

State of Florida

Docket No. 990649-TP,

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State of Georgia

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State of Missouri

Case No. T0-2001-439

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JUL 31 2001

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

**FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY**

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)
State Cooperation Commission)
Regarding Interconnection Disputes)
with Verizon-Virginia, Inc.)

CC Docket No. 00-251

In the Matter of)
Petition of WorldCom, Inc. Pursuant)
to Section 252(e)(5) of the)
Communications Act for Expedited)
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

**DIRECT TESTIMONY OF JOHN I. HIRSHLEIFER
ON BEHALF OF
AT&T AND WORLDCOM, INC.**

July 31, 2001

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1 **I. INTRODUCTION & QUALIFICATIONS**

2
3 **Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

4 A. My name is John I. Hirshleifer and my business address is Charles River Associates,
5 Inc., 10877 Wilshire Blvd., Suite 710, Los Angeles, California 90024.

6 **Q. WHAT IS YOUR OCCUPATION?**

7 A. I am a Vice President at Charles River Associates, Inc. ("CRA"), an international
8 financial and economic consulting firm.

9 **Q. WHAT IS YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND?**

10 A. I graduated from the University of California at Los Angeles with a B.A. degree in
11 1976. Subsequently, I received my M.B.A. in finance in 1980 from UCLA's Anderson
12 Graduate School of Management. I worked at Price Waterhouse from 1980 to 1984
13 and I am a certified public accountant in the State of California. From 1985 through
14 1990 I was the due diligence officer of Transamerica Financial Resources, Inc. (TFR),
15 the broker-dealer subsidiary of Transamerica Corporation. While at Transamerica I
16 held the registered representative, securities principal and financial and operations
17 principal licenses, and ultimately became TFR's treasurer and chief financial officer.
18 From 1991 through 1999 I was Vice President and Director of Research of FinEcon, a
19 firm which provided financial economic consulting services to corporations, law firms
20 and government agencies. At FinEcon I was responsible for numerous engagements
21 involving securities, valuation and cost of capital issues. In 1999, FinEcon merged

1 with CRA. As a Vice President with CRA, my duties are substantially similar to those
2 I held at FinEcon.

3 In the past several years, I have provided cost of capital testimony in numerous
4 state proceedings regarding the provision of unbundled network elements ("UNEs") to
5 competing local exchange carriers and the provision of universal service, and have
6 testified in the FCC's current proceeding regarding the represcription of rates for the
7 provision of interstate access services.¹ I have filed an affidavit regarding Verizon New
8 England Inc.'s application to the FCC dated November 2, 2000 to provide in-region
9 interLATA services in Massachusetts. I also co-authored an article entitled "Estimating
10 the Cost of Equity", which was published in the Autumn 1997 issue of *Contemporary*
11 *Finance Digest*. My resume is attached as Attachment JH-1.

12
13 **II. PURPOSE**

14
15 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

16 A. I have been asked by AT&T² to estimate the forward-looking economic cost of capital
17 that should be used in determining Verizon Virginia's (VZ-VA) forward-looking
18 economic costs to provide UNEs in Virginia.

19

¹ *In the Matter of Prescribing the Authorized Unitary Rate of Return for Interstate Services of Local Exchange Carriers*, CC Docket No. 98-166.

² This Affidavit is presented on behalf of WorldCom, Inc. and AT&T Communications of Virginia, Inc., TCG Virginia, Inc., ACC National Telecom Corp., MediaOne of Virginia and MediaOne Telecommunications of Virginia, Inc. (together, "AT&T").

1 **III. SUMMARY OF TESTIMONY/RECOMMENDATIONS**

2
3 **Q. PLEASE SUMMARIZE THE BASIC APPROACH OF YOUR TESTIMONY.**

4 A. My testimony involves applying the basic formula for the weighted average cost of
5 capital (“WACC”), given as equation (1) below, to estimate the cost of capital.

6 **Q. SUMMARIZE THE WACC FORMULA AND EXPLAIN HOW IT IS APPLIED.**

7 The WACC formula is given by,

8
$$\text{WACC} = w_d * k_d + w_e * k_e$$

9 (1)

10 where,

11 w_d = the fraction of debt in the capital structure,

12 k_d = the forward-looking cost of debt,

13 w_e = the fraction of equity in the capital structure,

14 k_e = the forward-looking cost of equity.

15 To apply the formula I estimate the forward-looking cost of both debt and equity using
16 methodologies that are well accepted by both financial economists and regulators. In
17 addition, I estimate the appropriate capital structure mix of debt and equity capital.

18 With these inputs, the WACC can be calculated from equation (1).

19 **Q. COULD YOU BRIEFLY SUMMARIZE YOUR COST OF CAPITAL**
20 **METHODOLOGY AND RESULTS?**

- 21 1. I have estimated the WACC for the business of providing UNE’s by VZ-
22 VA;

- 1 2. As there are no public companies solely involved in the provision of
2 UNE's, my analysis starts with a proxy group of telephone holding
3 companies, which own local exchange companies and also the
4 underlying network elements;
- 5 3. However, as noted by analysts, the credit rating agencies and the FCC,
6 telephone holding companies also own many riskier businesses, such as
7 wireless and international ventures.
- 8 4. By starting with this proxy group, the WACC estimated for the
9 telephone holding companies will be higher than what applies to the
10 network element leasing business alone.
- 11 5. Using a market value capital structure of the telephone holding
12 companies for weighting the costs of debt and equity yields a WACC
13 estimate for Verizon Communications Inc. (Verizon), the holding
14 company which owns many riskier businesses in addition to the UNE
15 business. This consequently provides an upper bound estimate in my
16 WACC range.
- 17 6. To estimate the WACC applicable to UNE's alone, I also calculate the
18 WACC using book value capital structure weights, and then take the
19 midpoint between this WACC value and the value described in the
20 previous paragraph as the best estimate of the market value capital
21 structure of a firm devoted to providing UNEs at wholesale in Virginia.
- 22 7. The WACC range and midpoint estimate that I arrive at as of June 30,
23 2000 are:
- 24 1) WACC range: 9.17% to 9.91%
- 25 2) midpoint estimate: 9.54%
- 26 8. Based on a:
- 27 1) Cost of debt of: 7.86%
- 28 2) Cost of equity of: 10.42%

1 9. The cost of debt is estimated by calculating the weighted average market
2 yield to maturity at June 30, 2000 on all of the long-term debt of
3 Verizon and its subsidiaries.

4 10. The cost of equity is estimated by averaging the results of the three-stage
5 DCF model and the CAPM model.

6 11. The capital structure implied by using the midpoint WACC estimate is:

7 1) Equity: 65.5%

8 2) Debt: 34.5%

9 12. As a reality check, I looked at discount rates used by investment banks
10 in the proxy statements of telecommunications companies, and at cost of
11 capital estimates used in numerous analysts' reports which largely
12 support the reasonableness of my WACC estimate.

13
14 **Q. HOW IS THE REMAINDER OF YOUR TESTIMONY ORGANIZED?**

15 A. The remainder of my testimony is divided into six sections. Section IV discusses the
16 fundamental relationship between risk and the cost of capital. Section V addresses the
17 cost of debt that should be employed. Section VI discusses several approaches to
18 estimating the cost of equity capital. Section VII addresses the question of determining
19 the appropriate capital structure to use when calculating the WACC, and presents my
20 estimates of the WACC. Section VIII discusses why the cost of capital I have
21 calculated for VZ-VA, based on the public data available for companies at the holding
22 company level, is likely to overstate the relevant cost of capital for the leasing of
23 UNEs. Finally, Section IX presents a summary of my conclusions.

1 **IV. THE RELATIONSHIP BETWEEN RISK AND THE COST OF CAPITAL**

2
3 **Q. WHAT IS THE RELATION BETWEEN THE RISK OF AN INVESTMENT**
4 **AND THE COST OF CAPITAL?**

5 A. Financial research has shown conclusively that investors are risk averse.
6 Consequently, the greater the risk of a business, the higher the expected return that
7 investors require to invest in the business. From the standpoint of a company, this
8 means that riskier businesses will have higher costs of capital.

9 **Q. WHAT ARE THE FUNDAMENTAL DETERMINANTS OF INVESTMENT**
10 **RISK?**

11 A. There are two fundamental sources of risk: operating risk and financial risk. Operating
12 risk arises from the actual operation of the business. It is affected by factors such as
13 competition, technological change, customer acceptance of a company's products,
14 variation in the costs of producing the company's products and the like.³ Financial risk
15 is determined by the amount of debt in a company's capital structure. Taking on more
16 debt increases fixed financial charges, thereby increasing the risk that the firm will not
17 be able to meet its financial obligations. The total risk investors face is determined by
18 the combination of operating risk and financial risk.

19 **Q. ARE OPERATING RISK AND FINANCIAL RISK RELATED?**

³ As I discuss later in my testimony, however, operating risks which an investor can diversify away are not compensated with a risk premium according to capital market theory. Competition risks, for example, are diversifiable. In this segment of my testimony I explain all types of operating risks that a company faces, including both diversifiable and nondiversifiable risk.

1 A. Yes. In an effort to control the total risk that investors face, companies manage their
2 capital structures in a manner that leads to a relation between operating risk and
3 financial risk. In particular, companies that face a great deal of operating risk, like high
4 technology firms, limit the debt they issue to prevent total risk from becoming too
5 large. On the other hand, firms that face little operating risk, like regulated utilities,
6 can benefit by using a good deal of low-cost debt without raising total risk to an
7 unacceptable level.

8 **Q. HOW DO YOU ACCOUNT FOR COMPANIES' BUSINESS AND FINANCIAL**
9 **RISK IN ESTIMATING COST OF CAPITAL?**

10 A. I apply the WACC formula to the closest comparable companies for which public
11 market data is available. The problem is that public data for key variables, such as
12 stock prices, are available only at the holding company level. Therefore, the
13 comparable companies that must be used are diversified firms. These firms operate
14 many businesses, most of which are riskier than the business in question in this case.
15 Further discussion of this risk issue is postponed until the final section of my
16 testimony. At this juncture, I proceed by using data at the holding company level.

17 **Q. WHAT COMPARABLES DO YOU USE IN THIS TESTIMONY?**

18 A. The comparable companies selected were derived from the list of telephone operating
19 companies in Standard and Poor's Industry Survey. These companies are presented
20 along with some descriptive information at Attachment JH-2, and include three
21 regional Bell holding companies ("RBHCs"), and two larger independent telephone
22 holding companies. The only RBHC omitted from the sample was US West, which

1 merged with QWEST on June 30, 2000. As a result of this merger, no stand-alone
2 capital structure information was available for US West as of this date. Exclusion of
3 US West from the sample is, in fact, conservative. If US West were included in the
4 sample for the purposes of calculation of Verizon's cost of equity, the cost of equity
5 and the weighted average cost of capital would have been a few basis points lower.
6 Telephone and Data Systems was excluded because only 27% of its revenues derive
7 from traditional telephone and network operations, it had only 682,200 access lines in
8 mostly rural areas, and 64% of revenues come from its high-risk cellular operations.⁴
9 Cincinnati Bell (now BroadWing Inc.) was excluded because it has ceased paying
10 dividends (to focus on investing in higher-growth businesses) and because I/B/E/S did
11 not have an analyst growth estimate.

12
13 **V. THE COST OF DEBT CAPITAL**

14 **Q. HOW DO YOU ESTIMATE THE COST OF DEBT?**

15 A. Because debt payments are fixed, the cost of debt can be computed directly and with a
16 high degree of accuracy.⁵ For this reason, I am able to utilize the costs of debt on the
17 outstanding debt securities for Bell Atlantic and GTE. It is not necessary to use a
18 sample of companies to estimate the cost of debt for the individual company because of
19 the small measurement error.

⁴ Alltel also had about 26% of its revenues from wireline, but had significantly more access lines (2,519,952) than Telephone and Data Systems (682,200). I have, therefore, included Alltel in my sample.

⁵ *Stocks, Bonds, Bills and Inflation, 1998 Yearbook*, Ibbotson Associates, Chicago, Illinois, pg. 150.

1 **Q. WHAT IS THE COST OF DEBT THAT YOU USE?**

2 A. The best estimate of the cost of debt is the weighted average cost over all of the subject
3 company's outstanding issues, including the debt of the holding company and any
4 subsidiaries. Standard & Poor's Bond Guide ("Bond Guide") provides information on
5 the face value and market yields to maturity on individual publicly-traded bonds.⁶

6 The data from the Bond Guide are presented in Attachment JH-3a. For both of
7 the companies' major debt issues the Attachment shows the bond rating, the face value
8 and the market yield to maturity. The yield to maturity is a forward-looking cost of
9 debt that measures the rate that the company would have to pay if the bonds were
10 issued at the measurement date, and reflects investors' expectations regarding the
11 future returns on these publicly-traded bonds.⁷

12 The June 30, 2000 cost of debt for Verizon is estimated as a weighted average
13 yield to maturity of the bonds of Bell Atlantic and GTE listed in the Standard & Poor's
14 Bond Guide. The resulting estimate is 7.86%. (See Attachments 3-a, 3-b and 3-c.)
15 Consequently, I use **7.86 percent** as the cost of debt of Verizon in my WACC analysis.

⁶ The Bond Guide does not include commercial paper and does not always cover all outstanding issues if there are many. It appears that the smaller and shorter-term obligations may be excluded. Because interest rates on longer-term obligations are generally higher, excluding the smaller and shorter term obligations would have the effect of overstating the cost of debt.

⁷ Theoretically, the yield-to-maturity on debt overstates the forward-looking cost of debt because of default risk. The problem raised by risky debt is that only the promised yield is observable, but it is the expected return that is required to estimate the cost of debt. Although the expected return and the default premium sum to the promised yield, neither the expected return nor the default premium can be observed directly. Because of this default risk, the debt cost of capital is actually the yield-to-maturity minus the expected default loss. The default risk of telephone holding company bonds is considered to be minimal and hence is ignored for purposes of this analysis.

1 **Q. DO THESE DEBT COST ESTIMATES INCLUDE THE COST OF SHORT**
2 **TERM DEBT?**

3 A. No. Because of data limitations, I have not tried to incorporate the impact of short-term
4 debt in my study as of June 30, 2000, such as the effect of the cost of commercial paper
5 issued by the operating telephone companies. Including the cost of short-term debt
6 would reduce the overall cost of debt.

7
8 **VI. THE COST OF EQUITY CAPITAL**

9
10 **Q. WHAT MAKES THE COST OF EQUITY CAPITAL MORE DIFFICULT TO**
11 **ESTIMATE THAN THE COST OF DEBT?**

12 A. The cost of debt can be computed directly because both the face value of debt and the
13 contractual payments a company agrees to make are fixed. In the case of equity,
14 however, there is no face value and dividends are paid at the discretion of management
15 depending upon business conditions. In addition, the dividend stream does not
16 terminate at a known point. For these reasons, there is no simple way to compute the
17 cost of equity capital and more complex approaches must be employed.

18 **Q. WHAT METHODS DO YOU USE TO ESTIMATE THE COST OF EQUITY**
19 **CAPITAL IN THIS CASE?**

20 A. I used two basic methods for estimating the cost of capital. The first is the discounted
21 cash flow ("DCF") method. Second, I use the capital asset pricing model, or
22 "CAPM". In various forms, the CAPM is the most widely employed theoretical

1 model, other than DCF, for estimating the cost of capital. Methods based on the
2 CAPM are sometimes referred to as “risk premium” methods because the model
3 provides an estimate of the risk premium associated with investing in specific issues of
4 common stock.

5 **Q. PLEASE EXPLAIN THE BASIC DCF METHOD.**

6 A. The DCF method is based on the realization that the price of a share of stock, P, equals
7 the present value of all future dividends expected to be received on that share,
8 discounted at the cost of common equity. Mathematically, the DCF model is written,

9
$$P = \text{Div}_1 / (1+k) + \text{Div}_2 / (1+k)^2 + \text{Div}_3 / (1+k)^3 + \dots, \quad (2)$$

10 where Div_1 is the expected dividend in year 1, Div_2 is the expected dividend in year 2,
11 etc.

12 The cost of common equity is arrived at by solving the DCF equation for the
13 cost of capital, k. There are two obstacles that make it difficult to solve the equation.
14 First, the number of terms in the equation is infinite. Second, dividends must be
15 forecast for every future year. To surmount these obstacles, simplifying assumptions
16 must be made about the behavior of future dividends.

17 **Q. WHAT ARE THE SIMPLIFYING ASSUMPTIONS THAT ARE EMPLOYED**
18 **IN THE CONTEXT OF THE DIVIDEND GROWTH MODEL?**

19 A. One of the simplest assumptions that can be made is that future dividends will grow
20 *forever*, at a constant rate, g, i.e., the growth rate can be maintained in perpetuity. In
21 that case the DCF equation simplifies to,

1
$$P = \text{Div}_1 / (1+k) + \text{Div}_1 * (1+g) / (1+k)^2 + \text{Div}_1 * (1+g)^2 / (1+k)^3 + \dots ,$$

2 which can be solved for k. The solution is well known to be,

3
$$k = \text{Div}_1 / P + g .$$

4 **Q. DID YOU USE THE CONSTANT GROWTH DCF EQUATION GIVEN ABOVE**
5 **IN ESTIMATING THE COST OF CAPITAL FOR YOUR SAMPLE OF**
6 **TELEPHONE COMPANIES?**

7 A. No. Once again a problem is raised by the fact that modern telephone holding
8 companies are composed of a variety of businesses, some of which— such as wireless
9 telephony and high-speed internet access— are expected to grow at rates of 25 percent
10 or more in the short run. Such high growth rates are clearly not sustainable into
11 perpetuity, so that the simple constant growth model cannot be applied unless one
12 modifies the growth rate or adopts some mitigating assumption. Stewart Myers and
13 Lynda Borucki state that,

14 [f]orecasted growth rates are obviously not constant forever.
15 Variable-growth DCF models, which distinguish short- and
16 long-term growth rates, should give more accurate estimates of
17 the cost of equity. Use of such models guards against naïve
18 projection of short-run earnings changes into the indefinite
19 future.⁸

20 Ibbotson Associates state that,

⁸ Stewart C. Myers and Lynda S. Borucki, "Discounted Cash Flow Estimates of the Cost of Equity Capital—A Case Study", *Financial Markets, Institutions & Instruments*, vol. 3, no. 3, New York University Salomon Center, 1994.

1 The reason it is difficult to estimate the perpetual growth rate
2 of dividends, earnings, or cash flows is that these quantities do
3 not in fact grow at stable rates forever. Typically it is easier to
4 forecast a company-specific or project-specific growth rate
5 over the short run than over the long run. To produce a better
6 estimate of the equity cost of capital, one can use a two stage
7 DCF model... For the resulting cost of capital estimate to be
8 useful, the growth rate over the latter period should be
9 sustainable indefinitely. An example of an indefinitely
10 sustainable growth rate is the expected long-run growth rate of
11 the economy.⁹

12 Sharpe,¹⁰ Alexander and Bailey state that,

13 Over the last 30 years, dividend discount models (DDMs) have
14 achieved broad acceptance among professional common stock
15 investors...

16 Valuing common stock with a DDM technically requires an
17 estimate of future dividends over an infinite time horizon.
18 Given that accurately forecasting dividends three years from
19 today, let alone 20 years in the future, is a difficult proposition,
20 how do investment firms actually go about implementing
21 DDMs?

22 One approach is to use constant or two-stage dividend growth,
23 models, as described in the text. However, although such
24 models are relatively easy to apply, institutional investors
25 typically view the assumed dividend growth assumptions as

⁹ *Stock, Bonds, Bills and Inflation, 1998 Yearbook*, Ibbotson Associates, Chicago, pp. 161-162.

¹⁰ Dr. Sharpe is a Nobel-prize winning financial economist.

1 overly simplistic. Instead, these investors generally prefer
2 three-stage models, believing that they provide the best
3 combination of realism and ease of application.

4 ...[M]ost three-stage DDMs make standard assumptions that
5 all companies in the maturity stage have the same growth rates,
6 payout ratios and return on equity.¹¹

7 Damodaran states that,

8 While the Gordon growth model is a simple and powerful
9 approach to valuing equity, its use is limited to firms that are
10 growing at a *stable growth rate*...

11 The second issue relates to what growth rate is reasonable as a
12 *stable growth rate*. Again, the assumption in the model that this
13 growth rate will last forever establishes rigorous constraints on
14 *reasonableness*. A firm cannot in the long term grow at a rate
15 significantly greater than the growth rate in the economy in
16 which it operates. Thus, a firm that grows at 12% forever in an
17 economy growing at 6% will eventually become larger than the
18 economy. In practical terms, the stable growth rate cannot be
19 larger than the nominal (real) growth rate in the economy in
20 which the firm operates, if the valuation is done in nominal
21 (real) terms...

22 ...If a firm is likely to maintain a few years of above-stable
23 growth rates, an approximate value for the firm can be obtained
24 by adding a premium to the stable growth rate, to reflect the
25 above-average growth in the initial years. Even in this case,

¹¹ Sharpe, William F., Gordon J. Alexander and Jeffrey V. Bailey, *Investments*, Fifth Edition, Prentice Hall, Englewood Cliffs, New Jersey, 1995, pp. 590-591.

1 the flexibility that the analyst has is limited. The sensitivity of
2 the model to growth implies that the stable growth rate cannot
3 be more than 1% or 2% above the growth rate in the economy.
4 If the deviation becomes larger, the analyst will be better
5 served by using a two-stage or a three-stage model to capture
6 the supernormal or above-average growth and restricting the
7 use of the Gordon growth model to when the firm becomes
8 truly stable.¹²

9 Copeland, Koller and Murrin echo these observations, stating that “[f]ew companies
10 can be expected to grow faster than the economy for long periods of time.”¹³

11 **Q. HOW DO YOU APPLY THE DCF MODEL?**

12 A. I use a three-stage version.¹⁴ The first stage lasts five years because that is the longest
13 horizon over which analysts’ forecasts of growth are available. The second stage is
14 assumed to last 15 years. During this stage the growth rate falls from the high level of
15 the first five years to the growth rate of the U.S. economy by the end of year 20. From
16 the twentieth year onward the growth rate is set equal to the growth rate for the
17 economy because rates greater than that cannot be sustained into perpetuity. A
18 perpetual growth rate that exceeded the growth rate of the economy would illogically
19 imply that eventually the whole economy would be comprised of nothing but telephone
20 companies.

¹² Damodaran, Aswath, *Damodaran on Valuation: Security Analysis for Investment and Corporate Finance*, John Wiley & Sons, New York, 1994, pp. 99-101.

¹³ Copeland, Tom, Tim Koller, and Jack Murrin, *Valuation: Measuring and Managing the Value of Companies*, John Wiley & Sons, New York, 1994, pg. 295.

¹⁴ There are numerous formulations of the DCF model of varying complexity.

1 **Q. WHAT DATA ARE USED TO ESTIMATE DIVIDEND GROWTH DURING**
2 **THE FIRST FIVE YEARS?**

3 A. To estimate growth rates during the first five years I use the Value Line dividend
4 forecasts for the year 2001, which incorporate Value Line's projection of dividend
5 growth for the full year, and individual company earnings forecast data from
6 Institutional Brokers' Estimate System ("I/B/E/S") as of June 2000 for the subsequent
7 four years. To compile the I/B/E/S data, more than 7,000 financial analysts
8 representing over 800 research organizations provide I/B/E/S with research on 18,000
9 stocks in 56 countries. In the U.S. alone, I/B/E/S receives estimates for 6,000
10 companies from over 240 research firms.¹⁵

11 By relying on the I/B/E/S data, which is for earnings, I am implicitly assuming
12 that dividends and earnings will grow at approximately the same rate over the five-year
13 horizon. There are no growth forecasts beyond a five-year horizon. That is why an
14 assumption must be made about how the growth rate behaves after that. As stated
15 above, I assume that it converges to the long-run aggregate growth rate of the U.S.
16 economy over the succeeding 15 years.

17 **Q. WHAT IS A REASONABLE ESTIMATE FOR LONG-RUN GROWTH IN THE**
18 **AGGREGATE ECONOMY?**

19 A. The long-term growth forecast was derived by averaging the long-term GNP growth
20 forecasts obtained from the Wharton Econometric Forecasting Associates ("WEFA")
21 Group and from Ibbotson Associates. The WEFA Group is an econometric forecasting

¹⁵ I/B/E/S website, www.ibes.com.

1 organization, formed in 1987 through a merger of WEFA and Chase Econometrics.
2 Ibbotson Associates is widely known in the fields of finance and valuation as one of
3 the leading providers of securities returns data and publications. As of June 2000,
4 WEFA predicted an average nominal GNP growth rate of 4.97% from 2000 through
5 2025. As of June 2000, Ibbotson Associates forecast long-term inflation to be 4.10%
6 annually. By adding this inflation forecast to the historical average long-term real
7 GNP growth rate of 3.50%, Ibbotson Associates predicted a nominal GNP growth rate
8 of 7.60%. I take the average of the two forecasts, 6.29%, rather than choose a single
9 GNP forecast.

10 **Q. DO YOU APPLY THE DCF MODEL TO EACH INDIVIDUAL COMPANY AS**
11 **YOU DID IN ESTIMATING THE COST OF DEBT?**

12 A. No. Consistent with financial practice, I use the DCF model to estimate cost of equity
13 for all of the companies selected as likely comparables, in addition to estimating a DCF
14 cost of equity for the individual companies.

15 **Q. WHY IS IT A GOOD IDEA TO APPLY THE DCF MODEL TO A NUMBER OF**
16 **SIMILAR COMPANIES, NOT JUST THE COMPANY WHOSE COST OF**
17 **COMMON EQUITY YOU ARE TRYING TO ESTIMATE?**

18 A. Estimating future growth for a company always involves some uncertainty because no
19 analyst can be expected to have perfect foresight. In some cases, the growth rate may
20 be overestimated and in other cases it may be underestimated. On average, over a
21 group of similar companies, these estimation errors tend to cancel out so that the
22 average growth rate for the group is estimated more accurately than the growth rate for

1 any individual company.¹⁶ Consequently, I apply the DCF method to all the telephone
2 companies in the previously selected sample.

3 **Q. YOUR SAMPLE IS COMPRISED OF 5 COMPANIES. DO YOU BELIEVE**
4 **THAT THIS PARTICULAR SAMPLE IS SUFFICIENTLY LARGE FOR THE**
5 **PURPOSE OF YOUR STUDY?**

6 A. Yes. Larger sample sizes of similar companies are desirable to minimize measurement
7 error. However, the companies should share important similarities to the subject
8 business, which in this case is the ownership of subsidiaries that own significant
9 network elements being utilized to provide local exchange service. My sample is
10 composed of primarily giant telecommunications holding companies which own much
11 of the network elements in use in the United States. Three of the companies have
12 assets in excess of \$24 billion dollars and are some of the largest companies in the
13 world. Many of these companies have been formed by the mergers of several
14 formerly-independent regional telephone holding companies with substantial local
15 telephone holdings, such as Bell Atlantic, GTE, NYNEX, SNET, Pacific Bell and

¹⁶ I refer to estimation error and the desirability of using averages in several discussions in my testimony. The following excerpt from *A Guide to Econometrics*, (3rd Edition, The MIT Press, Cambridge, MA, 1992) by Peter Kennedy summarizes the purpose for using larger samples:

“The sampling distribution of most estimators changes as the sample size changes. The sample mean statistic, for example, has a sampling distribution that is centered over the population mean but whose variance becomes smaller as the sample size becomes larger. In many cases it happens that a biased estimator becomes less and less biased as the sample size becomes larger and larger— as the sample size becomes larger its sampling distribution changes, such that the mean of its sampling distribution shifts closer to the true value of the parameter being estimated.” (pg. 18)

1 Ameritech. In prior studies, I included such companies in the sample when they were
2 independent entities.

3 **Q. HOW IS THE DCF COST OF EQUITY CAPITAL COMPUTED?**

4 A. Given the market price of a company's stock, the current dividend, and the forecast
5 growth rates during each of the three stages, equation (2) can be solved iteratively for
6 k. The iterative solution is the estimate of the cost of equity capital.¹⁷

7 **Q. WHAT IS YOUR DCF ESTIMATE OF THE COST OF EQUITY CAPITAL?**

8 A. Attachment JH-4 presents the DCF estimates of the cost of equity capital derived from
9 the three-stage model for the telephone company sample. The estimates range from a
10 low of 9.13 percent to a high of 11.07 percent.¹⁸

11 The cost of equity capital for Verizon is estimated to be 10.24 percent, based on
12 a value-weighted average of the equity cost of capital for all telephone holding
13 companies (excluding Verizon) and the cost of capital for Verizon itself. The table
14 below shows how this weighted average cost of equity capital was computed:
15

¹⁷ I utilize an annual DCF model because VZ-VA receives payments for the use of its network elements on a monthly basis, and consequently, are able to reinvest their cash flows on an approximate monthly basis. Thus, the effective rate that VZ-VA receives is the allowed rate - - as determined in UNE cost proceedings-- compounded monthly, regardless of the fact that telephone companies only pay dividends quarterly. Consequently, the use of a DCF cost of equity determined using the annual formula is conservatively high.

¹⁸ Because Century Telephone has a very small forward-looking dividend yield of 0.77%, applying the DCF model yields a cost of equity estimate that is not meaningful. As I note later in my testimony, the DCF approach may be less accurate for companies that pay small dividends. Consequently, I exclude Century Telephone from the DCF cost of equity calculation. However, I still include Century Telephone's CAPM cost of equity estimate. Because Century Telephone has a small market value of equity, its exclusion from the DCF calculation has a minimal (although slightly conservative) effect on the DCF cost of equity estimate for Verizon.

WEIGHTED AVERAGE DCF COST OF EQUITY FOR VERIZON

	Weight	Rate	Weighted Cost
Average (excluding Verizon)	.75	9.96%	7.47
Verizon	.25	11.07%	2.77
Weighted Cost of Equity			10.24%

1

2 **Q. WHY DO YOU USE A WEIGHTED AVERAGE TO COMPUTE VERIZON'S**
3 **DCF COST OF EQUITY?**

4 A. There is a trade-off between two considerations. First, because the DCF approach, like
5 any approach, estimates the cost of equity capital with error, it is wise to use an
6 average. This is because in the averaging process errors tend to cancel with
7 overestimates offsetting underestimates. However, the DCF method does not have a
8 mechanism to adjust for differences in risk caused by differing capital structures
9 employed by the firms in the sample. Therefore, of all the individual companies in the
10 sample, Verizon provides the best estimate of Verizon's own cost of capital. In light of
11 these two considerations, I feel a weighted average which assigns a $\frac{3}{4}$ weight to the
12 average excluding Verizon and a $\frac{1}{4}$ weight to Verizon is the best estimate. Using this
13 procedure, Verizon is given a significantly larger weight than any of the other
14 companies in the sample, but a smaller weight than the aggregate of all the
15 comparables.

16 **Q. WHAT OTHER METHODS DID YOU USE TO ESTIMATE THE COST OF**
17 **EQUITY?**

1 A. I also used the capital asset pricing model (“CAPM”).

2 **Q. WHAT ARE CAPITAL ASSET PRICING MODELS?**

3 A. Capital asset pricing models are mathematical formulas designed to quantify the trade-
4 off between risk and return. Professor William Sharpe was awarded the Nobel Prize
5 for developing the first capital asset pricing model. Here I employ several updated
6 variants of Professor Sharpe’s model.

7 **Q. HOW DOES THE CAPITAL ASSET PRICING MODEL (CAPM) WORK?**

8 A. The CAPM is designed to give the risk premium, that is the premium over the rate on
9 Treasury securities, required to induce investors to hold specific issues of common
10 stock. The standard CAPM is given by equation (3),

11
$$\text{Company risk premium} = \text{Company “beta”} * \text{Market risk premium.} \quad (3)$$

12 To apply the CAPM for a given company, it is necessary to estimate both that
13 company’s beta and the market risk premium.

14 **Q. WHAT IS A COMPANY’S BETA?**

15 A. The beta coefficient measures the systematic risk of investing in a company’s equity.
16 The CAPM is built upon the insight that investors will be rewarded for bearing only
17 those risks, called systematic risks, that cannot be eliminated by diversification. To
18 understand the difference between systematic and non-systematic risk, consider a
19 hypothetical investment in Apple Computer. The risks associated with this investment
20 can be seen as arising from two sources. First, there are risks that are unique to Apple.
21 Will Apple design competitive products? Will computer users accept Apple’s new

1 operating system? Second, there are risks that affect all common stocks. Will the
2 economy enter a recession? Will war break out in the Middle East?

3 The risks that are unique to Apple can be eliminated by diversification. An
4 investor who invests only in Apple will suffer significant losses if Apple's new
5 products are a failure, but an investor who holds Apple along with hundreds of other
6 securities will hardly notice the impact on the value of his or her portfolio if Apple's
7 new products fail. Therefore, risks that are unique to Apple are said to be non-
8 systematic.

9 On the other hand, market-wide risks cannot be eliminated by diversification. If
10 the economy enters a recession and stock prices fall across the board, investors holding
11 hundreds of securities fare no better than investors who put all their money in Apple
12 computer. Thus, economy-wide risks are systematic.

13 The CAPM says that only systematic risks, as measured by beta, are associated
14 with a risk premium. Non-systematic risks are not associated with premiums because
15 they can be eliminated by diversification.

16 *This concept is particularly important for the determination of cost of capital*
17 *because the risk that a company will lose customers to competition -- such as a*
18 *network leasing company losing business to competing facilities providers -- is a*
19 *diversifiable risk which does not increase the risk premium according to capital market*
20 *theory.*¹⁹

¹⁹ Ibbotson, Roger, and Gary P. Brinson, *Global Investing: The Professional's Guide to the World Capital Markets*, McGraw-Hill, 1993, at p. 45.