

EXHIBIT 1

PRINCIPLES FOR A TELRIC COST STUDY

- 1. The time horizon is long-run such that all costs are considered variable.**
- 2. The cost study is forward-looking in nature, and can utilize information from actual results where this information provides good evidence about forward-looking relationships or costs. Recent actual operating results can provide good evidence for use in determining the forward-looking costs.**
- 3. The cost study should include all categories of cost that an ILEC operating as a carrier-of-last-resort would incur in the real world.**
- 4. The cost of capital and related cost of capital structure should be the forward-looking cost of capital for an ILEC operating as a carrier-of-last-resort in a competitive market served by facilities-based carriers.**
- 5. Depreciation expense in the cost study should be based on forward-looking economic life estimates. The life estimates used by the ILEC, developed in accordance with GAAP principles, provide good evidence for use in determining the appropriate economic lives for plant.**

- 6. Technology used in the cost study should be consistent with the ILEC's engineering guidelines and represent the types of equipment that are currently being deployed for new, growth or replacement projects.**
- 7. It is unrealistic to assume that the entire network is constructed at a single point in time. Instead, it is assumed the carrier has constructed its network over time. The ILEC's existing network equipment locations, routes, and network parameters provide good evidence regarding how an efficient network would be constructed which has grown over time.**
- 8. The network costs associated with providing facilities to a reasonable number of vacant buildings or residences for the market being served is a cost any carrier with carrier-of-last resort obligations would incur and should be recognized in the cost study.**
- 9. Nonrecurring costs should also be forward-looking in nature. The ILEC's current operating experience provides good evidence for efficient work times for nonrecurring tasks. If more efficient operations are assumed, then an estimate of the costs necessary to achieve these increased efficiencies should also be included in the cost study.**

- 10. To the extent possible, costs should be assigned to elements or to nonrecurring activities on a cost-causative basis and should be recovered at the time they are incurred.**
- 11. The cost study should assume that a carrier would not necessarily rely on one vendor for equipment, but would normally use a mix of vendors. The ILEC's actual vendor mix provides good evidence for this assumption.**
- 12. Consistent with the assumption that the network was constructed over time, it is assumed that switching equipment costs reflect a mixture of new and growth equipment purchases.**
- 13. It is assumed that ILEC vendor contracts are representative of material and placement costs for an efficient carrier operating on the scale of a carrier-of-last-resort in the market.**
- 14. Estimates of structure sharing in the cost study should be reasonably achievable. The ILEC's actual structure sharing experience provides good evidence regarding a realistic, achievable level.**
- 15. Equipment utilization assumed in the cost study should represent a reasonable forward-looking, steady-state level for an ILEC competing in the market with other facilities-based carriers. The**

ILEC's actual utilization experience provides good evidence for determining a reasonable steady-state level and would likely represent the upper range.

16. The cost of the loop should not be allocated to various services carried over it. Loop costs represent access to the network and the entire cost of the loop should be assigned to the customer causing the cost regardless of which services the customer orders.

17. The cost study should not include any unrealistic inputs, discounts, or projected cost reductions for the purpose of generating an artificial lower cost to promote competition. The objective for deciding on all input values should be to calculate a fair and reasonable cost estimate for a real-world telecommunications provider operating in a competitive market.

EXHIBIT 2

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

In the Matter of)	
)	
Review of the Commission's Rules Regarding)	
The Pricing of Unbundled Network Elements)	WC Docket No. 03-173
And the Resale of Service by Incumbent)	
Local Exchange Carriers)	

**Statement of
Dr. Randall S. Billingsley, CFA
On Behalf of
BellSouth Telecommunications, Inc.**

December 16, 2003

I. INTRODUCTION

A. Statement of Qualifications

1. My name is Randall S. Billingsley. I am a finance professor at Virginia Polytechnic Institute and State University. I also act as a financial consultant in the areas of cost of capital analysis, financial security analysis, and valuation. More details on my qualifications may be found in Billingsley Exhibit No. RSB-1. My business address is: Department of Finance, Pamplin College of Business, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061-

0221.

2. This statement presents my independent professional opinions and is not presented by me as a representative of Virginia Polytechnic Institute and State University.

B. Purpose of Statement

3. The purpose of this statement, filed on behalf of Bellsouth Telecommunications (BST), is to respond to the Notice of Proposed Rulemaking (NPRM) released by the Federal Communications Commission (FCC or Commission) in WC Docket No. 03-173 on September 15, 2003.
4. More specifically, my purpose is to respond to the Commission's request in the NPRM for comments on the following cost of capital-related issues¹:
 - Quantification of how the various components of risk should be reflected in the cost of capital for providing unbundled network elements (UNEs) and interconnection services.

¹ NPRM, ¶¶85 and 88.

- Determination of how the cost of debt and cost of equity should be weighted in the estimation of an appropriate capital structure for financing the provision of UNEs.
- Methods that would allow the Commission to simplify cost of capital estimation.
- Identification of appropriate proxy companies for use in estimating UNE capital costs.

In addition to providing comments on the above issues, I provide current, market-based estimates of the costs of capital associated with providing UNEs. To that end, I provide estimates of the cost of debt, cost of equity, capital structure, and overall cost of capital. My comments are not limited to applying sound financial theory to the issues raised by the Commission but also emphasize the practical issues of data availability and reliability in assessing UNE capital costs.

C. Summary of Conclusions

5. The components of risk that should be reflected in the UNE cost of capital are captured in forward-looking, market-based measures of the cost of equity and the cost of debt. These data should be drawn from competitive markets. While it has been historically common in regulatory practice to use market value-based estimates of the cost of equity, it has also been quite common to incorrectly rely

on backward-looking, book value-based estimates of the historical cost of debt. Forward-looking risk will not be reflected accurately in the UNE cost of capital unless all of the underlying component capital costs are estimated using forward-looking, market-based data. As discussed below, reliance on book value-based capital structures contradicts the tenets of total element long-run incremental cost (TELRIC) pricing espoused by the FCC.

6. In determining the overall cost of capital in providing UNEs, the cost of debt and cost of equity should be weighted by the *market* value-based proportionate reliance of the UNE provider on each respective capital source. This is in marked contrast to the historically common regulatory approach of weighting each capital source's cost by its respective *book* value-based proportionate reliance on that source. As elaborated on below, reliance on book value-based capital structures is inconsistent with financial theory, at variance with commonly-accepted financial practice, and contradicts the tenets the FCC's TELRIC pricing approach.
7. It would be optimal to estimate the capital costs for firms solely providing UNEs. However, there are no such companies for which data are available. Thus, given realistic limitations on data availability and reliability, the constrained optimal approach to identifying proxy firms is to rely on the Standard & Poor's Composite 500 Index (S&P 500) in estimating the UNE cost of capital. Such reliance applies

objective, market-based data on firms operating in a competitive market to cost of capital estimation. Further, if supported by the Commission, this practice would greatly simplify the task of setting the cost of capital.

8. Consistent with the above conclusions, I use the S&P 500 to establish a lower-bound estimate of the UNE cost of capital. Specifically, I apply the discounted cash flow (DCF) model to the firms in the S&P 500 to measure the cost of equity of average-risk firms operating in a competitive environment. As discussed below, reliance on the S&P 500 is based largely on the FCC's recent clarification that the index is a "... useful benchmark for the risk faced on average by established companies in competitive markets."² Thus, I apply the DCF model to the S&P 500 to provide a conservative, market-determined cost of equity capital estimate for providing UNEs. Analysis of the S&P 500 produces an average cost of equity of 14.28%.
9. The appropriate cost of debt for providing UNEs is estimated using the current yield on the average bond rating category of firms in the S&P 500, which is BBB+. The current cost of debt is 6.73%. I rely on the average market value-based

² *In the Matter of Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the Communications 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 No. 00-218, and *In the Matter of Petition of AT&T Communications of Virginia Inc., Pursuant to Section 252(e)(5) of the Communications Act for Preemption of the Jurisdiction of the Virginia Corporation Commission Regarding Interconnection Disputes With Verizon Virginia Inc.*, CC Docket No. 00-251, Memorandum Opinion and Order, DA 03-2738, released August 29, 2003, ¶90, hereinafter Verizon Arbitration Order.)

capital structure for firms in the S&P 500, which is 30.50% debt and 69.50%. Thus, a reasonable estimate of the forward-looking overall cost of capital associated with providing UNEs is 11.98%.

D. Organization of Statement

10. Section II of my statement overviews the status of competition in the telecommunications industry in the United States and describes the structure of the CLEC industry to provide insight into the context in which UNE capital costs are estimated. Section III comments on the above-indicated issues raised in the FCC's recent NPRM. Section IV describes the methods that I use to estimate current capital costs associated with providing UNEs and presents my specific findings. Finally, section V summarizes my conclusions.

II. CONTEXT OF UNE COST OF CAPITAL ANALYSIS

A. Current Status of Competition in Local Telecommunications Markets

11. The issues raised by the Commission concerning UNE capital costs are best evaluated in light of the context in which such costs are estimated. Below I overview recent evidence indicating that local telecommunications market competition has increased significantly and that competitive local exchange

companies (CLECs) are playing a key role in that increase. In evaluating this evidence it is clear that incumbent local exchange companies (ILECs) face significant and growing competition from CLECs. Further, it is interesting to note that recent technological developments like softswitches are making local market entry easier and more profitable for CLECs.

12. Competition in the local telecommunications industry has increased dramatically in recent years. The sources of that increased competition include a greater number of new entrants in the industry, a significant increase in the number of existing competitors, a greater number of substitute telecommunications products and services, more intense competition among existing firms in the industry, and enhanced regulatory risk at both the state and the federal levels. Thus, both actual and potential competition has increased and the risk level of the industry has consequently increased.

13. A recent study by the Commission documents the significant and growing trend toward greater competition in the local telephone exchange market by observing the following³:

- Competitive local exchange carriers (CLECs) reported 24.8 million (or 13.2%) of the approximately 188 million nationwide

³ *Local Competition: Status as of December 31, 2002*, Industry Analysis Division, Wireline Competition Bureau, Federal Communications Commission, June 2003, pp. 1 - 3.

end-user switched access lines in service at the end of December 2002, compared to 21.6 million (or 11.4% of nationwide lines) in June 2002. This represents a 14% growth in CLEC market size during the second half of 2002.

- Since December 1999, the percentage of nationwide CLEC switched access lines reported to be provisioned by reselling services has declined steadily, to 19% at the end of December 2002, and the percentage provisioned over UNE loops has grown, to 55%.
- The Commission's data collection program requires CLECs and ILECs to identify each zip code in which the carrier provides local telephone service to at least one end-user customer. As of December 31, 2002, at least one CLEC was serving customers in 69% of the nation's zip codes. About 94% of United States households resided in these zip codes. Moreover, multiple carriers reported providing local telephone service in the major population centers of the country.

Thus, the Commission documents that competitors are making enormous strides in taking local telecommunications business away from the ILECs.

14. Similarly, Standard & Poor's emphasizes the risks brought by increasing competition⁴:

For local telephone companies, long-distance carriers, and cable providers alike, the Telecom Act's sweeping deregulation is a double-edged sword. On the one hand, a company can gain new revenue sources by providing extra services and entering markets that previously were out of reach. On the other hand, the added competition in all segments will result in tighter profit margins for all players.

15. The following recent comments by Marc Crossman of J. P. Morgan explain how

⁴ *Industry Surveys, Telecommunications: Wireline*, May 31, 2001, p. 19.

increasing competition is pressuring ILECs like BST⁵:

... The company is facing increasing facilities-based competition from cable operators on the consumer side and the CLECs controlled by WorldCom ... and AT&T ... on the business side. BellSouth also faces growing competition in both the consumer and business customer segments from non-facilities based wholesale competitors, which lease elements of BellSouth's network to provide service. We estimate that BellSouth will have lost 10% of access lines to wholesale competition by year-end 2002. ... Access line loss also places pressure on margins due to the high proportion of fixed versus variable costs associated with providing service.

Technology substitution exacerbates share loss for wireline voice. On the consumer side, wireless is replacing both primary and secondary lines at an accelerating rate, while cable and DSL broadband are eliminating demand for second lines used for dial-up Internet access. On the business side, DSL is replacing ISDN BRI, while ISDN PRI and fiber are replacing copper-based access lines. In many instances, BellSouth becomes the provider of the substitute technology and retains the customer; however, the revenue generated by the replacing technology tends to be lower ...

The point that one can draw from all of this is that the entire telecommunications industry is competitive and risky, and is growing more so with the passage of time. Thus, these competitive trends affect the capital costs associated with providing UNEs.

B. Current Condition of the CLEC Industry

16. It is important to consider the current condition of the CLEC industry since it is

⁵ *Company Report: BellSouth, Telecommunications Wireline Services Equity Research, March 15, 2002, p. 4.*

involved in providing UNEs. A number of factors explain the broad financial distress and bankruptcies experienced by the industry over the last two years:

Just as the fact that a number of CLECs have filed for Chapter 11 has become common knowledge, the reason for their bankruptcies is well known. In the 1990s, the CLECs acquired billions of dollars in financing to invest in telecommunications infrastructure with the assumption that the demand for their services would continue to experience accelerating growth. When this demand did not materialize, the CLECs were left with billions of dollars in debt and no way to pay it off. Some of these CLECs were forced into Chapter 11 to recapitalize their financial structure. Some of these CLECs finally succumbed to Chapter 7 bankruptcy after exhausting all efforts to reduce their debt loads.⁶

17. Industry observers note the importance of so-called softswitches in reducing the barriers to entering the local telecommunications market and increasing the ability of CLECs to compete profitably in it. They observe that one of the trends in 2002 was that⁷:

... at least 25% of the voice-focused pure-play CLECs – that is, of the CLECs in this Report – had an ongoing softswitch initiative in place. The world continues to move toward a packetized infrastructure.

This is an important trend, carrying significant implications for the future of local competition. To the extent local voice can be readily deployed over softswitches going forward, the expense of deploying a Class 5 switch as an entry barrier will be diminished. This suggests that many more CLEC resellers and ISPs will ultimately migrate to

⁶ New Paradigm Resources Group, Inc., *CLEC Report 2003: Competitive Last Mile Providers*, 17th edition, volume 1, chapter 2, 2003, p. 3 of 20.

⁷ New Paradigm Resources Group, Inc., *CLEC Report 2002: Competitive Last Mile Providers*, 15th edition, volume 1, 2002, chapter 2, p. 3 of 22.

facilities-based CLEC status, deploying voice as an application.

Thus, there is ample evidence that competition in local telecommunications markets is increasing. Further, the effective costs of entry into that market by CLECs are dropping. Market-based capital costs should reflect the impact of this competition.

III. EVALUATION OF COST OF CAPITAL ISSUES RAISED IN THE FCC'S NPRM

A. Quantifying the Components of Risk Reflected in the UNE Cost of Capital

18. The components of risk that should be reflected in the UNE cost of capital are captured in competitive, market-based measures of the cost of equity and the cost of debt. This position is consistent with the Commission's recent clarification that:

To ensure that UNE prices set by the states appropriately reflect the risks associated with new facilities and new services, we think it would be helpful to clarify two types of risks that should be reflected in the cost of capital. First, we clarify that a TELRIC-based cost of capital should reflect the risks of a competitive market. The objective of TELRIC is to establish a price that replicates the price that would exist in a market in which there is facilities-based competition. In this type of competitive market, all facilities-based carriers would face the risk of losing customers to other facilities-based carriers, and that risk should be reflected in TELRIC prices⁸.

⁸ *In Re Review of the Section 251, Unbundling Obligations of Incumbent Local Exchange Carriers, First Report and Order on Remand and Further Notice of Proposed Rulemaking*, FCC 03-36, released August, 21, 2003, ¶ 680, hereinafter TRO.

This indicates that the UNE cost of capital should be measured using data from competitive rather than just regulated markets. Further, it implies that the use of market rather than book value data is most appropriate.

19. The UNE cost of capital should reflect forward-looking, efficient capital structure, equity costs, and debt costs. This is consistent with the Commission's view that:

... To calculate rates based on an assumption of a forward-looking network that uses the most efficient technology (i.e., the network that would be deployed in a competitive market), without also compensating for the risks associated with investment in such a network, would reduce artificially the value of the incumbent LEC network and send improper pricing signals to competitors. Establishing UNE prices based on an unreasonably low cost of capital would discourage competitive LECs from investing in their own facilities and thus slow the development of facilities-based competition.⁹

20. The FCC's assertion that the cost of capital should reflect a forward-looking efficient network, as determined using competitive market-based data, presumably implies that the cost of capital should also reflect the assumption of an optimal, sustainable capital structure and its associated forward-looking capital costs. This should hold regardless of whether the Commission ultimately "... adopts a UNE pricing methodology that is tied more closely to the existing network of an incumbent LEC" or implements a pricing approach that focuses on a projected

⁹ TRO, at ¶ 682.

network "... in the long-run assuming facilities-base competition."¹⁰ Thus, capital costs – including equity and debt costs as well as capital structure – should be determined using forward-looking market data on required rates of return rather than historical costs.

B. Estimation of Appropriate Capital Structure for Use in UNE Cost of Capital Estimation

21. The UNE overall cost of capital should be estimated by weighting the cost of debt and cost of equity by the market value-based proportionate reliance of the UNE provider on each respective source of capital. This is consistent with the FCC's position in its recent review of the cost of capital determination process applied to Verizon¹¹:

... In calculating TELRIC prices, the theoretically correct capital structure is based on market values of debt and equity, not book values. In section 252(d)(1) of the Act, Congress specifically prohibited the use of traditional rate-base, rate-of-return ratemaking. The Commission has interpreted this section to require prices based on forward-looking costs, because forward-looking costs best replicate the costs a carrier would face in a market with facilities-based competition. Under the Commission's TELRIC rules, we calculate the investment necessary to build a network using the most efficient technology currently available. The TELRIC rules provide

¹⁰ NPRM, at ¶84.

¹¹ Verizon Arbitration Order, at ¶102.

for the recovery of the investment in that efficient network through the use of economic depreciation and they provide for a return on that investment through a risk-adjusted cost of capital. The book value of Verizon's existing network is irrelevant for these purposes. Investors would not earn the return that they require if a cost of capital that is based on book value is applied to the economic value of their assets, given that rational investors value these assets at market value. Thus, the use of a capital structure based on market values, rather than book values, represents a departure from traditional ratemaking, but one that is entirely appropriate under the Act.

Market value-based capital structures are also consistent with the FCC's standard of considering the expected cost of capital.¹² In addition to being consistent with well-established financial practice and theory, the use of market value-based capital structures is consistent with the universally-accepted Supreme Court precedents concerning what characterizes a reasonable rate of return for a regulated public utility.¹³ Further, the FCC clearly states that "... the use of a capital structure based on market values, rather than book values, represents a departure from traditional ratemaking, but one that is entirely appropriate under the Act."¹⁴

22. Because the expected cost of capital is, by definition, based on investors' expectations, all of its components must be based on expectations. The FCC's

¹² *First Report & Order*, FCC 96-325, released August 8, 1996, ¶700.

¹³ See *Bluefield Water Works & Improvement Co. v. Public Service Commission of West Virginia*, 262, U.S. 679, 692-3, (1923) and *Federal Power Commission v. Hope Natural Gas Co.* 320, U.S. 591, (1944).

¹⁴ Verizon Arbitration Order, at ¶102.

standard implies that the UNE providers' costs of debt, costs of equity, and capital structures must all rely on the expectations reflected in market values. Thus, well-accepted financial practice and theory as well as the FCC's espoused principles indicate that market value-based capital structures are more appropriate than accounting-based capital structures in cost of capital analysis.

23. Book value capital structures do not recognize the reality of UNE-providing firms obtaining capital in today's financial marketplace. The use of market values is both practically as well and theoretically appropriate and consistent with estimating a prospective cost of capital. Market values should be used exclusively because they are dynamically determined in the marketplace by investors, while book values are the result of historical accounting practices. One-time accounting events that do not change market values can significantly alter book values. Additionally, the point in time at which a company issued stock in the past can influence book values, while prospective market values are not affected. Current market values are determined by investors' most up-to-date expectations for the future. Book values look at a firm largely in dated isolation, while market values consider the firm's expected performance in light of its external competitive environment as well.
24. Over time, market values vary from book values as investors change stock prices

in response to new company announcements as well as to announcements concerning their competitors for investors' dollars. If an event or announcement significantly enhances or detracts from shareholder value, that change is immediately translated into a market value change by investors, while there is likely to be no immediate change in book value. It is obvious that relying on book values is unrepresentative of the investor's perspective in today's capital markets from which providing UNEs must obtain capital.

25. Market value-based capital structures reflect the most up-to-date expectations of investors in the capital markets. In contrast, book value-based capital structures reflect accounting conventions and historical costs. It is important to stress that capital costs inherently involve market-based expectations no matter what type of cost estimation model is used. Therefore, the capital structure that is matched with expected capital costs must also be measured in market value terms that capture investors' expectations. In order to be consistent with well-established financial practice and theory, market-determined capital costs must be matched with market-determined capital structures. Indeed, the use of market value-based capital structures in cost of capital and capital budgeting analysis is the standard approach taken in modern corporate finance textbooks.¹⁵

C. Appropriate Proxy Companies in Estimating UNE Capital Costs

26. It would be best to estimate UNE capital costs using firms “in the business solely of providing UNEs.”¹⁶ However, no such firms exist. While the CLEC industry is a possible proxy, unfortunately currently operating CLECs have not demonstrated an ability to maintain a sustainable presence in the market nor have they done so over some time. Thus, the CLECs as a whole continue to demonstrate some degree of financial instability. While that condition should improve in the future, CLEC data are not sufficient today to rely on exclusively in determining the capital costs for a representative CLEC. Thus, the best overall proxy for use in determining the UNE cost of capital is the S&P 500. This proxy captures data on capital costs that are determined in competitive markets.
27. The FCC has provided guidance concerning the usefulness of the S&P 500 in measuring equity capital costs. In the Verizon Arbitration Order the Commission observes that:

... the overall beta of 1.0 for the S & P 500 companies for which Verizon placed betas into the record does produce a useful benchmark for the risk faced on average by established companies in competitive markets.¹⁷

¹⁵ E.g., see S. A. Ross, R. W. Westerfield, and B. D. Jordan, *Essentials of Corporate Finance*, Irwin: 1996, pp. 316-317 or R. A. Brealey and S. C. Myers, *Principles of Corporate Finance*, McGraw-Hill: 1996, 5th ed., pp. 214, 517.

¹⁶ NPRM, at ¶88, footnote 130.

¹⁷ Verizon Arbitration Order, at ¶90.

The Commission consequently indicates that the S&P 500 market return is a reasonable proxy for the average risk faced by firms operating in competitive markets.

28. Using the firms of the S&P 500 as a surrogate for providing UNEs does not imply that the average UNE provider has the same risk as any firm in the S&P 500. It may be tempting to single out one company in the S&P 500 and incorrectly attempt to compare its various risk measures individually to those firms providing UNEs. However, none of the individual companies in the S&P 500 are precisely like the firms providing UNEs in every respect. The firms are alternative investment opportunities that, *in the aggregate*, have average risk. This benchmark consequently provides insight into UNE providers' long-term, sustainable capital costs in a fully competitive market.

29. Some may also incorrectly argue that the S&P 500 is of low risk. Yet this is incorrect because the index is, by definition, composed of firms that are, *as a group*, of average risk. The assumption that the S&P 500 captures only lower risk firms is likely based on a historical, rather than a forward-looking perspective. On a forward-looking basis there is plenty of risk associated with S&P 500 companies. For example, Eastman Kodak is an S&P 500 firm, yet it recently lost a

significant amount of its value as investors considered a future in which digital photography has in large part replaced traditional chemical-based photography. Thus, Eastman Kodak - and other S&P 500 firms - face considerable forward-looking risks from technological and market changes. In other words, a history of market dominance is no guarantee of such a future.

V. UNE COST OF CAPITAL ANALYSIS USING THE S&P 500 AS A PROXY

A. Cost of Equity Estimation

30. In light of the above discussion, it is reasonable to estimate the cost of equity for the S&P 500 using a standard DCF model. I use the constant growth form of the DCF model that assumes an indefinite or infinite holding period. I will first describe the general model that is commonly applied to individual firms and then I will describe how the model is refined for application to the S&P 500.

31. Since most U.S. firms pay dividends quarterly, I use the quarterly form of the DCF model under the realistic assumption that such dividends are changed by firms once a year, on average in the middle of the year. Specifically, the cost of equity K is calculated as:

$$K = [(D_0^q (1 + G)) / P_{mkt}] + G = [D_1^q / P_{mkt}] + G;$$

where G is the most recent average five-year earnings per share growth rate

projected by analysts, as reported by either Zacks Investment Research Inc. (Zacks) or by the IBES, and P_{mkt} is the average of the three most recent months (August to October of 2003) of high and low prices for the equity. D_0^q and D_1^q reflect the most recent annual and the anticipated next year amount of quarterly dividends, respectively. D_1^q is calculated as:

$$D_1^q = d_1 (1 + K)^{75} + d_2 (1 + K)^5 + d_3 (1 + K)^{25} + d_4 ;$$

where d_1 and d_2 are the quarterly dividends paid prior to the assumed yearly change in dividends and d_3 and d_4 are the two quarterly dividends paid after the given change in the amount paid by a firm. Thus, dividend D_1^q captures the quarterly payment of dividends that grow at rate G . In order to reflect the effect of flotation costs on the cost of equity, I directly reduce the market price P_{mkt} used in my analysis by a conservative 5 percent. Billingsley Exhibit No. RSB-2 elaborates on the nature and applicability of the DCF model in estimating the cost of capital. It also discusses the importance of adjusting for both the payment of quarterly dividends and for flotation costs.

32. The DCF model for the S&P 500 is estimated using essentially the same approach described above. However, the expected growth rate used in the quarterly version of DCF model is the market value-weighted mean of the five-year earnings per share estimates published by Zacks and IBES for the firms in the S&P 500. Similarly, the average closing values of the index for the three most recent months

(August to October of 2003) are used. A 5 percent flotation cost adjustment is also made. Dividend yield data are obtained from Standard & Poor's *The Outlook*, restated on a quarterly basis.

33. Application of the DCF model to the S&P 500 index produces a cost of equity of 14.23% using IBES growth rate estimates and a cost of equity of 14.32% using Zacks growth rate estimates, or an average of 14.28%.

B. Cost of Debt Estimation

34. The forward-looking cost of debt associated with providing UNEs is estimated by examining the yields on bonds with the same rating as the average issued by firms in the S&P 500. Using a numerical dummy coding of bond rating categories, the average corporate bond rating for members of the S&P 500 is BBB+ (or using the average corporate bond rating for members of the S&P 500 is BBB+ (or using the comparable Moody's Baa-rating). As of October of 2003, the average yield on such bonds is 6.73% (*Mergent Bond Record*, November 2003).

C. Overall UNE Cost of Capital Estimation

35. A reasonable approach to estimating the costs of equity and debt for providing UNEs is to rely on the average market value-based capital structure for firms in the S&P 500. Using first-quarter 2003 financial statements and market data as of the end of March of 2003, the average market value-based capital structure of firms in the S&P 500 is 30.50% debt and 69.50% equity. Combining these capital structure weights with the above average cost of debt and cost of equity estimates produces a pre-tax overall cost of capital for providing UNEs of 11.98%.

VI. SUMMARY OF CONCLUSIONS

36. The UNE cost of capital should be estimated using forward-looking, market-based measures of the cost of equity and the cost of debt. These data should be drawn from competitive, not just regulated markets. Forward-looking risk will not be reflected accurately in the UNE cost of capital unless all of the underlying component capital costs – both debt and equity - are estimated using forward-looking, market-based data.
37. The cost of debt and cost of equity should be weighted by the market value-based proportionate reliance of the UNE provider on each respective capital source. Reliance on book value-based capital structures is inconsistent with financial theory, at variance with commonly-accepted financial practice, and contradicts the tenets the FCC's TELRIC pricing approach.

38. Because there are no firms solely providing UNEs, the constrained optimal approach to identifying appropriate proxy firms is to rely on S&P 500 index in estimating the UNE cost of capital. This proxy applies objective, market-based data on firms operating in a competitive market to cost of capital estimation. Further, this practice would greatly simplify the task of setting the cost of capital for the Commission.
39. My analysis indicates that a forward-looking cost of equity estimate for providing UNEs using the DCF approach, as applied to the firms of the S&P 500, is an average of 14.28%. I also find evidence that the cost of debt of providing UNEs is an average of 6.73%. Combining the average market value-based capital structure of 69.50% equity and 30.50% debt with the above average costs of debt and equity produces an average pre-tax overall cost of capital for providing UNEs of 11.98%.

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APPOINTMENTS

1994 - Current: Associate Professor of Finance
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1993: Vice President
Association for Investment Management and Research
Education and Programs Department

Duties: Project director, responsible for the development and design of education technology products. Projects included videos on options and futures analysis, ethical issues in the investment profession, and financial statement analysis for investment valuation and management.

Responsible for the design and offering of continuing education programs to meet the needs of AIMR's members in particular and the investment industry in general.

Associate Professor, On Leave of Absence
Virginia Polytechnic Institute & State University

1987-1992: Associate Professor of Finance
Virginia Polytechnic Institute and State University

- 1981-1987:** Assistant Professor of Finance
Virginia Polytechnic Institute and State University
- 1978-1981:** Lecturer of Finance
Texas A&M University
- 1977-1978:** Lecturer of Economics
Research Assistant in Economics
Texas A&M University
- Summers 1978, 1980:** Research Associate
Texas Transportation Institute
Texas A&M University

Duties: (1978) Principal researcher and author of a study concerning design of optimal subsidy techniques for public transit projects. (1980) Co-author of research proposal for study of the projected economic impact of user charges on the Texas Gulf Intra-Coastal Waterway (proposal accepted and fully funded). Performed research concerning various policy issues in transportation economics.

PROFESSIONAL DESIGNATIONS

- 1986:** Chartered Financial Analyst (CFA)
The Institute of Chartered Financial Analysts
(Association for Investment Management and Research)
- 1992:** Certified Rate of Return Analyst (CRRA)
National Society of Rate of Return Analysts

EDUCATION

- 1982:** Doctor of Philosophy in Finance, supporting field in Economics
Dissertation Title: "A Multivariate Analysis of Bank Holding Company
Capital Note and Debenture Ratings"
Chairman: Dr. Donald R. Fraser
Texas A&M University
- 1978:** Master of Science in Economics, supporting field in Statistics
Texas A&M University

1976: Bachelor of Arts in Economics
Texas Tech University

PRIMARY TEACHING AND RESEARCH INTERESTS

Teaching: Financial Derivatives and Investments.

Research: Interests include investments, valuation methods, cost of capital analysis, primary market pricing of debt instruments, and public utility regulatory issues.

TEACHING HONORS

Teaching Excellence Award, The R. B. Pamplin College of Business, Virginia Polytechnic Institute and State University, 2002-2003.

Teaching Excellence Award, The R. B. Pamplin College of Business, Virginia Polytechnic Institute and State University, 1986-1987.

Excellence in Teaching Award, MBA Association, Virginia Polytechnic Institute and State University, 1985-1986.

PUBLICATIONS

Journal Articles - Refereed

"The Benefits and Limits of Diversification Among Commodity Trading Advisors," *Journal of Portfolio Management*, Vol. 23, No. 1, Fall 1996, pp. 65-80 (Author listing: R. S. Billingsley and D. M. Chance).

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"Regional Reciprocal Interstate Banking: The Supreme Court and the Resolution of Uncertainty," *Journal of Banking and Finance*, Vol. 16, No. 1, 1992, pp. 665-686, (Author listing: R. S. Billingsley and R. E. Lamy).

"Integration of the Mortgage Market," *Journal of Financial Services Research*, Vol. 6, 1992, 137-155, (Author listing: R. S. Billingsley, V. A. Bonomo, and S. P. Ferris).

"Units of Debt with Warrants: Evidence of the 'Penalty-Free' Issuance of an Equity-Like Security," *The Journal of Financial Research*, Vol. 13, No. 3, Fall 1990, pp. 187-199, (Author listing: R. S. Billingsley, R. E. Lamy, and D. M. Smith).

"Shareholder Wealth and Stock Repurchases By Bank Holding Companies," *Quarterly Journal of Business and Economics*, Vol. 28, No. 1, Winter 1989, pp. 3-25, (Author listing: R. S. Billingsley, D. R. Fraser and G. R. Thompson).

Abstract: *Journal of Economic Literature*, Vol. 27, No. 3, September 1989, p. 1503.

"The Regulation of International Lending: IMF Support, the Debt Crisis, and Bank Shareholders," *Journal of Banking and Finance*, Vol. 12, No. 2, 1988, pp. 255-274, (Author listing: R. S. Billingsley and R. E. Lamy).

"Put-Call Ratios and Market Timing Effectiveness," *Journal of Portfolio Management*, Vol. 15, No. 1, Fall 1988, pp. 25-28, (Author listing: R. S. Billingsley and D. M. Chance).

Citation: "Using 'Dumb' Money as a Market Guide," Earl C. Gottschalk, Jr., the *Wall Street Journal*, January 17, 1989, p. C1.

"Bankruptcy Avoidance As A Merger Incentive," *Managerial Finance*, Vol. 14, No. 1, November 1988, pp. 25-33, (Author listing: R. S. Billingsley, D. J. Johnson, and R. P. Marquette).

"The Pricing and Performance of Stock Index Futures Spreads," *Journal of Futures Markets*, Vol. 8, No. 3, June 1988, pp. 303-318, (Author listing: R. S. Billingsley and D. M. Chance).

"The Choice Among Debt, Equity, and Convertible Bonds," *The Journal of Financial Research*, Vol. 11, No. 1, Spring 1988, pp. 43-55, (Author listing: R. S. Billingsley, R. E. Lamy, and G. R. Thompson).

"Valuation of Primary Issue Convertible Bonds," *The Journal of Financial Research*, Vol. 9, No. 3, Fall 1986, pp. 251-259, (Author listing: R. S. Billingsley, R. E. Lamy, and G. R. Thompson).

Abridged Reprint: *The CFA Digest*, Vol. 17, No. 2, Spring 1987, pp. 18-19.

"The Reaction of Defense Industry Stocks to World Events," *Akron Business and Economic Review*, Vol. 18, No. 2, Summer 1987, pp. 40-47, (Author listing: R. S. Billingsley, R. E. Lamy, and G. R. Thompson).

"Listed Stock Options and Managerial Strategy," *Strategy and Executive Action*, No. 4, Fall 1986, pp. 17-20, 28, (Author listing: R. S. Billingsley and D. M. Chance).

"Reevaluating Mortgage Refinancing "Rules of Thumb," *Journal of the Institute of Certified Financial Planners*, Vol. 7, No. 1, Spring 1986, pp. 37-45, (Author listing: R. S. Billingsley and D. M. Chance).

"Explaining Yield Savings on New Convertible Bond Issues," *Quarterly Journal of Business and Economics*, Vol. 24, No. 3, Summer 1985, pp. 92-104, (Author listing: R. S. Billingsley, R. E. Lamy, M. W. Marr, and G. R. Thompson).

Abstract: *Journal of Economic Literature*, Vol. 24, No. 2, June 1986, p. 1083.

"Options Market Efficiency and the Box Spread Strategy," *The Financial Review*, Vol. 20, No. 4, November 1985, pp. 287-301, (Author listing: R. S. Billingsley and D. M. Chance).

Reprint: *CFA Readings in Derivative Securities*, pp. 217-231, Charlottesville, VA:
The Institute of Chartered Financial Analysts, 1988.

"Determinants of Stock Repurchases by Bank Holding Companies," *Journal of Bank Research*, Vol. 16, No. 3, Autumn 1985, pp. 128-35, (Author listing: R. S. Billingsley and G. R. Thompson).

"The Informational Content of Unrated Industrial Bonds," *Akron Business and Economic Review*, Vol. 16, No. 2, Summer 1985, pp. 53-58, (Author listing: R. S. Billingsley and R. E. Lamy).

"Split Ratings and Bond Reoffering Yields," *Financial Management*, Vol. 14, No. 2, Summer 1985, pp. 59-65, (Author listing: R. S. Billingsley, R. E. Lamy, M. W. Marr, and G. R. Thompson).

"Determinants of Bank Holding Company Bond Ratings," *The Financial Review*, Vol. 19, No. 1, March 1984, pp. 55-66, (Author listing: R. S. Billingsley and D. R. Fraser).

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"Market Reaction to the Formation of One-Bank Holding Companies and the 1970 Bank Holding Company Act Amendment," *Journal of Banking and Finance*, Vol. 8, No. 2, 1984, pp. 21-33, (Author listing: R. S. Billingsley and R. E. Lamy).

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"Preliminary Study Indicates Optimal Number of Advisors May Be 40 +," *Managed Account Reports*, Issue No. 185, July 1994, p. 13.

"Managing Portfolios Using Index Options," *Futures*, Vol. 14, No. 9, September 1985, pp. 70-74, (Author listing: D. M. Chance and R. S. Billingsley).

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"The Evolution of Depository Institution Regulation In the United States," in *Banking and Monetary Reform: A Conservative Agenda*, Catherine England, pp. 47-56, Washington, D. C.: The Heritage Foundation, 1985, (Author listing: R. S. Billingsley).

Fare Box and Public Revenue: How to Finance Public Transportation. State Department of Highways and Public Transportation, Texas Transportation Institute, February 1980, (Author listing: R. S. Billingsley, P. K. Guseman and W. F. McFarland).

Cases

"Merck & Company: A Comprehensive Equity Valuation Analysis," Charlottesville, VA: The Association for Investment Management and Research, (Author listing: R. S. Billingsley), 1996.

Adopted by the Candidate Curriculum Committee of the CFA Program: 1997, 1998, 1999, 2000, 2001, and 2002.

"Equity Securities Analysis Case Study: Merck & Company," *The CFA Candidate Readings II*, Charlottesville, VA: The Association for Investment Management and Research, (Author listing: R. S. Billingsley), 1994.

Adopted by the Candidate Curriculum Committee of the CFA Program: 1994, 1995, and 1996.

Proceedings

"Bankruptcy Avoidance as a Merger Incentive: An Empirical Study of Failing Firms," *The Financial Review*, Vol. 18, No. 3, 1983, p. 94, (Author listing: R. S. Billingsley, D. J. Johnson, and R. P. Marquette).

"A Multivariate Analysis of the Ratings of Bank Holding Company Debt Issues," *The Financial Review*, Vol. 17, No. 2, July 1982, p. 57, (Author listing: R. S. Billingsley and D. R. Fraser).

Editor

"Corporate Decision Making and Equity Analysis," Seminar Proceedings, Charlottesville, VA: The Association for Investment Management and Research, (Author listing: R. S. Billingsley, Editor), 1995.

"Industry Analysis: The Telecommunications Industry," Seminar Proceedings, Charlottesville, VA: The Association for Investment Management and Research, (Author listing: R. S. Billingsley, Editor), 1994.

PAPERS PRESENTED AT PROFESSIONAL MEETINGS

"The Telecommunications Act of 1996: Preliminary Surprises of Deregulation," (Author listing: R. S. Billingsley, P. P. Peterson, and J. M. Pinkerton). Presented at the Financial Management Association Meetings, Seattle, Washington, October 2000.

"Further Evidence on the Gains from Diversification in Multi-Manager Programs," (Author listing: R. S. Billingsley and D. M. Chance). Presented at Managed Account Reports' conference, *Alternative Investment Strategies*, Chicago, Illinois, June 1995.

"The Gains from Diversification in a Multi-Manager Program: Some Preliminary Results," (Author listing: R. S. Billingsley and D. M. Chance). Presented at Managed Account Reports' conference, *Derivatives Investment Management*, Chicago, Illinois, July 1994.

"Firm Value and Convertible Debt Issues: Signalling vs. Agency Effects," (Author listing: R. S. Billingsley, R. E. Lamy, and D. M. Smith). Presented at the Eastern Finance Association Meetings, Hot Springs, Virginia, April 1991.

"The Valuation of Simultaneous Debt and Equity Offerings," (Author listing: R. S. Billingsley, R. E. Lamy, and D. M. Smith). Presented at the Financial Management Association Meetings, Orlando, Florida, October 1990.

"The Choice Between Issuing Convertible Bonds and Units of Debt with Warrants," (Author listing: R. S. Billingsley, R. E. Lamy and D. M. Smith). Presented at the Financial Management Association Meetings, New Orleans, Louisiana, October 1988. (Subsequently published in *The Journal of Financial Research*, see article citation.)

"The Choice Among Debt, Equity, and Convertible Bonds," (Author listing: R. S. Billingsley, R. E. Lamy, and G. R. Thompson). Presented at the Financial Management Association Meetings, Las Vegas, Nevada, October 1987. (Subsequently published in *The Journal of Financial Research*, see article citation.)

"The Regulation of International Lending: IMF Support, the Debt Crisis, and Bank Shareholders," (Author listing: R. S. Billingsley and R. E. Lamy). Presented at the Conference on Bank Structure and Competition, Federal Reserve Bank of Chicago, Chicago, Illinois, May 1986. (Subsequently published in the *Journal of Banking and Finance*, see article citation.)

"Valuation of Primary Issue Convertible Bonds," (Author listing: R. S. Billingsley, R. E. Lamy and G. R. Thompson). Presented at the Financial Management Association Meetings, Denver, Colorado, October 1985. (Subsequently published in *The Journal of Financial Research*, see article citation.)

"The Economic Impact of Split Ratings on Bond Reoffering Yields," (Author listing: R. S. Billingsley, R. E. Lamy, M. W. Marr, and G. R. Thompson). Presented at the Financial Management Association Meetings, Toronto, Canada, October 1984. (Subsequently published in *Financial Management*, see article citation.)

"The Informational Content of Unrated Industrial Bonds," (Author listing: R. S. Billingsley and R. E. Lamy). Presented at the Financial Management Association Meetings, Atlanta, Georgia, October 1983. (Subsequently published in *Akron Business and Economic Review*, see article citation.)

"Bankruptcy Avoidance As A Merger Incentive: An Empirical Study of Failing Firms," (Author listing: R. S. Billingsley, R. P. Marquette, and D. J. Johnson). Presented at the Eastern Finance Association Meetings, New York, New York, April 1983. (Subsequently published in *Managerial Finance*, see article citation.)

"A Multivariate Analysis of the Ratings of Bank Holding Company Debt Issues," (Author listing: R. S. Billingsley and D. R. Fraser). Presented at the Eastern Finance Association Meetings, Jacksonville, Florida, April 1982. (Subsequently published in *The Financial Review*, see article citation.)

**PROFESSIONAL EDUCATIONAL SEMINARS PLANNED AND ORGANIZED FOR
THE ASSOCIATION FOR INVESTMENT MANAGEMENT AND RESEARCH**

"Corporate Financial Decision Making and Equity Analysis," New York, NY, February 2000.
Conference Moderator: M. Kritzman.

"Risk Management," Boston, MA, March 1999. Conference Moderator: B. Putnam.

"Investing in the "New" Telecommunications Industry," New York, NY, September 1997.
Conference Moderator: L. J. Haverty, Jr.

"Managing the Investment Professional," Chicago, IL, April 1996. Conference Moderator: R. S. Lannamann.

"Effective Risk Management in the Investment Firm," Boston MA, October 1995. Conference Moderator: G. L. Gastineau.

"Equity Analysis: The Role of Corporate Financial Decision Making," Washington, D.C., January 1995. Conference Moderator: R. S. Billingsley.

"Blending Quantitative and Traditional Equity Analysis," Boston, MA, March 1994. Conference Moderator: H. R. Fogler.

"Industry Analysis: The Telecommunications Industries," New York, NY, November 1993.
Conference Moderator: R. S. Billingsley.

PROFESSIONAL SERVICE

Board of Directors

Society of Utility and Regulatory Financial Analysts, 1993 – 2002.

Association for Investment Management and Research Activities

(Formally the Institute for Chartered Financial Analysts).

Professional service beyond duties performed as Vice President at AIMR.

Grading Staff, Institute of Chartered Financial Analysts, June 1987.

Candidate Curriculum Committee, Institute of Chartered Financial Analysts, Quantitative Analysis Sub-Committee, 1987-1989.

CFA Examination Analysis Team, Levels I-III, March 1988.
CFA Examination Grading Review Team, July 1988.

Faculty, CFA Refresher Course, Valuation: Equity, Charlottesville, VA, June 1992,
June 1993, June 1994, UCLA, November 1994.

Faculty, Basics of Equity Analysis, Montreal, Quebec, Canada, November 1994.

Consulting Clients

Association for Investment Management and Research

Bell Atlantic

BellSouth Telecommunications

The Financial Analysts' Review of the United States

Innovative Telephone Company

Institut Penembangan Analisis Finansial, Jakarta, Indonesia

Schweser Study Program (Kaplan Professional Company)

Securities Analysts' Association, Bangkok, Thailand

Sprint

Union Bank of Switzerland and UBS AG, Zürich and Basel

United States Telecommunications Association

Expert Witness Regulatory Testimony

(Note: only original docket indicated; direct and rebuttal not distinguished in same docket spanning over one year.)

<u>Company</u>	<u>Docket No.</u>	<u>Year</u>
Haviland Telephone Company (Kansas)	KCC 03-HVDT-664-RTS	2003
Innovative Telephone Company (U.S.V.I.)	VIPSC 532	2002
BellSouth Telecommunications (North Carolina)	NCPSC P-100, Sub133D	2002
BellSouth Telecommunications (Georgia)	GAPSC 14361-U	2001
BellSouth Telecommunications (Alabama)	ALPSC 27821	2000
BellSouth Telecommunications (Florida)	FLPSC 990649-TP	2000
BellSouth Telecommunications (Kentucky)	KPSC Adm. Case 382	2000
BellSouth Telecommunications (Louisiana)	LAPSC U-24714, Sub A	2000
BellSouth Telecommunications (Mississippi)	MPSC 2000-UA-999	2000
BellSouth Telecommunications (South Carolina)	SCPUC 2001-65-C	2000
United State Telephone Association, et. al.	FCC 98-166	1999
BellSouth Telecommunications and Sprint-Florida (Florida)	FLPSC 980696	1998
BellSouth Telecommunications (Alabama)	ALPSC 25980	1998
BellSouth Telecommunications (Florida)	FLPSC 980696-TP	1998
BellSouth Telecommunications (Kentucky)	KPSC Adm. Case 361	1998
BellSouth Telecommunications (Mississippi)	MPSC 98-AD-035	1998
BellSouth Telecommunications (Mississippi)	MPSC 98-AD-544	1998
BellSouth Telecommunications (North Carolina)	NC PSC P-100, Sub 133B	1998
BellSouth Telecommunications (North Carolina)	NC PSC P-100, Sub 133D	1998
BellSouth Telecommunications (Tennessee)	TRA 97-00888	1998
BellSouth Telecommunications (Florida)	FLPSC 960833-TP	1997
BellSouth Telecommunications (Kentucky)	KPSC Adm. Case 360	1997
BellSouth Telecommunications (Tennessee)	TRA 97-01262	1997
BellSouth Telecommunications (South Carolina)	SCPSC 97-374-C	1997
BellSouth Telecommunications (Florida)	FPSC 960833-TP	1997
BellSouth Telecommunications (Alabama)	ALPSC 26029	1997
BellSouth Telecommunications (Georgia)	GAPSC 7061-U	1997
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United States Telephone Association	FCC: AA096-28	1996
Southern Bell (South Carolina)	SCPSC 95-862-C	1995
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Southern Bell (South Carolina)	SCPSC 93-503-C	1994

<u>Company</u>	<u>Docket No.</u>	<u>Year</u>
Southern Bell (Georgia)	GPSC 3905-4	1994
Southern Bell (Florida)	FPSC 920260-TL	1993

Manuscript Referee

Journal of Banking and Finance

Journal of Financial Research

Journal of Futures Markets

Financial Review

Quarterly Journal of Business and Economics

Quarterly Review of Business and Economics

International Review of Economics and Finance

Japan and the World Economy

Journal of Business Research

Journal of Economics and Business

Engineering Economist

SELECTED INVITED SPEECHES/WORKSHOPS

LDC / Virginia State Corporation Commission Conference, "LDC Return On Equity: Has The World Changed? Common Myths in Cost of Capital Analysis," Roanoke, VA, October 2003.

Securities Analysts' Association, "Equity Valuation and Analysis Workshop," Bangkok, Thailand, March 1998.

Securities Analysts' Association, "Equity Valuation and Analysis Workshop," Bangkok, Thailand, March 1997.

Maryland - District of Columbia Utilities Association, "Telecommunications: Increasing Risk on the Horizon? An Investment Community Perspective," 71st Annual Fall Conference, Ocean City, MD, September 1995.

Bell Atlantic, "Do the 'Traditional' Cost of Equity Estimation Methods Work in the Current Environment?" National Accounting Witness Conference, Landsdowne Conference Resort, VA, April 1994.

Southeastern Electric Exchange, "Trends in Estimating the Cost of Equity for Public Utilities," St. Petersburg, FL, October 1993.

Securities Analysts' Association, "Common Problems in Valuing Equity Securities," Bangkok, Thailand, April 1992.

Virginia Bankers Association, Group Five (Credit Policy Committee), "Want to Sell Your Bank?" Interstate Banking in 1987 and Beyond," Credit Policy Conference, Radford, VA, April 1987.

NATURE AND APPLICABILITY OF THE DISCOUNTED CASH FLOW MODEL IN COST OF EQUITY CAPITAL ANALYSIS

I. Nature of the Discounted Cash Flow (DCF) Model

The DCF model is a formal statement of common sense and basic financial theory. The model asks an investor's most basic question: How much is this stock worth? Common sense dictates that the answer depends on what investors expect to get out of the stock and when they expect to get it. The "what" is the expected cash flow stream generated by the stock and the "when" is the projected timing of those expected cash flows.

Determining how much a stock is worth depends on one more critical consideration: the riskiness or probability that investors associate with their forecast of what they will receive from the stock. In this context, risk is the possibility that investors' expectations will be frustrated. Thus, risk is reflected by the probability that investors' actual returns will differ from their expected returns. The DCF model assumes that the average investor dislikes risk and consequently will accept higher risk only if there is a higher expected return.

The DCF model recognizes two types of expected cash flows: the periodic payment of cash dividends and the (possible) future sale of the stock. If an investor facing an opportunity cost of K percent expects to get dividends, D_t annually for the next N years and then sells the stock at the end of year N for a price of P_N , then the appropriate current price P_0 is:

$$P_0 = \frac{D_1}{(1 + K)^1} + \frac{D_2}{(1 + K)^2} + \dots + \frac{D_N + P_N}{(1 + K)^N}$$

In summary, the appropriate price of a stock is the present value of all of the cash benefits that an investor expects to get from owning it.

II. Applicable Form of the DCF Model

A. Issues

The above form of the DCF model is typically modified in at least two ways. First, a regulatory commission is presumably not concerned with determining how much a stock should sell for. Its goal is to determine what rate of return a firm's equity investors should reasonably expect to receive for bearing the firm's risk. Thus, a regulator is concerned with what the price is rather than with what it should be. The actual price P_{mkt} should consequently be used to infer investors' required rate of return.

Second, the form of the DCF presented above makes no explicit assumption concerning the expected rate of growth in dividends and the stock's price over time, nor any assumption concerning the length of an investor's expected holding period. However, the so-called constant growth form of the DCF model implicitly assumes that dividends and price grow at a constant rate G over time, that the growth rate is less than the required rate of return, and that investors have an infinite or indefinite holding period.

It is important to remember that the fundamental source of a stock's value to investors in the DCF model is its expected dividend stream. Why would investors be willing to trade a stock if the stock was no thing more than a piece of paper that would never pay any money? If the current price of a stock is the present value of all expected future cash flows, then the price at any point in time should be the present value of the expected cash flows beyond that point in time.

While an infinite holding period may not seem to apply to any one investor, this assumption is an accurate way of portraying the behavior of investors collectively. This is because investors must determine all prices, present and future, by projecting a seemingly endless series of future dividends. They must make such dividend projections since any expected future price is dependent on the dividends that are expected to be paid on that stock after it is purchased.

The constant growth form of the DCF model makes these two adjustments and can be expressed as:

$$K = \frac{D_0(1+G)}{P_{mkt}} + G = \frac{D_1}{P_{mkt}} + G,$$

where D_0 is the most recent dividend paid, G is the expected growth rate, D_1 is the next anticipated dividend, and the rest of the variables are defined as above.

Two additional modifications to the DCF model are necessary. First, it should be recognized that dividends are paid by most companies on a quarterly, not an annual basis. The second adjustment to the general DCF model presented above considers the flotation costs borne by the firm in raising equity funds.

B. Adjustment for Quarterly Dividends

1. Rationale

The annual form of the DCF model assumes that investors receive dividends only once a year and that they have the opportunity to reinvest those cash flows in investments of the same risk. The required rate of return implied by the annual form of the DCF model will be biased downward if investors actually receive their dividend payments in quarterly rather than in annual installments. This bias results because equity investors have the opportunity to start earning a return on their reinvested dividends sooner when these dividends are received quarterly than when the dividends are received only annually.

Investors determine prices that are consistent with the returns that they expect to earn. Thus, investors pay prices that reflect that they expect dividends quarterly rather than annually. Failure to make this adjustment to the DCF model will understate the cost of equity capital. This adjustment should be made in order to determine an economically correct cost of equity for a regulated firm.

2. Specific Adjustment

There are two basic ways in which quarterly dividends can be handled. The first approach makes the simplifying assumption that dividends are paid quarterly and grow quarterly as well. While this approach has the virtue of simplicity, it is not realistic because most firms adjust their dividend payments only once a year, not quarterly.

The second approach assumes that firms pay dividends quarterly but that those dividends are only changed by a firm annually. Thus, quarterly reinvestment opportunities are recognized and the more realistic pattern of annual dividend growth is accounted for as well. This is the approach that I use in my analysis of a regulated firm's cost of equity. Further, I assume that firms on average adjust the level of their dividends in the middle of the year.

The adjusted DCF model calculates a revised dividend, D_1^q :

$$D_1^q = d_1 (1 + K)^{.75} + d_2 (1 + K)^{.5} + d_3 (1 + K)^{.25} + d_4,$$

where d_1 and d_2 are the two quarterly dividends paid prior to the assumed yearly change in dividends and d_3 and d_4 are the two quarterly dividends paid after the given change in the amount paid by a firm. This dividend, D_1^q , revised to recognize the quarterly payment of dividends that grow at rate G once a year (on average for all firms in the middle of the next

12 months), is substituted in the place of D_1 in the basic form of the DCF model as follows:

$$K = \frac{D_1^q}{P_{mkt}} + G.$$

In my analysis, the market price is the average of the monthly high and low stock prices for the most recent three months for which data are available.

C. Adjustment for Flotation Costs

1. Rationale and Specific Adjustment

The cost of equity capital must reflect what a firm needs to earn on its funds in order to meet the return requirements of its investors. Flotation costs reduce the amount of funds that a firm has to invest and thereby increase the return that a firm must earn on those remaining funds if it is to continue attracting investors. If a utility was allowed to recover all of its flotation costs at the time of issuance, there would be no need for this adjustment. Otherwise, it is important to subtract the flotation costs from the price used in the DCF model in order to capture the fact that a utility does not receive the full proceeds of an equity issue.

Two empirical studies indicate that a 5% flotation cost is realistic. Research by C. W. Smith, Jr. (*Journal of Financial Economics*, 1977, pp. 273-307) finds that explicit flotation costs amount to between 4% and 5% of the amount of an equity issue. Focusing on the utility industry, research by R. H. Pettway (*Public Utilities Fortnightly*, May 10, 1984, pp. 35-39) finds that the sale of equity securities generally also involves implicit flotation costs in the form of a 2% to 3% decline in the price of the stock that results from market pressure.

While the above studies deal with both utilities and industrial firms, they are also relevant to the estimation of telecommunications companies' flotation costs. As the telecommunications industry becomes more competitive, such firms are increasingly being viewed more like industrials than as "pure" public utilities. Equity investors taking a long-term view in their valuations recognize this. Thus, the firm's cost of equity should reflect this expected transition. Therefore, given actual costs of approximately 4-5% and market pressure of 2-3%, I include a conservative 5% flotation cost adjustment that is implemented as a 5% reduction to the stock prices used in my DCF analysis.

2. Relevance of Flotation Costs Despite the Absence of Actual Equity Sales

The fact that a regulated firm does not actually sell equity by virtue of an affiliation with a parent company does not invalidate the need to adjust for flotation costs. Taken to its logical extreme, it could be argued that such a regulated subsidiary firm has no cost of equity capital at all since it does not sell shares of stock on the open market. Yet such regulated firms bear such equity costs and should be compensated accordingly.

The omission of a flotation cost adjustment is incorrect and is equivalent to comparing mortgage rates without adjusting for "points." A regulated firm will not get fair treatment if it is only permitted to earn a return that does not cover all of its reasonable costs, which include flotation costs.

3. Estimation of Growth for Use in the DCF Model

Investors are forward-looking. Investment decisions are made on the basis of how investors expect a stock to perform in the future. While how a stock has performed in the past may well influence an investor's expectations concerning future performance, there is no guarantee that the future will be a simple extension of the past. Thus, it is important that the estimated growth rate used in the DCF model be a prospective or expected, not a historical, rate.

Financial research indicates that the consensus growth rate forecasts of financial analysts are the most unbiased, objective, and accurate measure of investors' growth expectations for a stock. Thus, I use the growth rate estimates published by the Institutional Brokers Estimate System (IBES) and Zacks Investment Research, Inc. (Zacks). Both IBES and Zacks are used widely within the investment profession and are revised frequently enough to remain relevant to investors evaluating the growth prospects of stocks. Further, the use of both sources provides broad-based measures of long-term growth rate expectations.