FEDERAL COMMUNICATIONS COMMISSION
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Prescribing the Authorized Rate of Return

ANALYSIS OF METHODS FOR ESTABLISHING JUST AND REASONABLE RATES FOR LOCAL EXCHANGE CARRIERS

WIRELINE COMPETITION BUREAU

STAFF REPORT

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Executive Summary

The rules of the Federal Communications Commission authorize incumbent local exchange carriers (LECs) subject to rate-of-return regulation to earn a prescribed rate of return, currently 11.25 percent, on specified investment in plant used and useful in the efficient provision of certain interstate telecommunications services. The authorized rate of return is also used to determine the support incumbent LECs receive from the Universal Service Fund (USF or Fund) for High Cost Loop Support and Interstate Common Line Support.

In keeping with its statutory obligation to ensure that rates are just and reasonable, the Commission must set the rate of return high enough to allow carriers to maintain their credit-worthiness and attract capital, but no higher. If the rate is too high, customers pay unreasonably high prices both through direct payments to carriers and through excessive Universal Service Fund fees.

In the *USF/ICC Transformation Order,* the Commission concluded that it should represcribe the authorized rate-of-return and initiated a represcription proceeding. One formula for determining the rate of return is the Weighted Average Cost of Capital (WACC), which the Commission's rules specify is the sum of the cost of debt, the cost of preferred stock, and the cost of equity, each weighted by its proportion in the capital structure of the telephone companies. Both the National Exchange Carrier Association and the Ad Hoc Telecommunications Users Committee provided analyses of the WACC, relying on one or both of the methodologies to find the cost of equity that the staff uses in this Report. We appreciate their contribution to the record and build on their work in this Report. Although our analyses differ from theirs in certain respects, the approaches are fundamentally similar to the approach set out in this Staff Report.

The Commission last represcribed the authorized rate of return in 1990, reducing it from 12 to 11.25 percent. The Commission no longer has current data of the type it used to prescribe the rate of return in 1990, and substantial changes in technology, regulation, and the marketplace in the last 23 years raise a number of issues regarding how to represcribe the rate of return.

In an effort to inform the Commission as it moves to resolve this proceeding and set a rate of return that better reflects market realities and protects the consumers and businesses that pay into the Fund while providing more certainty for rate-of-return carriers, this Wireline Competition Bureau Staff Report reviews the record in this proceeding, discusses various methods and data sources that could be used to determine the WACC, and considers Commission options for addressing the Commission's goals and the issues raised by carriers, state regulators, consumer advocates, and others. Specifically, the Report discusses, among other things:

- Using publicly-traded rate-of-return incumbent LECs as proxies for rate-of-return incumbent LECs generally to determine the WACC. The Commission's 1990 represcription proceeding used the Regional Bell Holding Companies as proxies.
- Calculating the cost of equity using both the Capital Asset Pricing Model and the Discounted Cash Flow Model. In 1990, the Commission used the Discounted Cash Flow Model to determine the cost of equity.
- Determining a "zone of reasonableness" within which the rate of return can be selected.

Finally, the Report calculates the WACC using various methods and data sources and determines a zone of reasonable WACC estimates ranging from 7.39 percent to 8.72 percent. Noting, among other things, the current historically-low interest rates and the infrequency of represcription, the Report concludes that the Commission should consider establishing the authorized rate of return in the upper half of this range, between 8.06 percent and 8.72 percent.

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I. INTRODUCTION

1. The Federal Communications Commission (Commission) prescribes a unitary rate of return (commonly referred to as the "rate of return" or "authorized rate of return") for the roughly 1200 incumbent local exchange carrier (incumbent LEC) study areas subject to rate-of-return regulation.[1] The authorized rate of return is used to determine interstate common line rates and special access rates for rate-of-return incumbent LECs[2] and is also used in calculating some forms of support provided by the Universal Service Fund (USF or Fund), including High Cost Loop Support (HCLS)[3] and Interstate Common Line Support (ICLS).[4] The Commission, noting the major changes that have occurred in the market since the authorized rate of return was last prescribed in 1990, initiated a represcription proceeding in the *Further Notice* portion of the *USF/ICC Transformation Order*.[5]

2. The staff of the Wireline Competition Bureau (Bureau) has prepared this Staff Report (Report) to assist the Commission as it considers prescribing a new authorized rate of return. Taking into account comments filed in response to the *Further Notice* released in conjunction with the *USF/ICC Transformation Order*,[6] as well as regulatory and market changes since the Commission's last represcription, this Report analyzes various policies regarding represcription and possible procedural and substantive changes to the represcription process. We discuss analytical approaches to calculating the rate of return, with particular emphasis on

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[1] The Commission is required by Section 201 of the Communications Act of 1934 to ensure that rates are "just and reasonable." *See* 47 U.S.C. § 201(b). Section 205(a) of the Act authorizes the Commission, on an appropriate record, to prescribe just and reasonable charges of common carriers. *See* 47 U.S.C. § 205(a).

[2] In the *USF/ICC Transformation Order*, the Commission took rate-of-return incumbent LECs off of rate-of-return regulation for interstate switched access services. *See Connect America Fund et al.*, WC Docket No. 10-90 et al., Report and Order and Further Notice of Proposed Rulemaking, 26 FCC Rcd 17663, 17983-84, para. 900 (2011) (*USF/ICC Transformation Order*), *pets. for review pending sub nom. In re: FCC 11-161*, No. 11-9900 (10th Cir. filed Dec. 8, 2011).

[3] *See* 47 C.F.R. § 36.621(a)(1).

[4] *See* 47 C.F.R. § 54.901.

[5] *USF/ICC Transformation Order*, 26 FCC Rcd at 17870, paras. 639-40. The Commission reduced the authorized rate of return from 12% to 11.25% in 1990. *See Represcribing the Authorized Rate of Return for Interstate Services of Local Exchange Carriers*, CC Docket No. 89-624, Order, 5 FCC Rcd 7507 (1990) (*1990 Represcription Order*). The Commission's rules require that the Commission issue a notice inquiring whether it should undertake a represcription if the monthly average yields on ten-year United States Treasury securities remain, for a consecutive six month period, at least 150 basis points above or below the average of the monthly average yields in effect for the consecutive six month period immediately prior to the effective date of the current prescription. *See* 47 C.F.R. § 65.101. The Commission noted that the trigger was met and initiated a represcription proceeding in 1998, but the proceeding was terminated in the *MAG Order*, leaving the authorized rate of return unmodified. *See Multi-Association Group (MAG) Plan for Regulation of Interstate Services of Non-Price Cap Incumbent Local Exchange Carriers and Interexchange Carriers*, CC Docket No. 00-256, Second Report and Order and Further Notice of Proposed Rulemaking, 16 FCC Rcd 19613, 19701, para. 208 (2001) (*MAG Order*). In the *USF/ICC Transformation Order*, the Commission noted that the monthly average yields for the past six months had been "over 450 basis points below the monthly average yields in the six months immediately prior to the last prescription." *USF/ICC Transformation Order*, 26 FCC Rcd at 17870, para. 640 (citing 10-Year Treasury Constant Maturity Rate (GS10), Federal Reserve Bank of St. Louis (*available at* http://research.stlouisfed.org/fred2/series/GS10) (last visited Oct. 21, 2011)).

[6] *USF/ICC Transformation Order*, 26 FCC Rcd at 18051-56, paras. 1044-60.

calculating the cost of equity, and examine how best to establish a "zone of reasonableness," a range within which the rate of return should be set.

3. As discussed in greater detail below, we believe a reasonable analytical approach, using available data, would establish the zone of reasonableness for a unitary rate of return between 7.39 percent and 8.72 percent.[7] Based upon our analysis of another important financial benchmark for rate-of-return carriers (based upon times interest earned ratios), and given current historically-low interest rates and the infrequency of represcription, we conclude that the rate of return should be selected from the upper end of this range, between 8.06 percent and 8.72 percent.

II. BACKGROUND

4. Large market and regulatory changes have occurred since the Commission last prescribed the unitary rate of return in 1990.[8] At that time, there were 135 million incumbent LEC access lines, with that number increasing at a rate of three percent annually.[9] By 2008, the number of incumbent LEC access lines had decreased to 122 million, and were continuing to decrease at a rate of 7.5 percent annually.[10] In 1990, there were five million wireless subscribers, while there were 270 million by 2008.[11] Since 1990, the Commission has promulgated rules to implement the 1996 Communications Act[12] and expand price cap regulation,[13] and has removed interstate switched access from rate-of-return regulation.[14] The provision of video and data services, including broadband data services by incumbent LECs, has grown exponentially.[15] In addition, there has been substantial industry consolidation.[16] The Commission has granted AT&T, Verizon, and Qwest forbearance from the Cost Accounting Rules, including the filing of Automated Reporting Management Information System (ARMIS) reports upon which the last

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[7] Commission rules require that the final determinations of the cost of debt, cost of equity, cost of preferred stock, and of their capital structure weights be accurate to two decimal places. 47 C.F.R. § 65.306.

[8] *1990 Represcription Order*, 5 FCC Rcd at 7507, para. 1.

[9] *See Trends in Telephone Service,* Federal Communications Commission, Wireline Competition Bureau, Industry Analysis and Technology Division at Table 7-3 (Sept. 2010) (*2010 Trends in Telephone Service*), *available at* http://www.fcc.gov/reports/trends-telephony-service-2010.

[10] *Id*.

[11] *Id.*, Table 11-3 (reporting CTIA statistics).

[12] 47 U.S.C. § 1302.

[13] *See, e.g., Joint Petition of Price Cap Holding Companies for Conversion of Average Schedule Affiliates to Price Cap Regulation and for Limited Waiver Relief*, WC Docket No. 12-63; *Consolidated Communications Companies Tariff F.C.C. No. 2*, Transmittal No. 41; *Frontier Telephone Companies Tariff F.C.C. No. 10*, Transmittal No. 28; *Windstream Telephone System Tariff F.C.C. No. 7*, Transmittal No. 57, Order, 27 FCC Rcd 15753 (2012).

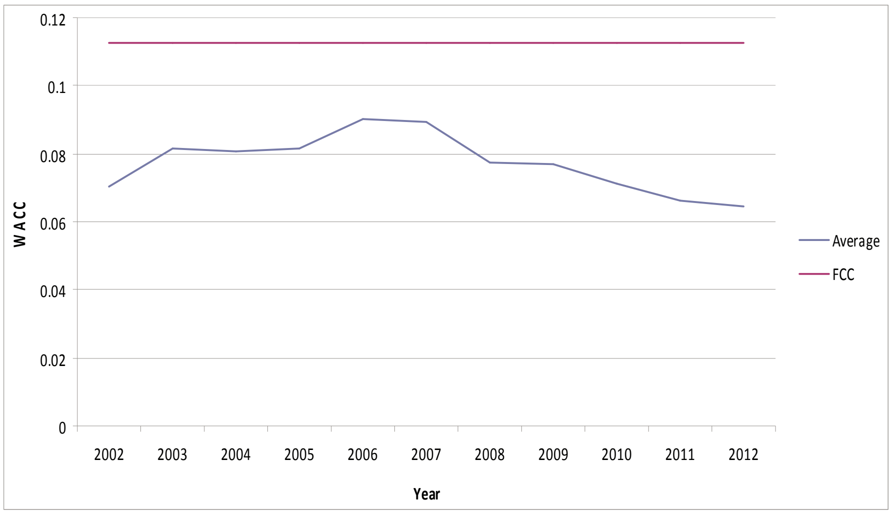
[14] *USF/ICC Transformation Order*, 26 FCC Rcd at 18052, para. 1049.

[15] *Id*. at 17983, para. 900.

[16] *See, e.g., AT&T Inc. and BellSouth Corporation Application for Transfer of Control*, WC Docket No. 06-74, Memorandum Opinion and Order, 22 FCC Rcd 5662 (2007); Order on Reconsideration, 22 FCC Rcd 6285 (2007); *SBC Communications Inc. and AT&T Corp. Applications for Approval of Transfer of Control*, WC Docket No. 05-65, Memorandum Opinion and Order, 20 FCC Rcd 18290 (2005); *Verizon Communications Inc. and MCI, Inc. Applications for Approval of Transfer of Control*, WC Docket No. 05-75, Memorandum Opinion and Order, 20 FCC Rcd 18433 (2005).

represcription was based.[17] The Commission's represcription rules, however, have remained largely unchanged for almost two decades.[18] Those rules specify that the Commission establish a unitary rate of return (*i.e.*, a single rate of return) for specified interstate services for all rate-of-return incumbent LECs,[19] and that the Commission may, but need not, initiate a represcription of this unitary rate of return if there has been a specified change in the yield on U.S. Treasury securities.[20]

Estimated Weighted Average Cost of Capital 2002 – 2012[21]



[17] *See Petition of AT&T Inc. for Forbearance Under 47 U.S.C. § 160 from Enforcement of Certain of the Commission's Cost Assignment Rules; Petition of BellSouth Telecommunications, Inc. for Forbearance Under 47 U.S.C. § 160 from Enforcement of Certain of the Commission's Cost Assignment Rules*, WC Docket Nos. 07-21, 05-342, Memorandum Opinion and Order, 23 FCC Rcd 7302, 7307, para. 12 (2008), *pet. for recon. pending*, *pet. for review pending*, *NASUCA v. FCC*, Case No. 08-1226 (D.C. Cir., filed June 23, 2008); *Petition of Qwest Corporation for Forbearance from Enforcement of the Commission's ARMIS and 492A Reporting Requirements Pursuant to 47 U.S.C. § 160(c); Petition of Verizon for Forbearance Under 47 U.S.C. § 160(c) from Enforcement of Certain of the Commission's Recordkeeping and Reporting Requirements*, WC Docket Nos. 07-204, 07-273, Memorandum Opinion and Order, 23 FCC Rcd 13647, 13660, para. 23 (2008).

[18] 47 C.F.R. §§ 65.101 *et seq*.

[19] 47 C.F.R. § 65.1.

[20] 47 C.F.R. § 65.101(a), (b). If the Commission determines that the monthly average yields on ten (10) year United States Treasury securities remain, for a consecutive six month period, at least 150 basis points above or below the average of the monthly average yields in effect for the consecutive six month period immediately prior to the effective date of the current prescription, the Commission is required to issue a notice inquiring whether a rate of return represcription should commence. 47 C.F.R. § 65.101(a). It is not, however, required to commence the represcription. 47 C.F.R. § 65.101(b).

[21] WACC calculations in this table were made using CAPM with betas from SNL Kagan, which use daily data and are not adjusted towards one. While our main analysis uses weekly data for the betas and adjusts them towards one, we show in the report that this methodological difference is inconsequential. We assume a 5.79 percent market risk premium, and risk-free rates from September 17 of each year. Otherwise, the methodology is identical to that used for the 2012 capital asset pricing model estimates described in the report.

5. If the Commission elects to represcribe the authorized rate of return, its rules require the new rate to be based upon its analysis of the cost of debt and equity, and the ratio of debt to equity, also known as the "capital structure." Specifically, the Commission is to calculate a Weighted Average Cost of Capital (WACC) by summing the estimated cost of debt, cost of preferred stock, and cost of equity, each weighted by its proportion in the capital structure of the telephone companies taken as a whole.[22] Because there is a range of reasonable estimates for each of the elements of the WACC, the Commission identifies a zone of reasonable WACC estimates and then decides, based on policy considerations, where within that "zone of reasonableness" to prescribe the unitary rate of return.[23]

6. One thing that has not changed is the critical importance to both the industry and customers that the Commission establish an appropriate rate of return. The WACC is the minimum rate of return required to attract capital to an investment (*e.g.*, by incurring debt and/or selling stock). The rate of return must be high enough to provide investors confidence in the "financial integrity" of a carrier, so that it can maintain its credit-worthiness and attract capital.[24] It "should not be higher than necessary for this purpose,"[25] because this would result in unreasonably high prices for customers and excessive demands on USF. The rate of return should also be "commensurate with returns on investments in other enterprises having corresponding risks."[26] As the United States Court of Appeals for the District of Columbia Circuit (D.C. Circuit) has recognized, "rate of return decisions are appropriately treated as policy determinations in which the agency is acknowledged to have expertise."[27]

7. Further explaining the need to set the rate of return correctly, the Commission has observed that if the authorized rate of return exceeds a carrier's actual WACC, the carrier may have an increased incentive to expand its rate base inefficiently,[28] thereby affecting customer prices and demands on USF.[29] Conversely, if the authorized rate of return is insufficient to cover carriers' WACC, carriers will be denied the opportunity to earn a reasonable rate of return on their investment, and ultimately will decline to make ongoing investments in the provision of efficient service. In either case, incentives to provide and consume regulated services would be

[22] 47 C.F.R. § 65.305(a).

[23] *1990 Represcription Order*, 5 FCC Rcd at 7508, para. 7.

[24] *U.S. v. FCC*, 707 F.2d 610, 612 (D.C. Cir. 1983) (quoting *Federal Power Comm'n v. Hope Natural Gas Co.*, 320 U.S. 591, 603 (1944)).

[25] *U.S. v. FCC*, 707 F.2d at 612 (citing *Permian Basin Area Rate Cases*, 390 U.S. 747, 791-92 (1968)).

[26] *Illinois Bell Tel. Co. v. FCC*, 988 F.2d 1254, 1260 (D.C. Cir. 1993) (quoting *Hope Natural Gas Co.*, 320 U.S. at 603).

[27] *Id*. at 618 (citing *Sun Oil Co. v. FPC*, 445 F2d 764, 767 (D.C. Cir. 1971)).

[28] *See, e.g.*, *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Further Notice of Proposed Rulemaking, 3 FCC Rcd 3195, 3219-20, paras. 39-40 (1988); *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Report and Order and Second Further Notice of Proposed Rulemaking, CC Docket No. 87-313, 4 FCC Rcd 2873, 2889-90, para. 30 (1989).

[29] As the Commission noted in the context of USF assessment reform, one of its primary goals was to "ensure the stability and sufficiency of the universal service fund as the marketplace continues to evolve." *Federal-State Board on Universal Service et al.*, CC Docket No. 96-45 *et al.*, Further Notice of Proposed Rulemaking and Report and Order, 17 FCC Rcd 3752, 3759, para. 15 (2002).

distorted, creating economic inefficiencies.[30] While the fundamental principles of WACC analysis remain unchanged and largely unchallenged in this proceeding, commenters highlight a number of changes in regulation, technology, and the marketplace that have occurred since 1990. These changes raise questions about when and how the Commission should calculate the estimated cost of debt, preferred stock, and equity, and about how the Commission should calculate the capital structure of the companies subject to rate-of-return regulation. We discuss these issues, and other issues raised by commenters, below.

III. DISCUSSION

A. Identifying and Obtaining Data to Compute the Weighted Average Cost of Capital

8. As discussed above, the WACC is the key to establishing the rate of return. We therefore begin this section with an analysis of the financial data needed to calculate the WACC and then consider the sources from which we can obtain that data.

1. Data Needed to Calculate the WACC

9. To calculate a company's (or a group of companies')[31] WACC, we need to determine: 1) the company's capital structure, *i.e.*, the proportions of debt, equity, and preferred stock a company uses to finance its operations; and 2) how much that debt, equity, and preferred stock cost.[32] In these calculations, we will consider book values (also called "accounting values") or market values (also called "economic values"), as appropriate, and as discussed in greater detail below.

10. While the cost of debt can often be estimated directly for each firm, the cost of equity for firms that are not publicly traded can only be inferred based on data from firms that are publicly traded. In the past, the Commission used the Regional Bell Holding Companies (RHCs) as proxy firms to determine capital structure and the costs of debt, equity, and preferred stock for all incumbent LECs.[33] We discuss below the extent to which the RHCs, as well as other groups

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[30] A significant portion of the assets to which the authorized rate of return applies will be paid for, directly or indirectly, from the nationwide universal service funds. This could lower the risks debt and equity holders bear as compared with purely commercial activities, but that we have made no attempt to quantify that effect or any other impacts of regulation on carrier risk.

[31] The Commission's rules specify that WACC analysis be based on whole-company costs and capital structure. *See* 47 C.F.R. § 65.300. Although carriers are entitled to earn a prescribed rate of return only on specified investment in plant used and useful in the efficient provision of certain interstate telecommunications services, *i.e.*, its rate base, 47 C.F.R. § 65.800, it is not possible to buy stock solely in the LECs' interstate access operations. *1990 Represcription Order*, 5 FCC Rcd at 7516, para. 76. Accordingly, the Commission must use a company's overall equity to determine the cost of equity applicable to the company's rate base for which the rate of return is authorized.

[32] A firm's cost of debt and equity can vary by line of business depending on the specific risk of the business. So, too, might a firm's mix of debt and equity financing vary depending on the risk or other factors specific to the particular line of business. Thus, the WACC estimate for a particular project or line of business should be based on the costs of debt and equity for the project or the business line, and on the mix of financing that would be optimal for that project or business line, even if these are not independently financed. In practice, we cannot measure the WACC of any particular line of business with sufficient accuracy (most notably because the relevant data are not available below the level of the firm), and so have developed WACC estimates that reflect the cost of debt and equity and the mix of debt and equity financing for the entire business. *See 1990 Represcription Order*, 5 FCC Rcd at 5710-11, paras. 31-34.

[33] *See generally 1990 Represcription Order.*

of companies that the Commission could use, are suitable proxies for incumbent LECs generally, and rate-of-return LECs in particular.

2. Identifying an Appropriate Proxy Group for Rate-of-Return Carriers

11. The reliability of the Commission's analysis depends in large part on the representativeness of the proxy group it uses. Accordingly, we must consider how to identify a group of firms that can serve as an effective proxy for rate-of return LECs as a whole. We discuss below potential proxy groups identified by our rules, commenters, and Commission staff.

12. The cost of capital is a function of risk, and it is difficult to measure risk differences among the incumbent LECs precisely. In selecting a representative proxy group, it is important to compare the qualitative characteristics of the firms for which the WACC is being calculated with those of the potential proxies—looking in particular at whether the potential proxies face similar risks, and whether, in the view of experienced industry observers, the potential proxies have an institutional setup similar to that of the represented firms.[34] It is also important to consider the type of financial data available about those firms. Staff used the following three-part test to select proxy companies:

- *Threshold of Incumbent LEC Operations*. Staff attempted to discern the amount of companies' total operations that can be classified as incumbent LEC price-regulated interstate telecommunications services, limiting consideration to those companies for which this proportion of operations constituted at least 10% of overall operations. Although this is a low threshold, we note that these are still fundamentally communications companies, and many of their other lines of business provide related services.
- *Similarity to Rate-of-Return Operations*. Staff attempted to determine the extent to which firms offer the same or similar services as those for which we are trying to determine the WACC. As discussed above, the relevant service is price-regulated interstate special access and common line service. Companies providing this service will face similar market and regulatory risks that affect the cost of capital. Companies serving rural or high-cost areas are more similar to rate-of-return LECs than companies serving urban areas, and companies subject to rate-of-return regulation are more similar than those subject to price cap or other incentive regulation.[35]
- *Reliability of Financial Data*. As discussed in detail below, the analysis of the cost of equity relies on data associated with the public trading of a company's equity and the availability of analysts' growth estimates of a company. If a company's equity is traded infrequently, or is infrequently the subject of analysts' growth estimates, its financial data is less reliable in determining the cost of equity. Similarly, a company's overall financial health makes its financial data more reliable in determining the cost of equity than that of a company in financial difficulty.

13. Though each possible proxy group has its strengths and weaknesses when analyzed according to these criteria, staff proposes that the Commission use data from a group of

[34] *See generally* Tom Copeland, Tim Koller, and Jack Murrin, *Valuation: Measuring and Managing the Value of Companies* at 219 (McKinsey & Company, Inc. (2000)).

[35] It may also be worthwhile to consider the similarity of operations of publicly-traded "pure play" cable companies.

16 carriers (the "Staff Proposed Proxy") consisting of three groups of proxy carriers discussed below: the RHCs,[36] the Mid-Size Proxy Companies,[37] and the Publicly-Traded RLECs.[38] We also discuss our grounds for rejecting proxy groups proposed by commenters in this proceeding.[39]

a. Staff Proposed Proxy

14. We believe it is appropriate to use the RHCs, the Mid-Size Proxies, and the Publicly-Traded RLECs to create a Staff Proposed Proxy to use as a proxy for the universe of rate-of-return carriers. While none of these sub-groups, standing alone, is necessarily sufficient, we believe that the 16 companies that comprise the Staff Proposed Proxy represent a range of company types and capital costs that collectively can serve as a reasonable proxy for the rate-of-return carriers. We analyze the WACC for these companies individually, by group, and collectively. Each of the companies in the Staff Proposed Proxy satisfies the first prong of the three-part test. That is, based upon staff review of publicly-filed documents, 10 percent or more of their revenues come from the provision of price-regulated interstate telecommunications services as an incumbent LEC.

(i) Regional Bell Holding Companies

15. The Commission's current represcription rules explicitly contemplate using the RHCs[40] as proxies,[41] but a number of parties filed comments opposing the use of RHCs as proxies for rate-of-return incumbent LECs.[42] For example, the Ad Hoc Telecommunications Users Committee (Ad Hoc) suggests that the RHCs, among other large companies, are not appropriate proxies for rate-of-return carriers because larger companies have capital structures "more heavily weighted toward the relatively more expensive equity than debt" compared to smaller RLECs that "never go to capital markets to raise funds" and instead "borrow funds directly from [the Rural Utility Service] at rates that include no risk premium."[43] The National Exchange Carrier

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[36] The RHCs are AT&T, Verizon, and CenturyLink. The Commission decided in 1990 to use the capital structure of the Regional Bell Holding Companies rather than the Regional Bell Operating Companies because the capital structure of the BOCs is subject to manipulation by the holding companies. *See 1990 Represcription Order*, 5 FCC Rcd at 5708, para. 8.

[37] The Mid-Size Companies are Alaska Communications, Inc., Cincinnati Bell, FairPoint Communications, Frontier Communications, Hawaiian Tel., Lumos, and Windstream.

[38] The Publicly-Traded RLECs are Alteva, Consolidated Communications, HickoryTech, New Ulm Telephone, Shenandoah Telecommunications, and Telephone and Data Systems.

[39] The Staff Proposed Proxy includes all publicly traded Incumbent LECs meeting the test described above, for which reliable data is available. As discussed below, a number of publicly-traded RLECs were omitted from the Staff Proposed Proxy.

[40] Many commenters in the current represcription proceeding refer to "RBOCs" or "BOCs" or simply AT&T, CenturyLink, and Verizon. There is no indication that the commenters believe the operating companies should be used rather than the holding companies, and this Report does not revisit the distinction between the two.

[41] The Commission's rules specify that the components of the WACC be calculated using RHC data reported to the Commission through ARMIS. 47 C.F.R. § 65.300(a). The rules do not, however, require that the Commission use the results of those calculations to determine the unitary rate of return "if the record in that proceeding shows that their use would be unreasonable." *Id*.

[42] *See, e.g.*, NECA et al. Comments at 56, n.98 and App. C, Statement of Prof. Randall S. Billingsley, Billingsley Exhibit RSB-2; *see generally* Ad Hoc Comments.

[43] Ad Hoc Comments at 5-6.

Association (NECA or NECA et al.) argues that "other companies, when measured on objective terms, in fact more closely resemble RLECs in terms of business risk than [AT&T and Verizon] and should accordingly be used in any analysis intended to estimate RLEC costs of capital."[44] In 1990, the Commission addressed the issue of the extent to which the RHCs were representative of regulated incumbent LEC operations generally, noting RHC diversification, including then-nascent cellular operations, but concluding that the RHCs were appropriate proxies.[45]

16. We agree that RHCs likely differ significantly from other incumbent LECs and we therefore do not recommend that the Commission rely *exclusively* on RHC data in a represcription proceeding.[46] Nevertheless, the RHCs, like most other incumbent LECS, whether subject to price cap or rate-of-return regulation, offer regulated wireline voice service as a significant portion of their business; this similarity supports the inclusion of RHCs among the proxies to be used in this proceeding. As discussed above,[47] this diversification, in particular with regard to expansion of wireless service, has continued.

17. Among the companies in the Staff Proposed Proxy, the financial data available for the RHCs is more likely to produce a reliable WACC measurement than data from any other group of incumbent LECs. As compared with the incumbent LECs generally, the RHCs are subject to substantially greater scrutiny from regulators, analysts and investors, including stock market traders, and consequently their self-reports are likely to be undertaken with greater care, and more quickly corrected where errors are made. At the same time, there is relatively accurate external information available about these firms. For example, their shares are traded frequently, and in relatively high volumes, by highly informed traders. This means that the share price for these firms is likely to rapidly capture new information about these companies as it becomes available. Additionally, the RHCs have many large and sophisticated shareholders, who have strong incentives to watch the companies' behavior and to seek damages for misreporting. Similarly, analysts and credit agencies, all in competition with each other, follow such companies carefully, and publish reports about the same.

18. Further, WACC estimates are likely to be most accurate for carriers, such as the RHCs, with relatively constant and unremarkably high or low debt-to-equity and times-interest-earned-ratios, and solid bond ratings. Thus, we believe that the nearly certain and significant

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[44] NECA et al. Comments at 50.

[45] *1990 Represcription Order*, 5 FCC Rcd 7516-19, paras. 76-102. The Commission noted ("[T]he record does show that the RHCs are also involved in activities which are perceived as riskier than their regulated telephone business. We therefore find that we should give some weight in our decision to the possibility that a cost of equity estimate for an RHC as a whole company might somewhat overstate the cost of equity for interstate access service alone." *Id*. at 7517, para. 86.

[46] The Commission's rules specify that the calculations "shall be based on data reported to the Commission in ARMIS report FCC Report 43-02. 47 C.F.R. § 65.300(a). In 2008, the Commission granted AT&T, Verizon, and Qwest forbearance from the filing of FCC Report 43-02. *See, e.g., Petition of Qwest Corporation for Forbearance from Enforcement of the Commission's ARMIS and 492A Reporting Requirements Pursuant to 47 U.S.C. § 160(c)*, WC Docket No. 07-204, Memorandum Opinion and Order, 23 FCC Rcd 18483 (2008). The Commission has not collected the ARMIS data identified in our rules since 2007 due to the grant of forbearance to the RHCs. In the Further Notice portion of the *USF/ICC Transformation Order,* the Commission sought comment on what additional data the Commission should require and rely upon in the absence of current ARMIS data. *USF/ICC Transformation Order*, 26 FCC Rcd at 18052-53, para. 1050. Staff recommends that the Commission waive the requirement of Section 65.300 of the Commission's rules. 47 C.F.R. § 65.300.

[47] *See supra*, para. 4.

benefit of having a more accurate estimate of the RHCs' WACCs provides an objective benchmark for our analysis (albeit one that must be treated carefully). At a minimum, given the size of the RHCs, the substantially large share of the industry's debt and equity capital they raise, and competition among all incumbent LECs for the limited amount of capital provided by debt and equity investors, WACC estimates for the RHCs provide a benchmark against which to judge the reasonableness of differences among WACC estimates for all of the incumbent LECs. To enable comparisons, we report WACC estimates for RHCs separately from WACC estimates for other incumbent LECs, in addition to developing an overall WACC estimate.

19. In this vein, the RHCs should be included in any analysis of incumbent LECs' rates of return because they will provide the most reliable discounted cash flow (DCF) estimates for the cost of equity. There is a significantly greater number of analysts' growth estimates for the RHCs than for the other incumbent LECs. These growth estimates are used to establish the consensus growth rate used in one of the models (the Discounted Cash Flow, or DCF Model) used to determine the cost of equity. The greater number of analysts' growth estimates makes the consensus growth rate more reliable, and therefore makes the DCF model cost of equity, and ultimately the WACC, more reliable (though again, such numbers must be treated with care: we do not assume that that the RHCs are identical to other incumbent LECs, but there are important similarities between these groups, and it is valuable to have reasonably objective information about at least one).

20. For these reasons, we believe that RHCs should be included among those companies in the proxy group for calculation of the WACC.

(ii) Mid-Size Proxies

21. Staff also considered publicly-traded mid-sized incumbent LECs,[48] and recommends that Alaska Communications Services, Inc., Cincinnati Bell, FairPoint, Frontier, Hawaiian Telcom, and Windstream (the "Mid-Size Proxies"), be included in the Staff Proposed Proxy for calculation of a composite WACC. The Mid-Size Proxies are more similar to rate-of-return operations than are the RHCs: unlike Verizon and AT&T, which also provide extensive wireless service, the Mid-Size Proxies are less diversified and thus more closely match the majority of incumbent LECs' wireline service offerings, have a significant fraction of their incumbent LEC operations in population sparse, high cost, rural areas of the country, and have a relatively large number of analysts' growth estimates reflected in the consensus growth rate used in the DCF model to estimate the cost of equity.

22. However, these carriers are primarily subject to price cap regulation rather than rate-of-return regulation, and are much larger than most RLECs, and therefore are still an imperfect proxy group. In addition, these companies in general have a large share of debt in their capital structures, low times-interest-earned ratios, and non-investment-grade debt ratings and thus are less than ideal for estimating the cost of capital for providers with lower, often subsidized, debt. As with the RHC proxies, we recommend that the Commission include them in

[48] *See* PA PUC Reply at 6. Such a group would be consistent with the Pennsylvania PUC's recommendation that "proxy company groups that are composed [of] mid-size carriers that are subsidiaries of publicly traded holding companies without wireless operations should be utilized for the derivation of the [return on equity] estimates applicable to the operations of wireline carriers that primarily serve higher cost rural areas." We note by way of example that AT&T and Verizon together accounted for over 61% of wireless subscribers by 2008. *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Fifteenth Report, WT Docket 10-133, 26 FCC Rcd 9664, 9696, para. 31 (2011) (using 2009 statistics).

calculating a composite WACC, but not rely on them exclusively.

(iii) Publicly-Traded RLEC Proxies

23. The RHCs and the Mid-Size Proxies differ from rate-of-return incumbent LECs in that their operations are not substantially subject to rate-of-return regulation. Staff has identified seven publicly-traded U.S. incumbent LECs subject to rate-of-return regulation that could serve as proxies for the Commission's calculation of the WACC. These carriers are HickoryTech Corporation, Shenandoah Telecommunications Company, Telephone and Data Systems, Inc., Consolidated Communications, New Ulm, Lumos, and Alteva[49] (the "Publicly-Traded RLEC Proxies").

24. We do not, however, recommend using the Publicly-Traded RLEC Proxies as the sole proxy because their financial data is not as reliable for the types of calculations needed to determine the cost of equity. Some of the Publicly-Traded RLEC Proxies have a small number of analysts' growth estimates. It is these analyst growth estimates that are used in the DCF model to determine the cost of equity; if there are too few estimates, the reliability of the DCF estimate of the cost of equity is reduced. Similarly, some of these small carriers appear to also have thinly traded stock. Data from stock trades is used by in the Capital Asset Pricing Model (CAPM) to estimate the cost of equity; stock that is infrequently traded could result in a bias in the CAPM estimate of the cost of equity. Finally, there are only seven such carriers, a number that is probably not large enough for measurement errors reflected in the estimates to be expected to largely offset each other, especially given that these errors might not be totally random and the fact that any given error may be large.

(iv) Recommendation: the Staff Proposed Proxy

25. The staff recommends using all three groups, the Staff Proposed Proxy, to determine the composite WACC. Each of the companies in the Staff Proposed Proxy provides price-regulated interstate service as an incumbent LEC, and such service is estimated to exceed the ten percent threshold of the first prong in the Commission's test: Threshold of Incumbent LEC Operations. With regard to the second and third prongs, however, there appears to be an inverse relationship between the similarity to rate-of-return operations and the reliability of financial data. The RHC Proxy companies have frequently-traded equity and numerous analysts' growth estimates, making their financial data highly reliable for purposes of our CAPM and DCF analysis, but with their more urban service areas and price-cap or price-flexibility regulation, have operations least similar to those of rate-of-return carriers. Accordingly, we do not recommend relying exclusively on the RHCs despite the reliability of their financial data. Conversely, the Publicly-Traded RLEC Proxies, subject to rate-of-return regulation and serving rural and higher cost areas, are most similar to rate-of-return operations. However, their stock tends to be infrequently traded, and there are few analysts' growth estimates for use in our CAPM and DCF estimates. The Mid-Size Proxies, although subject to price cap regulation, have more rural and high-cost service areas than the RHC Proxies, and in that regard have greater similarity to rate-of-return operations. The Mid-Size Proxies' stock is more frequently traded than that of the Publicly-Traded RLEC Proxies, and there are more analysts' growth estimates for the Mid-Size Proxies than there are for the Publicly-Traded RLEC Proxies. However, the disproportionate capital structure (specifically with regard to the large share of debt) and non-investment-grade debt rating of many of these companies make their financial data less reliable than that of the RHC Proxies. Collectively, the three groups represent a wide spectrum of incumbent LEC operations, include both price cap and rate-of-return regulated operations, and

[49] Alteva was formerly Warwick Valley Telephone.

include those incumbent LECs with the most widely traded equity, allowing greater confidence in the calculations that rely on the public trading of stock, especially given that it is highly uncertain where within that spectrum non-publicly-traded RLECs lie.

b. Other Proxies Considered

26. Ad Hoc and NECA each submitted a proposal for data sources for calculating the WACC.[50] While we build on the Ad Hoc and NECA analyses in several other respects, for the reasons discussed below, we believe the Staff Proposed Proxy better reflects the risks faced by rate-of-return carriers, and would therefore enable the Commission to better estimate the rate of return those carriers require.

(i) Damodaran Telecom Utility Proxies

27. Ad Hoc proposes to use publicly available cost of capital data compiled by Professor Aswath Damodaran of the Stern School of Business at New York University, specifically the "telecom utility" sector of Prof. Damodaran's Cost of Capital by Sector compilation (the "Damodaran Telecom Utility Proxies").[51]

28. Although the Damodaran Telecom Utility Proxies data is readily available to the public and has the advantage of having been compiled by a source without an interest in this proceeding,[52] we believe the Staff Proposed Proxy is preferable for determining the rate of return for U.S. rate of return incumbent LECs. Although the Damodaran Telecom Utility Proxies include several publicly-traded incumbent LECs included in the Staff Preferred Proxy (*i.e.*, Alaska Communications Services, Inc., CenturyLink Inc., Cincinnati Bell, Consolidated Communications, FairPoint Communications, Frontier Communications, HickoryTech Corp., New Ulm Telecom Inc., Alteva, and Windstream Corp.), the majority of the Damodaran Telecom Utility Proxies are either (primarily) foreign (*e.g.*, B Communications Ltd (Israel), BCE Inc. (Canada), BT Group ADR (United Kingdom), Deutsche Telekom ADR (Germany), Hellenic Telecom Org. SA (OTE) (Greece), Manitoba Telecom Services Inc. (Canada), Telefonica SA ADR (Spain), Telefonos de Mexico ADR (Mexico), and therefore not necessarily subject to the same market conditions or regulatory structure as U.S. rate-of-return incumbent LECs, or do not provide service as incumbent LECs (ERF Wireless Inc., IDT Corp., ITC Deltacom, Level 3 Communications, Spot Mobile International Ltd., tw telecom, XO Holdings Inc.) The Damodaran Telecom Utility Proxies may be more representative of the global telecommunications industry generally than is the Staff Preferred Proxy, but for the narrow purpose of determining the WACC for U.S. rate-of-return incumbent LECs, we believe the Staff Preferred Proxy is better suited than the Damodaran Telecom Utility Proxies.

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[50] Ad Hoc Comments at 4-6; NECA et al. Comments at 56-57 and App. B at 8-11.

[51] Aswath Damodaran, *Cost of Capital by Sector*, DAMODARAN ONLINE, http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/wacc.htm (last visited Oct. 2, 2012). For 2011 the Damodaran Telecom Utility Proxies were: Alaska Communications, Inc., B Communications Ltd, BCE Inc., BT Group ADR, CenturyLink Inc., Cincinnati Bell, Consolidated Communications, Deutsche Telekom ADR, ERF Wireless Inc., FairPoint Communications, Frontier Communications, Hellenic Telecom Org. SA (OTE), HickoryTech Corp., IDT Corp., ITC Deltacom, Level 3 Communications, Manitoba Telecom Services Inc., New Ulm Telecom Inc., Otelco Inc., Spot Mobile International Ltd., SureWest Communications, Telefonica SA ADR, Telefonos de Mexico ADR, tw telecom, Warwick Valley Tel Company (now Alteva), Windstream Corp., and XO Holdings Inc. *Id.*

[52] Ad Hoc Comments at 5.

(ii) NECA Proxies

29. NECA proposes to use financial data from a group of twenty firms (the "NECA Proxies") that it describes as facing "comparable overall risk" to the universe of rate-of-return incumbent LECs. The NECA Proxies are: 3M Company, Abbott Labs, Advance Auto Pt., Albemarle Corporation, Autoliv, Inc., Bard C R, Inc., Baxter International, Church & Dwight, Coca Cola Company, Cooper Industries, Plc., Dentsply International, Ecolab, Inc., Flowers Foods, Flowserve Corporation, General Dynamics, Idex Corporation, Johnson & Johnson, Raytheon Company, Sigma Aldrich, and V F Corporation. NECA selected its proxies by calculating a vector of variables chosen to measure financial risk for an "average RLEC."[53] NECA then conducted a cluster analysis of firms that had the appropriate data available in both the Zacks Investment Research data application Research Wizard and in the Value Line Investment Survey, selecting the cluster that was closest to the value of the "average RLEC." While this approach is not necessarily invalid, it should be used in conjunction with common sense analysis of business conditions.

30. The representativeness of proxy firms is particularly at issue when, as with the NECA Proxies, the proxy companies are facially quite dissimilar to the rate-of-return incumbent LECs. Unlike the Damodaran Telecom Utility Proxies, the NECA Proxies are not limited to the telecommunications field. Indeed, the portfolio does not include a single telecommunications company, and is instead based on companies – like Coca Cola, Johnson & Johnson, or Raytheon – that have little business resemblance to rate-of-return carriers. Like the Damodaran Telecom Utility Proxies, the NECA Proxies include foreign companies. As discussed above, we find this makes them less suitable proxies because foreign, non-incumbent LEC companies do not face the same market risks or regulatory structure that rate-of-return incumbent LECs face. Finally, even if we were to overcome these hurdles, NECA has not sufficiently demonstrated that the financial risk values it uses as an RLEC average are in fact representative. For all of these reasons, we do not recommend using the NECA Proxies in the calculation of the WACC.

B. Computing the WACC

31. As discussed above, the WACC estimates the rate of return that the incumbent LECs must earn on their investment in facilities used to provide regulated interstate services in order to attract sufficient capital investment. The Commission's rules specify that the composite WACC is the sum of the cost of debt, the cost of preferred stock, and the cost of equity, each weighted by its proportion in the capital structure of the telephone companies:[54]

WACC = (Equity/(Debt + Equity + Preferred)) x Cost of Equity + (Debt/(Debt + Equity + Preferred)) x Cost of Debt + (Preferred/(Debt + Equity + Preferred)) x Cost of Preferred

32. In this part, we calculate these elements and determine the WACC for the recommended Staff Proposed Proxy. First, based upon the financial data of the companies in the Staff Proposed Proxy (the Proxy Firms), we determine the capital structure of the Proxy Firms, *i.e.*, the proportions of debt, equity, and preferred stock the Proxy Firms use to finance their operations. We then calculate how much that debt, equity, and preferred stock cost the Proxy Firms. Finally, we multiply the proportion of debt, equity, and preferred stock by their respective

[53] NECA et al. Comments at App. C, Statement of Prof. Randall S. Billingsley, Attach. 3. This vector contains normalized values of the following variables: equity-to-total capital ratio; cash flow-based interest coverage ratio; the standard deviation of the ratio of a firm's operating cash flows to total assets; and the firm's operating cash-flow-to-total assets.

[54] *See* 47 C.F.R. § 65.305(a).

costs; the sum of these products is the WACC.

33. The formulas for determining the cost of debt, cost of preferred stock, and capital structure are codified respectively in sections 65.302, 65.303, and 65.304 of the Commission's rules.[55] The rules do not, however, specify a formula for the cost of equity.[56]

34. In the *Further Notice* portion of the *USF/ICC Transformation Order*, the Commission sought comment on whether it should augment or replace its WACC calculation with other analyses or approaches.[57] Noting that "many rate-of-return companies have diversified beyond regulated voice services, for example to offer broadband, video, or wireless services,"[58] the Commission sought comment on whether the WACC "should be computed for only the regulated portion of the company's business, or at the level of the entire company?"[59] Although there was little dispute regarding the WACC formula itself, there were differing views on how to measure the components of the WACC.[60]

35. Having recommended the type of data the Commission should use, and the companies that would comprise the Staff Proposed Proxy, in this section, we now analyze the data to determine: (a) capital structure; (b) the cost of debt; (c) and the cost of equity. As discussed below, we do not have sufficient data to calculate the percentage of preferred stock in the capital structures or to calculate the cost of preferred stock. Accordingly, as discussed below, we have not included it in these calculations.

1. Capital Structure

36. The capital structure of a firm is the percentage of debt, preferred stock, and equity the firm uses to finance its operations. For example, if a firm had \$60 of debt, \$10 of preferred stock, and \$130 of equity, then its capital structure would be 30 percent debt (60/(60+10+130)), five percent preferred stock (10/(60+10+130)); and 65 percent equity (130/(60+10+130)).

37. The WACC can be calculated with the "observed" capital structure, which is based on book values or the market values at a moment in time, or a firm's "target" capital structure, which is the capital structure the firm wishes to obtain.[61] The Commission's rules

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[55] 47 C.F.R. §§ 65.302-65.304.

[56] 47 C.F.R. § 65.301.

[57] *USF/ICC Transformation Order* at 18052, para. 1049.

[58] *Id*.

[59] *Id.*

[60] *See*, *e.g*., NECA et al. Comments at App. C, Statement of Prof. Randall S. Billingsley.

[61] To maximize its value, a firm will seek to minimize its cost of capital by targeting its optimal mix of debt and equity. This is not, however, a reference to a hypothetical capital structure, such as one that regulators sometimes use to develop WACC estimates. For example, an all-equity firm could lower its WACC by adding relatively low-risk, tax-deductible, low-cost debt to its capital structure. But it could only lower the WACC up to a point, after which the benefits of the additional debt would be more than offset by higher debt and equity costs, as the additional debt significantly increases the probability of financial distress, including default and bankruptcy, substantially increases agency costs and intangible costs, such as those of losing the flexibility of financing future project with debt. *See* Roger A. Morin, *Regulatory Finance: Utilities' Cost of Capital*, 413-429 (Public Utilities Reports 1994) (*Morin Regulatory Finance*). A firm's target capital structure can be difficult for firm outsiders to assess; there is "no universal theory of the debt-equity choice," Stewart C. Myers, Capital Structure, J. Econ. Persp. 81-102 (Spring 2001) (*Myers Capital Structure*).

specify that capital structure is to be calculated based upon book values.[62] A discussion of the issues associated with target capital structure and with using book values and market values in calculating the capital structure is included in Appendix C. For the reasons given below, we recommend that the Commission use market values rather than book values when calculating capital structure, as we find market values to be a better indication of the firms target capital structures.

a. Book Value Capital Structure Results

38. The Commission's rules currently require that the capital structure be calculated using the observed book values of debt, preferred stock, and equity. "Book value" means the value on the company's balance sheet. Under the Commission's rules, capital structure is calculated as follows:[63]

Book Value of a Particular Component / (Book Value of Debt +Book Value of Preferred Stock + Book Value of Equity)

39. Appendix D1 shows the share of debt based on book values, in the capital structure for each carrier in the Staff Proposed Proxy from 2008 to 2012. The average share of debt for the Staff Proposed Proxy was 73 percent in 2012, based on book values. However, we question whether this average share of debt is representative. For instance, six of the 16 carriers in the sample have remarkably high debt shares both absolutely and relative to their debt shares based on market values.[64]

Company	Book Value Share of Debt (as a percentage of total company book value)
ACS	107%
CBT	135%
Consolidated	90%
FairPoint	150%
Lumos	82%
Windstream	88%

40. By comparison, AT&T's debt percentage is 42 percent when based on book values, and Verizon's debt percentage is 36 percent.

41. Additionally, ACS's, CBT's, and FairPoint's book value capital structures are not representative of their target capital structures,[65] *i.e.*, the capital structures that the companies

[62] 47 C.F.R. § 65.304.

[63] 47 C.F.R. § 65.304.

[64] Sometimes accounting losses, arising, for example, from large amounts of interest payments, depreciation, or amortization, result in debt levels that exceed the book value of the firm's assets. In these cases, a firm might have a book capital structure that has more than 100% debt and a negative equity percentage equaling the absolute value of the amount by which the debt percentage exceeds 100%.

[65] Excluding the six carriers that have remarkably high debt shares, *i.e.*, debt shares 82 percent or greater, in 2012, the average book value capital structure is 51 percent debt, and the average market value capital structure is 44 percent debt.

would strive to obtain over time. A book value of debt that exceeds 100 percent of debt plus equity is nonsensical. It is also at least unlikely that even a 100% debt capital structure is optimal.[66] As noted, a firm's capital structure is optimized by choosing the levels of debt and equity which minimize its over-all cost of capital necessary for its operations.[67] It is a widely held belief that there are tradeoffs between the benefits of debt financing versus those of equity financing,[68] which means that optimal capital structure will involve a mix of debt and equity. ACS, CBT, and FairPoint have non-investment-grade bond ratings. Consolidated, Windstream, and Lumos have book values unlikely to represent their target capital structures, as the high degree of leverage of Consolidated and Windstream is likely a reason that they also have lower debt ratings. (Lumos has no debt rating.) This suggests that even a 100% debt capital structure would not minimize these companies' WACC, as the penalty for a lower debt rating is high interest rates.

b. Comparison of Book Value and Market Value Capital Structure Results

42. Because several carriers have book value capital structures in excess of 100 percent debt, we are concerned that the book value calculations required by Section 65.304 of the Commission's rules[69] may not provide reasonable data as required by Section 65.300.[70] As discussed above, market value calculations reported on Appendix D2 are an alternative to book value calculations; here we compare the two calculations. Overall, as explained in more detail below, we believe that capital structures based on market values almost certainly provide a more accurate approximation of the carriers' target capital structures.[71] We note that NECA and Ad Hoc arrive at results that are closer to our chosen market capital structure of 54 percent (see both Appendix D2 and Appendix I1) than to our book capital structure of 73 percent. In particular, Ad

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[66] Indeed, if a firm's stock trades at a positive price, there is a strong presumption that the firm has a positive equity value and therefore its debt is less than 100% of debt plus equity.

[67] *See*, *e.g*., Giacchino and Lesser, *Principles of Utility Corporate Finance* at 80-82 (Public Utilities Reports 2011) (*Giacchino and Lesser*) noting the optimal debt/equity ratio for a regulated firm may be different from the debt/equity ratio for a non-regulated firm.

[68] While the exact nature of this tradeoff is an open question, theories addressing it include the "tradeoff," "pecking order," and "cash flow" theories. *Myers Capital Structure* at 81-102. They depart from the classic framework laid out by Modigliani and Miller, Franco Modigliani and Merton H. Miller, The Cost of Capital, Corporation Finance and the Theory of Investment, 48 A. Econ. Rev. 261-297 (June 1958), in which capital structure has no effect on the value of a firm.

[69] 47 C.F.R. § 65.304.

[70] 47 C.F.R. § 65.300. The target capital structure of a firm is difficult, if not impossible, to ascertain precisely. However, if a given firm has a poor bond rating and a capital structure that differs significantly from the capital structures of firms with solid bond ratings in the same industry—whether these differences show up in comparisons of book value or market value capital structures—we reasonably can conclude that the given firm's observed capital structure could not be its target capital structure. Where the capital structure of a firm is so exaggerated and so obviously out of line with such an industry benchmark, as with some of the firms in our sample, its use might render an estimate of the WACC for that firm meaningless, and a prescription based upon that estimate unreasonable.

[71] "Your first choice should be to use the firm's target capital structure for the weights. However, if you are an outside analyst and do not know the target weights, it would probably be best to estimate weights based on the current market values of the capital components." Eugene F. Brigham, Phillip R. Daves, Intermediate Financial Management, 392 SW. C. (Feb. 23, 2012).

Hoc arrives at a share of debt of 46 percent,[72] and NECA uses a share of debt of 21 percent.[73]

Company	Book Value of Debt (as a percentage of total company book value)	Market Value of Debt (as a percentage of total company book value)
ACS	107%	86%
CBT	135%	71%
Consolidated	90%	66%
FairPoint	150%	82%
Lumos	82%	59%
Windstream	88%	62%

43. By comparison, AT&T's debt percentage based on book value is 42 percent, as compared to 26 percent based on market value; and Verizon's debt percentage is 36 percent based on book values, as compared to 28 percent based on market values. The share of debt that these two carriers have in their capital structures is much lower than the share of debt in the capital structures of the six carriers mentioned above, and both AT&T"s and Verizon's book value and market value debt shares are relatively close, in contrast to the book value and market value debt shares of the six carriers. In addition, AT&T and Verizon have highly, but not the highest, rated investment grade debt,[74] which would suggest that the capital structure that we observe for these carriers likely better reflects their target capital structure than the same measure for the other six carriers.[75]

[72] Ad Hoc Comments at 18.

[73] NECA et al. Comments, App. C, Statement of Prof. Randall S. Billingsley at 8.

[74] Investment grade bonds have a relatively low risk of default and therefore a relatively low yield. These bonds are rated "Baa3" or higher by Moody's and "BBB-" or higher by Standard & Poor's and Fitch. Non-investment grade bonds have a relatively high risk of default. These bonds are rated "Ba1" or lower by Moody's and "BB+" or lower by Standard & Poor's and Fitch. *See* http://www.fitchratings.com/web_content/ratings/fitch_ratings_definitions_and_scales.pdf , http://img.en25.com/Web/StandardandPoors/Ratings_Definitions.pdf; http://www.moodys.com/ratings-process/Ratings-Definitions/002002 (last visited Apr. 16, 2013).

[75] Calculating these carriers' average capital structures over the five-year period from 2008 to 2012 might make their target capital structure more evident. A large amount of debt financing or equity financing in a single year, or sharply negative earnings or a random economic occurrence during the last two or three years might produce a significant deviation from the target capital structure. Five years is likely to be long enough that the historical effects of any such individual developments would be lessened by the averaging; at the same time, the period likely is short and recent enough to be representative of the carriers' current financial situation. The exception to the usefulness of looking at the average would be FairPoint, which entered and exited bankruptcy during the five-year period. Accordingly, we do not give any weight to what the average for FairPoint might tell us. Based on book values, the average of the five-year average share of debt for the sample of carriers, excluding FairPoint, and also Hawaiian Telcom and Lumos, as capital structure data are not available for either of the latter two carriers for every year of the five-year period, is 63%, which is significantly greater than 46%, the average of the five-year average share for these carriers.

44. We notice similar trends across the different proxy groups. In book value calculations for 2012, the RHCs had an average of 43 percent debt, the Mid-Size Carriers had an average of 103 percent debt; and the Publicly-Traded RLECs averaged 60 percent. By contrast, in market value calculations the RHCs averaged 33 percent debt, the Mid-Size Carriers averaged 72 percent debt, and the Rate-of-Return Carriers averaged 47 percent debt.[76] We therefore recommend that, despite precedent to the contrary (when the proxy group was the RHCs),[77] market value capital structures should be used to calculate the WACC.[78]

2. Cost of Debt

45. The Commission's rules provide that the cost of debt[79] is calculated as follows:

Excluding the six carriers that have remarkably high debt shares, the average of the five-year average book value capital structures is 44%, which is relatively close to 35%, the average of the five-year average market value capital structures.

Based on five-year average book values, the four carriers (listed in the table above, excluding FairPoint and Lumos) have remarkably high debt shares both absolutely and relative to their debt shares based on market values. Based on average book values, ACS's debt is 102% of its capital structure, as compared to 67%, based on market values; CBT's is 144%, as compared to 78%; Consolidated's is 92%, as compared to 66%; and Windstream's is 91%, as compared to 57%. Again, based on the averages, these carrier's book value capital structures are not likely to be representative of their target capital structures, as these structures exceed 91% or greater.

[76] *See* http://www.sec.gov/edgar.shtml (last visited Apr. 16, 2013) for individual firms' 10-K reports.

[77] *See 1990 Represcription Order*, 5 FCC Rcd at 7510, para. 28.

[78] Having concluded that we should use market values to determine the capital structure, the question remains whether to use data for the most recent year, 2012, or whether to use market values averaged over a longer period of time, such as the five-year period discussed above. Based on market values, the average share of debt in 2012 for the 13 carriers, excluding FairPoint, Hawaiian Telcom, and Lumos, is 51%, while the average of the five-year average share for these carriers is 46%. We conclude that the analysis would not be significantly affected by the choice between these two values. We will use 2012 market values, however, because these values reflect investors' expectations, and the same expectations are reflected in our cost of equity estimates. In theory, if we were to use the five-year average market values, we would have to adjust the cost of equity downward slightly to reflect the slightly lower risk associated with the use of these market values in capital structures as opposed to the risk associated with the use of the 2012 market values. We note that there are financial formulas that can be used to make such an adjustment where one is warranted. Roger A. Morin, New Regulatory Finance (Public Utilities Reports 2006) at 220-23, 243, and 479-482 (*Morin New Regulatory Finance*).

While the capital structure adjustment to reflect relatively less debt and more equity by itself would increase the WACC, the downward adjustment to the cost of equity would reduce the WACC, partially offsetting the effect of the capital structure adjustment. The adjustment to the capital structure is relatively easy to make, but the adjustment to the cost of equity is relatively complex. As the two adjustments are offsetting, the net effect of choosing 2012, rather than five-year average, market value capital structures could be small.

[79] After-tax cost of debt is typically used in industry calculations of the WACC. In these cases, the WACC is used as the discount rate in calculating the net present value of future cash flows. The stream of future cash flows to be discounted assumes that the firm will finance these flows with equity; the recognition of debt financing is through the use of the after-tax cost of debt when developing the WACC. However, the rate-of-return carriers regulated by the FCC develop a revenue requirement used to set prices in part by: 1) calculating the total allowable return on rate base; (2) calculating the taxable fraction of the total return that is available to shareholders after paying the tax-deductible interest on the debt; and applying the federal and state corporate income tax rates to the equity holders' fraction of the total return to calculate the carrier's

Embedded Cost of Debt=Total Annual Interest Expense/Average Outstanding Debt[80]

where "Total Annual Interest Expense" = "the total interest expense for the most recent two years for all local exchange carriers with annual revenues equal to or above the indexed revenue threshold as defined in § 32.9000" and "Average Outstanding Debt" = the average of the total debt for the most recent two years for all local exchange carriers with annual revenues equal to or above the indexed revenue threshold as defined in § 32.9000.[81] These data are readily available from Staff Proposed Proxy carriers' Form 10-Ks.

46. As a threshold matter, we believe that this equation is incorrect: it uses two years' interest expense divided by an average of two years' total debt, resulting in an overstatement of the cost of debt. This would approximately double the true embedded cost of debt. We therefore recommend that the Commission instead use the following equation for calculating debt based on the most recent year's interest expense:

Embedded Cost of Debt=Previous Year's Interest Expense/Average of Debt Outstanding at the

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income taxes. The total return and income taxes are part of the carrier's revenue requirement. Under this approach, the pre-tax cost of debt is used to calculate the WACC and that calculation enables the carrier fully to compensate its debt and equity holders and to pay the taxes on the return available to equity holders. Accordingly, the WACC estimates we develop in this Report reflect the pre-tax cost of debt. When the WACC is used outside of the context of calculating a revenue requirement in this manner the pre-tax cost of debt might have to be adjusted downward to account for the tax benefits of debt financing, the so-called "tax shield."

[80] 47 C.F.R. § 65.302. The Commission's rules require that embedded cost of debt be used to calculate the WACC, which is logically consistent with its rules requiring the use of an original cost (essentially a book value) rate base. There is an argument for use of current debt yields in place of the embedded cost of debt, as current yields better reflect the opportunity cost of debt capital invested in the firm. However, current debt yields multiplied by the debt holders' share of a book value rate base does not provide these investors with their opportunity cost. If the rate base instead were based on market value, current debt yields should be used in place of the embedded cost of debt, to better reflect opportunity cost. *See Morin New Regulatory Finance* at 26-27.

To illustrate why the use of current debt yields in calculating the WACC would not provide debt holders with their opportunity cost, assume that the embedded cost of debt is 5%, the current yield on equivalent debt is 2.5%, the cost of equity is 10%, and that the rate base is $100 and is financed with $50 of debt and $50 in equity, each expressed in book value terms. The debt holder receives the embedded cost of debt, 5%, times the debt share of the book value rate base, $50, or a return of $2.50, which matches the contractual obligation of the firm to its debt holders. The debt holder receives a return of $2.50, or five percent, on the book value share of the rate base, $50, regardless of the current yield on equivalent debt, 2.5% in our example. Moreover, the WACC would be 6.25% if it were based on the current debt yield rather than the embedded cost of debt (2.5% current cost of debt times the debt holders' share of the rate base, 50%, plus the cost of equity, 10%, times the equity holders' share of the rate base, 50%). The 6.25% total rate of return applied to the rate base of $100 yields a total return of $6.25. Given that the fixed obligation on the debt is $2.50, the return that remains to compensate equity holders after payment to the debt holders is $3.75, which equates to a rate of return of only 7.5% on the book value of the equity holders' invested capital of $50 ($3.75 divided by $50), much less than the rate of return equity holders require, 10% in our example.

If instead the embedded cost of debt is less than the current yield on equivalent debt, and the WACC is based on that current yield, debt holders again receive a return equal to the fixed amount of the contractual obligation on the outstanding debt, while equity holders this time receive a return that is greater than they require.

[81] 47 C.F.R. § 65.302.

Beginning and at the End of the Previous Year

47. Alternatively, an estimate of the current cost of debt for a given company could be based on the current yield on bonds that have the same rating as and a maturity that is similar to the company's bonds. Such an estimate is likely to be imprecise in at least some cases, as it would be difficult using such a simple approach to account for the characteristics of debt that significantly affect the yields they pay. Such debt characteristics include the maturity, *e.g.*, 5, 10, or 20 years, fixed versus variable interest rates, seniority, and whether the debt is callable or convertible. A more precise calculation might also require knowledge of how much of each type of debt instrument each company uses. However, as interest rates have been declining for a number of years, and companies that are in good financial health typically are able to refinance, on average the embedded cost of debt and the current cost of debt for these companies should not differ significantly, provided there have not been substantial changes in the cost of debt since the last filing of the companies' 10-Ks. Thus, we recommend using the method specified in the Commission's rules, as corrected, to estimate the cost of debt, at least at this time. We note, however, that for companies not in good financial health, the embedded cost of debt may to some extent reflect low rates to which the companies no longer have access. Whether the WACC is to be based on the Commission's cost of debt formula or a current cost of debt calculation, the Commission should consider calculating the WACC based upon firms that have either investment-grade bond ratings, or times-interest-earned ratios roughly equal to the ratios of firms that have such a rating, given that the WACC estimates of such firms, firms that are not in financial distress, generally would be more reliable.

48. The embedded cost of debt calculated as described above, based upon data from the Staff Proxy Firms' SEC filings, is reported in Appendix E. The average embedded cost of debt for all 16 carriers is 6.19 percent. For the RHCs it is 5.17 percent, the lower rate likely reflecting, among other things, their financial stability in the eyes of lenders. The Mid-Size Proxies pay an average interest rate of 7.65 percent. The Publicly-Traded RLEC Proxies pay an average interest rate of 5.14 percent on their debt.

49. We note that it may be necessary to reduce, or cap, the embedded cost of debt due to the availability of government subsidized loans to most, if not all, rate-of-return carriers. When the interest rates carriers face are not market-based but rather subsidized by the government or by non-profit entities (*e.g.*, the Rural Utilities Service (RUS), CoBank, or the Rural Telephone Finance Cooperative (RTFC)), these subsidized rates must be taken into account in calculating carriers' cost of debt. This is because RLECs may have access to loans at below-market interest rates; for example, RUS currently offers loans with interest varying from current Treasury rates to no more than five percent.[82] If such extensive funding is readily available to most RLECs from these sources, then even a generous estimate of the cost of debt should be no more than the current highest rate charged by RUS, CoBank, or RTFC. It is unclear, however, whether it would be feasible and/or unduly burdensome for a carrier to finance all of its assets with loans from these lenders, and to refinance older debt at current rates.

50. We point out that the staff estimate of the cost of debt, 6.19 percent, is higher than the estimates provided by NECA (4.42 percent) and Ad Hoc (3.63 percent). Of course, the NECA and Ad Hoc estimates were for very different groups of proxy firms. NECA uses the expected yield on corporate bonds rated A- by Standard and Poor's.[83] This is the average bond

[82] *See* http://www.rurdev.usda.gov/supportdocuments/telecomloansflyerfactsheet.pdf (last visited Apr. 16, 2013).

[83] NECA et al. Comments, App. C, Statement of Prof. Randall S. Billingsley at 8.

rating of the firms in their portfolio. Ad Hoc relies on the information made publicly available by Prof. Damodaran to obtain its cost of debt estimates. Damodaran uses sector-by-sector debt estimates,[84] and Ad Hoc uses his reported after-tax cost of debt to calculate the WACC. As explained in this Report, the pertinent cost of debt in the context of how the FCC calculates revenue requirements is the pre-tax cost of debt. Using the pre-tax cost of debt provided by Ad Hoc,[85] the Ad Hoc cost of debt is 4.79 percent.[86]

3. Cost of Equity

51. Equity is the value of a firm's assets, such as equipment, patents, and goodwill, after the firm's financial liabilities have been deducted. The Commission's rules do not specify how the cost of equity is to be calculated,[87] and there are several asset pricing methods that might be used to estimate the cost of equity. For its preliminary analysis in the *USF/ICC Transformation Order*, the Commission used CAPM, the most widely used method in commerce.[88] The Commission sought comment on using CAPM and on using the Discounted Cash Flow Model (DCF), on which it relied to calculate the cost of capital in the *1990 Represcription Order*.[89] Both models calculate the cost of equity based upon an analysis of firms' common stock. Parties offered little discussion regarding CAPM or the difference between CAPM and DCF. NECA provided analysis based upon both DCF and CAPM,[90] and Ad Hoc's comments are based on a study using CAPM.[91] We discuss below both of these popular models for measuring the cost of equity. In this Report we use both models to determine the cost of equity, and to create a zone of reasonableness, because both models have different limitations.[92]

52. *Background*. Equity derives its market value from the expected present discounted value of the profits it can generate. Because the market for the products and services sold by a firm and capital markets are not static, the expected flow of profits changes with new information, and the value of equity is always in flux. In publicly traded companies, ownership of the corporation is shared among stockholders according to their stockholdings. In the event of liquidation, stockholders are entitled to a share of the proceeds that remain from selling off the assets of the company and repaying the firm's creditors. If portions of the company's equity are traded on a regular basis on the stock market, there is a readily observable price for the entirety of the firm's equity: the price of a share multiplied by the number of shares outstanding.

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[84] Ad Hoc comments at 18.

[85] *Id*.

[86] *Id*.

[87] 47 C.F.R. § 65.301. ("The cost of equity shall be determined in represcription proceedings after giving full consideration to the evidence in the record, including such evidence as the Commission may officially notice.").

[88] John R. Graham and Campbell R. Harvey, The Theory and Practice of Corporate Finance: Evidence from the Field, 60 J. FIN. ECON. at 187-243 (2001) (*Graham and Harvey*).

[89] *USF/ICC Transformation Order*, 26 FCC Rcd at 18054, para. 1055 (*citing 1990 Represcription Order*, 5 FCC Rcd at 7527-29, paras. 174-189).

[90] NECA et al. Comments at 56-57 and App. C, Statement of Prof. Randall S. Billingsley at 6-7, 15-26.

[91] Ad Hoc Comments at 5-7.

[92] *See*, *e.g*., Phillips, Charles F. Jr., The Regulation of Public Utilities, Public Utilities Reports, Inc., (1993) at 394-97.

53. In privately held firms, including the overwhelming majority of RLECs, however, equity cannot be readily measured, even though an equity figure is reported in their balance sheets. Unlike in publicly traded firms, in private firms claims to the residual value of the assets of the company after repaying its creditors are not traded in a market. Therefore, there is no market price reflecting the consensus of investors as to the value of a private firm's equity; that value can only be inferred by looking at comparable publicly traded companies.

54. The cost of equity of a firm is the return that investors require given the perceived risk of the firm's expected stream of future profits. In the case of publicly traded companies, one can observe the stock market price of equity, and any dividends it pays, and can estimate the after-the-fact cost of equity based upon these data. But as explained above, in the case of privately held companies, the price of equity is not observed. Accordingly, the established practice in finance to estimate the cost of equity for private firms is to find publicly traded firms that have similar risk as the private firms. The cost of equity is estimated for these publicly traded companies, and that estimate is attributed to the private ones.[93]

55. The effort to identify publicly traded firms with risks similar to those of privately held firms has two obvious limitations. First, there may be important, unobserved risk factors that drive a firm to become publicly traded in the first place. This makes it likely that even if the company appears to be identical in risk to the private firm whose cost of equity is being estimated, important though unobserved differences that could affect the cost of equity remain. Second, it is not likely that a publicly traded firm will be identical to a privately traded one even in the observable risk characteristics, making the choice of representative firms an ultimately imperfect and subjective method.

56. As the cost of equity reflects the uncertain expectations of investors, there is potential for introducing significant errors into the estimates, and no single model can be counted on exclusively to provide a precise estimate of the cost of equity. Each methodology has conceptual shortcomings, requires the use of informed judgment, and involves measurement error. We discuss these models, and their strengths and weaknesses, below.[94]

[93] The Commission also sought comment on the importance of flotation costs, small costs associated with the issuance of stocks or bonds, for our cost of equity calculations, *USF/ICC Transformation Order*, 26 FCC Rcd at 18054, para. 1055, but received little comment. *See, e.g*., NECA et al. Comments, App. C, Statement of Randall S. Billingsley at 7. Of all carriers with at least one rate-of-return study area, we have identified fewer than twenty that are publicly traded. Because flotation costs tend to be proportionately small, and are primarily relevant for public companies issuing new securities, we believe that they are not significant for the vast majority of RLECs (which are not publicly traded) and have not been incorporated into calculations meant to be representative of RLECs in general.

[94] NECA has provided an estimate of the cost of equity based upon another model, a Free Cash Flow (FCF) model analysis in which current free cash flow is divided by the value of the firm. *See* NECA et al. Comments at 57-60. Based upon its analysis, NECA concludes that the average value for cost of capital is between 11.75% and 23.49%. *Id.* at 59-60. NECA does not provide sufficient information regarding its analysis to allow meaningful assessment of its calculations. NECA's analysis is based upon unsubstantiated assumptions about the value of RLEC lines instead of demonstrated market values (*see* NECA et al. Comments at 58 ("RLEC lines may be more valuable than price cap companies' rural lines for at least two reasons. First, RLEC lines are in better shape because these companies have heretofore focused their full attention, investment and maintenance upon their rural exchanges,"); arbitrarily reduces price-per-line data (*see* NECA et al. Comments at 59 ("Since 2008, sale prices for RLECs and price cap exchanges suggest a range between $3200 and $1500 per line. [footnote omitted]. Sales prices in prior years were considerably higher, and the likelihood of continued decline in P is not unreasonable. Therefore, it appears reasonable to use a $2500 to $1200 price-per-line range to produce cost of capital estimates,");

57. *Limitations of Models Used to Estimate the Cost of Equity*. Outside of the regulatory context, CAPM is the most widely used model for determining the cost of equity.[95] DCF, however, is the most widely used in regulation, and was used in the Commission's 1990 represcription.[96] At that time the Commission chose DCF over CAPM for determining the cost of equity, but stated that "[w]e continue to believe that the CAPM approach has the potential to provide estimates of the cost of equity capital with the same reliability as the DCF approach."[97] We use both methods in this Staff Report to estimate the cost of equity

58. Unlike DCF, CAPM does not require analysts' predictions regarding changes in dividends, and so eliminates that particular element of speculation from the equation. By the same token, however, the inputs required to implement the CAPM, in particular, the expected beta[98] and the expected risk premium, are prone to measurement error because these estimates involve speculation as to investor expectations.[99] The true value of each of the inputs required to implement the CAPM is unknown, and each is difficult to measure precisely. In formulation, the constant-growth DCF, the variant of the general DCF model used in the past by the Commission and in this Report, also assumes that a firm's dividends grow at the same rate in perpetuity, which is unlikely. However, it can be argued that in fact it allows for fluctuations around a long–run average growth rate, and error as to expected dividend payments in the more distant future have a limited impact on the accuracy of the approach, for example, because investors reasonably could be expected to largely if not completely discount the value of the dividends they might expect to receive beyond the foreseeable future.[100]

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relies on a non-random sample of cost companies that chose to respond to a NECA data request (NECA et al. Comments at 59); and relies on unweighted median data without providing mean data. *Id*. For these reasons, we find NECA's FCF analysis unpersuasive with regard to the issues discussed in this Report.

[95] *See*, *e.g*., William F. Sharpe, Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk, J. FIN. at 425-442 (1964). Methods such as the Gordon Growth Model or Dividend Discount Model (DDM) popularized by Gordon and Shapiro in 1959. (*See* Myron J. Gordon & Eli Shapiro, Capital Equipment Analysis: The Required Rate of Profit, MGMT. SCI. at 102-110 (1956)) were widely used in practice prior to this time. ("In the 1940s and 1950s, prior to the development of the Capital Asset Pricing Model… the cost of equity capital was backed out from the cash flows that investors could expect to receive on their shares in relation to the current price of the shares. A popular method of estimating the cost of equity this way was the Gordon and Shapiro (1956) model, in which a company's dividends are assumed to grow in perpetuity at a constant rate g." André F. Perold, The Capital Asset Pricing Model, J. ECON. PERSP. at 3-24 (2004).

[96] *1990 Represcription Order,* 5 FCC Rcd at 7528, para. 178.

[97] *Id.* at 7523, para. 139. The Commission found that the CAPM estimates submitted in that proceeding used unrealistically high betas and risk premiums. *Id*.

[98] As discussed in greater detail below, beta is a measurement of the volatility of a company's stock relative to the volatility of the market.

[99] Eugene F. Fama and Kenneth R. French, The Capital Asset Pricing Model: Theory and Evidence, J. ECON. PERSP. at 44 n.7 (2004) (*Fama and French*).

[100] To understand why, consider that the general DCF model assumes that the stock price is equal to the present value of all future dividends, and that the discount rate exceeds the dividend growth rate. As the discount rate is greater than the growth rate, dividends after some period of time, albeit possibly a long period, become insignificant. Thus, the constant-growth DCF model is valid as long as a firm is able to grow at constant growth rate for a sufficiently long period, not forever. For example, assuming a discount rate of 10% per year, a dividend growth rate of five percent per year, and a current dividend of $1.00 per

59. While in a constant-growth DCF analysis, companies with high dividend growth rates (relative to the expected long-run growth rate of the economy as a whole) may be judged to have high costs of equity, the incumbent LECs in our sample are forecast to have modest growth rates. Accordingly, the DCF model is suitable for estimating their cost of equity. Furthermore, to the extent that any of the firms in our sample have growth estimates that might be judged high, we note that firms have in the past (and can in the future) grow at above average rates for long periods of time, periods long enough that investors might place little or no weight on the returns that might be expected to be available at the time that growth starts to slow significantly. To estimate future dividends, it is standard practice to rely on the consensus estimates of industry analysts.[101] We consider this reasonable, since investors, particularly institutional investors that routinely buy and sell significant quantities of stocks, rely on these analysts' estimates when making such decisions.[102] The analysts' estimates are expensive to produce, and the services that collect the available range of estimates have substantial prices, indicating that the purchasing investors significantly value such services. Moreover, even if analysts' growth estimates turn out to be too high or too low in hindsight, arguably such error is largely irrelevant. As long as investors base their expectations on the analysts' estimates, these are the estimates, regardless of whether they are too optimistic or too pessimistic, that are reflected in the market price of equity.[103]

60. The DCF model cannot be used to estimate the cost of equity for companies that do not pay dividends on a regular basis, however, such as Cincinnati Bell. For these companies, we cannot calculate the cost of equity using the DCF model and thus will lack a second estimate to corroborate the company-specific results of the CAPM.

61. As for the CAPM, there is compelling evidence that it does not accurately predict equity returns, which is the ultimate test for a model used specifically for the purpose of estimating the cost of equity, as we do here.[104] Moreover, a substantial fraction of investors are not significantly diversified, and face company specific-risk, contrary to a key assumption of the CAPM.[105] Also, beta, the lone risk factor in the CAPM, arguably needs to be supplemented with other risk variables, such as dividend yield, firm size, and skewness, to explain security returns.[106] And there are real-world constraints on investor borrowing, such as on short selling, contrary to

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year that is paid annually, the present value of the dividend payment in year 50 is approximately 10 cents, and in year 115 this value is approximately zero.

[101] *See*, *e.g.*, *1990 Represcription Order*, 5 FCC Rcd at 7515, para. 67; *Morin New Regulatory Finance* at 297-303; *Giacchino and Lesser* at 253.

[102] *1990 Represcription Order* at 7529, para. 188. The Commission previously found the use of consensus forecasts of industry analysts to be a reasonable approach to estimating dividend growth rates, and relied on them in the *1990 Represcription Order.*

[103] Some argue that earnings growth rate estimates of analysts that work for investment banking and stock brokerage firms tend to be overstated, and use of these estimates in the DCF model tends to bias cost of equity estimates upward. *See* Peter D. Easton and Gregory A. Sommers, Effect of Analysts' Optimism on Estimates of the Expected Rate of Return Implied by Earnings Forecasts, J. ACCT. RES., 983-1015 (2007); *Morin New Regulatory Finance* at 299-302.

[104] *See*, generally, *Fama and French*; *Morin Regulatory Finance* at 338; *Morin New Regulatory Finance* at 175–89.

[105] *Morin New Regulatory Finance* at 175.

[106] *Morin Regulatory Finance* at 338; *Morin New Regulatory Finance* at 175-89.

one of the CAPM assumptions.[107]

a. Capital Asset Pricing Model (CAPM)

62. The Capital Asset Pricing Model is widely used by financial practitioners in industry to calculate the cost of equity of publicly traded firms.[108] For example, a survey of 392 Chief Executive Officers in the United States found that "CAPM is by far the most popular method of estimating the cost of equity capital: 73.5 percent of respondents always or almost always use the CAPM."[109] It is the benchmark for academic research in finance.[110] Using the CAPM estimates of the cost of equity for a representative firm to calculate the WACC for regulated industries is also standard procedure.[111] CAPM starts out with the assumption that investors face a tradeoff between assets with high returns and high volatility and assets with low returns and low volatility, with volatility understood as the standard deviation of returns. Investors then create a diversified portfolio of assets that give them the highest rate of return possible for their chosen level of risk. The model then further assumes that all investors have the same expectations about the behavior of the market, an assumption that is sufficient to derive the market equilibrium rate of return for any given asset.

63. The required rate of return in CAPM is:

Asset rate of return = Risk free interest rate + Asset Beta*Market Premium

The risk free interest rate is the return that investors can get on their money having the certainty that there will be no default. U.S. government securities are considered to fulfill this role, as there are few alternative assets, if any, which have a higher probability of full repayment than U.S. government debt.[112]

64. Long-term Treasury yields should be used in the CAPM as the risk-free-rate because common stock is a long-term investment.[113] As a long-term investment, the expected rate of return on common stock depends on long-term cash flows. Moreover, RLEC assets have

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[107] *Morin New Regulatory Finance* at 175, 177.

[108] [108] The efficient market hypothesis is the foundation upon which the CAPM (and the DCF model) is based, and there are no real alternatives to estimating the cost of equity that are not based on it. *See Giacchino and Lesser* at 250-251. The hypothesis has sharp critics. *Id.; see also* Robert J. Shiller, From Efficient Markets Theory to Behavioral Finance, J. ECON. PERSP. 83-104 (2003).

[109] *Graham and Harvey* at 187–243.

[110] *See*, *e.g.*, *Fama and French* at 25–46; *Giacchino and Lesser* at 185.

[111] "Regulators use the CAPM to establish a "fair" rate of return on invested capital for public utilities and other firms subject to price regulation. For example, a commission regulating an electric power company may have to establish a price that the company is allowed to charge its customers for electricity. The commission will do so by computing the cost of producing the electricity, including an allowance for the cost of capital…. In computing the cost of capital, a regulatory commission must compensate the providers of capital for the risk they bear by investing in the electric utility. Because the investors are able to diversify their investment portfolios, the only risk the regulators need to compensate them for is market risk, as measured by beta." Zvi Bodie and Robert C. Merton, *Finance* at 352 (Prentice Hall 2000)

[112] For example, *Forbes* reports the thoughts of former Federal Reserve Chairman Alan Greenspan on this issue: "The United States can pay any debt it has because we can always print money to do that. So there is zero probability of default." http://www.forbes.com/sites/johntharvey/2012/09/10/impossible-to-default/ (last visited Apr. 15, 2013).

[113] *See Morin New Regulatory Finance* at 151–152.

long useful lives that typically are financed with long-term securities.[114] Thus, the appropriate risk free rate is the one reflected in long-term (*e.g.*, 10- or 20-year) U.S. Treasury bonds rather than shorter-term U.S. Treasury notes or bills (*e.g.*, five-year notes, or 90 or 30 day bills).[115] Short-term investors would face reinvestment risk at the end of every 90 day period, for example, because they do not currently know what the rates will be in 90 days, 180, 270, and so on, while the value of the underlying asset depends on the present value of its long-term future cash flows, regardless of investors' investment horizons. Whether a 10-, 20-, or 30-year Treasury bond rate should be used is an open question. In our detailed analysis below, we take the interest rate on the 10-year Treasury note as the risk free rate because the standard deviation of the mean historical equity premium measured relative to returns on 10-year Treasury securities is readily available. This rate was 1.92 percent as of March 26, 2013.[116] Ad Hoc does not specify how it computed the risk free rate. NECA uses a 20-year Treasury note rate.[117] This choice does not have a major impact on NECA's cost of equity calculations, which are higher than ours primarily because of their choice of market premium.

65. Because we believe the interest rate that is the best predictor of the future interest rate on government securities is the current interest rate (which is consistent with the hypothesis that interest rates follow a random walk), we use the current rate as the risk-free interest rate. This rate incorporates an accurate reflection of investors' current expectations about the future rate. The staff recommends using this estimate of the risk free interest rate, which is forward-looking, because CAPM requires the use of forward-looking values.

(i) Primary Variables in CAPM

66. There are a number of variables needed to determine the cost of equity using CAPM: 1) the choice of which market index is to be used for this analysis; 2) the time period over which to measure risk; 3) the market premium, which is the market's return above the return that would be offered for a risk-free investment; 4) additional risk premiums; and 5) betas, which measure the volatility of a company's stock relative to the market. We discuss our analysis of these variables below.

67. *Choice of Market Index*. To calculate the cost of equity using CAPM, the returns on an individual company's equity are compared to the returns on equity generally. In theory, this comparison should be to a comprehensive market portfolio;[118] in practice, it is necessary to select a market index for this comparison. The choice of which market index is to be used has been debated.[119] The S&P 500 is considered a sufficient market index because it includes enough securities to be broadly representative of the entire market. It is widely used by regulators,[120] was

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[114] *Id.*; *Giacchino and Lesser* at 234–35.

[115] *See generally* Tom Copeland, Tim Koller, and Jack Murrin, *Valuation: Measuring and Managing the Value of Companies* at 217 (McKinsey & Company, Inc. (2000)) (*Copeland*).

[121] http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield (Last accessed May 2, 2013).

[117] NECA et al. Comments, App. C, Statement of Prof. Randall S. Billingsley at 23.

[118] *See generally*, *Fama and French*.

[119] *Giacchino and Lesser* at 225 (Noting that this point was made in "[s]tudies by Fama [showing] that when a portfolio has 50 or more assets, the influence of the covariance terms swamps the influence of the individual variance terms.").

[120] *Id.*

used by NECA in its comments, [121] and we use the S&P 500 in this Report. Ad Hoc's source does not specify the market index used in its WACC calculations.[122]

68. *Choice of Time Period*. There is general consensus that a long historical time period is most appropriate in producing risk premium estimates based on historical data.[123] Even unusual events can be repeated in the long run. For this reason, unusual market events should not be dropped from the sample simply on the basis that they were outliers, a point reinforced by the recent financial crisis. We use the time period 1928-2012. NECA does not use a historical market premium, and Ad Hoc does not specify how its market premium is calculated.[124]

69. *Market Premium*. The market premium is defined in the CAPM as the difference between the return one can expect to earn holding a market portfolio and the risk-free interest rate. Here we find calculating the historical market premium to be the best approach available to us, and for the data available to us, we find the reasonable range for market premium ranges from 1.22-10.54 percent.

70. A survey of 150 finance textbooks found that 129 textbooks consider the *expected* market premium to be the relevant variable for estimating the cost of equity, and 82 took the view that investors consider the average historical market premium to be the best forecast of the expected market premium.[125] It is common to rely on as long a time series as possible when calculating the average historical market premium.[126]

71. A commonly used source, Ibbotson,[127] estimates the expected market premium to be 6.7 percent based on the historical market premium over the twenty-year U.S. government bond rate.[128] The calculation is the arithmetic average difference between the S&P 500 company stock total annual returns and the government bond *incom*e returns (*i.e*., excluding capital gains on the bonds)[129] over the period 1926-2010.[130] Unfortunately, we did not have access to the

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[121] NECA et al. Comments at 5, App. C, Statement of Prof. Randall S. Billingsley at 22.

[122] See the definition of "Cost of Equity" at http://people.stern.nyu.edu/adamodar/New_Home_Page/datafile/variable.htm (Last accessed 05/01/2013)

[123] *Giacchino and Lesser* at 225.

[124] See the definition of "Cost of Equity" at http://people.stern.nyu.edu/adamodar/New_Home_Page/datafile/variable.htm (Last accessed 05/01/2013)

[125] Pablo Fernandez, *The Equity Premium in 150 Textbooks*, J. FIN. TRANSFORMATION, Capco Inst. at 14-18 (2009) (*Fernandez*), which reports that of 150 textbooks, "129 claim the REP [required (by investors) equity premium] = EEP [Expected equity premium]" and that "82 books use the HEP [Historical equity premium] as the best estimation of the EEP."

[126] *Morin New Regulatory Finance* at 157; *Giacchino and Lesser* at 235-236.

[127] Ibbotson SBBI 2011 Classic Yearbook; Market Results for Stocks, Bonds, Bills, and Inflation, 1926-2010 (Ibbotson Associates 2011) (*Ibbotson*). On common use of *Ibbotson*, *see Morin New Regulatory Finance* at 157-158.

[128] *Ibbotson* at 124, Table 10-1.

[129] The income portion of total bond return (*i.e*., the coupon rate), not the total return, is used on grounds that the income return better reflects the risk-free portion of the bond return, as realized capital gains or losses are largely unanticipated by investors. *See generally, Ibbotson; see also Giacchino and Lesser* at 234. *Ibbotson's* 20-year market premium from 1926 to 2010, based on total returns from holding government bonds, is 5.7 %, a full percentage point less than the rate determined by focusing on income

underlying data for the Ibbotson calculation to provide a confidence interval around the reported estimated means. We recommend that the Commission obtain these or similar data.

72. The average historical market premium above the 10-year risk free rate for the longest period readily available to us (1928-2012) was 5.88 percent and came from data supplied by Prof. Damodaran.[131] The calculation is the arithmetic average of the difference between the annual return on the S&P 500, and return on the 10-year U.S. government bond including capital returns. The interval defined by two standard deviations[132] around the 10-year government bond historical market premium was 1.22-10.54 percent. Statistically, we are approximately 95 percent confident that the true mean value of the market premium lies within these ranges.[133] However, there is substantial variation in observed market premiums over this period (for example, for the 10-year market premium, the lowest market premium in any year was -56.65 percent, and the highest 49.27 percent). Ideally, we would have considered the 10- and 20-year historical premium on government bonds, over both the total bond return and the bond income return.

73. Surveys are another source for expected market premiums. There are risks associated with using surveys.[134] We considered three surveys, but the range each survey reports mixes estimates made under differing assumptions, such as the purpose of the survey, the specified market portfolio, and the specific risk free rate. Consequently, they cannot be formally compared with each other or any other estimates, but perhaps provide rough sanity test ranges. The first survey, from 2009, reported an average from 150 finance textbooks of 6.5 percent from a range from three to ten percent.[135] The second, a survey of over 1500 finance and economics professors conducted during 2010 found that the average market premium estimated by the 462 U.S. based academics in the sample was 6.0 percent, with a range of two to twelve percent. The third, the January 2013 results of the quarterly poll of American CFOs regularly conducted by Duke University, found that the surveyed CFOs expect the market premium of the S&P 500 over the ten-year government bond to be, on average, 3.83 percent, with the surprising range of -32 to

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returns only. *Ibbotson* at 32, Table 2-1. *See also*, Roger G. Ibbotson, The Equity Risk Premium, RES. FOUND. CFA INST. at 19 (2011).

[130] The reliability of U.S. stock market data prior to 1926 is questionable. *Morin New Regulatory Finance* at 158-159.

[131] The standard deviation of the market premium was 2.33%. (Aswath Damodaran, Professor of Finance at the Stern School of Business at New York University, http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/histretSP.html) (last visited Apr. 15, 2013).

[132] Here we refer to the estimated standard deviation of the estimated mean market premium. In other words, we refer to the sample standard deviation of the observed distribution of market premiums, divided by the square root of the number of years (minus 1) for which we have data, *i.e.*, the square root of 84 – 1 = 83. Because the distribution of the estimated mean approaches a normal distribution as the sample size grows, for a sample of this size, we can expect that around 95% of the time the mean market premium will be within two standard deviations of the estimated mean of 5.88%.

[133] The range defined by two standard deviations of the estimated mean above and below the estimated mean is an approximate 95% confidence interval for the mean. This means that there is a 95% chance that the true mean is within this range. Setting the confidence coefficient at 95% is common. *See*, *e.g.*, Statistical Methods in Discrimination Litigation at 168 (Marcel Dekker 1986); Confidence Limits, HANDBOOK OF BIOLOGICAL STATISTICS, *available at* http://udel.edu/~mcdonald/statconf.html (last visited Apr. 16, 2013).

[134] *See, e.g., Morin New Regulatory Finance* at 161-62.

[135] *Fernandez* at 14-18.

98 percent.[136] The Ibbotson and Damodaran historical averages lie well within these ranges.

74. Another approach that makes use of expectations is to estimate the average DCF return to equity for the components of the S&P 500, and obtain the implied market premium by subtracting the risk-free rate. NECA applied this analysis and found an implied market premium of 11.2 percent, substantially higher than any other estimate we are aware of (excluding the obviously very high estimates of some CFOs).[137]

75. *The Effect of Size on Market Premium*. NECA asserts that "[e]xtensive research documents that small capitalization firms such as the average RLEC also require an additional risk premium of about 1.53 percent." However, recent research indicates that the size effect "seems to vary over time or even disappears,"[138] with smaller firms in the United States not performing significantly better than large ones from 1980 onward. Therefore, we do not recommend adding a risk premium based on size to the cost of equity.[139]

76. *Beta*. A company's beta is the coefficient on market returns resulting from a simple regression of the security's returns on market returns, *i.e.*, it is a measurement of the volatility of a company's stock compared to the volatility of the market. If a company has a beta of one, changes in the return on a company's stock are the same as those in the market generally. If a company's beta is zero, changes in its returns do not correlate with changes in the market generally. A beta greater than zero but less than one means a company's stock generally moves in the same direction as the market, but not as much as the market. A beta greater than one means a company's stock moves in the same direction as the market, but the changes are of greater magnitude. The returns on stocks with very low betas will fall less when the market goes down than returns on those stocks with high betas, allowing investors to be less susceptible to market

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[136] *Graham and Harvey*. The range of the survey can be found in "March 2013 United States Topline Tables." *cfosurvey.org*. Duke/CFO. Web. 10 Apr. 2013. http://cfosurvey.org/13q2/Q1-13-US-Topline-Updated.rtf, at 39 (last visited Apr. 16 2013). Since the poll was started in June of 2000, the quarterly average has never gone below 2.12% or above 4.78%.

[137] NECA presents an analysis by Prof. Billingsley that applies the DCF methodology to calculate the required return for the S&P 500. *See* NECA et al. Comments, App. C, Statement of Prof. Randall S. Billingsley at 7; Prof. Billingsley considers that, in a time of economic crisis, and "in the wake of the recent financial crisis in the U.S.," investors are pessimistic and demand higher returns than they historically have. *Id.* at 22. The DCF approach to estimating the market premium is not without its critics. *See Copeland* at 222 (Analysts "have shown limited skill in forecasting price changes in the S&P 500. In addition, the formula that provides the basis for this approach assumes perpetual growth at a constant rate. This is a particularly stringent assumption.").

[138] Crain, Michael A., *A Literature Review of the Size Effect* (October 29, 2011), *available at* SSRN: http://ssrn.com/abstract=1710076 (last visited Apr. 16, 2013) or http://dx.doi.org/10.2139/ssrn.1710076 (last visited Apr. 16, 2013).

[139] *But see Giacchino and Lesser* at 239 ("Empirical studies have typically found that small firms typically have higher returns over the long run than larger firms."). These authors report on the findings published in the Morningstar 2009 SBBI Valuation Yearbook as to the implied size premiums, measured by subtracting the estimated CAPM return above the risk-free rate from the actual return above the risk-free rate, for the period 1926 to 2008, for 10 different firm sizes, based on market capitalization. These premiums, which would be added to the cost of equity estimates obtained using the CAPM, ranged from 5.81 percent for the smallest group of firms (the smallest firm in this group had a market capitalization of $1.6 million), to 1.54 percent for the fifth largest group (the smallest firm in this group had a market capitalization of $1.85 billion), to minus .36 percent for the largest group (the smallest firm in this group had a market capitalization of $18.628 billion), the only group that had a negative size premium. It is unclear whether Ad Hoc adds a size effect, but their 5.5 percent market premium suggests that they do not.

risk. This feature makes them particularly attractive, and investors require lower returns from them. Conversely, assets with high betas will substantially increase their returns only when the market goes up. Because returns on these stocks tend to improve noticeably only when the market as a whole is improving, investors require high returns from assets with high betas. Betas for the RHCs, the Mid-Size Proxies, and the Publicly-Traded RLEC Proxies are included in Appendix F.[140] These betas are based upon a regression analysis of each company's returns on stock compared to the returns on the S&P 500 for the 5-year period ending September 18, 2012.[141] These estimates are forward-looking inasmuch as recent historical values predict future ones.

77. Some additional methodological choices must be made when obtaining betas. These include the periodicity of returns used in the regression, and whether to adjust the value of beta towards one.

78. *Periodicity of Data*. Data on stock returns are available on a daily basis, and the SNL Kagan financial service to which the Commission subscribes uses daily data for its beta regressions. However, weekly data and monthly data are used most frequently both in the financial academic literature and in practice.[142] Appendix F reports betas using daily, weekly, and monthly data. We note that Ad Hoc uses weekly data[143] and NECA uses betas provided by Value Line, but does not document the underlying methodology. As shown in Appendix F, however, the variations are inconsequential: our average beta is 0.89, whereas the average Value Line beta for the companies in our portfolio is 0.85.

79. Using higher frequency data, such as daily observations, creates certain problems, but using lower frequency data creates different problems. On one hand, the stocks of the smallest companies in our portfolio are not traded very frequently, which can lead to statistical bias in beta calculations based on higher frequency, such as daily, data. On the other hand, betas calculated with monthly data use fewer observations, and several of them lose statistical significance in our sample. The betas in this Report have been calculated using daily, weekly, and monthly data.

80. *Adjustment Towards One*. Betas provided by financial services other than SNL Kagan, such as Bloomberg and Value Line, frequently give a weight of 2/3 to the beta obtained from simple regression and then add 1/3 to the result.[144] This has the effect of making all betas closer to one. It is meant to account for the empirically observed tendency of betas to move over time towards the market beta of one.[145] Appendix F reports betas with and without this

[140] T-statistics and R-squared values associated with these betas are provided in Appendix G.

[141] Practitioners very often obtain betas from financial services providers. The staff did not have full access to any financial information service other than SNL Kagan that would provide methodological details about their beta calculations. Betas that are publicly available on the Internet rarely include a discussion of their methodology.

[142] *Giacchino and Lesser* at 225.

[143] See the definition of betas at http://people.stern.nyu.edu/adamodar/New_Home_Page/datafile/variable.htm (Last accessed 05/01/2013).

[144] *Id*.

[145] Marshall E. Blume, On the Assessment of Risk, J. FIN. at 1-10 (1971).

adjustment.[146]

81. Appendix F shows the betas of the 16 representative firms in our portfolio.[147] When betas are calculated using daily data on returns, the average beta is 0.81; when weekly data are used, 0.84; with monthly data, the average becomes 0.75. Adjusting weekly betas for the empirically observed tendency to revert towards the market beta of one, the average beta is 0.89. Compared to the market, these are relatively low values. It must be understood that they do not mean that the U.S. telecommunications utility sector has a low level of risk for investors. They do mean, however, that much of the risk borne by utility investors can be easily diversified away by investing elsewhere in the market. In turn, this implies that the required returns on equity for telecom should not exceed the overall market return on equity. This conclusion does not change if we focus our attention on the companies that are primarily under rate-of-return regulation. The average betas using the methods described above become 0.69 (daily), 0.77 (weekly), 0.61 (monthly), and 0.85 (weekly, adjusted toward one), implying even lower required returns on equity than the overall telecom utility portfolio. While the precision of beta estimates falls as the portfolio becomes smaller, there is no indication that the smaller RLECs require higher returns on equity than the rest of the telecom utility portfolio.

82. To ensure statistical significance, our preferred betas use weekly data. We adjusted for the tendency to revert toward the market mean of one over time. These betas are highly statistically significant,[148] and are close to those reported by Value Line as of March 27, 2013. Where our Publicly-Traded RLEC Proxies portfolio has an average beta of 0.85, Value Line has 0.88; with midsize carriers, the difference is between 0.99 and 0.93; for the RBOCs, it is 0.81 versus 0.70; and the averages for the entire portfolio are 0.89 and 0.85, respectively. These differences are small and changing the set of betas used does not have a significant effect on our WACC calculations.

(ii) CAPM Cost of Equity Results

83. We calculated the cost of equity using CAPM based upon various betas and the arithmetic mean of the market premium. The results are shown in Appendix H. With our preferred weekly data adjusted betas, the average cost of equity for the 16 company portfolio is 7.18 percent; for the RBOCs 6.70 percent; for the midsize carriers 7.75 percent; and for the rate-of-return carriers, 6.90 percent.

84. As shown in Appendix I1, the CAPM estimates are low compared to the cost of debt. This is anomalous; because equity is subordinate to debt with regard to a company's profits and assets, equity should command a higher return. The arithmetic means of total returns on large company stocks (those in the S&P 500 index), small company stocks, and long-term corporate bonds for the period from 1926 to 2010, respectively were 11.90, 16.70, and 6.20

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[146] Ad Hoc does not use such an adjustment. *See* the definition of betas at http://people.stern.nyu.edu/adamodar/New_Home_Page/datafile/variable.htm (Last accessed 05/01/2013). NECA uses Value Line betas. Removing the adjustment would change our average beta from 0.89 to 0.84 and would increase the CAPM cost of equity by .31 percent.

[147] Some proxy firms have been part of a merger during the last five years. In those cases, we used data from the acquiring company. Because FairPoint emerged from bankruptcy in 2011, data are only available for the 19 months preceding our analysis.

[148] Both our daily and weekly data based betas are highly statistically significant. HickoryTech has the lowest t-statistic, 3.93, and a p-value of 0.000 (*i.e.*, the probability of incorrectly rejecting the null hypothesis that beta equals zero is 0.000.) On the other hand, our estimates using monthly data are not statistically significant (even at the 10% level) for FairPoint or Shenandoah.

percent. The differences between the large company stock return and the long-term bond return and the small company stock return and the long-term bond return were 5.7 and 10.5 percent, respectively.[149] As shown in Appendix I1, the average cost of debt for the 16 company portfolio is 6.19 percent (versus a 7.18 percent cost of equity); 5.71 percent (versus 6.70 percent) for the RBOCs; 7.65 percent (versus 7.75 percent) for the mid-size carriers; and 5.15 percent (versus 6.90 percent) for the various rate-of-return carriers. We note that the CAPM estimates of the cost of debt for six of the sixteen carriers - New Ulm, Alteva, Alaska, Hawaiian, and Frontier - are actually higher than the cost of equity. For New Ulm: the cost of debt is 5.41 percent (versus 4.83 percent cost of equity); for Alteva: 5.89 percent (versus 5.0 percent); for Alaska: 7.38 (versus 6.84 percent); for Hawaiian: 7.52 (versus 6.30 percent); and for Frontier, 8.27 (versus 7.56 percent). Cost of debt estimates that are higher than the cost of equity for some companies are likely largely the result of measurement error. By averaging the estimates for the entire sample of 16 companies, and emphasizing that average in our analysis, however, the effect of at least some, though not necessarily all, of any such measurement error might be removed. These anomalies also could reflect in part a higher embedded cost of debt than the cost of debt that would be issued today. In particular, the cost of debt could have fallen since the 10-K forms upon which our embedded debt calculations are based were last filed.

85. While the difference between the cost of debt and the cost of equity would vary over time and across carriers, the current authorized rate of return was based on an 8.8 percent cost of debt estimate and a 13.19 percent cost of equity estimate at the time of the 1990 represcription, representing a 4.39 percent difference between the cost of debt and the cost of equity. That difference is significantly higher than the .99 percent average difference between the estimates of the cost of debt and the cost of equity for the 16 incumbent LECs that comprise the Staff Proposed Proxy based on the CAPM estimates in this Report. While both the current and the 1990 estimates are subject to error, the 0.99 percent difference in the current estimate seems, as discussed below, to be low, a result that could arise from an overestimate of the cost of debt, an underestimate of the cost of equity, or a combination of the two. As discussed below, we address this issue in determining the reasonable CAPM WACC Range.

(iii) CAPM WACC Range

86. In this section we establish a range for the cost of equity based on the CAPM, and a resulting CAPM range for an estimate of the WACC. Variation in our estimates of the CAPM WACC comes primarily from the choice of the market premium, including choices made to deal with situations where the cost of equity is found to be too close to, or lower than, the cost of debt, and so we focus on these.[150] Requiring a minimum return to equity necessary to ensure all carriers' cost of equity is not less than their cost of debt, we conclude that the CAPM analysis suggests the WACC most likely lies between 7.39 and 8.58 percent.

87. Any equity premium less than 7.57 percent results in a cost of equity that is less than the cost of debt for some of our firms, which violates a fundamental precept of financial

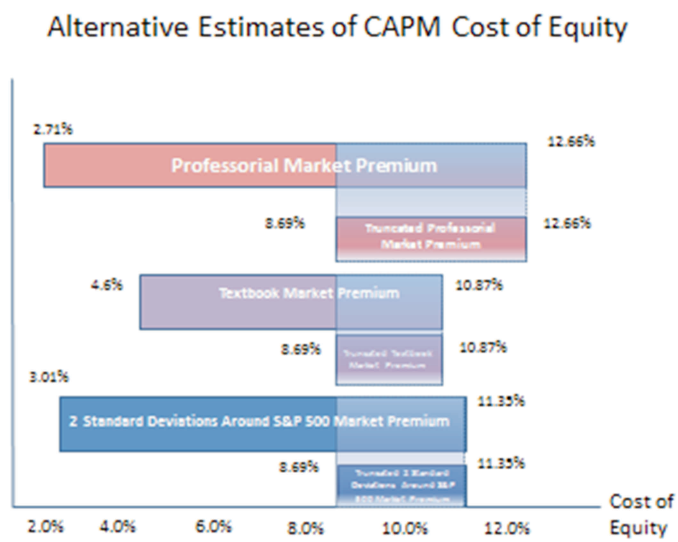
[149] Ibbotson, Roger G., The Equity Risk Premium, RES. FOUND. CFA INST. at 19, Tbl 1 (2011).

[150] The assumptions behind the various beta estimates of our set of representative companies do not lead to substantial changes in the average WACC of our portfolio. For example, if we fixed the market premium at the average historic market rate of 5.88% and looked at the upper and lower CAPM bounds created by using different beta estimation methods (that is, our four versions of the betas plus betas provided by external analyst services; *see* Appendix I2, the resulting WACC range runs from 6.28% to 6.82%. In contrast, using our preferred betas (weekly data and adjusted towards one), and allowing the market premium to vary across the range reported in financial textbooks of 3-10% which is narrower than the historical range we also consider, gives a WACC range of 5.56% to 8.36%.

economics, strongly implying error in our estimates.[151] As an approximation designed to remove this anomaly, we performed the cost of equity calculation using 7.57 percent as the lower bound of the market premium, obtaining cost of equity ranges of 8.69-11.35 percent.[152]

88. This adjustment is not without its own problems. On one hand, to the extent our estimates of the cost of debt are too high, this choice would bias upward our estimates of the return on equity. On the other hand, since the cost of equity typically would materially exceed the cost of debt, assuming a cost of equity that equals the cost of debt tends to bias our estimates downwards. It is not clear which of these two offsetting biases is likely to be larger.

89. The cost of equity ranges that arise from the 16 examined carriers using the textbook and professorial market premium ranges, the historical confidence interval, and the same ranges with the truncated market premium range, are illustrated in the chart below. As discussed, we prefer the historical confidence interval.

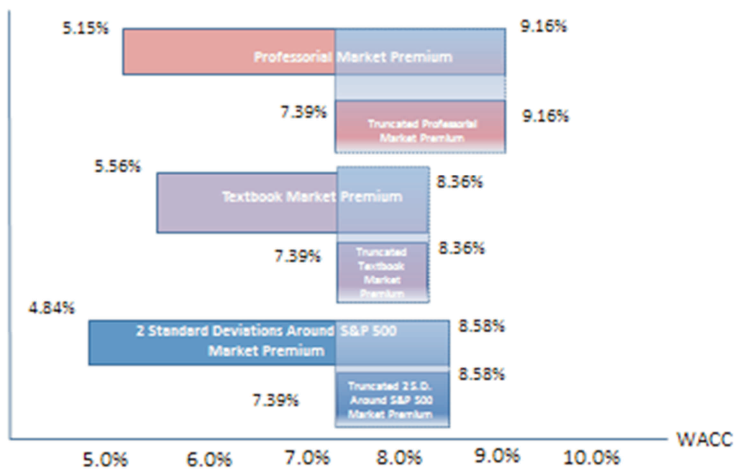


90. *CAPM WACC*. The CAPM WACCs that result from the CAPM costs of equity just outlined are reproduced in the chart below. Again, focusing on the cases where no carrier's cost of equity is less than its cost of debt, our recommended CAPM WACC range is 7.39-8.58 percent.

[151] In the event that a company must be wound up, debt holders are paid ahead of equity holders, and hence, by definition, equity holders bear more risk than debt holders. To compensate for that risk, equity holders require a greater return.

[152] Using Ibbotson's long-term risk premium, 6.7 percent, the 20-year government bond yield on March 26, 2013 of 2.75 percent, and the adjusted betas in the CAPM, results in an overall average cost of equity estimate of 8.74 percent, and a cost of equity estimate for each carrier in the sample that exceeds its cost of debt estimate. However, if it were available to us, we would still likely have to truncate the 95 percent confidence interval around this mean.

Alternative CAPM Estimates of the WACC



91. *Cost of Equity for Different Proxy Groups*. Analysis of the CAPM cost of equity for different proxy groups, as shown in Appendix H, does not demonstrate substantial variation across subgroups. The variations across these subgroups are not statistically significant.[153]

92. In summary, we prefer the two standard deviation spread around the historical mean market premium observed in the S&P 500 index, but we place a lower bound on the market premium range that ensures a cost of equity that is no less than the cost of debt for all 16 companies examined. The result is a CAPM WACC range of 7.39-8.58 percent. We note that this range is between the WACCs based on CAPM analysis provided by Ad Hoc, 6.24 percent, and by NECA, 12.1 percent.

b. Discounted Cash Flow

93. The general discounted cash flow model[154] assumes that the price of a share of stock is equal to the discounted present value of all its expected future dividend payments extending to infinity.[155] Using projections of the firm's future dividends,[156] the general DCF

[153] A two-sided statistical test showed none of these averages were statistically different from the other at the 0.05% confidence level.

[154] The general discounted cash flow model is expressed as follows:

$$P_o = D_1/(1+K_e) + D_2/(1+K_e)^2 + D_3/(1+K_e)^3 \text{ and so on continuously}$$

where:

$D_1, D_2 \ldots D_n$ = expected dividends in each year;

P_o = current stock price;

K_e = required return on, or cost of, equity.

[155] Thus, the value of common stock is expressed as the value of its stream of dividends to infinity. This is justified by assuming that the investor has an infinite investment horizon, or by assuming that the expected

model calculates the implicit return on equity required by investors as reflected in the current price of the stock. The assumption that the price of a share of stock is equal to the expected present discounted value of the firm's future dividends is reasonable, as it is a statement of the efficient market hypothesis. The general DCF model can be modified to accommodate different dividend growth patterns.

94. The most widely used modified version of the general DCF model, the constant-growth, or standard, DCF model,[157] calculates the cost of equity as:

$$\textbf{Cost of Equity} = (\textbf{Dividends per Share}_1 / \textbf{Price per Share}_0) + \textbf{g}$$

where Cost of Equity = cost of common stock equity; Dividends per Share_1 = annual dividends per share in period 1; Price per Share_0 = price per share in period 0; g = constant growth rate in dividends per share in the future; and $D_1 = (1 + g)$ times D_0, the annual dividends per share in period 0.[158] The Commission used this approach in 1990.[159] NECA uses the quarterly version of the constant growth DCF model.[160] That version of the model assumes that dividends are paid quarterly, while the version we use assumes that dividends are paid once a year at the end of the year.[161]

(i) DCF Variables

95. Historical dividends and share prices are public information. While dividend per share (DPS) growth forecasts are not generally available, industry analysts routinely make earnings per share (EPS) growth forecasts, and dividends tend to grow as earnings grow.[162] EPS growth forecasts are commonly used by investors.[163] The Commission used EPS growth in the

resale price at the end of a limited horizon is itself a present value of the expected dividends following the end of that horizon to the new purchaser. *See Morin New Regulatory Finance* at 250-253.

[156] The general DCF model cannot be used to calculate the cost of equity for a firm that does not pay dividends.

[157] The constant-growth DCF model assumes that the stock's price and expected earnings per share grow at the same rate as expected dividends. If the stock's price is expected to grow significantly faster or slower than dividends, estimates of the cost of equity obtained using the standard DCF model might be significantly less reliable. *See Morin New Regulatory Finance* at 256-258.

[158] Data from http://finance.yahoo.com/ on Mar. 27, 2013. The dividend in the DCF model is an annualized dividend reflecting the most recent dividend payment prior to Mar. 27, 2013. We did not multiply g by .5 to calculate D_1, as the Commission did the last time it last prescribed the rate of return for incumbent LECs. *1990 Represcription Order,* 5 FCC Rcd at 7511, para. 36. It did so then because all of the carriers in its sample had increased their dividends per share within the prior six months. *Id.* In contrast, only TDS, AT&T, and CenturyLink, among the carriers studied here, have done so in the six months prior to March 27, 2013.

[159] *1990 Represcription Order*, 5 FCC Rcd at 7515, para. 67.

[160] NECA et al. Comments, App. C, Statement of Prof. Randall S. Billingsley at 15-16.

[161] The Commission rejected use of the quarterly version of the constant growth DCF model in 1990 proceeding. See *1990 Represcription Order, 5* FCC Rcd, 7507, at pp. 7515, paras. 70-72.

[162] Earnings create the capacity to pay dividends. *See Morin New Regulatory Finance* at 250-253.

[163] The databases that contain EPS forecasts are expensive, but widely used by institutional investors, indicating that the information contained in them is of considerable value.

DCF model in the *1990 Represcription Order*.[164]

96. We obtained long-term EPS growth forecasts online from Yahoo Finance,[165] CNN Money,[166] Zack's Investment Research,[167] and Reuters,[168] to use as estimates of g.[169] The growth forecasts published by these four entities reflect the consensus of analysts that study the incumbent LEC industry. Yahoo Finance obtains its data from Thomson Financial network, which is owned by Thomson Reuters.[170] Thompson Reuters owns the Institutional Brokers' Estimate System (IBES), the system from which the Commission obtained its data to estimate g in the *1990 Represcription Order*.[171] That database is perhaps the most respected of its kind in the industry.[172] Zack's is a well-respected firm that has been in business developing consensus forecasts for many years.[173] Reuters is owned by Thompson Reuters. We do not know the source of the forecast data published by CNN Money. To ensure the quality of future DCF analyses, the staff recommends that the Commission purchase access to a financial information service including analyst forecasts of EPS and/or DPS growth, such as IBES. NECA uses the consensus of the analysts' earnings-per-share grow rates reported by Zacks.[174]

97. The consensus forecast for the large incumbent LECs, such as AT&T, reflects a relatively large number of analysts' views, while the consensus forecast for the RLECs, such as Shenandoah, reflects a relatively small number. Accordingly, the forecasts for smaller incumbent LECs should be expected to have greater uncertainty.

98. We used the current stock price (at the close of markets on March 26, 2013), not an average price, in the DCF model. The use of the current stock price is consistent with the semi-strong form of the efficient market hypothesis, which holds that all publicly available information is fully reflected in current stock prices. Thus, the current price is a better estimate of the fundamental value of the stock than any other price, and should be used to estimate the cost of equity, based on this hypothesis.[175] NECA uses the average of the three most recent monthly

[164] *1990 Represcription Order*, 5 FCC Rcd at 7519, para. 99.

[165] http://finance.yahoo.com (last visited Nov. 9, 2012).

[166] http://money.cnn.com (last visited Mar. 27, 2013).

[167] http://www.zacks.com (last visited Mar. 27, 2013).

[168] http://www.reuters.com/finance (last visited Mar. 27, 2013).

[169] Each source other than Reuters describes its long-term forecast as a five-year forecast. Reuters describes its forecast as a long-term forecast, without specifying how far into the future this forecast extends. Zacks' growth estimates also can be obtained online from MSN Money, *available at* http://money.cnn.com; and NASDAQ.com, *available at* http://www.nasdaq.com.

[170] *See* http://finance.yahoo.com (last visited Mar. 27, 2013).

[171] *1990 Represcription Order*, 5 FCC Rcd at 7511, para. 36

[172] *See Morin New Regulatory Finance* at 301-303; *Giacchino and Lesser* at 253; *1990 Represcription Order,* 5 FCC Rcd at 7515, para 67.

[173] *See Morin Regulatory Finance* at 155-156; *Morin New Regulatory Finance* at 301-303; *Giacchino and Lesser* at 253.

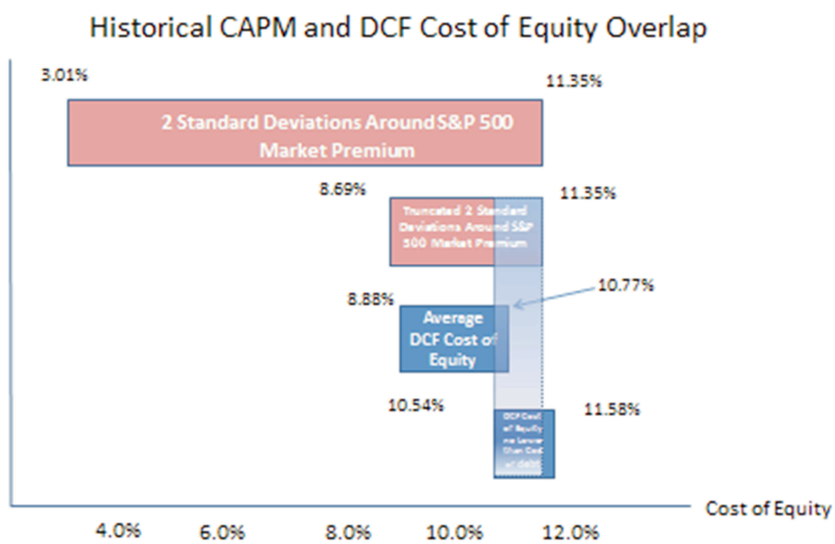
[174] NECA et al. Comments, App. C, Statement of Prof. Randall S. Billingsley at 15.

[175] *See Morin New Regulatory Finance* at 279-280; Edwin J. Elton and Martin J. Gruber, Modern Portfolio Theory and Investment Analysis at 361 (Wiley 2006).

closing prices.[176]

(ii) **DCF Cost of Equity Results**

99. We calculated the cost of equity using the constant-growth DCF model based upon the four different data sources. The results are shown in Appendix J, and a concise summary of these results is set out in the table at the end of this section. The average DCF cost of equity estimates obtained using growth rates from these four different data sources range from 8.88 percent to 10.77 percent. The consensus forecasts from the four sources likely reflect, to some extent, surveys of the same analysts. In some cases, however, the forecasts differ significantly and so do the DCF estimates. These DCF estimates have a substantially higher lower bound than the lower bound on our CAPM estimates of the cost of equity that use the full range of textbook market premium (8.88 percent compared with 4.60 percent). When the textbook and DCF ranges are chosen to ensure all of the carriers in our sample have a cost of equity that is no lower than their cost of debt, the DCF range lies above the CAPM range. These four cases are illustrated in the chart that follows. Our preferred DCF cost of equity range (as explained below) is the last of these, 10.54 to 11.58 percent.



100. While no single source of publicly-available, non-subscription fee-based analyst projections allows us to produce estimates for all of the dividend-paying carriers in our sample, given that the magnitude of the forecasts used is relatively modest, and that we are relying on a sample of companies and forecasts from a number of different and reputable sources, we believe the constant-growth DCF model provides reasonable estimates of the DCF-based cost of equity.

101. DCF does not appear to produce reliable estimates for Windstream and ACS based upon published consensus growth rates. The published growth rates are low, and use of

176 The Commission used the average of the monthly high and low stock prices in the 1990 proceeding. *See 1990 Represcription Order*, 5 FCC Rcd, 7507, at pp. 7514, paras. 61-63.

these rates in most cases results in cost of equity estimates that are less than the cost of debt estimates for these two firms, and in one case a negative cost of equity estimate for Windstream.[177] These results make no economic sense, even though it is plausible for analysts to project low and even negative growth in earnings per share. As equity is more risky than debt, no rational investor would ever purchase any firm's common stock if that firm's debt is expected to provide a higher rate of return. And no investor would ever pay a positive price for a common stock on which the expected rate of return is less than zero. These anomalously low cost of equity estimates reflect a limitation of the constant-growth DCF model: it is unlikely to produce a reasonable cost of equity estimate when the growth rate is very low or high. Indeed, when developing the cost of equity in the *1990 Represcription Order*, the Commission applied a screen designed to remove from consideration those firms for which the cost of debt exceeded the cost of equity.[178]

102. However, depending on the source, excluding Windstream and ACS, the average of the growth forecasts ranged from 3.45 to 5.78 percent.[179] No DCF estimate is made for New Ulm Telecom or Alteva because none of the sources that we used publish a long-run growth rate forecast for these carriers. No DCF estimate is made for FairPoint, Cincinnati Bell, or Hawaiian Telcom because these carriers do not pay common stock dividends. Depending on the source used, the average cost of equity for as many carriers that pay dividends and for which a growth rate was published online, including Windstream and ACS, ranges between 8.88 percent and 10.77 percent. The average cost of equity estimates range between 9.38 and 10.94 percent for the RBOCs, 8.28 and 11.72 percent for the rate-of-return carriers, and 5.85 and 14.27 percent for percent for the mid-size carriers. For the reasons given above, we remove Windstream and ACS from the sample we use to estimate the cost of equity. Excluding Windstream and ACS, the average cost of equity for the entire sample of dividend-paying carriers ranges from 10.40 to 11.44 percent, while the average cost of equity for the remaining midsize carrier, Frontier, ranges from 11.83 to 16.79 percent.[180]

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[177] These growth rates for Windstream vary from minus 11.25 percent to positive 0.01 percent, depending on the source. The growth rate estimates that Zacks (1%) and CNN Money (-2%) provide for Windstream result in cost of equity estimates of 13.41% and 10.04%, respectively. These equity cost estimates are greater than the debt cost estimates for Windstream, 7.33%. In contrast, the growth rate estimates that Yahoo Finance (-11.25%) and Reuters (-6.83%) provide for Windstream result in cost of equity estimates of negative .35% and 4.62%, respectively. These equity cost estimates are less than the debt cost estimate.

Only two of the four sources provide a growth estimate for ACS. The growth rate estimates that Yahoo Finance and CNN Money provide are the same (negative 10%), and this estimate results in a cost of equity estimate of 1.11%. This equity cost estimate is less than the debt cost estimate for ACS, 7.38%.

[178] Some parties in the 1990 prescription proceeding argued that companies whose cost of equity estimates did not exceed their cost of debt should be excluded from the equity analysis. In response, the Commission removed from consideration companies whose cost of equity estimates were below the yield on single A corporate bond ratings. *See 1990 Represcription Order*, 5 FCC Rcd at 7513-14, paras. 55-58.

[179] Excluding Windstream and ACS, the average of the growth rate forecasts is from 1.74 to 3.91%.

[180] Neither the cost of equity estimates that are greater than the cost of debt for Windstream nor the estimates that are less than the cost of debt for Windstream and ACS are reflected in these ranges. Use of the CNN Money growth rates does result in a cost of equity estimate that is greater than the cost of debt estimate for Windstream. If we do not remove Windstream's equity estimate from the estimates that are based on CNN Money growth rates, the average equity estimate based on this source decreases from 11.44 percent, which is the top of the this range, to 11.30 percent. Use of the Zacks growth rates also does result in a cost of equity estimate that is greater than the cost of debt estimate for Windstream. If we do not

103. To minimize the extent to which we rely on a range of equity cost estimates that is affected by the number of firms for which each source provides estimates, and to maximize the extent to which the available growth rate information informs these estimates, we develop a single cost of equity estimate for each of the 11 firms using all of the growth estimates available for that firm, and then calculate the average of these cost of equity estimates.[181] To do this, we identify the low and the high estimates among the available estimates for each firm, determine the midpoint between these two estimates, and use this value as the growth rate in the DCF model for each firm. We use the midpoint of the high and the low growth rates, rather an average of all of the growth rates, to avoid applying too much weight to estimates of analysts that might be reflected in the consensus estimate of more than one source.

Constant-Growth DCF Average Cost of Equity Estimates						
Group	Four g sources, including Windstream and ACS	Four g sources, excluding Windstream and ACS	g midpoint, including Windstream and ACS	g midpoint, min. debt cost = equity cost	g midpoint, excluding Windstream and ACS	g midpoint, min. debt cost = avg. debt - equity cost diff., if equity cost < debt cost
RoR carriers	8.28-11.72	8.28-11.72	11.06	11.06	11.06	11.06
Mid-size carriers	5.85-14.27	11.83-16.79	7.32	9.67	14.31	13.47
RBOCs	9.38-10.94	9.38-10.94	10.55	10.55	10.55	10.55
All carriers	8.88-10.77	10.40-11.44	9.90	10.54	11.25	11.58

104. The cost of equity estimates based on this midpoint growth rate analysis are in Appendix J. Based on this analysis, the overall cost of equity estimate for the 11 firms is 9.90 percent. These cost of equity estimates for the rate-of return incumbent LECs, mid-size

remove Windstream's equity estimate from the estimates that are based on Zacks' growth rates, the average equity estimate based on this source increases from 10.40 percent to 10.77 percent.

[181] The number of firms for which each source provides analysts' estimates varies: Yahoo Finance and CNN Money provide estimates for 11 firms, Zacks for eight; and Reuters for six. The cost of equity estimates we developed using growth estimates from these sources vary because the growth estimates are sometimes significantly different for the same firms. For example, the low growth rate estimate for Frontier is 1.5 percent (based on CNN Money growth rates), while the high estimate for this firm is 6 percent (Yahoo Finance). For that reason, the cost of equity estimate for Frontier varies from 11.83 percent to 16.79 percent. The cost of equity estimates also are likely to vary because the number of firms for which each source provides estimates varies. The common subset of firms for which each source does provide estimates comprises the following six firms: Consolidated, Windstream, Frontier, AT&T, Verizon, and Century Link. The average estimate of the cost of equity for these six firms ranges from 9.24 (Yahoo Finance) to 12.09 percent (Zacks). The low average cost of equity estimate for these six firms is higher than the low average estimate for all of the firms for which any source provides growth rates, as reported above, 8.88 percent (again, Yahoo Finance), and the high estimate based on the six is higher than the high estimate for all of the firms, 10.77 percent (again, Zacks').

incumbent LECs, and the RBOCs are 11.06, 7.32, and 10.55 percent, respectively. Excluding Windstream and ACS from the sample, for the reasons given above, the overall cost of equity estimate using midpoint growth rates for the nine remaining firms is 11.25 percent. The cost of equity estimate for midsize incumbent LECs is 14.31 percent, which is the estimate for Frontier, the only remaining midsize firm in the sample, and the estimates for the rate-of-return incumbent LECs and the RBOCs are unaffected by the exclusion of Windstream and ACS.

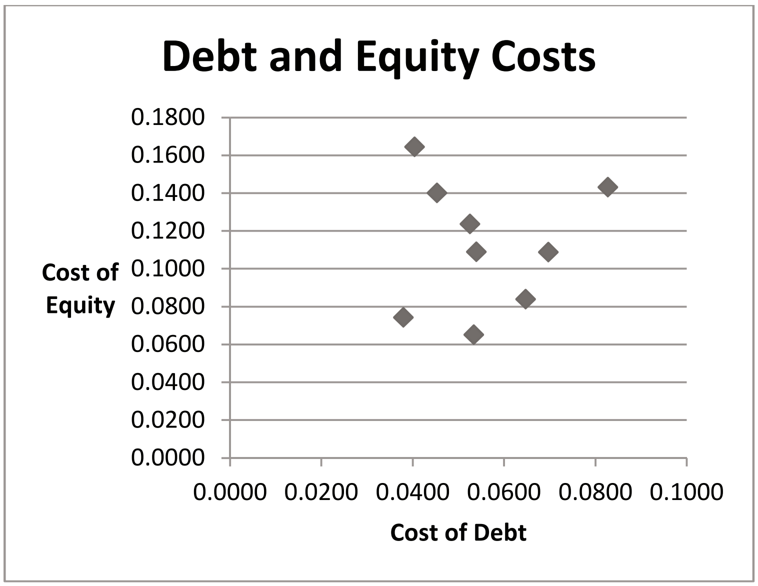
105. There are ways to evaluate the sensitivity of excluding Windstream and ACS from the sample, other than simply removing these carriers from the sample. One way is to set the cost of equity estimate for each of these two firms equal to its cost of debt estimate, and then to recalculate the average of the cost of equity estimates for all of the 11 firms. Setting the cost of equity estimate equal to the cost of debt estimate for the two firms, while also using the midpoint growth rates to estimate the cost of equity for the other nine firms, produces an overall average cost of equity estimate of 10.54 percent. All else the same, this approach would understate the overall cost of equity for Windstream and ACS and thus the overall average estimate for the 11 firms, because equity is riskier than debt, and investors would expect to receive a higher return on equity as compared to debt, not the same return. However, if the embedded cost of debt were greater than the current cost of debt, as of the measurement date for our analysis, then this overstatement would be at least partially offset.

106. Another way to evaluate the sensitivity of excluding Windstream and ACS is to set the cost of equity estimate for each of the two firms equal to the debt cost estimate of each firm plus the average difference between the cost of equity estimates and the cost of debt estimates for the other nine firms. Calculating the average difference between the cost of equity estimates and the cost of debt estimates for the other nine firms, adding this increment to the cost of debt estimate for Windstream and ACS, and using the midpoint growth rates to estimate the cost of equity for the other nine firms, produces an average cost of equity estimate of 11.58 percent. All else the same, this approach might also tend to understate the overall cost of equity for Windstream and ACS. These two firms' debt cost estimates, 7.33 and 7.38 percent, respectively, are higher than the average of the debt cost estimates for the other nine firms, 5.64 percent, suggesting that the these two firms' equity would be riskier than average and have a greater than average cost. If that is so, then the increment that we add to their debt costs to estimate their cost of equity would be too small. The table below summarizes our constant-growth DCF model estimates.

107. We believe that we should give the most weight to the equity cost estimates that incorporate the midpoint growth rates, and the least weight to the estimates that incorporate only growth rates from a single source, because the former estimates simultaneously reflect the larger body of information reflected in the growth rate estimates from all the sources. We also believe that to the extent that use of these growth rates produces cost of equity estimates that have no economic meaning, such estimates should be omitted. Or, at the very least, the impact of including such meaningless equity costs estimates on the overall estimate has to be taken into account. In this regard, there is no dispute that equity is riskier than debt and has a greater cost. Accordingly, cost of equity estimates that are significantly less than cost of debt estimates is strong evidence of clear error that, if unaccounted for, is likely to impair the results of an equity cost analysis. Here the inclusion of Windstream and Alaska, both of which have debt cost estimates that are greater than their cost of equity estimates based on midpoint growth rates, significantly reduce the overall cost of equity estimate based on the midpoint growth rate estimates.

108. We therefore find that the lower bound of a reasonable range for the cost of equity, based on midpoint growth rates, is, at the very least, 10.54 percent. This lower bound figure incorporates cost of equity estimates for Windstream and ACS set equal to their cost of

debt, which, all else the same, is a conservative adjustment. We also find that the upper bound of this range is 11.58 percent. This upper bound figure incorporates cost of equity estimates for Windstream and ACS set equal to their cost of debt, plus the average of the differences between the cost of equity and cost of debt estimates for the other nine firms, which, all else the same, is also a conservative adjustment. However, the results we obtain, as displayed in the chart below, do not suggest the existence of any strong positive relationship between the cost of debt and the cost of equity in the estimates for the nine other firms in our sample. We do not find a reasonable range to be higher than 11.58 percent, given the data for our sample of firms.



109. As a rough test of the reasonableness of the lower and upper bound of this range of cost of equity estimates, we calculate the difference between the average cost of debt estimate for the sample of the 11 firms and the lower bound cost of equity estimate, on the one hand, and difference between the average cost of debt estimate and the upper bound cost of equity estimate, on the other. We then compare these two differences to three benchmarks. The difference between the average cost of debt for the 11 firms, 5.89 percent, and the lower bound cost of equity estimate, 10.54 percent, is 4.65 percentage points (or 465 basis points). The difference between the average cost of debt for these firms and the upper bound cost of equity estimate, 11.58 percent, is 5.69 percentage points (or 569 basis points).

110. We have three readily-available benchmarks for evaluating the reasonableness of the debt-equity differences reflected in our lower and upper bound cost of equity estimates. The first benchmark is 4.39 percentage points (439 basis points). This is the difference between the cost of debt, 8.8 percent, and the cost of equity, 13.19 percent, on which the Commission's current 11.25 percent authorized rate of return is based. This rate of return was developed in 1990 based on the debt and equity costs at that time. The difference between the lower bound cost of equity estimate and the average of the cost of debt estimates exceeds the debt-equity cost difference reflected in the Commission's currently authorized rate of return, but by only 26 basis points. Thus, these two cost differences are roughly equal. The difference between the upper bound cost of equity estimate and the average of the cost of debt estimates exceeds the debt-equity cost difference reflected in the Commission's current authorized rate by 150 basis points. Thus, there is a more material difference between the debt-equity cost difference reflected in our upper bound cost of equity estimate and the debt-equity cost difference reflected in the authorized

rate of return (which was based on analysis of a different set of firms and is now more than two decades old).

111. The second benchmark is the average difference between the large company stock return, *i.e*., S&P 500 companies, and the long-term corporate bond return, from 1926-2010, 5.7 percent.[182] We use this historical difference as a benchmark to judge the debt-equity cost difference reflected in our estimates because the returns on debt and equity that investors actually realize over a long period of time must reflect their expectations; otherwise, they would not invest. To the extent that the S&P 500 represents the broad portfolio of assets available to investors (as assumed for the CAPM analysis in this Report), the average S&P 500 company would have a beta of one. The average beta for the sample of firms in this Report, adjusted for the tendency of beta to move toward one over time, and estimated using weekly data, is .89. So the average firm in our sample has a somewhat lower beta, or a lesser amount of non-diversifiable risk, than the average S&P 500 company. Equity investors in the average S&P 500 company might therefore require a higher return on the stock of such a company, relative to the return they would require on that company's debt, than the return investors might require on an investment in the stock of the average firm in our sample, relative to that firm's debt. Keeping that in mind, the debt-equity cost differences reflected in our lower bound and upper bound cost of equity estimates, 465 and 569 basis points, respectively, are both less than the historical debt-equity return differences for S&P 500 firms, 570 basis points. This suggests our DCF cost of equity range is reasonable.

112. The third benchmark is the difference between small company stock returns and the long-term corporate bond returns, from 1926-2010, 10.5 percent.[183] This benchmark might be pertinent to our sample of firms because only four of these firms are S&P 500 firms; the other firms are much smaller than S&P 500 firms. The debt-equity cost differences reflected in our lower bound and upper bound cost of equity estimates, 465 and 569 basis points, respectively, are both significantly less than the historical difference between equity and debt returns for small company stocks, 1005 basis points. This suggests our DCF cost of equity range might be too low. However, if it is true that, as other analysis suggests,[184] returns to small companies are no longer statistically different from those of larger companies, then this benchmark does not provide any insights.

113. In summary, none of these three benchmarks suggest in a compelling way that our lower and upper bound estimates for the cost of equity are unreasonable.

(iii) DCF WACC Range

114. We recommend that a reasonable DCF WACC Range be established by using the lower and the upper bound for the reasonable range of cost of equity estimates, *i.e*., from 10.54 to 11.58 percent, along with the cost of debt and capital structure estimates developed above for each firm in our sample. When the lower and the upper bound DCF cost of equity estimates are used to determine the WACC, the DCF WACC Range is 8.45 percent to 8.72 percent. By comparison, NECA's WACC estimate based upon a DCF analysis of the cost of capital was 10.85 percent.

[182] Ibbotson, Roger G., The Equity Risk Premium, Res. Found. CFA Inst. At 19, Tbl 1 (2011).

[183] *Id*.

[184] Crain, Michael A., *A Literature Review of the Size Effect* (Oct. 29, 2011), *available at* SSRN: http://ssrn.com/abstract=1710076 (last visited Apr. 16, 2013) or http://dx.doi.org/10.2139/ssrn.1710076 (last visited Apr. 16, 2013).

c. Cost of Preferred Stock

115. The Commission's rules specify that the WACC calculations incorporate the cost of preferred stock.[185] Preferred stock is stock that entitles its holders to receive a share of the assets of the corporation before common stockholders do, and offers other benefits, such as priority when dividends are paid, that vary across firms. Of the carriers in our representative firm portfolio, CenturyLink, Cincinnati Bell Telephone Company, TDS and Alteva have issued preferred stock. Our main source for financial data in this represcription, SNL Kagan, reports that none of these companies has issued preferred stock since at least January 1, 2000.[186] The data called for by our rules to calculate the cost of preferred stock are either not available to us or not publicly reported, so we are unable to include the cost of preferred stock in the calculation of the WACC. We expect that including the cost of preferred stock from the WACC, if we were able to do so, would not significantly alter our results for the following reasons. The representative firms do not typically raise capital through the issuance of preferred stock, as indicated by the prolonged period of time in which they have not done so; most of them do not issue preferred stock at all. Further, preferred stock is only a small share of the capital structure for the proxy firms that have such stock. In the case of Cincinnati Bell, for example, on a book value basis, preferred stock is around three percent of the firm's capital (debt plus preferred stock plus common stock), and for Alteva it is roughly a half of a percent. The preferred stock of both CenturyLink and TDS is not traded frequently and as a result we cannot observe its market price, which keeps us from being able to calculate the precise share, on a market value basis, of the preferred stock in the capital structure of these companies. However, the reasons listed above give us confidence that both these carriers and the companies for which we use them as proxies follow the same pattern – inclusion of preferred stock in the WACC calculation would not significantly alter the WACC. Accordingly, we recommend that the Commission waive or eliminate the requirement to include the cost of preferred stock in the WACC calculation.

4. WACC Results

116. Appendix K shows the WACCs resulting from using both CAPM and DCF, together with the component values of each model and the estimates of the cost of debt and capital structure.

5. Establishing the Zone of Reasonableness

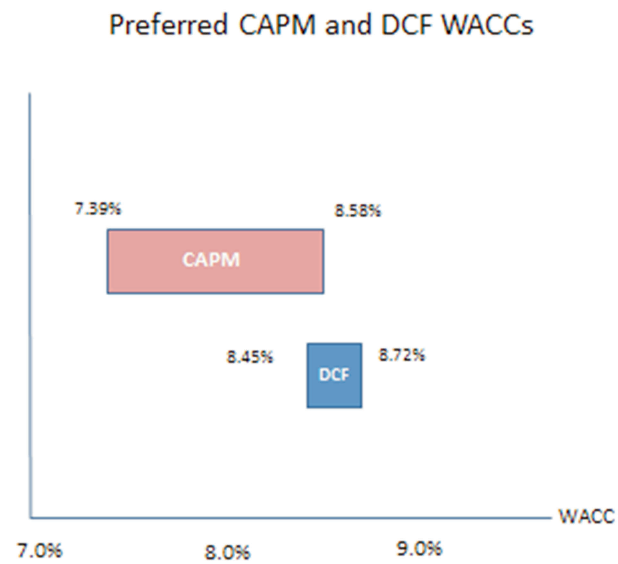
117. As discussed above, in determining the authorized rate of return the Commission establishes a zone of reasonable estimates of the overall WACC. After identifying this "zone of reasonableness," the Commission should determine, based on policy considerations, where to prescribe the unitary rate of return.[187] To determine a zone of reasonableness, we compare the range of WACCs produced when the cost of equity is determined using CAPM with varying market premiums,[188] and the range produced when the cost of equity is determined using DCF with varying analysts' forecasts. These two ranges are illustrated in the chart below.

[185] 47 C.F.R. § 65.303.

[186] *See, generally*, http://www.snl.com/Sectors/Media/Default.aspx (last visited Apr. 16, 2013).

[187] *1990 Represcription Order*, 5 FCC Rcd at 7508, para. 7.

[188] We use weekly adjusted betas for CAPM because we find them optimal for methodological reasons.



118. Without strong reasons for preferring one of these sources over another, given the data available to us, we recommend a zone of reasonableness that runs from 7.39 percent, the lower bound of the WACC CAPM 95 percent confidence interval, to 8.72 percent, the upper bound of the DCF WACC range. We note that the zone of reasonableness is between the WACC estimates provided by Ad Hoc, 6.24 percent, and by NECA, 10.85 percent (using DCF to estimate the cost of capital)/12.1 percent (Using CAPM to estimate the cost of capital).

a. Selecting the Unitary Rate of Return: Times Interest Earned Analysis

119. As one approach to choosing a unitary rate of return within the zone of reasonableness, as well as to assess the reasonableness of this range, we provide a Times-Interest-Earned (TIE) ratio analysis. The TIE ratio shows the number of times that a firm's earnings cover its interest obligations[189] for a given WACC, and hence is indicative of what various rates of return mean for the ability of a firm to pay its debts. Consequently, TIE ratio analysis provides a check on our cost of equity estimates. Based upon this analysis, we recommend that the Commission select a unitary rate of return near the upper end of the zone of reasonableness.

120. The TIE analysis is not a substitute for the determination of a zone of reasonableness; it does not attempt to determine the cost of capital. Rather, it is one of the key measures that bond rating agencies use to assess a firm's creditworthiness and to assign corporate credit ratings.[190] Firms often are expected to maintain adequate TIE or similar coverage ratios under their contractual obligations to debt holders, and lenders evaluate creditworthiness in part based on the TIE ratio. The ratio can be calculated a number of ways; [191] the TIE ratio often used

[189] *See Morin Regulatory Finance* at 240-243.

[190] *See Morin Regulatory Finance* at 241-242; *Morin New Regulatory Finance* at 445-446; *Giacchino and Lesser* at 63-64, 107-108.

[191] For example, some lenders use after-tax operating income in the numerator of this ratio.

by bond rating agencies is:

TIE = Earnings Before Interest and Taxes/Interest Charges

121. To assess the effects of prescribing a rate of return based upon a particular WACC estimate, we calculate a *pro forma* TIE ratio for each incumbent LEC in our sample and compare these ratios to a range of TIE ratios. That is, we calculate the number of times that each incumbent LEC's earnings would cover its interest payments, assuming that each earns the same given rate of return, which in turn equals a particular WACC, and then compare these numbers to criteria often used by analysts to determine whether a firm's interest coverage is adequate.

122. We note that, just as our WACC estimates reflect holding-company cost of debt and capital structure data, so too do these *pro forma* ratios. Neither the WACC estimates nor the *pro forma* ratios would precisely represent regulated interstate special access or common line services, even if the holding company WACC and *pro forma* ratios are precise. Given that the WACC estimates are based on holding company data, it is logically consistent to evaluate these estimates by analyzing TIE ratios developed from holding company data.

123. The TIE ratio analysis is particularly helpful in weighing the impact of a unitary rate of return on carriers that have WACCs that might differ significantly from the average WACC. In addition, there are a number of firms in our sample that are highly leveraged and have a high cost of debt, meaning that these firms have relatively large interest expenses. As the TIE ratio is specifically designed to determine the ability of a firm to cover its interest payments, it is especially useful for evaluating WACC estimates relating to a sample that has a number of highly-leveraged firms, such as ours.

b. Calculating the TIE Ratio

124. We calculate for each incumbent LEC in our sample a *pro forma* TIE ratio for a number of different WACCs. To calculate these ratios, we assume that each such LEC will earn a rate of return equal to these various WACCs and use our estimates of each incumbent LEC's cost of debt and capital structure,[192] the current federal and state corporate income tax rate, and the implied cost of equity for each WACC estimate.[193] The current federal income tax rate is 35 percent,[194] and we assume that the current state income tax rate is 5 percent.[195] We also assume

[192] We note that the value of the *pro forma* ratio depends only on the percentages of debt and equity; it is not affected by the absolute amounts debt and equity reflected in these percentages.

[193] The return to equity holders is what remains of the total return after the incumbent LEC pays the fixed amount of the interest obligations on the debt. Thus, there is an implied cost of equity for each WACC, assuming that the prescribed rate of return is set equal to that WACC. Given D, E, K_d, K_{ie}, and T, as defined above, and a series of WACC estimates, we calculate the implied cost of equity by rearranging the WACC equation and by substituting values for these variables into that equation. The rearranged equation is as follows:

$$K_{ie} = (WACC - (D/(D+E))K_d)/(E/(D+E)).$$

[194] 26 U.S.C. § 11(b)(D). This is the current statutory maximum corporate federal income tax rate. The revenue requirement on which a rate of return carrier's interstate rates are based includes an allowance for recovery of federal income taxes based on this statutory maximum rate. The rate base is net of the amount of any deferred taxes arising from timing differences between the actual payment of taxes to the government and the recognition of these taxes in the revenue requirement, which in turn result from differences between tax depreciation and regulatory depreciation expense schedules.

[195] If the state corporate income tax rate is less than 5 percent, then the *pro forma* TIE ratio is higher than it should be as the amount in the denominator of this ratio assumes that the carrier is able to recover state

that all income is available to meet coverage requirements, interest expense is the only fixed charge, and that the book value of a carrier's assets, net of depreciation, *i.e*., the equivalent of regulated firm's rate base, equals invested capital.[196] The equation that we use to calculate the *pro forma* TIE ratios is equivalent to the one above (earnings before interest and taxes divided by fixed interest charges) and is as follows:

$$TIE = (((D/(D+E))K_d) + ((E/(D+E))(K_{ie}/(1-T))))/((D/(D+E))K_d)$$

where:

D = debt outstanding;
E = equity outstanding;
K_d = cost of debt;
K_{ie} = implied cost of equity;
T = composite federal and state corporate income tax rate.[197]

(i) *Pro Forma* TIE Ratios

125. Appendix L1 shows the incumbent LEC's *pro forma* TIE ratios for WACC estimates ranging from six percent to 11.25 percent. The capital structure used in calculating these particular sets of ratios reflects the use of market value capital structures (as used in our WACC estimates). These ratios vary significantly among the incumbent LECs for a given WACC estimate. For example, given a six percent WACC estimate, ACS's *pro forma* TIE ratio is .95, while AT&T's ratio is 6.29. ACS has a relatively large share of debt in its capital structure and a high cost of debt, so its *pro forma* TIE ratio is relatively low. Conversely, AT&T has a relatively low share of debt in its capital structure and a relatively low cost of debt, so its *pro forma* TIE ratio is relatively high. The *pro forma* TIE ratio also varies significantly for all of the incumbent LECs over the range of WACC estimates. For example, TDS's *pro forma* TIE ratio is 3.73, given a six percent WACC estimate, while its *pro forma* ratio is 7.54, given an 11.25 percent WACC estimate.

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income taxes assuming that the tax rate is 5 percent. The opposite is true if the state income tax rate is higher than 5 percent.

[196] If not all of a carrier's earnings are available to meet coverage requirements, the *pro forma* ratio would be lower because the numerator of this ratio would be lower. If interest expense is not the only fixed charge, this ratio would be lower if these fixed charges require payment before or at the same time as the required interest payments because the numerator would then be lower. If a regulated carrier's rate base is less than the amount of invested capital, the pro forma ratio would be affected. The most obvious reason why the two amounts might not be equal is that a regulator might make a disallowance to a firm's rate base if an asset that is purchased by the firm and financed by investors is not a prudent investment, or if an asset is not used and useful in providing service. In this case, the *pro forma* TIE ratio would be lower as the numerator would be lower than otherwise because earnings are lower as the authorized rate of return is applied to a rate base that is net of the disallowance. In addition, if investors finance deferred charges, deferred pension expenses, or construction work in progress, for example, the amount of invested capital will exceed the rate base if an allowance for each item is not included in the rate base. If such allowances are excluded from the rate base, the *pro forma* TIE ratio again would be lower than otherwise (as the WACCs in this analysis are not adjusted upward to account for these exclusions from the rate base). *See Morin New Regulatory Finance*, at pp. 15-17, 31-32, 495-97.

[197] The composite federal and state corporate income tax rate is .3825, given a federal income tax rate of .35 and a state income tax rate of .05.

(ii) Historical TIE Ratios

126. Appendix M shows the historical TIE ratio measured at the holding company level for each of the incumbent LECs in the sample, for the period 2010 to 2012, and the average ratios for that three-year period.[198]

127. The average, historical TIE ratio for AT&T, Verizon, and TDS in 2012 is 3.99. The average of the three-year average TIE ratios for these incumbent LECs is 4.43.[199] AT&T and Verizon have high (but not the highest) debt ratings from Moody's (A2 and Baa2 depending on the security, and A2, A3, and Baa1, respectively), Standard & Poor's (A- for both), and Fitch (A for both). AT&T's 2012 TIE ratio is 4.0, while its three-year average ratio is 4.63. Verizon's 2012 TIE ratio is 4.83, while its three-year average ratio is 5.17. TDS has ratings near the low end for investment grade debt from Moody's (Baa2), Standard & Poor's (BBB-), and Fitch (BBB). TDS's 2012 TIE ratio is 3.16, while its three-year average ratio is 3.50.

128. Appendix N shows the bond ratings for each incumbent LEC in the sample. AT&T, Verizon, and TDS currently have investment grade debt ratings from all three of the major debt rating agencies. Each of the other incumbent LECs does not have investment grade debt ratings for all of its debt from as many rating agencies as rated its debt, or does not have a bond rating.

(iii) TIE Ratio Benchmarks

129. To assess the affect changes in the authorized rate of return will have on carriers, we compare carriers' TIE ratios at different WACCs to three TIE ratio benchmarks.[200] We have chosen the following benchmarks

1) RUS standards for hardship loans, after-tax TIE Ratio = 1

2) Federal Financing Bank loans standards, TIE Ratio = 1.25

3) CoBank loans standards, TIE Ratio = 1.5.[201]

130. For purposes of comparison, we also include a comparison of *pro forma* TIE ratios to a TIE ratio of 4.5, which is the average of the TIE ratios from 2010 to 2012 of carriers

[198] Fairpoint is omitted from the actual, historical averages and medians for carriers that have below investment grade debt set forth in Appendix I1-I3 because the relationship between TIE ratios and bond ratings reflected in these summary statistics otherwise would be skewed by this carrier's entry into and exit from bankruptcy.

[199] ACS, CBT, Consolidated Communications, FairPoint, Frontier, and Hawaiian Telcom do not have investment grade stock. CenturyLink's debt is rated investment grade by Moody's and Fitch, while Standard & Poor's rates its debt speculative grade. Some of Windstream's debt is rated investment grade by Moody's, while Standard & Poor's and Fitch rate all of its debt speculative. We regard CenturyLink and Windstream as having speculative grade debt for purposes of this analysis. The actual, historical average TIE ratio for this category of incumbent LECs in 2012, excluding FairPoint, is 1.48. The average of the three-year average TIE ratios for these incumbent LECs is 1.94.

[200] We note that the RUS analysis is conducted using after-tax earnings. A TIE ratio based on after-tax earnings is equal to a TIE ratio based on pre-tax earnings if zero earnings are available to equityholders in the form of dividends or retained earnings after the firm pays its debtholders, creditors, suppliers, etc., because in this case the firm would pay no corporate income taxes. If there are positive earnings available to equityholders, then the pre-tax TIE ratio is greater than the after-tax TIE ratio because in this case the firm would pay corporate income taxes.

[201] *See generally*, 7 C.F.R. § 1714.

that have investment grade bond ratings rounded up to the nearest tenth of a percent (the Investment Grade TIE Ratio). A firm that issues investment grade debt, a grade assigned by the major bond rating agencies, is unlikely to default on its interest obligations and therefore is able to issue debt at a relatively low rate of interest. Bond ratings significantly affect investors' perception of risk, and therefore affect the rate of return that both debt and equity investors require.[202]

131. For this comparison, we compare the *pro forma* TIE ratios for each carrier in the Staff Proposed Proxy, calculated in accordance with the procedure described above, to actual, historical ratios calculated for carriers that have investment grade debt. We calculate actual, historical ratios for each carrier that has investment grade bond ratings by dividing actual, historical earnings before interest and taxes by actual, historical interest expense.

(iv) Analysis of Carrier TIE Ratios at Various WACCs

(a) Carrier TIE Ratios: *Pro Forma*, Pre-Tax, Market Value Capital Structures

132. A rate of return of eight percent, a figure that lies roughly in the middle of the WACC zone of reasonableness, results in an average *pro forma* TIE ratio of 4.46, which is almost equal to the investment grade TIE ratio of 4.5. All carriers have *pro forma* TIE ratios that exceed 1.25, and 15 out of 16 have TIE ratios that exceed 1.5.[203] By comparison, a rate of return of nine percent, a figure roughly at the top of our WACC zone of reasonableness, results in an average *pro forma* TIE ratio of 5.10, and all carriers have a pro forma TIE ratio exceeding 1.5. A significantly higher rate of return, for example, 10 percent, would produce an average *pro forma* TIE ratio of 5.74. All carriers exceed a 1.9 ratio, and three exceed 10.0.

(b) Carrier TIE Ratios: *Pro Forma*, Pre-Tax, Book Value Capital Structures

133. To be cautious, we also calculate *pro forma* ratios based on book value capital structures, instead of the market value capital structures reflected in the *pro forma* ratios discussed above. Appendix L2 also shows the incumbent LEC's *pro forma* TIE ratios for WACC estimates ranging from six percent to 11.25 percent, calculated as explained above (except using book value capital structures). As explained above, a number of the firms in our sample have high shares of debt in their book value capital structures. And the share of debt for these firms based on book value capital structures is much higher than the share based on market value capital structures. On the one hand, the use of market value capital structures to calculate the WACC benefits the incumbent LECs because the WACC is higher than if book value capital structures were used. On the other hand, if book value capital structures are representative of how incumbent LECs finance regulated incumbent LEC services, then the incumbent LECs would have higher interest payments than the payments implicit in the *pro forma* ratios based on

[202] We use a three-year average ratio, not the most recent year's average, because the ratio will fluctuate over time without there necessarily being a change in the debt rating at the same time. None of the firms that currently have the investment grade debt rating had a rating below that at any point during these three years. We do not use an average calculated over a longer period than three years because bond ratings are supposed to be forward-looking.

[203] The *pro forma* TIE ratios reported in this paragraph are calculated based on before-tax earnings. These ratios would be lower if they were based on after-tax earnings if positive earnings are available to equityholders, as these earnings would be subject to corporate income taxes. Thus, these *pro forma* ratios are not directly comparable to the RUS benchmarks. We make the more precise comparison to the RUS benchmarks below.

market value capital structures. Therefore, a given level of earnings would cover interest payments fewer times than indicated by the *pro forma* ratios based on market value capital structures. Another reason to use book values to calculate pr*o forma* TIE ratios is that the TIE ratios that bond ratings agencies and industry analysts examine typically are based on book value data.

134. Based on this second *pro forma* TIE calculation, and given a rate of return of 8 percent, the average *pro forma* TIE ratio is 3.37. Two carriers, FairPoint and CBT, have a TIE ratio below one, three carriers have a ratio below 1.25, and six below 1.5.[204] A rate of return of 9 percent would produce an average TIE ratio of 3.86. Two carriers still have a TIE ratio less than one, one carrier has a TIE ratio of 1.23, all other carriers have a TIE ratio exceeding 1.25, and 13 of 16 exceed 1.5.

(c) Carrier TIE Ratios: *Pro Forma*, After-Tax, Book Value Capital Structures

135. RUS examines after-tax TIE ratios based on book value data. We calculate the *pro forma* TIE ratio a third way, this time on an after-tax basis using book value capital structures, so that these ratios are comparable to the RUS benchmarks, using the following equation: [205]

$$TIE = (((D/(D+E))K_d) + ((E/(D+E))K_{ie}))/((D/(D+E))K_d)$$

Appendix L3 also shows the incumbent LEC's after-tax, book value *pro forma* TIE ratios for WACC estimates ranging from six percent to 11.25 percent.

136. A rate of return of 8 percent produces an average after-tax, *pro forma* TIE ratio of 2.45. At this rate of return, all but two carriers, FairPoint and CBT, have TIE ratios exceeding one. Five carriers have TIE ratios less than 1.25, and seven have TIE ratios less than 1.5. A rate of return of 9 percent produces an average after-tax *pro forma* TIE ratio of 2.76. At this rate of return two carriers still have TIE ratios less than one, three carriers have TIE ratios less than 1.25, and six carriers have TIE ratios less than 1.5. A rate of return of 11.40 percent is required to produce an after-tax *pro forma* TIE ratio that equals or exceeds one for every carrier. At that rate of return, three incumbent LECs still would have after-tax *pro forma* ratios that are less than 1.50, and two would have ratios that are less than 1.25. At the same time, a rate of return that high would produce an average after-tax *pro forma* TIE ratio of 3.50, a ratio that is much higher than all of the RUS benchmarks.

c. TIE Ratio Analysis Conclusion

137. Based on these analyses, we conclude that an authorized rate of return in the top half of the zone of reasonableness would strike a reasonable balance between providing highly leveraged firms with adequate interest payment coverage and providing less leveraged firms with too much coverage.

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[204] *Id*.

[205] The numerator of this equation excludes an allowance for corporate income taxes. This equation is otherwise identical to the TIE equation used to above to calculate *pro forma* TIE ratios based on before-tax earnings.

C. Grants

138. Substantial telecommunications infrastructure grants in recent years[206] raise the issue of how such grants might affect carriers' WACC. Regulated companies should not be receiving any rate of return on grants. When the grants are received directly by the regulated company, the grants must be credited to the appropriate plant account.[207] This will exclude the grant from earning the rate of return and exclude the plant getting depreciation expenses. Crediting the grant to plant account protects the rate payers from paying rate of return on the plant and also paying for depreciation expenses on the plant that gets included in the cost of service. However, given the current freeze of cost category relationships for some rate-of-return carriers,[208] plant accounts credited may not be representative and related expenses, for example, may be allocated unreasonably.

139. When an affiliated company receives a grant, the grant should be transferred to the regulated company in accordance with Part 32 of the Commission's rules.[209] Specifically, the Commission's rules require that for all assets outside of tariff transactions sold by or transferred to a carrier from its affiliate, the asset shall be recorded at no more than the lower of fair market value and net book cost.[210] In this case, only the net book value of the investment in excess of that paid for by the grant would be recorded in the plant account. As above, if the grant is large, this treatment categorization (separations) may not be representative.

140. In the case of large grants, the accounting rules may need to be strengthened and/or modified so that the categorization is more representative and that the investment paid for by grants, whether directly to the regulated company or transferred to the regulated company by an affiliate, does not receive depreciation or return treatment.

IV. CONCLUSION

141. Developments in the telecommunications industry, regulation, and the marketplace since the Commission last established a rate-of-return have significantly changed how the Commission should analyze the rate-of-return carriers should earn. In its last represcription, the Commission could rely primarily on ARMIS reports. Those reports came from companies with investment-grade bond ratings—companies engaged in substantially the same wireline operations as the small incumbent LECs also subject to rate-of-return regulation. Analyst estimates of the expected growth rates of those companies were plentiful and the companies' equity was widely traded.

142. Today, with those ARMIS reports a thing of the past, and with the largest telephone companies increasingly dissimilar from the smaller rate-of-return companies, the Commission must expand its analysis to include smaller carriers to ensure its analysis reasonably

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[206] *See, e.g.*, Broadband Technology Opportunities Program (BTOP) Quarterly Program Status Report, National Telecommunications and Information Administration, Sept. 2012 ("In 2009 and 2010, NTIA invested approximately $4 billion in 233 BTOP projects benefitting every state, as well as five territories and the District of Columbia."), *available at* http://www.ntia.doc.gov/files/ntia/publications/btop_14th_quarterly_report.pdf (last visited Nov. 16, 2012).

[207] 47 C.F.R. § 32.2000.

[208] *Jurisdictional Separations and Referral to the Federal-State Joint Board*, CC Docket No. 80-286, Report and Order, 27 FCC Rcd 5593 (2012) (extending the separations freeze until June 30, 2014).

[209] 47 C.F.R. § 32.01 *et seq*.

[210] 47 C.F.R. § 32.27.

reflects the circumstances of those smaller incumbent LECs. Doing so raises a number of other issues. Firms not frequently traded provide less-reliable data from which to determine cost. Firms in financial distress do not provide meaningful data for some of the essential calculations necessary to determine a reasonable rate of return.

143. Based upon the analysis in this Report, we believe the Commission can address these concerns by using a broad range of publicly-traded incumbent LECs, including the RHCs as well as mid-size carriers and smaller carriers. Using the data from these carriers, the Commission can determine zones of reasonableness based upon two different means of calculating the cost of capital: DCF and CAPM. Based upon the analysis described in this Report, we believe that the range of 7.39 percent to 8.72 percent represents a robust zone of reasonableness from within which to select the authorized rate of return. Analyzing the effects of a new rate of return with a TIE analysis, and given current historically low interest rates and the infrequency of represcription, we conclude that the rate of return should be at the upper half of that zone of reasonableness, from 8.06 percent to 8.72 percent.

144. The data and observations set forth in this Report should provide valuable assistance to the Commission as it moves forward with prescribing an authorized rate of return that ensures just and reasonable rates for customers and helps ensure the stability and sufficiency of the universal service fund while allowing incumbent LECs to continue to maintain their credit and to attract capital.

APPENDIX A

List of *USF/ICC Transformation Further Notice* Commenters and Reply Commenters

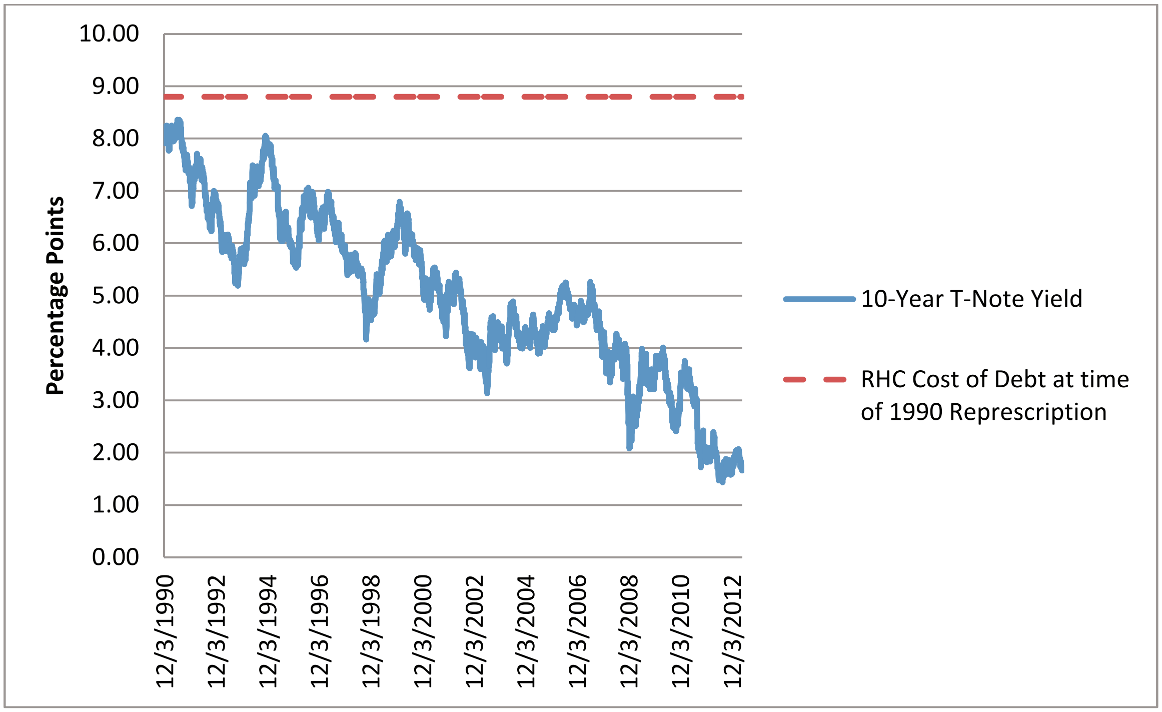
Commenter	**Abbreviation**
Ad Hoc Telecommunications Users Committee	Ad Hoc
Alaska Regulatory Commission	Alaska Commission
Alaska Rural Coalition	ARC
C Spire Wireless	C Spire
CTIA – The Wireless Association	CTIA
Gila River Telecommunications	Gila River
GVNW Consulting	GVNW
Hopi Telecommunications	Hopi
Mescalero Apache Telecom Inc.	MATI
Moss Adams	Moss Adams
National Association of State Utility Consumer Advocates, Maine Office of the Public Advocate, New Jersey Division of Rate Counsel and Utility Reform Network	NASUCA et al.
National Cable & Telecommunications Association	NCTA
Nebraska Rural Independent Companies	Nebraska Rural
NECA, NTCA, OPASTCO and WTA	NECA et al.
Parrish, Blessing & Associates	Parrish
RCA – The Competitive Carriers Association	RCA
Time Warner Cable	Time Warner Cable
T-Mobile USA	T-Mobile
United States Telecom Association	U.S. Telecom
Universal Service for America Coalition	USA Coalition
Windstream Communications	Windstream
Washington Independent Telecommunications Association, Oregon Telecommunications Association, Idaho Telecom Alliance, Montana Telecommunications Association and Colorado Telecommunications Association	Western Associations

Reply Commenter	**Abbreviation**
Alaska Regulatory Commission	Alaska Commission
Cellular South	Cellular South
GTA Telecom	GTA
GVNW Consulting	GVNW
Louisiana Telecommunications Association Small Company Committee	Louisiana Small Committee
Montana Telecommunications Association	Montana Association
National Association of State Utility Consumer Advocates, Maine Office of the Public Advocate and New Jersey Division of Rate Counsel	NASUCA et al.
NECA, NTCA, OPASTCO and WTA	Rural Associations
New Mexico Exchange Carrier Group and Mescalero Apache Telecom Inc.	NMECG and MATI
Pennsylvania Public Utility Commission	PA PUC
RCA – The Competitive Carriers Association	RCA

Rural Iowa Independent Telephone Association	RIITA
Texas Statewide Telephone Cooperative, Inc.	TSTCI
Universal Service for America Coalition	USA Coalition

Appendix B

Comparison of RHC Embedded Cost of Debt Found in 1990 Represcription with 10-Year Treasury Note Yield



Annualized daily yields on 10 year Treasury Notes. Source: SNL Kagan

APPENDIX C

Discussion of Book Values and Market Values in Calculation of Capital Structure

1. This appendix discusses the strengths and weaknesses of using book and market values to estimate the capital structure of a firm. The book value of a firm is the book value of its equity plus the book value of its liabilities. The market value of a firm is the amount that would have to be paid in a competitive market to purchase the company and fulfill all of its financial obligations, *i.e*., it is equal to the sum of the market values of the firms' equity and debt. Regulators, including the FCC, typically use book values to determine the capital structure of firms, while academics and financial analysts favor target values or in their defect market values, while advising against book values.[1]

2. While the book and market values of debt are often similar, the book and market values of equity are not. This difference will lead to different capital structure and WACC estimates depending on which one is used.

A. Book Value

3. Book equity records the nominal value of the financial investments made in a company at the time those investments were made. The book value of equity is the sum of the nominal dollar value at which funds were invested in the company by the owner(s), plus the nominal value of earnings retained throughout the history of the firm. Book equity can be split into two components, neither of which will reflect market valuation: the historical market value of a company's shares at the time they were issued (share capital plus additional paid-in capital), and aggregate retained earnings, recorded in nominal values. When new business opportunities open up for a company and new future profits seem likely, book values of equity will not immediately reflect this, even though market values automatically will; and when past investments are demonstrated to have been unwise, book values are not revised downward as market values are.

4. There are a number of arguments that support the use of book values when determining a firm's WACC. Some rate-of-return practitioners argue that the target capital structure is reflected in the book values, not the market values, of debt and equity.[2] If a firm over

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[1] *See*, *e.g*., H. Kent Baker, J. Clay Singleton, and E. Theodore Veit, Survey Research in Corporate Finance: Bridging the Gap between Theory and Practice at 142 (Oxford University Press 2011) ("Finance theory specifies that the weights used to calculate WACC should reflect a firm's target capital structure . . . . Clearly, the weights used to calculate WACC should not be book-value weights appearing on the firm's balance sheet, unless, by coincidence, they also happen to be the capital structure weights that maximize the firm's stock price. Book-value weights of debt and equity ignore current market conditions . . . . Some experts advocate using market-value weights based on the number of shares of common stock, the market price per share, and the market value of a firm's outstanding debt. [This] is clearly better than using book-value weights.")

[2] *See Morin New Regulatory Finance* at 452. *See also* John R. Graham and Campbell R. Harvey, How Do CFOs Make Capital Budgeting and Capital Structure Decisions? J. APP. CORP. FIN. at 12-13 (2002). The authors found from a survey of 392 CFOs that 19% of firms do not have a target debt ratio; 37% have a flexible target; 34% have a somewhat tight target or range; and 10% have a strict target. Among regulated firms, 67% were found to have tight or somewhat strict targets. The authors also found that only 16.4% of firms say that changes in the market value of equity are important or very important to their debt decisions. In the Virginia Arbitration, the parties debated the merits of using book or market values to estimate a firm's target capital structure. *See also* Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the

time issues debt and equity in increments so as to maintain a long-run target capital structure that is based on book values, then the return needed to cover the costs of debt and equity has to be based on book value proportions because these are the actual proportions in which these funds are issued. In fact, regulators conventionally allow a rate of return on the actual equity and debt issued, which is what book value reflects.[3] In that case, it is (obviously) logically consistent to use book value weights (along with the embedded cost of debt) to determine the WACC because the rate of return (which is based upon the WACC) is applied to an original cost rate base[4] (essentially a book value rate base). Such ratemaking also is easy to understand and is administratively efficient.[5]

5. Use of book value weights (along with the embedded cost of debt and a book value rate base) is consistent with the belief that investors' right to a fair and reasonable rate of return on the capital applies to what they have actually invested in the firm.[6] Moreover, as the contractual obligation as to the amount of interest payments on existing debt is fixed, regulators prevent equity holders from realizing "windfall" gains or losses when the market rate of interest increases or decreases by allowing the firm to earn a return equal to the embedded cost of debt times the book value of debt, plus the cost of equity times the book value of equity.[7] Further, if investors expect a regulated firm actually to earn a return on a book value rate base that, on average, over a long period of time, is equal to its cost of capital, then the market value of the firm will (approximately) equal its book value.[8] Regulation could then be viewed as successful if

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Communication Act for Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration, CC Docket Nos. 00-218, 00-251 (*Virginia Arbitration*), Rebuttal Testimony of Dr. James H. Vanderweide on behalf of Verizon Virginia, Inc. at 24-37, dated Aug. 27, 2001; and Surrebuttal Testimony of John I. Hirshleifer on behalf of AT&T and Worldcom, Inc., at 53-59, dated Sept. 21, 2001.

[3] The one instance where the Commission used market values of debt and equity to estimate the capital structure was in the Virginia Arbitration, where the rate base to which the rate of return was applied was a market value rate base consistent with the Commission's Total Element Long Run Incremental Cost or TELRIC rules that governed in that proceeding. Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the Communication Act for Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration, CC Docket Nos. 00-218, 00-251, Memorandum Opinion and Order, 18 FCC Rcd 17722, 17753-58, paras. 65-76 (WCB 2003).

[4] For example, assume that a regulated firm has an embedded cost of debt of 5% (that is, the firm is contractually obligated to pay debt holders a coupon rate of 5%), a cost of equity of 10%, and book value rate base equal to $100, $50 of which is financed by debt holders and $50 dollars of which is financed by equity holders. The book value weights of debt and equity are thus both 50% ($50/$100). The WACC is 7.5%, given these assumptions ((.5 x .05) + (.5 x .1)), and the total required return on rate base is $7.50 (.075 x $100). Of that total return, the debt holders receive $2.50, or a 5% rate of return ($2.50/$50), which is precisely equal the cost of debt. And equity holders receive a return of $5.00, or a 10% rate of return ($5.00/$50), which is precisely equal to the cost of equity.

[5] Conversely, such ratemaking does not perform well in terms of rationing customer demand or incenting managerial efficiency. *See*, James Bonbright, Albert Danielsen, and David Kamerschen, Principles of Public Utility Rates at 300 (Public Utility Reports, 2d ed. 2008).

[6] *U.S. v. FCC*, 707 F.2d 610, 612 (D.C. Cir. 1983).

[7] *Morin New Regulatory Finance* at 452.

[8] For example, consider a firm that has a zero long-term growth rate and no debt. These assumptions require that the firm pays a dividend, otherwise the firm must grow, at least if it is being operated efficiently. Assume that the firm's rate base equals net book value.

the book values and the market values of equity are (approximately) equal to each other.[9]

6. Book values also provide investors with stability and therefore protect the rate-of-return calculation against the vagaries reflected in the variability of the market's valuation of the firm's debt and equity.[10] Such market variation can be substantial.

7. Finally, the use of book values avoids the circularity problem associated with use of market values. Specifically, unlike book values, market values reflect investors' expectations as to the current or anticipated *authorized* rate of return, while the regulator is trying to determine what the authorized rate of return should be independent of market expectations about the current or anticipated authorized rate of return.[11]

8. Despite this, book values have a fundamental difficulty: accounting processes do not effectively capture changes in prices, technology, demand and other circumstances, and consequently, book values become increasingly disconnected from the underlying assets they are intended to represent. In some cases, this disconnection can be so severe as to render book values meaningless.

B. Market Value

9. The basic critique of book values, just foreshadowed, is that they are not *economically* meaningful. As a result, it is a standard practice in applied corporate finance to infer the target capital structure of a firm on the basis of the market value of its equity, debt, and other sources of capital.[12] The basic argument in favor of this is that market values reflect exactly the underlying net value of the firm and it assets (at least as presently priced by the market). However, whether this reflects the target capital structure, rather than merely the current capital

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A rate-of-return carrier's expected earnings, E, are equal to the allowable rate of return, r, times rate base, assumed to equal book value, B. Thus, E = r x B. The easiest way to identify the firm's dividend stream is to assume it pays a constant steady-state dividend, D, consistent with the zero growth assumption, that is, D equals earnings (assuming zero growth), or D = r x B. The present value of such a stream is r x B/ k, where k is the market-determined cost of capital for the firm. Alternative dividend streams that would satisfy investors and the zero growth assumption must have the same present value as this dividend stream; otherwise they would either affect growth assumptions or fail to satisfy investors.

The market value, M, of a firm's stock is the present value of the future dividends investors expect to receive, discounted at the risk-adjusted cost of capital, k: M = D/k = (r x B)/k. Thus, M/B = r/k. The simplest and really only plausible case for which this formula is true is where M = B and r = k.

See A. Lawrence Kolbe, James A. Read, Jr., and George R. Hall, The Cost of Capital, Estimating the Rate of Return for Public Utilities at 25-33 (The MIT Press 1984).

[9] *Morin New Regulatory Finance* at 452. This argument should be understood in the narrow sense of evaluating the outcome, i.e., the end result, of the rate-setting process; it should not to be construed as endorsing as a starting point an approach by which regulators would set rates so as to produce a market equity-to-book equity ratio of 1. We note that economic theory suggests that in the long-run in a competitive industry the market value of a firm's common equity should equal the replacement cost of its assets, which will not necessarily be the case when the market and book values of equity are equal. *See Morin New Regulatory Finance* at 376-378.

[10] *See*, *e.g*., Charles F. Phillips, Jr., The Regulation of Public Utilities at 336-38 (Public Utilities Reports, Inc. 1993); *Morin New Regulatory Finance* at 452.

[11] *Morin New Regulatory Finance* at 452-53.

[12] *See generally* Tom Copeland, Tim Koller, and Jack Murrin, Valuation: Measuring and Managing the Value of Companies, Chapter 10 (McKinsey & Company, Inc. 2000).

structure of the firm, remains an open question. There is evidence that financial managers very often ignore the market value of equity when deciding on how much debt firms should issue.[13]

10. Market values have the additional advantage of being readily and objectively observable, at least in the case of publicly listed companies.

11. Using market values, however, presents a regulatory difficulty: market forces determine the value of a firm's debt and equity based on expectation of that firm's earning capacity, which is exactly what the regulator is trying to control in setting a regulated rate of return. This introduces circularity in the reasoning. To see this problem, consider a rate of return that inadvertently allows monopoly pricing. Investors, seeing an attractive asset in the form of the regulated firm, will seek to buy it, driving its price up until the expected return on the investment exactly compensates the marginal investor for the risk associated with holding that asset. This means that if the regulator checks whether they set the right rate of return, it will appear that they in fact have, because the market price of the asset adjusted to bring expected returns to investors in line with all other investment opportunities. Thus, to know what the right rate of return is, the regulator must be careful in treating market valuations as given.

[13] *See* John R. Graham and Campbell R. Harvey, How Do CFOs Make Capital Budgeting and Capital Structure Decisions? J. APP. CORP. FIN. at 12-13 (2002).

Appendix D1

Historical Book Value Shares of Debt

Company	2012	2011	2010	2009	2008	Average
Alaska Communications Systems Group (ACS)	1.07	1.10	1.04	0.95	0.95	1.02
AT&T Inc. (T)	0.42	0.37	0.35	0.39	0.39	0.38
CenturyLink (CTL)	0.50	0.51	0.43	0.43	0.51	0.48
Cincinnati Bell Inc. (CBB)	1.35	1.40	1.36	1.50	1.57	1.44
Consolidated Communications Holdings (CNSL)	0.90	0.95	0.92	0.92	0.92	0.92
FairPoint (FRP)	1.50	1.12	-0.01	0.00	0.99	NA
Frontier Communications Corporation (FTR)	0.67	0.65	0.61	0.93	0.90	0.75
Hawaiian Telcom (HCOM)	0.69	0.63	NA	NA	NA	NA
HickoryTech Corp (HTCO)	0.73	0.73	0.73	0.78	0.81	0.76
Lumos (LMOS)	0.82	0.86	0.40	0.00	NA	NA
New Ulm (NULM)	0.43	0.43	0.45	0.47	0.50	0.46
Shenandoah Telecommunications Company (SHEN)	0.53	0.45	0.49	0.14	0.18	0.36
Telephone and Data Systems (TDS)	0.27	0.25	0.25	0.25	0.27	0.26
Verizon (VZ)	0.36	0.37	0.34	0.40	0.37	0.37
Alteva (ALTV)	0.49	0.00	0.03	0.07	0.11	0.14
Windstream (WIN)	0.88	0.86	0.90	0.96	0.96	0.91
	0.73	0.67	0.55	0.55	0.67	0.63
Group	**Average**					
RHCs	0.43	0.41	0.37	0.41	0.42	0.41
Mid-Size	1.03	0.96	0.78	0.87	1.07	1.03
Publicly-Traded RLECs	0.60	0.52	0.47	0.37	0.46	0.48

Appendix D2

Historical Market Value Shares of Debt

Company	2012	2011	2010	2009	2008	Average
Alaska Communications Systems Group	0.86	0.80	0.52	0.60	0.57	0.67
AT&T Inc.	0.26	0.25	0.25	0.28	0.27	0.26
CenturyLink	0.44	0.48	0.34	0.40	0.55	0.44
Cincinnati Bell Inc.	0.71	0.81	0.82	0.74	0.82	0.78
Consolidated Communications Holdings	0.66	0.61	0.61	0.63	0.72	0.64
FairPoint	0.82	0.90	1.00	0.00	0.89	NA
Frontier Communications Corporation	0.66	0.62	0.45	0.66	0.63	0.61
Hawaiian Telcom	0.65	0.51	NA	NA	NA	NA
HickoryTech Corp	0.51	0.44	0.47	0.51	0.64	0.51
Lumos	0.59	0.50	1.00	1.00	NA	NA
New Ulm	0.58	0.53	0.61	0.60	0.56	0.58
Shenandoah Telecommunications Company	0.39	0.39	0.29	0.06	0.05	0.23
Telephone and Data Systems	0.42	0.35	0.28	0.29	0.31	0.33
Verizon	0.28	0.31	0.31	0.37	0.33	0.32
Alteva	0.19	0.00	0.01	0.04	0.08	0.06
Windstream	0.62	0.56	0.51	0.57	0.57	0.57
Average	0.54	0.50	0.50	0.45	0.50	0.46
Group	**Average**					
RHCs	0.33	0.35	0.30	0.35	0.38	0.34
Mid-Size	0.72	0.70	0.66	0.51	0.70	0.66
Publicly-Traded RLECs	0.47	0.40	0.47	0.45	0.39	0.39

Appendix E

Embedded Cost of Debt

Carrier	2011 Non-current Long-term Debt	2012 Debt Non-current Long-term Debt	2012 Interest Expense	Embedded Cost of Debt
HTCO	$118,828,000	$135,133,000	$5,749,000	4.53%
TDS	$1,529,857,000	$1,721,571,000	$86,745,000	5.34%
NULM	$39,809,000	$42,494,000	$2,227,000	5.41%
SHEN	$158,662,000	$230,200,000	$7,850,000	4.04%
CNSL	$875,719,000	$1,208,248,000	$72,604,000	6.97%
LMOS	$323,897,000	$304,325,000	$11,921,000	3.80%
ALTV	$0	$14,095,000	$415,000	5.89%
RoR Average	**$435,253,143**	**$522,295,143**	**$26,787,286**	**5.14%**
WIN	$8,936,700,000	$8,114,900,000	$625,100,000	7.33%
ALSK	$538,624,000	$533,772,000	$39,570,000	7.38%
HCOM	$297,400,000	$292,410,000	$22,183,000	7.52%
FTR	$8,224,392,000	$8,405,488,000	$687,985,000	8.27%
FRP	$992,690,000	$948,470,000	$67,610,000	6.97%
CBB	$2,520,600,000	$2,676,000,000	$218,900,000	8.42%
Midsize Average	**$3,585,067,667**	**$3,495,173,333**	**$276,891,333**	**7.65%**
CTL	$21,355,259,000	$19,399,644,000	$1,319,000,000	6.47%
VZ	$50,303,000,000	$47,618,000,000	$2,571,000,000	5.25%
T	$61,299,737,000	$66,358,483,000	$3,444,000,000	5.40%
RBOC Average	**$44,319,332,000**	**$44,458,709,000**	**$2,444,666,667**	**5.71%**
Average for All Carriers	**$9,844,698,375**	**$9,875,202,063**	**$573,928,688**	**6.19%**

Appendix F

Betas

Carrier	Betas (Daily Data)	Betas (Weekly Data)	Betas (Monthly Data)	Betas (Weekly Data, Adjusted Towards 1)	Value Line Beta
HTCO	0.49	0.67	0.88	0.78	NA
TDS	1.08	1.12	1.03	1.08	0.95
NULM	-0.14	0.24	-0.28	0.50	NA
SHEN	1.53	1.31	0.85	1.21	0.85
CNSL	0.94	1.03	1.08	1.02	0.85
LMOS	0.73	0.73	0.33	0.82	NA
ALTV	0.18	0.29	0.42	0.52	NA
RoR Average	**0.69**	**0.77**	**0.61**	**0.85**	**0.88**
WIN	0.82	0.91	1.04	0.94	0.95
ALSK	0.85	0.76	0.66	0.84	0.75
HCOM	0.42	0.62	0.79	0.74	NA
FTR	0.84	0.94	0.77	0.96	0.95
FRP	1.83	1.25	1.22	1.16	NA
CBB	1.10	1.46	1.19	1.30	1.05
Midsize Average	**0.98**	**0.99**	**0.95**	**0.99**	**0.93**
CTL	0.73	0.70	0.74	0.80	0.75
VZ	0.70	0.74	0.56	0.83	0.65
T	0.77	0.72	0.68	0.81	0.70
RBOC Average	**0.73**	**0.72**	**0.66**	**0.81**	**0.70**
Average for All Carriers	**0.81**	**0.84**	**0.75**	**0.89**	**0.85**

Appendix G

T-statistics and R-squared Values of Monthly, Weekly, and Daily Betas Used in CAPM

	betas using monthly data		betas using weekly data		betas using daily data	
Carrier	**t-statistic**	**r-squared**	**t-statistic**	**r-squared**	**t-statistic**	**r-squared**
HCOM	4.23	0.0305	3.03	0.0733	1.77	0.1108
HTCO	4.95	0.2968	7.83	0.1922	11.03	0.0883
TDS	5.45	0.3388	14.07	0.4341	31.75	0.4451
NULM	-1.33	0.0295	1.9	0.0137	-1.99	0.0032
SHEN	3.63	0.1851	11.05	0.3212	32.19	0.4519
CNSL	8.09	0.5305	14.34	0.4434	30.71	0.4286
LMOS	0.32	0.0072	1.92	0.0501	3.49	0.0338
ALTV	3.3	0.158	4.82	0.0827	5.31	0.022
WIN	7.91	0.5192	13.21	0.4035	32.21	0.4521
ALSK	2.55	0.1012	6.63	0.1455	18.52	0.2143
FTR	5.19	0.317	11.58	0.3418	26.01	0.3498
FRP	1.82	0.121	3.51	0.1009	11.36	0.1917
CBB	5.12	0.3114	13.73	0.4223	24.6	0.3251
CTL	6.27	0.4039	10.35	0.2935	26.77	0.3632
VZ	5.71	0.3599	15.4	0.4789	36.12	0.5093
T	8.19	0.5366	17.63	0.5465	43.6	0.6019

Appendix H

Cost of Equity: Capital Asset Pricing Model

Carrier	Cost of Equity (Daily Betas)	Cost of Equity (Weekly Betas)	Cost of Equity (Monthly Betas)	Cost of Equity (Weekly, Adjusted Betas)	Cost of Equity (Value Line Betas)
HTCO	4.79%	5.85%	7.07%	6.50%	NA
TDS	8.30%	8.53%	7.95%	8.29%	7.51%
NULM	1.12%	3.35%	0.28%	4.83%	NA
SHEN	10.90%	9.61%	6.89%	9.01%	6.92%
CNSL	7.45%	7.96%	8.26%	7.91%	6.92%
LMOS	6.22%	6.19%	3.84%	6.73%	NA
ALTV	2.99%	3.61%	4.40%	5.00%	NA
RoR Average	**5.97%**	**6.44%**	**5.53%**	**6.90%**	**7.11%**
WIN	6.76%	7.29%	8.03%	7.46%	7.51%
ALSK	6.92%	6.37%	5.82%	6.84%	6.33%
HCOM	4.37%	5.54%	6.55%	6.30%	NA
FTR	6.89%	7.44%	6.46%	7.56%	7.51%
FRP	12.67%	9.25%	9.10%	8.77%	NA
CBB	8.42%	10.48%	8.92%	9.59%	8.09%
Midsize Average	**7.67%**	**7.73%**	**7.48%**	**7.75%**	**7.36%**
CTL	6.22%	6.04%	6.26%	6.63%	6.33%
VZ	6.02%	6.28%	5.19%	6.78%	5.74%
T	6.43%	6.14%	5.93%	6.69%	6.04%
RBOC Average	**6.23%**	**6.15%**	**5.80%**	**6.70%**	**6.04%**
Average for All Carriers	**6.65%**	**6.87%**	**6.31%**	**7.18%**	**6.89%**

Appendix I1

Weighted Average Cost of Capital

Carrier	Debt/ (Debt+ Equity)	Embedded Cost of Debt	Cost of Equity (CAPM Using Weekly, Adjusted Betas)	Cost of Equity (DCF Using Zacks EPS growth estimates)	CAPM WACC	DCF WACC
HTCO	50.67%	4.53%	6.50%	NA	5.50%	NA
TDS	41.85%	5.34%	8.29%	6.52%	7.05%	6.03%
NULM	58.12%	5.41%	4.83%	NA	5.17%	NA
SHEN	38.56%	4.04%	9.01%	NA	7.09%	NA
CNSL	65.57%	6.97%	7.91%	10.88%	7.29%	8.31%
LMOS	58.55%	3.80%	6.73%	7.43%	5.01%	5.30%
ALTV	18.99%	5.89%	5.00%	NA	5.17%	NA
RoR Average	**47.47%**	**5.14%**	**6.90%**	**8.28%**	**6.04%**	**6.55%**
WIN	62.49%	7.33%	7.46%	13.41%	7.38%	9.61%
ALSK	85.74%	7.38%	6.84%	NA	7.30%	NA
HCOM	59.30%	7.52%	6.30%	NA	7.02%	NA
FTR	66.30%	8.27%	7.56%	15.14%	8.03%	10.59%
FRP	81.95%	6.97%	8.77%	NA	7.29%	NA
CBB	70.69%	8.42%	9.59%	NA	8.77%	NA
Midsize Average	**71.08%**	**7.65%**	**7.75%**	**14.27%**	**7.63%**	**10.10%**
CTL	44.22%	6.47%	6.63%	10.06%	6.56%	8.48%
VZ	27.80%	5.25%	6.78%	11.77%	6.36%	9.96%
T	26.07%	5.40%	6.69%	10.98%	6.36%	9.53%
RBOC Average	**32.70%**	**5.71%**	**6.70%**	**10.94%**	**6.42%**	**9.32%**
Average for All Carriers	**53.55%**	**6.19%**	**7.18%**	**10.77%**	**6.71%**	**8.47%**

Appendix I2

Weighted Average Cost of Capital: Alternative Specifications of CAPM Betas

Carrier	Daily Beta WACC	Weekly Beta WACC	Monthly Beta WACC	Adjusted Weekly Beta WACC	Value Line Beta WACC
HTCO	4.66%	5.18%	5.78%	5.50%	NA
TDS	7.06%	7.19%	6.85%	7.05%	6.60%
NULM	3.62%	4.55%	3.26%	5.17%	NA
SHEN	8.25%	7.46%	5.79%	7.09%	5.81%
CNSL	7.14%	7.31%	7.41%	7.29%	6.95%
LMOS	4.80%	4.79%	3.81%	5.01%	NA
ALTV	3.54%	4.04%	4.69%	5.17%	NA
RoR Average	**5.58%**	**5.79%**	**5.37%**	**6.04%**	**6.45%**
WIN	7.12%	7.32%	7.59%	7.38%	7.40%
ALSK	7.31%	7.24%	7.16%	7.30%	7.23%
HCOM	6.24%	6.72%	7.13%	7.02%	NA
FTR	7.81%	7.99%	7.66%	8.03%	8.02%
FRP	8.00%	7.38%	7.35%	7.29%	NA
CBB	8.42%	9.03%	8.57%	8.77%	8.33%
Midsize Average	**7.48%**	**7.61%**	**7.58%**	**7.63%**	**7.74%**
CTL	6.33%	6.23%	6.35%	6.56%	6.39%
VZ	5.81%	5.99%	5.21%	6.36%	5.61%
T	6.16%	5.95%	5.79%	6.36%	5.87%
RBOC Average	**6.10%**	**6.06%**	**5.79%**	**6.42%**	**5.96%**
Average for All Carriers	**6.39%**	**6.52%**	**6.28%**	**6.71%**	**6.82%**

Appendix I3

Weighted Average Cost of Capital: Alternative Sources of Analyst Projections for DCF

Carrier	Yahoo DCF WACC	CNN Money DCF WACC	Reuters DCF WACC	Zacks DCF WACC	Midpoint WACC
HTCO	7.07%	11.34%	NA	NA	9.21%
TDS	6.03%	6.03%	NA	6.03%	6.03%
NULM	NA	NA	NA	NA	NA
SHEN	12.29%	11.04%	NA	NA	11.66%
CNSL	8.31%	8.31%	8.31%	8.31%	8.31%
LMOS	5.30%	5.30%	NA	5.30%	5.30%
ALTV	NA	NA	NA	NA	NA
RoR Average	**7.80%**	**8.40%**	**8.31%**	**6.55%**	**8.10%**
WIN	4.45%	8.35%	6.31%	9.61%	7.03%
ALSK	6.49%	6.49%	NA	NA	6.49%
HCOM	NA	NA	NA	NA	NA
FTR	11.14%	9.47%	9.78%	10.59%	10.31%
FRP	NA	NA	NA	NA	NA
CBB	NA	NA	NA	NA	NA
Midsize Average	**7.36%**	**8.10%**	**8.05%**	**10.10%**	**7.94%**
CTL	6.61%	6.64%	7.10%	8.48%	7.54%
VZ	9.23%	11.99%	8.79%	9.96%	10.39%
T	9.29%	9.64%	9.53%	9.53%	9.46%
RBOC Average	**8.38%**	**9.42%**	**8.47%**	**9.32%**	**9.13%**
Average for All Carriers	**7.84%**	**8.60%**	**8.30%**	**8.47%**	**8.34%**

Appendix J

Cost of Equity Using Discounted Cash Flow Model

Carrier	Cost of Equity (Yahoo DCF Estimates)	Cost of Equity (CNNMoney DCF Estimates)	Cost of Equity (Reuters DCF Estimates)	Cost of Equity (Zacks DCF Estimates)	Cost of Equity (DCF Midpoint)
HTCO	9.68%	18.34%	NA	NA	14.01%
TDS	6.52%	6.52%	NA	6.52%	6.52%
NULM	NA	NA	NA	NA	NA
SHEN	17.47%	15.43%	NA	NA	16.45%
CNSL	10.88%	10.88%	10.88%	10.88%	10.88%
LMOS	7.43%	7.43%	NA	7.43%	7.43%
ALTV	NA	NA	NA	NA	NA
RoR Average	**10.40%**	**11.72%**	**10.88%**	**8.28%**	**11.06%**
WIN	-0.35%	10.04%	4.62%	13.41%	6.53%
ALSK	1.11%	1.11%	NA	NA	1.11%
HCOM	NA	NA	NA	NA	NA
FTR	16.79%	11.83%	12.75%	15.14%	14.31%
FRP	NA	NA	NA	NA	NA
CBB	NA	NA	NA	NA	NA
Midsize Average	**5.85%**	**7.66%**	**8.68%**	**14.27%**	**7.32%**
CTL	6.72%	6.77%	7.59%	10.06%	8.39%
VZ	10.76%	14.58%	10.15%	11.77%	12.37%
T	10.67%	11.13%	10.98%	10.98%	10.90%
RBOC Average	**9.38%**	**10.83%**	**9.58%**	**10.94%**	**10.55%**
Average for All Carriers	**8.88%**	**10.37%**	**9.49%**	**10.77%**	**9.90%**

Appendix K

CAPM and DCF WACC Ranges

Carrier	CAPM Cost of Equity Lower Bound	CAPM Cost of Equity Upper Bound	DCF Cost of Equity Lower Bound	DCF Cost of Equity Upper Bound	CAPM WACC Lower Bound	CAPM WACC Upper Bound	DCF WACC Lower Bound	DCF WACC Upper Bound
HTCO	7.82%	10.13%	14.01%	14.01%	6.15%	7.29%	9.21%	9.21%
TDS	10.12%	13.34%	6.52%	6.52%	8.12%	9.99%	6.03%	6.03%
NULM	5.67%	7.14%	NA	NA	5.52%	6.13%	NA	NA
SHEN	11.05%	14.63%	16.45%	16.45%	8.34%	10.55%	11.66%	11.66%
CNSL	9.63%	12.66%	10.88%	10.88%	7.88%	8.93%	8.31%	8.31%
LMOS	8.11%	10.54%	7.43%	7.43%	5.58%	6.59%	5.30%	5.30%
ALTV	5.89%	7.45%	NA	NA	5.89%	7.15%	NA	NA
RoR Average	**8.33%**	**10.84%**	**11.06%**	**11.06%**	**6.78%**	**8.09%**	**8.10%**	**8.10%**
WIN	9.05%	11.85%	7.33%	13.02%	7.98%	9.03%	7.33%	9.47%
ALSK	8.26%	10.75%	7.38%	13.07%	7.51%	7.86%	7.38%	8.19%
HCOM	7.55%	9.77%	NA	NA	7.54%	8.43%	NA	NA
FTR	9.18%	12.03%	14.31%	14.31%	8.58%	9.54%	10.31%	10.31%
FRP	10.74%	14.20%	NA	NA	7.65%	8.27%	NA	NA
CBB	11.79%	15.67%	NA	NA	9.41%	10.55%	NA	NA
Midsize Average	**9.43%**	**12.38%**	**9.67%**	**13.47%**	**8.11%**	**8.95%**	**8.34%**	**9.32%**
CTL	7.98%	10.36%	8.39%	8.39%	7.31%	8.64%	7.54%	7.54%
VZ	8.18%	10.64%	12.37%	12.37%	7.37%	9.14%	10.39%	10.39%
T	8.07%	10.48%	10.90%	10.90%	7.37%	9.15%	9.46%	9.46%
RBOC Average	**8.08%**	**10.49%**	**10.55%**	**10.55%**	**7.35%**	**8.98%**	**9.13%**	**9.13%**
Average for All Carriers	**8.69%**	**11.35%**	**10.54%**	**11.58%**	**7.39%**	**8.58%**	**8.45%**	**8.72%**

Appendix L1

Pro Forma Pre-Tax Times-Interest-Earned Ratios (Market Value Capital Structures)

Carrier	If WACC = 0.06 then TIE =	If WACC = 0.07 then TIE =	If WACC = 0.08 then TIE =	If WACC = 0.09 then TIE =	If WACC = 0.10 then TIE =	If WACC = 0.1125 then TIE =
HickoryTech Corp.	3.62	4.32	5.03	5.73	6.44	7.32
Telephone and Data Systems, Inc.	3.73	4.46	5.18	5.91	6.63	7.54
New Ulm Telecom Inc.	2.47	2.98	3.50	4.01	4.53	5.17
Shenandoah Telecommunications	5.62	6.66	7.70	8.74	9.78	11.08
Consolidated Communications	1.51	1.86	2.22	2.57	2.93	3.37
Lumos Networks Corp.	3.75	4.48	5.21	5.94	6.67	7.58
Alteva	8.07	9.52	10.97	12.41	13.86	15.67
RoR Average	4.11	4.90	5.69	6.47	7.26	8.25
Windstream Corporation	1.50	1.85	2.21	2.56	2.91	3.36
Alaska Communications Systems	0.95	1.17	1.43	1.68	1.94	2.26
Hawaiian Telcom.	1.56	1.92	2.28	2.65	3.01	3.46
Frontier Communications	1.15	1.45	1.74	2.04	2.33	2.70
FairPoint Communications, Inc.	1.08	1.37	1.65	1.93	2.22	2.57
Cincinnati Bell	1.01	1.28	1.56	1.83	2.10	2.44
Midsize Average	1.21	1.51	1.81	2.12	2.42	2.80
CenturyLink	2.78	3.34	3.91	4.47	5.04	5.75
Verizon	6.04	7.15	8.26	9.37	10.48	11.86
ATT	6.29	7.44	8.59	9.74	10.89	12.33
RBOC Average	5.03	5.98	6.92	7.86	8.80	9.98
Average for All Carriers	3.20	3.83	4.46	5.10	5.74	6.53

Appendix L2

Pro Forma Pre-Tax Times-Interest-Earned Ratios (Book Value Capital Structures)

Carrier	If WACC = 0.06 then TIE =	If WACC = 0.07 then TIE =	If WACC = 0.08 then TIE =	If WACC = 0.09 then TIE =	If WACC = 0.10 then TIE =	If WACC = 0.1125 then TIE =
HickoryTech Corp.	2.30	2.79	3.28	3.76	4.25	4.86
Telephone and Data Systems.	6.13	7.25	8.38	9.50	10.62	12.03
New Ulm Telecom Inc.	3.53	4.22	4.91	5.61	6.30	7.16
Shenandoah Telecom	3.96	4.72	5.49	6.25	7.01	7.97
Consolidated.	0.96	1.19	1.45	1.71	1.97	2.29
Lumos Networks Corp.	2.48	3.00	3.52	4.04	4.55	5.20
Alteva	2.73	3.29	3.85	4.41	4.97	5.66
RoR Average	3.16	3.78	4.41	5.04	5.67	6.45
Windstream Corporation	0.93	1.14	1.39	1.64	1.89	2.20
Alaska Communications	0.76	0.82	1.02	1.23	1.43	1.69
Hawaiian Telcom	1.90	2.31	2.73	3.15	3.57	4.10
Frontier Communications	1.13	1.42	1.71	2.01	2.30	2.66
FairPoint Communications	0.57	0.67	0.76	0.86	0.95	1.12
Cincinnati Bell	0.53	0.61	0.70	0.79	0.88	0.99
Midsize Average	0.97	1.16	1.39	1.61	1.84	2.13
Century Link	2.37	2.87	3.37	3.87	4.37	4.99
Verizon	4.55	5.42	6.28	7.14	8.00	9.08
ATT	3.70	4.42	5.14	5.86	6.57	7.47
RBOC Average	3.54	4.24	4.93	5.62	6.32	7.18
Average for All Carriers	2.41	2.88	3.37	3.86	4.35	4.97

Appendix L3

Pro Forma After-Tax Times-Interest-Earned Ratios
(Book Value Capital Structures)

Carrier	If WACC = 0.06 then TIE =	If WACC = 0.07 then TIE =	If WACC = 0.08 then TIE =	If WACC = 0.09 then TIE =	If WACC = 0.10 then TIE =	If WACC = 0.1125 then TIE =
HickoryTech Corp.	1.80	2.11	2.41	2.71	3.01	3.38
Telephone and Data Systems, Inc.	4.17	4.86	5.55	6.25	6.94	7.81
New Ulm Telecom Inc.	2.56	2.99	3.42	3.84	4.27	4.81
Shenandoah Telecom	2.83	3.30	3.77	4.24	4.71	5.30
Consolidated Communications	0.96	1.12	1.28	1.44	1.60	1.80
Lumos Networks Corp.	1.92	2.24	2.56	2.87	3.19	3.59
Alteva	2.07	2.41	2.76	3.10	3.45	3.88
RoR Average	2.33	2.72	3.11	3.49	3.88	4.37
Windstream Corporation	0.93	1.08	1.24	1.39	1.55	1.74
Alaska Communications Systems	0.76	0.89	1.01	1.14	1.27	1.43
Hawaiian Telcom	1.55	1.81	2.07	2.33	2.59	2.91
Frontier Communications	1.08	1.26	1.44	1.62	1.80	2.03
FairPoint Communications, Inc.	0.57	0.67	0.76	0.86	0.95	1.07
Cincinnati Bell	0.53	0.61	0.70	0.79	0.88	0.99
Midsize Average	0.90	1.05	1.20	1.36	1.51	1.69
Century Link	1.85	2.16	2.46	2.77	3.08	3.47
Verizon	3.19	3.73	4.26	4.79	5.32	5.99
ATT	2.67	3.11	3.55	4.00	4.44	5.00
RBOC Average	2.57	3.00	3.43	3.85	4.28	4.82
Average for All Carriers	1.84	2.15	2.45	2.76	3.07	3.45

Appendix M

Historical Times-Interest-Earned Ratios

Company	**2012**	**2011**	**2010**	**Average**	**Rating**
AT&T Inc.	4.00	2.86	7.05	4.63	I
Telephone and Data Systems	3.16	4.00	3.36	3.50	I
Verizon	4.83	4.68	5.99	5.17	I
Alaska Communications Systems Group	1.59	1.32	0.97	1.29	S
Cincinnati Bell Inc.	1.16	1.20	1.36	1.24	S
CenturyLink	1.95	1.88	3.81	2.55	S
Consolidated Communications Holdings	1.10	1.84	1.83	3.47	S
Frontier Communications Corporation	1.33	1.37	1.51	1.40	S
Hawaiian Telcom	1.84	1.98	7.80	3.87	S
Windstream	1.43	1.49	1.96	1.63	S
FairPoint	-2.68	6.45	-1.05	0.91	S
HickoryTech Corp	3.37	3.13	5.13	3.88	NA
New Ulm Telecom	2.01	2.20	1.90	2.04	NA
Shenandoah Telecommunications Company	4.64	3.92	7.82	5.46	NA
Alteva	-32.57	-58.47	NA	-45.52	NA
Lumos	3.30	-3.02	7.16	2.48	NA
Averages					
Investment Grade Carrier	3.99	3.85	5.46	4.43	
Speculative Grade Carrier (excluding FairPoint)	1.48	1.58	2.75	1.94	
Source: SNL Kagan, EBIT and Interest Expense figures.					

Appendix N

Long-Term Bond Ratings

Company	Moody's Long Term	S&P Long Term	Fitch ST	Fitch Long Term
AT&T Inc.	A2	A-	F1	A
AT&T Corp	A2	-	-	A
Indiana Bell Telephone Company, Inc.	Baa2	-	-	A
BellSouth Corporation	A2	-	WD	A
Pacific Bell	A2	-	-	A
Southwestern Bell Telephone Company	A2	-	-	A
Verizon	A3	A-	F1	A
Verizon Global Funding Corp	A3	-	-	-
GTE Corporation	Baa1	A-	-	A
Cellco Partnership	A2	A-	-	A
Verizon Wireless Capital LLC	A2	-	-	A
Qwest	Baa3	-	-	BBB-
Qwest Capital Funding	Baa3	-	-	BBB-
Qwest Corporation	Baa3	-	-	BBB-
Mountain States Telephone and Telegraph Co	Baa3	-	-	-
Northwestern Bell Telephone Company	Baa3	-	-	-
Telephone and Data Systems	Baa2	BBB-	-	BBB
United States Cellular Corporation	Baa2	BBB-	-	BBB
Windstream	Ba2	BB-	-	BB+
Windstream Holding of the Midwest	Baa3	BB-	-	BB+
Windstream Georgia Communications	Baa2	BB-	-	BB+
Alaska Communications Systems Group	B1	B+	-	-
Consolidated Communications Holdings	-	B+	-	-
Consolidated Communications Inc.	B1	-	-	-
Consolidated Communications Finance Co	B3	-	-	-
FairPoint	B2	B	-	-
Frontier Communications Corporation	Ba2	BB	-	BB+
New Communications Holdings Inc.	Ba2	-	-	-
Cincinnati Bell Inc.	B1	B	-	B
Cincinnati Bell Telephone Company	Ba1	B	-	B
CenturyLink	Baa3	BB	-	BBB-
Embarq Corporation	Baa3	-	-	BBB-
Centel Capital Corp	Baa2	-	-	-
Carolina Telephone & Telegraph Company	Baa1	-	-	BBB-
Embarq Florida, Inc.	Baa1	-	-	BBB-
United Telephone Co. of Pennsylvania	Baa1	-	-	-
Hawaiian Telcom Inc.	-	B		-
Hawaiian Telcom Communications	B1			-
HickoryTech Corp	-	-	-	-
New Ulm	-	-	-	-
Shenandoah Telecommunications Company	-	-	-	-
Alteva	-	-	-	-
Lumos	-	-	-	-

APPENDIX O

Proposed Correction of Rule 47 C.F.R. § 65.302 (Cost of Debt)

The Federal Communications Commission amends 47

CFR part 65 to read as follows:

PART 65—INTERSTATE RATE OR RETURN PRESCRIPTION PROCEDURES AND METHODOLOGIES

§65.302 Cost of Debt

The formula for determining the cost of debt is equal to:

$$\text{Embedded Cost of Debt} = \frac{\text{Total Annual Interest Expense}}{\text{Average Outstanding Debt}}$$

Where:
"Total Annual Interest Expense" is the total interest expense for the most recent year for all local exchange carriers with annual revenues equal to or above the indexed revenue threshold as defined in §32.9000.
"Average Outstanding Debt" is the average of the total debt outstanding at the beginning and at the end of the most recent year-for all local exchange carriers with annual revenues equal to or above the indexed revenue threshold as defined in §32.9000.

[60 FR 28545, June 1, 1995, as amended at 67 FR 5702, Feb. 6, 2002]