal	381 & Good engineering practice	
B-3		Pomfret	Not Inspected	Power Supply - No Locks	1 Block east of Shelton Drive	224B2c	
B-4		White Plains	Not Inspected	Smashed pedestal		381 & Good engineering practice	
B-5		Waldorf	Grounded to outside water	Not Inspected			820.100
B-6		La Plata	Not Inspected	Power Supply - No Locks		224B2c	
B-7		La Plata	Not Inspected	Power Supply - No Locks		224B2c	
B-8		White Plains	Not Inspected	Power Supply - No Locks	1 Block north of Randall Dr	224B2c	
B-9		White Plains	Not Inspected	Power Supply - No Locks	2 Spans south of Billingsley Rd	224B2c	
B-10		White Plains	Not Inspected	Broken lashing wire	2 spans. Temporary cable hanging from pole	214	
B-11		Waldorf	Not Inspected	Missing pedestal cover		381 & Good engineering practice	
B-12		Bryans Road	Not Inspected	Smashed pedestal		381 & Good engineering practice	
B-13		Saint Charles	Not Inspected	Power Supply - No Locks	At ground level	224B2c	
B-14		White Plains	Not Inspected	Cable hardline and phone touching		235H	
B-15		Bryans Road	Not Inspected	Power Supply - No Locks	At ground level	224B2c	
B-16		Waldorf	Not Inspected	Unburied drop	3 drops need bury, (not new drops)	Section 3	
B-17		Saint Charles	Not Inspected	Unburied drop		Section 3	

ID	ADDRESS	CITY	At Residence or Facility up to the pole or	At Pole, Pedestal/Vault or Right of Way	Comments	Codes	
						NESC	NEC
B-18		White Plains	Not Inspected	Smashed pedestal		381 & Good engineering practice	
B-19		White Plains	Not Inspected	Smashed pedestal		381 & Good engineering practice	
B-20		White Plains	Not Inspected	Smashed pedestal		381 & Good engineering practice	
B-21		White Plains	Not Inspected	Smashed pedestal		381 & Good engineering practice	
B-22		White Plains	Not Inspected	Open pedestal	Drops need bury at pedestal	381 & Good engineering practice	
B-23		White Plains	Not Inspected	Smashed pedestal		381 & Good engineering practice	
B-24		White Plains	Not Inspected	Broken lashing wire		214	
B-25		White Plains	Not Inspected	Broken lashing wire		214	
B-26		White Plains	Not Inspected	Broken lashing wire		214	
B-27		La Plata	Not Inspected	Loose or broken down guy		264	
B-28		Indian Head	Not Inspected	Broken lashing wire		214	
B-29		Indian Head	Not Inspected	Broken lashing wire		214	
B-30		Indian Head	Not Inspected	Broken lashing wire	2 spans	214	
B-31		Indian Head	Not Inspected	Broken lashing wire		214	
B-32		Waldorf	Not Inspected	Broken lashing wire	3 of 5 spans between 4647 & 4723	214	
B-33		Waldorf	Not Inspected	Incomplete pole transfer		214	
B-34		Waldorf	Not Inspected	Power Supply - No Locks		224B2c	

ID	ADDRESS	CITY	At Residence or Facility up to the pole or	At Pole, Pedestal/Vault or Right of Way	Comments	Codes	
						NESC	NEC
B-35		Waldorf	Not Inspected	Power Supply - No Locks	NE Corner	224B2c	
B-36		Waldorf	Not Inspected	Loose or broken down guy	NW Corner	264	
B-37		Cobb Island	Not Inspected	Drop(s) not properly attached to pole		239D3	
B-38		Cobb Island	Not Inspected	Drop(s) not properly attached to pole		239D3	
B-39		La Plata	Not Inspected	Incomplete pole transfer	Cables and fiber are hanging low off of strand	214	
B-40		La Plata	Not Inspected	Drop(s) not properly attached to pole		239D3	
B-41		Bryantown	Not Inspected	Amplifier not grounded in pedestal		Section 9	
B-42		Hughsville	Not Inspected	Power Supply - No Locks		224B2c	
B-43		Waldorf	Not Inspected	Broken lashing wire		214	
B-44		Waldorf	Not Inspected	Broken lashing wire		214	
B-46		Waldorf	Not Inspected	Broken lashing wire	Approximate address	214	
B-47		Waldorf	Not Inspected	Power Supply - No Locks	Approximate address	224B2c	
B-48		Waldorf	Not Inspected	Broken lashing wire	2 spans	214	
B-49		Waldorf	Not Inspected	Incomplete pole transfer		214	
B-50		Waldorf	Not Inspected	Power Supply - No Locks		224B2c	
B-51		La Plata	Not Inspected	Broken lashing wire		214	
B-52		La Plata	Not Inspected	Broken lashing wire		214	

ID	ADDRESS	CITY	At Residence or Facility up to the pole or	At Pole, Pedestal/Vault or Right of Way	Comments	Codes	
						NESC	NEC
B-53		La Plata	Not Inspected	Broken lashing wire	Cable touching phone	214	
B-54		Port Tobacco	Not Inspected	Loose or broken down guy		264	
B-55		Port Tobacco	Not Inspected	Drop(s) not properly attached to pole	Power supply no locks	239D3	
B-56		La Plata	Not Inspected	Missing down guy		264	
B-57		La Plata	Not Inspected	Broken lashing wire		214	
B-58		La Plata	Not Inspected	Broken lashing wire		214	
B-59		Indian Head	Not Inspected	Broken lashing wire	4 spans	214	
B-60		Indian Head	Not Inspected	Abandoned power supply 2 spans east of Fire Department		214	
B-61		Indian Head	Not Inspected	Broken lashing wire	3 Of 4 spans between Jameric Pl & 4975 Abell Rd	214	
B-62		Marbury	Not Inspected	Missing down guy		264	
B-63		La Plata	Not Inspected	Broken lashing wire	3 spans between 4755 & 5420 Mason Springs Rd	214	
B-64		La Plata	Not Inspected	Loose or broken down guy	1 span south of 244	264	
B-65		La Plata	Not Inspected	Broken lashing wire	1 span south of Smith Dr	214	
B-66		Indian Head	Not Inspected	Broken lashing wire		214	
B-67		Indian Head	Not Inspected	Broken lashing wire		214	
B-68		Indian Head	Not Inspected	Drop(s) not properly attached to pole		239D3	
B-69		Indian Head	Not Inspected	Broken lashing wire		214	

ID	ADDRESS	CITY	At Residence or Facility up to the pole or	At Pole, Pedestal/Vault or Right of Way	Comments	Codes	
						NESC	NEC
B-70		Indian Head	Not Inspected	Broken lashing wire	4-5 spans north of Chicomuxen Rd	214	
B-71		Indian Head	Not Inspected	Broken lashing wire		214	
B-72		Indian Head	Not Inspected	Broken lashing wire		214	
B-73		Waldorf	Not Inspected	Unlocked power supply	Active wires from power company's secondary to old power supply were bare and exposed to pedestrians 4.5 feet above the ground	224B2c	