SERVICE DATE
FEB - 9 2005

**BEFORE THE WASHINGTON STATE
UTILITIES AND TRANSPORTATION COMMISSION**

In the Matter of the Review of: Unbundled Loop and Switching Rates; the Deaveraged Zone Rate Structure; and Unbundled Network Elements, Transport, and Termination (Recurring Costs)	)	DOCKET NO. UT-023003
	)	TWENTY-FOURTH SUPPLEMENTAL ORDER ESTABLISHING RECURRING COSTS AND RATES FOR UNBUNDLED NETWORK ELEMENTS, TRANSPORT, AND TERMINATION; ESTABLISHING DEVERAGED ZONE LOOP RATES
.....	)	

Synopsis: *The Commission establishes recurring rates for unbundled network elements, switching, transport, and termination and establishes deaveraged zone loop rates for Verizon.*

TABLE OF CONTENTS

INTRODUCTION

1 **Proceedings**. Docket No. UT-023003 is a proceeding to review recurring costs and rates for unbundled network element ("UNE") loops, switches, transport, and termination, and to review the deaveraged zone rate structure for loops and switching. The Commission initiated this proceeding on February 12, 2002, to address issues arising out of a previous generic cost proceeding, Docket No. UT-003013.[1]

2 The Commission conducted evidentiary hearings before Chairwoman Marilyn Showalter, Commissioner Richard Hemstad, Commissioner Patrick J. Oshie, and Administrative Law Judge Theodora Mace from May 26 to June 4, 2004. The parties filed initial briefs on July 15, 2004, and reply briefs on August 12, 2004.

3 **Appearances.** Verizon Northwest Inc. (Verizon), by Catherine Ronis, attorney, Washington, D.C.; Qwest Corporation (Qwest) by Lisa Anderl, attorney, Seattle, Washington; AT&T of the Pacific Northwest, Inc. (AT&T), Pac-West, Inc. (Pac-West), and XO Washington, Inc. (XO), by Gregory J. Kopta, attorney, Seattle, Washington; MCI/WorldCom (MCI) by Michel Singer-Nelson, attorney, Denver, Colorado; Covad Communications Company (Covad), by Karen Frame, attorney, Denver, Colorado; WeBTEC, by Arthur Butler, attorney, Seattle, Washington; Eschelon Telecom, Inc. (Eschelon), by Dennis Ahlers, Minneapolis, Minnesota; and Commission Staff, by Shannon Smith, Assistant Attorney General.

4 The only parties to present evidence and cross-examine witnesses during the proceeding were Verizon, AT&T (in conjunction with MCI),[2] and Commission Staff.

---

[1] *In the Matter of the Continued Costing and Pricing of Unbundled Network Elements, Transport, and Termination*, Docket No. UT-003013 (UT-003013), Twenty-Sixth Supplemental Order, October 19, 2001.
[2] AT&T and MCI are referred to throughout as AT&T although they jointly sponsored witnesses and submitted briefs.

5 **Commission decision:** In this order, the Commission establishes rates for UNEs, including average rates for 2- and 4-wire loops, switching, transport, and termination. The Commission establishes revised deaveraged zone loop rates and rejects deaveraged zone switching rates.

MEMORANDUM

I. INTRODUCTION

A. Procedural history

6 The Commission initiated its first review of rates for interconnection, UNEs, transport, and termination, and resale on November 21, 1996 in consolidated Docket Nos. UT-960369, UT-960370, and UT-960371 (UT-960369).[3] In its orders in that consolidated proceeding, the Commission established rates for unbundled loops, switching, and transport. It also established deaveraged loop rates.

7 In February 2000, the Commission initiated Docket No. UT-003013[4] to address issues arising out of the Federal Telecommunications Act of 1996 (the Act) and out of the first cost docket. As a result of proposals made by MCI and Staff for further rate review, the Commission decided to open the instant docket to revisit recurring and nonrecurring UNE rates for Qwest and Verizon that "may be set too high or too low based on their direct costs."[5] In addition, the Commission decided to reexamine the deaveraged zone rate structure established in its Twenty-fourth Supplemental Order in UT-960369.[6]

---

[3] *In the Matter of the Pricing Proceeding for Interconnection, Unbundled Network Elements, Transport and Termination, and Resale, et al.* Docket Nos. UT-960369, 960370, 960371 (UT-960369). This was the Commission's first cost proceeding initiated after passage of the federal Telecommunications Act of 1996 (the Act). The Commission established rates for interconnection prior to the Act in *WUTC v. US WEST Communications, Inc., et al*, Docket Nos. UT-941464, 941465, 950146, 950265, 4th Supplemental Order (1995).

[4] *In the Matter of the Continued Costing and Pricing of Unbundled Network Elements, Transport, and Termination, Docket No. UT-033013* (UT-003013).

[5] *Id., Third Supplemental Order*, August 13, 2002, at ¶ 11.

[6] *UT-960369, Twenty-Fourth Supplemental Order*, May 4, 2000.

8 At the outset, this proceeding was established to address recurring and nonrecurring costs for UNEs for both Qwest and Verizon. Over the course of its procedural history, the Commission agreed to bifurcate the proceeding so that recurring costs and nonrecurring costs would be addressed separately.[7] Ultimately, the Commission opened Docket No. UT-033034 to address the nonrecurring cost issues.[8]

9 As part of the preliminary procedural phase of this docket, Qwest and the other parties reached a settlement establishing deaveraged loop rates for Qwest and removing all Qwest issues from the case.[9] Thus, at the time of the evidentiary hearing, only Verizon's recurring rates remained at issue.

B. Recurring Rates and Total Element Long Run Incremental Cost (TELRIC)

10 Recurring rates are those monthly charges imposed by the incumbent local exchange carrier (ILEC) on competitive local exchange carriers (CLECs) for the lease of UNEs. A recurring rate is "based on the sum of three separate cost components – operating costs, depreciation expense, and return on capital."[10]

11 Recurring rates are set based on TELRIC principles established at the Federal level. Under the Telecommunications Act of 1996 (the Act), ILECS such as Verizon are required to interconnect with any requesting telecommunications carriers at rates,

---

[7] *UT-023003, Fourth Supplemental Order*, November 8, 2002; *Fifth Supplemental Order*, February 20, 2003.

[8] *UT-023003, Twelfth Supplemental Order*, August 5, 2003; *Seventeenth Supplemental Order*, November 25, 2003. The Commission has since then dismissed the nonrecurring cost proceeding. *Docket No. UT-033034, Order Dismissing, October 12, 2004.*

[9] *UT-023003, Twenty-Second Supplemental Order*, May 11, 2004.

[10] *In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996 et al.*, CC Docket Nos. 96-98 et al., First Report and Order, 11 FCC Rcd. 15,499, FCC 96-325 (1996) (Local Competition Order) at ¶ 703; see also *In the Matter of Review of the Commission's Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers*, WC Docket NO. 03-173, FCC 03-224, September 10, 2003 (TELRIC NOPRM) at ¶ 10.

terms, and conditions that are just, reasonable, nondiscriminatory, and cost-based.[11] Section 252(d) of the Act sets the pricing standard for interconnection and network element charges and provides that state commissions may not establish rates with reference to rate-of-return or other rate-based proceedings but that state commissions may set cost-based rates that include a reasonable profit.

12 In the Local Competition Order, the Federal Communications Commission (FCC) established the TELRIC pricing methodology to ensure that UNE rates comply with the statutory standards.[12] The FCC directed that UNE prices should replicate the conditions of a competitive market[13] and be based on forward-looking costs, rather than on embedded network costs.[14]

13 In the Local Competition Order, the FCC also formulated regulations providing that state commissions must comply with the FCC's TELRIC pricing methodology when setting UNE rates for ILECs.[15] The regulations provide that the forward-looking cost of a UNE equals the sum of the TELRIC element and a reasonable allocation of forward-looking common costs.[16] The TELRIC of an element includes forward-looking costs directly attributable to the element calculated, recognizing that the ILEC also provides other elements.[17] The regulations further state that under TELRIC the cost of a UNE must be based on "use of the most efficient telecommunications technology currently available and the lowest cost network configuration, given the existing location of the incumbent LEC's wirecenters."[18]

---

[11] *Sections 251(c)(2) and 252(d)(1)(A).*
[12] *Local Competition Order,* ¶¶ 679 *et seq.*
[13] *Id.* at ¶¶ 704-711.
[14] *Local Competition Order,* ¶ 679, 704-711.
[15] 47 C.F.R. §. 51.
[16] 47 C.F.R. § 51.505(a).
[17] 47 C.F.R. § 51.505(b).
[18] 47 C.F.R. §51.505(b)(1); *see also TELRIC NOPRM,* which indicates that the FCC intends to revisit TELRIC methodology. In the TELRIC NOPRM, the FCC states that "firms do not instantaneously replace all of their facilities with every improvement in technology" (¶50) and tentatively concludes that "TELRIC rules should more closely account for the real-world attributes of the routing and topography of an incumbent's network in the development of forward looking costs." (¶ 52).

Finally, the regulations prohibit consideration of embedded costs and retail costs when calculating UNE rates.[19]

14 The FCC's recent Triennial Review Order[20] clarified the FCC's pronouncements on the issue of depreciation lives and cost of capital, both of which are important inputs in determining UNE recurring cost rates. These provisions are discussed in more detail later in this order.

15 Recently, in its Interim Rules Order,[21] issued in response to the federal appeals court decision vacating in part the Triennial Review Order,[22] the FCC stated that current UNE rates for switching, enterprise market loops, and dedicated transport should remain in effect for six months unless a state commission authorizes a rate increase.[23] After the initial six months expires, the Interim Rules provide for an additional six-month period when the rate for UNE Platform[24] would increase by $1 relative to the current rate[25] and the rates for enterprise market loops and/or dedicated transport could increase by 15% over current rates.[26]

16 The Interim Rules Order has been challenged by ILECs in the D.C. Circuit.[27] In addition, the CLECs have requested that the FCC clarify several provisions of the Interim Rules Order, including whether or not the FCC intended to permit only rate

---

[19] 47 C.F.R. §51.505(d).
[20] *In re Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers*, CC Docket Nos. 01-338, et al., FCC 03-36, Report and Order and Order on Remand (Triennial Review Order) August 21, 2003.
[21] *In the Matter of Unbundled Access to Network Elements*, FCC 04-179, August 20, 2004 (Interim Rules Order). The FCC released its permanent unbundling rules on February 4, 2005 in FCC 04-290, WC Docket No. 04-313, CC Docket No. 01-338.
[22] *United States Telecom Ass'n v. FCC*, 359 F. 3d 554 (D.C. Cir. 2004) (USTAII).
[23] *Interim Rules Order*, ¶ 1. The six-month period begins with the September 13, 2004 publication of the rules in the Federal Register. Federal Register, Vol. 69, No. 176, 55111-55112.
[24] UNE Platform (UNE-P) is a combination of loop, transport and switching elements that CLECs lease from ILECs, for which the CLECs pay a single UNE-P rate.
[25] *Id.* at ¶ 29.
[26] *Id.*
[27] TR Daily, October 12, 2004, "Supreme Court Denies Review of Decision on Unbundling Rules," last paragraph.

increases ordered by state commissions during the freeze period, or whether rate decreases were also permitted.[28]

17 This Commission has adopted TELRIC pricing principles in prior cost dockets, to promote healthy competition and to establish accurate price signals that "tell competitors when to invest and when to use other strategies."[29] In the first generic cost proceeding, the Commission stated that: "The TELRIC methodology 1) assumes the use of best available technology within the limits of existing network facilities; 2) makes realistic assumptions about capacity utilization rates, spare capacity, field conditions, and fill factors; 3) employs a forward-looking, risk-adjusted cost of capital; 4) uses economic depreciation rates for capital recovery; and 5) properly attributes indirect expenses to network elements on a cost-causative basis."[30]

18 We recognize the uncertainty regarding UNEs and UNE rates that has been created by recent federal court orders and the FCC's interim rules. However, the Commission has an independent obligation under the Telecommunications Act of 1996 to establish just and reasonable prices for interconnection.[31] The parties have made a substantial record in this case, and the Commission intends to review and analyze that record to determine appropriate rates for UNEs in this case. The final legal effect of the rates that result from this proceeding can only be determined after this WUTC process is concluded.

---

[28] The Commission requested input from the parties regarding the effect of the Interim Rules Order on this proceeding. Verizon recommended that the Commission suspend the proceeding pending the outcome of Verizon's mandamus petition or issuance by the FCC of permanent rules. AT&T and Staff pointed out that the Interim Rules Order pertained to only three of the UNEs at issue in this proceeding – enterprise market loops, switching, and dedicated transport – and recommended that the Commission proceed to enter an order in this case. They argue that only at that point will the newly established rates be known with sufficient certainty to determine whether they may properly be implemented under federal and state laws and rules.

[29] *UT-960369, 31st Supplemental Order*, December 14, 2000, ¶ 23.

[30] *UT-960369, 8th Supplemental Order*, April 16, 1998, ¶ 10.

[31] Section 252(d) of the Act establishes state commissions' authority to approve, arbitrate and enforce interconnection agreements and to establish prices for interconnection and network elements.

19 We will turn first to the three basic components of recurring rates: cost of capital, depreciation, and annual cost factors that are used to estimate operating expenses. We will address them in sequence, starting with cost of capital.

II. COST OF CAPITAL

A. Introduction

20 The overall cost of capital, also termed the weighted average cost of capital, is the rate of return on UNE investment that is used in developing the recurring cost for the UNE. A company's total capital is composed of a certain percentage of debt and a certain percentage of equity capital. The weighted average cost of capital depends on the percentage of debt and equity capital that is determined appropriate for the company's capital structure. The company's debt and equity costs are weighted according to the capital structure percentages for each component. In this proceeding, each party disputes the others' estimates of Verizon's costs of debt and equity, and proposed capital structures. A summary of their positions appears in the table below.

TABLE 1

Comparison of Cost of Capital Proposals

	Verizon	AT&T	Staff
Capital Structure Debt/Equity	25%/75%	30%/70%	37%/63%
Cost of debt	6.26%	4.98%	4.98% or 6.26%
Cost of equity	13.95%	8.51%	None
Sample	S&P industrials	RBOCs[32]	None
Methodology	DCF	CAPM	None
WACC	12.03%	7.45%	10.6% or 11.1%

[32] Regional Bell Operating Companies.

Risk premium	3.95%	None	None
Total Cost of Capital	15.98%	7.45%	10.6% or 11.1%

21 In the Local Competition Order, the FCC stated that forward-looking TELRIC-based costs should include "a reasonable return on investment."[33] The FCC indicated that ILECs should be permitted to earn a "normal profit" under TELRIC[34] and that ILECs' currently authorized rate of return at the federal or state level was a reasonable starting point for TELRIC calculation.[35] The FCC added that the ILECs bore the burden of showing that the business risks they face in providing UNEs justify a different risk-adjusted cost of capital.[36]

22 In the Triennial Review Order, the FCC stated:

> ...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 prices.[37]

23 In the Triennial Review Order, the FCC also rejected the contention that a state may only consider actual competitive risk currently confronting an ILEC in determining UNE prices.[38] Rather, "states should establish a cost of capital that reflects the competitive risks associated with participating in the type of market that TELRIC assumes."[39] Furthermore, the FCC clarified that a "TELRIC-based cost of capital should reflect any unique risks (above and beyond the competitive risks discussed

---

[33] *Local Competition Order*, ¶ 673; 47 C.F.R. § 51.505(c)(1), (2).
[34] *Local Competition Order*, ¶ 700.
[35] *Id.* ¶ 702.
[36] *Id.*
[37] *Triennial Review Order*, ¶ 680.
[38] *Id.*, ¶ 681.
[39] *Id.*

above) associated with new services that might be provided over certain types of facilities."[40]

24 In light of these requirements and guidelines, we turn first to the issue of the appropriate capital structure to adopt for purposes of determining the cost of capital.

B. Capital Structure

25 Verizon proposes a capital structure consisting of 25% debt and 75% equity. Verizon contends that this is a TELRIC-based structure because it reflects the average market-value percentage of debt and equity in the capital structures of a sample group of Standard & Poor industrial companies, including telecommunications companies, based on data from 1998 to 2002.

26 AT&T proposes a market-based capital structure somewhat similar to Verizon's, of 30% debt and 70% equity. AT&T claims its methodology is similar to the one adopted in the FCC Wireline Competition Bureau's (WCB's) Virginia Arbitration Order,[41] but is based on market capitalization figures for all of the RBOCs for the most recent five-year period for which statistics are available (1999-2003).[42]

27 AT&T claims that Verizon has failed to demonstrate that its proposal is consistent with an ILEC in a TELRIC environment. AT&T also maintains that Verizon's

---

[40] *Id.* ¶683.

[41] *In re 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 Nos. 00-218 and 00-251, DA 03-2738, Memorandum Opinion and Order (Aug. 29, 2003)(Virginia Arbitration Order). In the Virginia Arbitration Order the FCC's Wireline Competition Bureau (WCB) resolved an interconnection dispute between Verizon Virginia and several CLECs. The WCB stood in the place of the Virginia State Corporation Commission in doing so. The WCB resolved the issues by employing, for the most part, "baseball" style arbitration in which the arbitrator selects one or another of the parties' proposals, rather than creating a separate resolution.

[42] *Ex. 651T* at 58-59.

calculations are based on older data (1998-2002) and that Verizon has not identified which companies it includes among its "telecommunications companies."[43]

28 According to Verizon, the data underlying its initial proposal was updated to include data from 2003.[44] Verizon also claims that it identified the telecommunications companies it included in its sample, in response to AT&T/XO Data Request 4-001 and 4-002.[45]

29 Verizon asserts that AT&T's proposal is an unrealistic measure of investor expectations because in its calculations, AT&T incorrectly included data for Qwest—a company Verizon describes as so highly leveraged that bond rating agencies have lowered its bond ratings to below investment grade, and a company that is largely unable to attract the capital needed to invest in its telecommunications network. Verizon contends that when Qwest's data are excluded from AT&T's calculations, the average capital structure for the remaining RBOCs would closely match Verizon's proposed capital structure. Verizon further asserts that when estimating its own cost of capital, AT&T uses a capital structure that assumes a higher ratio of equity to debt than Verizon proposes here.[46]

30 AT&T argues that the inclusion of Qwest's data is consistent with TELRIC principles because fully competitive markets include firms that are highly leveraged and have difficulty in attracting the capital needed to invest in their facilities.

31 AT&T also maintains that Verizon relies on figures that AT&T uses to calculate AT&T's own internal hurdle rate for individual local exchange projects, rather than AT&T's cost of capital.[47] AT&T contends that a hurdle rate is a target rate of return on a specific investment initiative, establishing the minimum projected return that a company would accept before allocating capital funds to any one specific project.[48]

---

[43] *AT&T Brief*, ¶15.
[44] *Ex. 106TC* at 79:13-18.
[45] *Ex. 283C.*
[46] *Ex. 658.*
[47] *TR 704.*
[48] *Ex. 657T* at 12.

The cost of capital, on the other hand, allegedly reflects the portfolio risk associated with the totality of the enterprise. According to AT&T, it makes no sense for a firm to invest in a project that merely returns the firm's overall cost of capital, so all firms routinely establish higher objective earnings levels for individual projects.

32 Contrary to Verizon and AT&T, Staff argues against using a market-based capital structure. Staff recommends that the Commission adopt Verizon's current capital structure of 63 % equity and 37 % debt. Staff maintains that because Verizon manages its current capital structure on a daily basis, it is safe, efficient, and balances economy with flexibility.[49]

33 Verizon argues that Staff's proposal is inappropriate because it calls for the Commission to adopt a book-value capital structure from 1994 that does not reflect investors' forward-looking expectations. Verizon also claims that Staff fails to explain why Verizon's proposed capital structure is not prudent or how it ignores the need to balance economy with financial flexibility.

34 ***Discussion and decision.*** As an initial matter, we take this opportunity to address the parties' reliance throughout this case on the WCB's Virginia Arbitration Order. Verizon cites the Virginia Arbitration Order to challenge reliance on inputs from the FCC's Universal Service Inputs Order[50], but otherwise disputes the Virginia Arbitration Order's value as precedent for this Commission. AT&T cites the WCB's order to challenge Verizon's reliance on data from the company's existing network.

35 Verizon contends that the Virginia Arbitration Order is not binding on this Commission and has no special persuasive value. Verizon points out that the company has filed a petition for review of the order with the FCC.[51] AT&T asserts that the Virginia Arbitration Order is the latest interpretation by the FCC of its rules implementing the UNE pricing standards established in the Telecom Act and that Verizon's representations about the order's validity contradict FCC Rule 47 C.F.R. §

---

[49] *TR 1092, lines 14-18.*

[50] *Federal-State Joint Board on Universal Service,* CC Docket No. 96-45, Tenth Report and Order, 14 FCC Rcd 20156 (USF Inputs Order).

0.5(c).[52] Staff maintains that the WCB's decisions on issues raised in the Virginia Arbitration Order may be helpful to the Commission but are not binding.

36 We are persuaded that the WCB's decisions in the Virginia Arbitration Order are not binding on this Commission. It is clear that the order is not an order of the FCC itself, because, according to Rule 47 C.F.R. § 0.5(c), the WCB's delegated actions are subject to review by the Commission. If a WCB action is under review, as is the WCB's Virginia Arbitration Order, the action does not have the same effect as an action taken by the Commission itself.

37 However, though not binding, the Virginia Arbitration Order may provide this Commission with valuable insights on issues addressed in this case and may suggest potential solutions worthy of adoption by this Commission because of the value of its analysis.

38 Returning to the question of the appropriate capital structure to adopt in this proceeding, we first reject AT&T's argument that the inclusion of Qwest's data in AT&T's sample group is consistent with TELRIC principles because fully competitive markets include firms that are highly leveraged and have difficulty in attracting the capital needed to invest in their facilities. While we agree that competitive markets may have firms that are more highly leveraged than their competitors and/or firms that are on the verge of bankruptcy or are engaged in a new line of business, we do not think that it is reasonable to assume that 25% of the

---

[51] *Verizon initial brief,* fn. 42. The petition was filed on September 29, 2003.

[52] 47 C.F.R. § 0.5(c) reads:

> Delegations of authority to the staff. Pursuant to section 5(c) of the Communications Act, the Commission has delegated authority to its staff to act on matters which are minor or routine or settled in nature and those in which immediate action may be necessary. See subpart B of this part. Actions taken under delegated authority are subject to review by the Commission, on its own motion or on an application for review filed by a person aggrieved by the action. Except for the possibility of review, actions taken under delegated authority have the same force and effect as actions taken by the Commission. The delegation of authority to a staff officer, however, does not mean that he will exercise that authority in all matters subject to the delegation. In non-hearing matters, the staff is at liberty to refer any matter at any stage to the Commission for action, upon concluding that it involves matters warranting the Commission's consideration, and the Commission may instruct the staff to do so.

firms in a competitive market are in positions such as these.[53] It is not reasonable to assume that a hypothetically competitive market would, over time, be so volatile.

39 Second, we reject Staff's capital structure proposal because it is inconsistent with the assumption of a hypothetically competitive market. Even if Verizon were currently in a fully competitive market, as it claims to be because of intermodal competition, it is reasonable to assume that its current capital structure would reflect its past structure, determined during the period it was a monopoly provider, because it was during that time period that the debt on its books was accumulated. The decisions Verizon made prior to its markets being opened to competition are not so far in the past that they are inconsequential to its current financial structure.

40 We note that AT&T's and Verizon's capital structure proposals are similar. However, AT&T's proposal of 30% debt is based only on data from four companies: Verizon, SBC, Bell South, and Qwest. Again, because of Qwest's recent accounting problems, its debt/equity ratio is severely out of balance. Also, because of the small size of AT&T's sample, the inclusion of Qwest's data biases its results towards more debt. On the other hand, Verizon's analysis, based on the capital structure of telecommunications firms and of the S&P Industrials, is a more informative approach in light of the guidance provided by the FCC in its Triennial Review Order.[54] Therefore, we approve Verizon's proposed capital structure of 25% debt and 75% equity.[55]

C. Cost of Debt

41 Verizon proposes a cost of debt of 6.26%. Verizon contends this rate complies with TELRIC because it is a market-based interest rate, based on the market value of the

---

[53] AT&T confines this argument only to situations where it is recommending that the Commission include Qwest as one of four members of its sample.

[54] *Ex. 101T* at 43, Table 2.

[55] In reaching this conclusion we implicitly reject Verizon's suggestion that AT&T's internal capital structure and hurdle rate support capital structures that contain much more equity than is proposed by either party here. Internal hurdle rates are intended as criteria evaluating the wisdom of engaging in a specific investment rather than as a measure of risk for the whole business enterprise.

average yield to maturity on Moody's A-rated industrial bonds. Verizon argues that 6.26% is a conservative rate because it does not include flotation costs.

42 AT&T proposes a debt cost of 4.98%, based on the average yield to maturity on all debt of Verizon Northwest's parent and subsidiaries.

43 AT&T faults Verizon's proposed cost of debt because none of the industrial companies in Verizon's debt analysis are telecommunications companies. AT&T contends that the WCB weighed proposals similar to those in this case and adopted AT&T's proposal because it reflected the cost of companies in the relevant industry.[56] AT&T urges the Commission to take a similar action in this case.

44 AT&T also rejects Verizon's position that if the company's own debt is to be used in determining cost of capital, it should reflect the rate Verizon would obtain today to finance network construction. AT&T contends that this argument ignores Verizon's own modeling assumption that a mix of old and new vintage equipment should be used to recreate the network.

45 Verizon points out that since all industrial companies with A-rated bonds pay the same interest rates, exclusion of telecommunications companies from its analysis is immaterial. Verizon is listed by Moody's as an A-rated industrial company. On this basis, Verizon maintains that the yield to maturity for A-rated industrial bonds is an appropriate measure for the cost of debt Verizon would face in a TELRIC scenario.

46 Verizon also disagrees with AT&T's reliance on Verizon's total outstanding debt costs. Verizon contends that all of Verizon's long-term debt is near maturity and is traded as short-term debt. Thus Verizon's debt costs do not reflect the cost for long-term debt that would be applicable if it were required to rebuild its network under TELRIC assumptions.

47 AT&T responds that Verizon's designation of its debt as "short-term" is misleading because the average maturity of that debt is twelve years, not the one-year period

typically considered "short-term." Verizon counters that the twelve years is an average figure that includes one-year short-term maturities. Verizon argues against reliance on such an average maturity because the one-year instruments included in the average render the resulting rate inappropriate for determining a debt rate for a long-term telecommunications facility.

48 Commission Staff advocates either of two alternatives for cost of debt. Staff recommends adoption of AT&T's cost of debt for use in developing a cost of capital based on Verizon's current book capital structure. Alternatively, Staff recommends adoption of Verizon's proposed debt cost for use in Verizon's actual current capital structure. This results in Staff's recommendation that the upper limit for Verizon's weighted average cost of capital be set at 11.1% and the lower limit be set at 10.6%. This recommendation will be discussed further below.

49 ***Discussion and decision.*** We are persuaded that Verizon's cost of debt proposal is the most reasonable. Verizon is correct that the exclusion of telecommunications firms from its calculations is immaterial because all industrial companies with 'A' rated bonds pay the same interest rate. Nothing on the record indicates that Verizon should anticipate being upgraded from its current 'A' rating. In fact, with increased competition there is a greater possibility that Verizon's bond rating would be lowered, thus raising its debt costs.[57]

50 Furthermore, using a sample of 'A' rated industrials likely results in a lower cost of debt than would result from use of a telecom-based sample because of the precarious financial condition of some of those companies, such as Qwest, which are likely to be farther down on Moody's scale. Since Verizon is listed by Moody's as an 'A' rated industrial company, the yield to maturity for 'A' rated industrial bonds is an appropriate measure of the cost of debt Verizon would pay going forward.

---

[56] *Virginia Arbitration Order* at ¶67.

[57] "Downgrades Toll for 3 Baby Bells as Core Lines Weaken," *Wall Street Journal*, September 27, 2004, http://online.wsj.com/article/0,,SB109623780593728275,00.html.

51 In reaching our determination, we reject AT&T's argument that Verizon's assumption of a network rebuild at current borrowing rates is inconsistent with Verizon's modeling assumption of mixed equipment vintages. AT&T's reliance on existing debt is an embedded approach contrary to what AT&T advocates elsewhere in this case. For example, if one assumes that Verizon is purchasing all new switches, then for consistency's sake one must also assume that it is financing the purchases with debt acquired at current rates. Based on our rejection of AT&T's proposal, we also reject Staff's recommendation to adopt AT&T's cost of debt.

D. Cost of equity

52 Verizon recommends a cost of equity of 13.95%, using the Discounted Cash Flow (DCF) methodology. AT&T recommends a cost of equity of 8.51% using a Capital Asset Pricing Model(CAPM) methodology. Although disputing Verizon's methodology for determining Verizon's cost of equity, Staff recommends adoption of Verizon's proposed cost of equity for use with Verizon's current actual capital structure (rather than Verizon's proposed capital structure) to derive a weighted average cost of capital.

53 Underlying the parties' recommended equity rates are numerous disputes about aspects of each other's equity pricing methodologies and selection of comparable companies.

1. Discounted Cash Flow (DCF)

54 The DCF methodology is "based on the assumption that the market price of a firm's stock is equal to the present value of the stream of cash flows that investors expect to receive from owning the stock."[58] The one-stage perpetual growth DCF model[59] formula is expressed as:

---

[58] *Ex. 101T* at 17.

$$R=(D/P)+g$$[60]

Where:
- r = cost of equity
- D = the dividend payout
- P= the original price of equity
- g= the dividend growth rate

55 The dividend growth rate, "g," is the most significant component of the formula and requires an estimate of investors' expectations for long-term growth. The "D" and "P" components of the equation are observed in the marketplace and are less subjective in nature. Verizon's proposed growth rate, discussed in more detail later in this section, is 11.90%.

2. Capital Asset Pricing Model (CAPM)

56 The CAPM "assumes that investors assess risk and demand returns based on a stock's variability vis-à-vis the market as a whole (often measured by the S&P 500); the more a stock's variability differs from the overall market variability, the riskier it is."[61]

The formula for the CAPM is:

$$E(R_i) = R_f + \beta_i * [E(R_m) - R_f]$$

Where:

---

[59] The one-stage DCF model uses a growth rate assumed to be in effect for perpetuity. A two- or three-stage DCF model assumes different growth rates for different periods of time in the future. *Ex. 106T* at 66; TR 614-615.

[60] The actual, somewhat more complicated formula used by Dr. VanderWeide, appears on Exhibit 10 at 3. This actual formula incorporates use of quarterly rather than annual data but causes only a minor difference in the cost of equity. *TR 614.*

[61] *Ex. 651T* at 18-19.

1. R_f = The risk-free rate of return. The time value of money.
2. R_m = Market risk. The reward for investors' bearing the systematic risk of the market is the compensation the market offers for bearing the average amount of systematic risk relative to the pure time value of money. Its value is measured by the expected rate of the market, R_m, less the risk-free rate of return [$E(R_m) - R_f$]. This risk is non-diversifiable.
3. β_i = Unique risk. β_i (Beta) is the amount of systematic risk present in a particular asset, relative to the average asset.

57 Each of these components is significant in determining the cost of equity capital using the CAPM methodology. AT&T proposes a risk-free rate of 2.81%,[62] a beta of .75,[63] and a market risk premium of 7.61%.[64]

a. Determining the appropriate methodology

58 Verizon recommends use of the single-stage DCF model to estimate its cost of equity, claiming that this Commission has long recognized the merits of the DCF model and has chosen it on numerous occasions over the CAPM.[65] Verizon argues that the DCF model is especially appropriate for measuring the TELRIC cost of equity because it reflects the best estimate of investors' expectations for long-term growth and because it is statistically superior to historically-oriented growth calculations. In addition, Verizon argues that the single-stage DCF model is easy to apply, as it requires only two inputs: the dividend yield, which can be observed in the marketplace, and the growth rate, which can be estimated for most companies through the consensus analysts' forecasts published by the Institutional Brokers Estimate System (IBES).[66]

---

[62] *Id.*, at 56, Table 7, l. 4.
[63] *Id.*, Table 7, l. 8.
[64] *Id.*, l. 7.
[65] *WUTC v. Washington Natural Gas Company*, Docket No. UG-920840, Fourth Supplemental Order, Sept. 27, 1993; *WUTC v. American Water Resources*, Docket No. UW-980072, et al., Sixth Supplemental Order, Jan. 21, 1999; *WUTC v. Avista Corp.*, Docket No. UE-991606, et al., Third Supplemental Order, Sept. 29, 2000).
[66] *Ex. 106TC* at 70:20-22.

59 AT&T recommends that the Commission use the CAPM to estimate Verizon's cost of equity. AT&T contends that the WCB rejected the DCF model supported by Verizon because use of "the constant growth DCF model to estimate the cost of equity capital for its S&P proxy group stretches the reasonable limits of its use."[67] The WCB reasoned that the constant growth rate Verizon used was more than twice the long-term economy-wide growth rate estimate. Thus, AT&T claims that the WCB correctly concluded that, "no company can grow forever at a greater rate than the economy as a whole, and therefore we conclude that Verizon's assumption is not reasonable."[68] AT&T recommends that this Commission reach the same conclusion and adopt the CAPM methodology.

60 Verizon claims that companies do not have to grow at the same rate forever for a one-stage DCF model to reasonably approximate how prices are determined in capital markets because future periods are discounted in the DCF model. Thus, Verizon argues, the fact that the proxy groups would technically overtake the economy at some distant point of time has no real effect on the cost of capital Verizon proposed.

61 AT&T maintains that Verizon also ignores the fact that the analyst forecasts on which Verizon relies have been substantially inaccurate. According to AT&T, Verizon's witness admitted that based upon the S&P 2003 Analyst Handbook the average earnings per share for the S&P 500 composite for 1998 was $40.79, and that had the then-forecasted 12.51% annual earnings growth actually occurred, the composite earnings per share figure for 2002 would have been $65.36.[69] In fact, according to the 2003 S&P Analyst Handbook, earnings per share for the S&P composite for 2002 were actually only $22.57, not the $65.36 that the 1998 IBES analysts had projected. Thus, AT&T recommends that the Commission give no credence to Verizon's analysis.

---

[67] *Virginia Arbitration Order* ¶ 73.
[68] *Id.*
[69] *TR 619; Ex. 121.*

62 Verizon claims that although analysts' earnings forecasts in 1998 may have been higher than the actual 2002 earnings for the S&P composite, the analyst forecasts are, at any given time, the best available estimate of future growth. According to Verizon, it simply does not matter how accurate the forecasts ultimately are if investors rely on them today to make investment decisions.

63 AT&T notes that the WCB concluded that the CAPM was the better mechanism for estimating the cost of equity because the CAPM does not rely on assumptions concerning dividend growth rates, and therefore cost of capital estimates derived from the CAPM are no better or worse for companies that are growing rapidly than for those growing slowly.[70]

64 Verizon disputes AT&T's suggestion that the CAPM is both easier to apply and more theoretically sound than the DCF model. Verizon maintains that this Commission and others have already rejected that notion. Verizon argues that the CAPM should be rejected purely because the three fundamental inputs required by the CAPM are all subject to a high degree of uncertainty. Leaving aside its alleged complexity, Verizon argues that the CAPM should be rejected because AT&T incorrectly employs it to produce an exaggeratedly low cost of equity.

65 AT&T claims Verizon is wrong to suggest that this Commission has chosen the DCF model on numerous occasions over the CAPM. AT&T asserts it is not aware of a single case in which this Commission was presented with a choice between the CAPM and DCF Model, much less has chosen the DCF Model over the CAPM. AT&T asserts that Verizon's claim that the CAPM should be rejected because it produces a low cost of equity is irrelevant to the Commission's choice of a methodology for estimating the cost of equity.

66 ***Discussion and decision.*** Although both Verizon and AT&T contend that the other party's proposed methodology is flawed and should be rejected, their strongest advocacy concerns the equity model inputs and the proxy samples from which the inputs are derived, and not the fundamentals of the models themselves.

67 However, our primary concern is with the models themselves. Putting aside the issue of inputs, we find that the main problems with the DCF model are: 1) that it requires users to estimate the rate at which Verizon's dividends would grow in perpetuity, and 2) that the model will return erroneous results if a company included in the sample has no dividend or zero or negative growth. The process of identifying the dividend growth rate is subjective[71] and the difficulty of estimating the dividend growth rate is compounded by the fact that the growth rate has a very significant effect on the results of the model.

68 While the CAPM does not place as much weight on a single input, or require that a firm have both a dividend and positive growth, the tradeoff is that the CAPM requires the user to estimate three inputs that are not readily observable in the marketplace. The most important of these is the beta, the measure of systematic risk relative to the market as a whole.

69 Verizon is correct that in the past the Commission has relied on the DCF model to estimate the cost of equity capital.[72] Although we recognize that each model has its flaws, because the DCF model has fewer variables and has been a reliable tool in past Commission cases for estimating the cost of equity, we will employ it again in this case. We find that we can adjust the DCF model to compensate for problems that occur as a result of the constant growth rate assumption. Any further problems related to selection of an appropriate proxy sample group can also be eliminated by making an adjustment to the sample group input, as discussed below.

70 We note that even though Verizon's expert cost of capital witness, Dr. VanderWeide, testified that there is no clear reason to prefer one model over the other,[73] reputable

---

[70] *Virginia Arbitration Order*, ¶71.
[71] Andre F. Perold, "The Capital Asset Pricing Model," Journal of Economic Perspectives, vol. 18 (2004), p. 5.
[72] *WUTC v. Washington Natural Gas Company*, Docket No. UG-920840, Fourth Supplemental Order, September 27, 1993; *WUTC v. American Water Resources*, Docket No. UW-980072, *et al.*, Sixth Supplemental Order, January 21, 1999; *WUTC v. Avista Corp.*, Docket No. UE-991606, *et al.*, Third Supplemental Order, September 29, 2000.
[73] *Ex. 105TC at 71.*

scholars in the cost-of-capital field have recently expressed significant concern about the forensic quality of the CAPM methodology.[74] It is possible that in the future, problems with the CAPM model may be corrected or alleviated. For purposes of this proceeding, we find the DCF model, as adjusted, provides us the best method for determining the cost of equity.

b. Determining appropriate proxy samples and equity model inputs

71 According to Verizon, since "Verizon Northwest, Inc." is neither market-traded nor solely engaged in providing UNEs, a proxy is necessary to estimate the appropriate cost of equity. Verizon argues that the S&P Industrials provide a conservative proxy group because it is a large, well-known sample of publicly traded companies operating in competitive markets. To purportedly reduce any statistical anomalies, Verizon used only the second and third quartiles of the S&P Industrials, thereby eliminating the first quartile, whose growth rates were significantly lower than average, and the fourth quartile, whose growth rates were significantly higher than average.

72 AT&T believes that the sample chosen by Verizon is inappropriate because it does not include any telecommunications firms. AT&T also claims that Verizon's sample of non-telecommunications companies is inappropriate because these firms have an average forecasted earnings growth of 11.90 %, which is nearly double that for the ten telecommunications firms in the S&P 500, and roughly triple that for the four RBOCs.[75] AT&T maintains that Verizon has produced no evidence demonstrating

---

[74] Eugene F. Fama & Kenneth R. French, *The Capital Asset Pricing Model: Theory and Evidence*, 18 Journal of Economic Perspectives No. 3, Summer 2004, pp. 25-46. In this article, the authors state: "The version of the CAPM developed by Sharpe (1964) and Lintner (1965) has never been an empirical success. In the early empirical work, the Black (1972) version of the model, which can accommodate a flatter tradeoff of average return for market beta, has some success. But in the late 1970's, research begins to uncover variables like size, various price ratios and momentum that add to the explanation of average returns provided by beta. The problems are serious enough to invalidate most applications of the CAPM." (at 43). The authors also caution "that despite its seductive simplicity, the CAPM's empirical problems probably invalidate its use in applications." (at 44).
[75] *Ex. 657TC* at 6.

that Verizon's sample in any way accurately represents the cost of equity of an ILEC in a TELRIC environment.

73 ***Discussion and decision.*** As discussed above, we adopt the DCF model to estimate the cost of equity capital in this case.[76] However, we find Verizon's DCF proposal to be flawed and to require adjustment.

74 The chief problem with Verizon's DCF proposal is that the assumed growth rate of 11.90% in perpetuity is too high—approximately double that of the ten telecommunications firms in the S&P 500; roughly triple that for the four RBOCs; and almost four times the expected growth rate for the economy as a whole.[77] An additional problem is that Verizon proposes use of a proxy sample limited to non-telecommunications firms to determine the appropriate DCF cost of capital. While a sample of only four telecommunications companies, as AT&T proposed, is too small, we find that reliance only on non-telecommunications industrial firms is unreasonable when there is ample data available on a broader telecommunications sample .

75 Although Dr. Selwyn recommended a growth rate of approximately 3%, which is more in line with the economy as a whole, it may be too low.[78] We believe that a more reasonable growth rate to include in the DCF model is closer to 6-8%. At this level it would be assumed that Verizon is slightly outpacing the growth in the economy. This range of rates also falls near the midpoint between Verizon's current growth estimate of 3.7%[79] and the value advocated in this proceeding by Verizon, 11.90%, which was based on the proxy of S&P Industrial firms.

76 We also find support for the 6-8% range from our review of data from the ten telecommunications firms that are a part of the S&P Industrials. The growth rate for

---

[76] *See WUTC v. Washington Natural Gas Company*, Docket No. UT-920840, Fourth Supplemental Order, September 27, 1993 at 26-27.
[77] *Ex. 657TC* at 6.
[78] *Ex. 651T* at 16.
[79] *Ex. 657T* at 5.

this telecom group is 6.47%[80] and incorporating it into the DCF model results in a cost of equity of 8.22%. However, the dividend growth rate estimates for these firms likely understates the growth estimates to be expected from a competitive market because these firms are not yet subject to full competition. For these reasons, we exercise our judgment[81] to adjust the growth rate for the DCF model to a range of 6% to 8%, relying on the sample proxy group of telecommunications firms taken from Dr. Selwyn's testimony.[82]

3. Summary

77 In the chart below, we list our adopted proxy sample group of ten telecommunications firms, including Verizon, using a 7% growth rate estimate (the mid-point of our adopted range of growth rates). As shown, we exclude firms with a negative growth estimate and firms that do not pay dividends. The resulting DCF cost of equity, based on a 7% growth rate estimate, is 11.22%.

---

[80] *Id.*

[81] *See Joint Application of AT&T Communications of California, Inc. (U 5002 C) and WorldCom, Inc. for the commission to Re-examine the Recurring Costs and Prices of Unbundled Switching in its First Annual Review of Unbundled Network Element Costs Pursuant to Ordering Paragraph 11 of D.99-11-050, et al,* Applications 01-02-024, 0102-035, 02-02-031, 02-02-032, 02-02-034 and 02-03-002, Opinion Establishing Revised Unbundled Network Element Rates for Pacific Bell Telephone Company DBA SBC California, September 23, 2004. In this opinion, the California Commission stated: "It is important to note that while we review the financial modeling presented by the parties, particularly where it estimates the cost of equity, we will use judgment as well as models to render our decision." *Opinion* at 146; *see also* ¶64, *supra*, where we indicate that determining a dividend growth rate is a subjective process.

[82] *Ex. 657T* at 6.

TABLE 2

Company	Market Capitalization	7% Growth	Share Price	Dividend	Cost of Equity	Weight	Weighted COE
ALLTELL	15.2	7.00%	$ 50.34	$ 1.42	9.82%	5.64%	0.55%
AT&T	15.4	-13.80%	$ 17.15	$ 0.85			*a*
AT&T WIRELESS	36.6	27.10%	$ 13.81	none			*b*
BELLSOUTH	48.3	7.00%	$ 25.81	$ 0.92	10.56%	17.92%	1.89%
CENTURY	3.8	7.00%	$ 28.88	$ 0.22	7.76%	1.41%	0.11%
CITIZENS	3.6	8.20%	$ 13.04	none			*b*
QWEST	7.1	0.00%	$ 4.02	none			*b*
SBC	78.4	7.00%	$ 24.90	$ 1.41	12.66%	29.08%	3.68%
SPRINT	24.1	7.00%	$ 17.89	$ 0.50	9.79%	8.94%	0.88%
VERIZON	99.8	7.00%	$ 37.74	$ 1.54	11.08%	37.02%	4.10%
	269.60					100.00%	11.22%
Reasons for dropping firms from calculations:							
a-Firms with negative growth estimates are excluded from the cost of equity calculation.							
b-DCF formula uses dividend as an input. Thus, if there is no dividend the DCF model cannot estimate COE							

78 In conclusion, we adopt an 11.22% cost of equity for Verizon. This, in combination with our determinations about capital structure and cost of debt, results in a weighted average cost of capital of 9.98%, as shown below:

TABLE 3

Adjusted Weighted Average Cost of Capital

	Rate	Weight	Weighted Rate
Debt	6.26%	25%	1.57%
Equity	11.22%	75%	8.41%
Weighted Average Cost of Capital			**9.98%**

4. Risk premium

79 Verizon proposes to add a risk premium of 3.95% to its weighted average cost of capital of 12.03%. Verizon contends this is necessary to allow it to account for regulatory risks associated with the TELRIC standard. Verizon asserts these otherwise uncompensated risks occur because CLECs have the option to cancel their UNE leases with Verizon without notice, leaving Verizon with the stranded investment that was required to provide the UNEs. Verizon employed a method external to its DCF calculation to value options to cancel such short-term or "operating" leases.

80 Both AT&T and Staff recommend rejection of Verizon's proposed risk premium. AT&T argues that risks attendant upon cancelable leases should already be incorporated in the beta that investors attribute to Verizon. AT&T argues that in any event, the risk that a CLEC will cancel a lease is no greater than that a customer will cancel retail service—an equally likely scenario—and that that risk is incorporated in Verizon's current cost of equity. The TELRIC assumption of facilities-based competition makes it more likely that a retail customer would cancel its service than that a CLEC would cancel its lease.

81 AT&T also points out that the FCC, and the D.C. Circuit in USTA II, have concluded that Verizon's obligation to provide UNEs is limited to those facilities the denial of access to which would impair the CLECs' ability to provide competing service. Thus, AT&T claims that Verizon cannot credibly claim that a CLEC is more likely to "cancel" its UNE lease when the result is the inability of the CLEC to provide competing service. AT&T asserts that the New Hampshire Public Utilities Commission recently rejected Verizon's cancelable-lease-risk premium theory, and recommends that this Commission do the same.[83]

---

[83] *Verizon New Hampshire Investigation Into Cost of Capital*, NHPUC Docket No. DT 02-110, Order No. 24,265, slip op. at 47; 67-69, January 14, 2004.

82 Staff recommends rejection on the basis that no other state has adopted the risk premium and that the Pennsylvania and New Hampshire commissions have rejected it.

83 ***Discussion and decision.*** We reject Verizon's proposed 3.95% risk premium. Regulation is a surrogate for competition. Thus, if the Commission were to base Verizon's cost of capital on its current operations, which do not reflect the hypothetically competitive market required by TELRIC, then an additional risk premium might be appropriate to reflect certain competition-related risks that Verizon does not currently face as a dominant telecom firm. However, because we have estimated Verizon's cost of capital based on debt, equity, and capital structure estimates derived from competitive firms and competitive markets,[84] we believe the 'additional risks' Verizon's seeks compensation for are already accounted for in the cost of capital calculations, even though they may not be explicitly addressed in either the CAPM or DCF.

84 Verizon (like other regulated firms with unbundling obligations) is not unique in that it may face greater risk when it provides service to customers who have the option of canceling their leases. Many firms in many industries must consider potential revenue shortfall if customers (retail or wholesale) back out of or default on leases. The cancellation-option theory Verizon relies on is not new, yet, to date, it has not been applied to regulated telecommunications firms. Because the ability of customers to cancel leases is not unique to Verizon or regulated firms, we believe it is reasonable to assume that the data relied on to estimate Verizon's cost of capital include firms that also face this type of risk.

85 Furthermore, in order to base our decisions on a consistent set of assumptions in this proceeding, it is inappropriate to assume that Verizon operates in a competitive environment yet retains its unbundling obligations. In sum, UNE obligations cannot coexist with the assumption of a competitive marketplace. As we stated above, a

---

[84] We are persuaded that using a 7% dividend growth rate in the DCF model is more reflective of a growth rate for a competitive ILEC in the hypothetical environment envisioned by the FCC than the value recommended by Verizon.

risk premium might be appropriate if we were to base our cost of equity calculations only on ILEC data associated with the provision of regulated services. The cost of capital for regulated services, which face limited competition, is lower than for riskier competitive services. Verizon's cost of money advocacy is internally inconsistent because Verizon turns to more competitive markets to determine its cost of equity, but then asks us to rely on its own current risk in order to justify a risk premium. We reject Verizon's effort to pick and choose which market environment will be used to determine its cost of money.

III. DEPRECIATION

A. Overview

86 Depreciation is the device used by companies to recover their investment in an asset over the life of the asset. Depreciation involves estimating the appropriate useful life to assign to the asset and determining how quickly during that life period the investment will be recovered.

87 In the Local Competition Order, the FCC stated that properly designed depreciation schedules should take into account expected declines in the value of assets.[85] FCC rules require only that states use "economic depreciation."[86] The Supreme Court affirmed the FCC's holding that for setting UNE rates under TELRIC, existing regulatory depreciation rates were an appropriate starting point that could be adjusted based on demonstrated need.[87]

88 In the Triennial Review Order, the FCC noted that depreciation rates for UNEs should reflect any factors that would cause a decline in asset value, such as competition and technological change.[88] The FCC declined to adopt the use of financial lives to establish depreciation expense for UNEs because there was no "empirical basis on which we could conclude that financial lives always will be

---

[85] *Local Competition Order*, ¶686.
[86] *47 C.F.R. § 51.505(b)(3).*
[87] *Verizon v. FCC, 535 U.S.467,* at 519, *citing to Local Competition Order* ¶702.

more consistent with TELRIC than regulatory lives" or that either set of lives "reflect the actual useful life of an asset that would be anticipated in a competitive market."[89] The Triennial Review Order stated: "state commissions continue to have discretion with respect to the asset lives they use in calculating depreciation expense."[90]

B. Depreciation Proposals

89 Verizon recommends that the Commission calculate depreciation expense based on the economic depreciation lives Verizon uses in its financial reports, which are developed pursuant to Generally Accepted Accounting Principles (GAAP). Verizon claims its GAAP or financial depreciation lives are the only depreciation lives proposed in this proceeding that comply with the FCC's TELRIC requirements. According to Verizon, its GAAP lives take into account the factors that shorten the useful lives of the telecommunications assets subject to unbundling requirements—primarily, the pace of technological innovation and the effect of competition. Verizon also claims to have benchmarked its GAAP lives against those used by other firms in the industry such as AT&T, and this comparison reveals that Verizon's proposed depreciation lives generally are equal to or longer than those used by its competitors.

90 Both AT&T and Staff recommend that the Commission continue to use the latest depreciation lives that the Commission has prescribed for Verizon.[91] According to AT&T, the Commission has thoroughly reviewed those lives and found them to be fair, just, reasonable, and sufficient. AT&T maintains that this finding is no less applicable when establishing UNE rates in this proceeding, since the Commission has consistently used its currently prescribed depreciation rates in every cost docket to date. AT&T also claims that GAAP lives are inappropriate because they reflect

---

[88] *Triennial Review Order* at ¶¶ 685-688.
[89] *Id.*, ¶688.
[90] *Id.*
[91] *In the Matter of the Investigation into the Propriety and Adequacy of Certain Depreciation Rates of GTE Northwest, Inc.*, Docket No. UT-992009, Order Authorizing Revised Depreciation Rates, June 16, 2000.

the principle of conservatism whereby asset lives are shortened and expenses are overstated to protect investors.[92]

91 Verizon responds that GAAP lives are no longer governed by the principle of conservatism because the Financial Accounting Standards Board (FASB) has taken a series of actions to ensure that conservatism is excluded from GAAP.

92 AT&T claims that Verizon has presented no studies, documents, or other evidence to prove that anticipated technological advances will accelerate its current asset lives or that increased competition has or will have any effect on those lives. AT&T maintains that Verizon's benchmarking analysis is immaterial because the record is devoid of evidence about how other companies developed their financial book lives, and the Commission has no basis on which it could find that the economic lives of other companies' assets are comparable to Verizon's or reflect the best estimate of the anticipated economic life of the assets in question.

93 Staff contends that Verizon's current depreciation rates are consistent with FCC rules that require the use of economic depreciation lives.[93] Staff also notes that although Verizon recommends that the Commission adopt financial depreciation lives because they are allegedly more forward-looking than regulatory depreciation lives, the FCC rejected this same argument in the Triennial Review Order because Verizon and the other ILECs failed to provide empirical evidence in support. Staff contends that Verizon similarly has failed to provide any evidence in this proceeding that would justify the use of shorter lives. Staff claims that in response to its request that Verizon provide studies to support the claim that the Commission's current lives are no longer applicable, Verizon merely stated that there is evidence of competitive entry in Washington. Alternatively, Staff recommends that the Commission incorporate depreciation rates from the currently

---

[92] *Ex. 1001TC* at 43-44.
[93] *47 C.F.R. § 51.505(b)(3).*

pending depreciation docket, once the Commission enters a final order in that proceeding.[94]

94 Verizon contends that the depreciation rates proposed by AT&T and Staff are outdated because they do not account for the various competitive and technological developments that have occurred since the rates were approved in 2000 and that have substantially shortened the useful lives of Verizon's assets. Furthermore, according to Verizon, those lives do not comply with TELRIC principles because they were set for regulatory accounting purposes pursuant to a rate-of-return methodology that the 1996 Act specifically prohibits for use in setting UNE rates.

95 ***Discussion and decision.*** We agree with Staff and AT&T that Verizon's UNE rates should be calculated using Verizon's currently authorized depreciation rates. Verizon's mere statement that there is competitive entry into the market is not a sufficient basis for reversing our prior finding that regulatory depreciation rates are a reasonable input for a forward-looking cost study.[95]

96 We note that the FCC explicitly rejected use of financial lives in the Triennial Review Order because of the lack of empirical evidence to support such lives.[96] We also observe that in the Virginia Arbitration Order the WCB rejected use of financial lives because Verizon failed to show that financial book lives are a more appropriate measure of the actual economic life of an asset.[97] There is a dispute regarding how new technologies like xDSL change the life of facilities. Some technological advances make facilities obsolete while others extend their useful lives far beyond what analysts originally thought possible. The effect of these developments will be explored in the pending depreciation proceeding, Docket No. UT-040572.

97 We recognize that Verizon's new depreciation case may result in a change in depreciation lives based on evidence presented in that proceeding. The parties to

---

[94] *In the Matter of the Petition of Verizon Northwest, Inc. for Approval of Revised Depreciation Rates,* Docket No. UT-040520, filed March 22, 2004.
[95] *UT-960369, 8th Supplemental Order,* ¶¶ 215-217.
[96] *Triennial Review Order* ¶ 688.
[97] *Virginia Arbitration Order* ¶¶ 115-116.

this proceeding may petition us to incorporate those changed lives into the calculation of Verizon's UNE rates after we enter a final order in that depreciation docket. For purposes of our order in this case, we adopt the depreciation rates established in Docket No. UT-992009.

IV. ANNUAL COST FACTORS

A. Overview

98 The two cost models used in this proceeding convert UNE investments into annual (and monthly) operating costs through the use of expense factors, or "Annual Cost Factors" (ACFs). By applying such factors to the investment values of different facilities, telephone companies are able to take into account the variation in equipment lives, maintenance costs, capital, and other expenses. The ACFs allow one to express, on an annual basis, the costs associated with an investment. The ACF formula is expressed as a ratio of expense and investment:

ACF = expense/investment

99 The parties disagree about the appropriate values for both the "expense" numerator and the "investment" denominator.

100 With respect to the numerator, the parties start with historical expense data and then trend it forward. The parties disagree over how the historical expense should be adjusted to reflect both inflation and productivity gains.

101 With respect to the denominator, AT&T uses Verizon's embedded investment. Verizon starts with embedded investment and then makes an adjustment, termed the Forward-Looking Calibration (FLC). The FLC takes into account the fact that while forward-looking investment levels will be lower, expenses to operate and maintain those investments will not necessarily be lower.

B. Methodology

102 Verizon uses ACFs that are designed to express the relationship between expenses and investment for specific equipment or plant. Verizon asserts that it uses its actual GAAP financial accounting cost data reported to the SEC as a starting place for its analysis. Verizon claims that because it operates in a competitive environment with pressures from wireless, Voice over Internet Protocol (VoIP), cable telephony, and facilities-based CLEC providers, its actual current expenses already are extremely efficient.

103 According to Verizon, the expenses produced by its model reflect the economies produced by the specific mix of forward-looking investment included in the model. The model applies a specific ACF for each type of plant to the units of the relevant network investment. Verizon argues that this approach is superior to a top-down approach that is designed to recover a fixed dollar amount from all types of investment because, for example, as fiber replaces copper in the TELRIC network, the model reflects the cost-saving efficiencies of using easier-to-maintain fiber.

104 Verizon claims to make several adjustments to its booked expenses to ensure that they are forward-looking and appropriate for use in a TELRIC study. For example, to reflect the fact that overall copper-related maintenance expenses in a forward-looking network using newer copper would likely be lower than its current expenses, Verizon adjusts the maintenance expenses for copper cable downward by 5%. Verizon claims it also adjusts for cost savings related to the Bell Atlantic-GTE merger and eliminates one-time merger expenses, in addition to other adjustments to ensure that its expenses are appropriate for a forward-looking study.[98]

105 AT&T asserts that the expense module in HM 5.3 converts the investments associated with each component of the network into per-unit costs for individual UNEs by considering three categories of cost: (1) capital carrying costs, (2) network-related expenses, and (3) non-network related expenses. AT&T obtains its expense

---

[98] Verizon also makes adjustments to remove retail avoided costs and expenses that it recovers from other charges, such as non-recurring and DUF charges. *Ex. No. 201TC* at 144:11-150:5.

data for the latter two cost categories from the FCC's Uniform System of Accounts (USOA), which Verizon provides in its annual reports. AT&T claims that it modified this data to exclude costs associated with Verizon's retail operations and to ensure that the cost figures represent the TELRIC-compliant expenses that Verizon will incur.

106 AT&T criticizes Verizon's expense factors because they require a complex set of interrelated calculations that are fundamentally flawed. AT&T claims its argument is supported by the fact that Verizon's witness could not quantify the additional amount that Verizon's expense factors add to the cost of UNEs in general or to an unbundled loop in particular.[99]

107 According to Verizon, AT&T complains that Verizon's approach is flawed simply because it does not apply a fixed expense mark-up to all investment. Verizon maintains that it uses a far more nuanced and accurate approach where specific annual cost factors represent the particular relationships between investment and expense in different equipment/plant accounts. Thus, as the mix of forward-looking investment in particular accounts changes, so do the total annual expenses produced by VzCost.

108 AT&T argues that Verizon has not produced any evidence to either quantify or justify the adjustments that Verizon purportedly made to its embedded expense accounts. According to AT&T, Verizon's underlying expense data are two years old and fail to reflect the increased efficiency and decreased costs that Verizon has been working to achieve during that time period.

109 Verizon maintains that its adjustments are well documented in its workpapers, which AT&T entered into the record,[100] and in the responses to numerous data requests. Verizon contends that its expense factors are based on data from the year 2001, because that was the most recently available data when it filed its cost studies in June 2003. Verizon also claims AT&T's criticism regarding the vintage of its data

---

[99] *TR 816-19.*

[100] *Ex. Nos. 270C and 278C.*

can hardly be credited because AT&T itself proposes using 1998 expense data from the FCC's Universal Service Inputs Order[101] for the plant-specific factors it advocates.

110 Although Verizon claims that the relationship between expenses and investment remains generally constant over time, in order to ensure that its factors are forward-looking it applies a productivity adjustment that accounts for technological and other changes that improve efficiency.

111 Staff does not address ACFs in its post hearing briefs.

112 ***Discussion and decision.*** We find that each party's approach to determining annual expenses is generally acceptable. Although Verizon's ACF methodology is more complex than AT&T's, Verizon's approach does not systematically overstate costs. Mere complexity is not sufficient cause to reject a proposal. In fact, the complexity in Verizon's approach may simply be a reflection of the actual complexity of the system involved. Moreover, we are not persuaded that Verizon's failure to quantify the additional amount that Verizon's ACFs add to the cost of UNEs to be sufficient cause to reject the ACFs, in view of our finding that Verizon's ACF calculations were not shown to overstate costs. Nevertheless, we find it necessary to adjust Verizon's expense factors as discussed below, where we increase its FLC, adopt AT&T's recommended productivity and inflation factors, and reduce Verizon's proposed retail-avoided expenses.

1. Forward-Looking Calibration (FLC)

113 Verizon proposes a FLC adjustment to the ACF of .85. Verizon contends that it needs to apply the FLC to the investment denominator of the ACF in order to make forward-looking maintenance expenses TELRIC-compliant. Verizon argues that when forward-looking investment levels decrease due to greater technological efficiency, or for whatever reason, this does not mean that the forward-looking maintenance expenses related to the investment decrease. For example, a $40,000

---

[101] USF Inputs Order, ¶¶ 296-314.

switch that will cost $10,000 in the future will not necessarily incur lower maintenance expenses going forward. Verizon's .85 FLC has the effect of returning maintenance expense levels to what they were before Verizon modeled its network re-design.

114 AT&T complains that Verizon's FLC actually has the effect of by-passing the cost-minimizing effect of redesigning the network. AT&T recommends instead that the Current Cost to Book Cost (CC/BC) ratio be used to adjust the ACF because it measures changes in unit prices of investment over time. The CC/BC corrects the problem of lower levels of TELRIC plant investment, but allows the changes in plant mix that occur during plant redesign also to be reflected in maintenance expenses. AT&T points out that the WCB rejected Verizon's FLC adjustment in the Virginia Arbitration Order and applied CC/BC ratios instead.[102]

115 Verizon responds that use of a CC/BC ratio is wrong because the ratio only estimates the current cost of reproducing embedded network investment rather than projecting forward-looking TELRIC investment. Verizon also maintains that CC/BC ratios further distort expense reductions that occur in the absence of the FLC, because almost all of the relevant CC/BC ratios are greater than one. This results in increasing the investment in the denominator and lowering the value of the ACF. Verizon asserts that since TELRIC investment tends to be lower than booked investment, increasing the investment level in the denominator of the ACF only exacerbates the mismatch between the ACFs and the modeled TELRIC investment.

116 ***Discussion and decision.*** We agree with Verizon that since the ACFs are calculated based on booked investments that are generally greater than TELRIC cost estimates, applying the booked ACF to the lower TELRIC estimate will cause an artificial reduction in expense estimates. We also agree that the maintenance expense for given units of most types of plant is relatively constant and independent of the

[102] *Virginia Arbitration Order*, ¶¶ 139-141

purchase price. There is no reason to assume that it would cost half as much to maintain a switch just because the vendor reduced the purchase price by 50%.[103]

117 However, we conclude that there are two problems with Verizon's FLC proposal that warrant adjustment. The first problem is that, because of the way ACFs are estimated, there are two cost 'mismatches' in the embedded vs. TELRIC network that should be addressed:

> 1) Time-period-specific differences in costs (*i.e.*, the TELRIC estimate of how much it costs to purchase and install a copper cable now vs. how much investment is on Verizon's books for the same copper cable); and
>
> 2) The change in the number of units of a particular item. [104]

118 The FLC is designed to adjust for the first type of mismatch by putting the booked investment on the same terms as the forward-looking investment. To do this it essentially inflates the ACF by the ratio of booked-to-TELRIC investment. However, the TELRIC investment is not different from the booked investment purely because of this first type of cost mismatch—changing material prices. The TELRIC investment is also different because the models will use a plant mix that is more efficient than what is reflected on Verizon's books (*i.e.*, less copper and more fiber) – the second type of cost mismatch.[105] Thus, if the FLC adjusts each ACF to account for the entire proportional difference between booked and TELRIC costs, some of the efficiencies gained because of the second type of cost mismatch will be lost. The FLC would then overstate expenses and should be corrected.

---

[103] For example, it costs the same amount to dry clean a given suit regardless of whether one paid $300 or $600 for it.

[104] The first mismatch operates as follows: if Verizon's books show $1000 in investment but VzCost estimates only $800 the FLC will increase the ACF by 100/80 or 25%. The second mismatch results from modeling of a network that requires fewer cables. Fewer cables are needed in a TELRIC environment because cables are sized to meet total, rather than incremental demand. Rather than having one 100 pair and two 50 pair cables, a TELRIC model might cost out serving the same area with one 200 pair cable.

[105] *See Ex. 1001TC* at 6-8.

119 The second problem is that it appears that VzCost has not modeled all of the plant (and services) that generate the operating expenses used in Verizon's ACF and FLC calculations. Verizon's cost witness was not clear about this when examined.[106] To the extent that expenses are included on Verizon's books but the associated plant and services are not modeled in VzCost, the ACFs are going to be overstated. This also requires adjustment of the FLC.[107]

120 Since Verizon proposed using a single FLC to apply to all ACFs, some adjusted ACFs will be too high and others too low, depending on the ratio of TELRIC to booked investment and the relative efficiency of the plant mix in the modeled network. However, the end result is that the ACFs will be systematically overstated if the TELRIC network uses more efficient plant than is on the books in the embedded network. For these reasons, just as with our cost of equity determination, we use our judgment to adjust for the overstatement of ACFs by increasing the FLC from .85 to .90.[108]

2. Inflation and productivity adjustments

121 Verizon adjusts all of its operating expenses in its year 2001 USOA accounts, first to bring them to current 2003 levels, and then to account for inflation and productivity for the 2004-2006 planning period when the UNE rates established in this order will likely be in effect. Verizon uses the Consumer Price Index (CPI) to account for inflation in certain of its USOA accounts. Verizon contends the CPI indices are widely used in forecasting inflation, are not skewed by aberrant data for a particular year, and are updated quarterly. To account for productivity, Verizon uses a Bureau of Labor Statistics (BLS)-published productivity factor based on non-farm Business productivity data.[109]

---

[106] *TR 853 et seq.*

[107] Because we are not sure exactly which ACFs and expense accounts are affected by this problem, we require a global change to Verizon's ACFs by adjusting the FLC instead.

[108] Because the FLC is used in the denominator of the calculations, this adjustment will reduce Verizon's ACFs. The .90 value will not be adjusted after VzCost is run to reflect other changes discussed in this order.

[109] *Ex. 228TC* at 116-121.

122 AT&T disagrees with Verizon's reliance on the CPI to adjust for inflation and proposes instead the use of the Gross Domestic Product – Price Index (GDP-PI). AT&T criticizes the CPI as a measure of inflation because it affects retail consumers, rather than corporations like Verizon. AT&T asserts that the CPI has increased faster than the GDP-PI from 1996-2002 and would thus overstate the effect of inflation on Verizon's expenses. AT&T also claims that the FCC, in federal price-cap proceedings, has used the GDP-PI for a decade in measuring general price inflation facing ILECs.

123 AT&T also disputes Verizon's use of the BLS Non-farm Business productivity data to adjust for productivity. AT&T contends that the BLS labor productivity series for Wired Telecommunications Carriers is more representative of Verizon's productivity experience than the Non-farm Business index.

124 Verizon responds that the GDP-PI is inferior to the CPI because it is overbroad and measures data, such as exported goods and residential construction materials that are not properly included in its expense accounts. On the other hand, the CPI measures price changes that are likely to occur in the affected USOA accounts – electricity, airline fares, computers, and computer information- processing services and equipment.

125 Verizon contends that use of the Wired Telecommunications Carriers index to adjust for productivity is incorrect because it is skewed by a significant peak in productivity that occurred during the first few years following the 1996 Act. Verizon points out that the productivity numbers from this index dropped from 7.2% in 1999 to a very low 1.6% in 2001, the last published year. Verizon argues that because of these spikes, using an average productivity factor from those years will not be representative of future productivity in the industry.

126 ***Discussion and decision.*** We are persuaded that it is more appropriate to use the GDP-PI index to adjust for inflation in Verizon's non labor-driven expense accounts related to Aircraft, General Purpose Computers, Power, Advertising, and

Information Management. The CPI is inappropriate for this purpose because it is a measure of inflation related to the retail purchases of individuals and not the purchases of large firms like Verizon. Moreover, the GDP-PI is a broader measure of the economy as a whole, and it is used by the FCC in the price cap formula.[110] Furthermore, it is noteworthy that in price-cap proceedings before the FCC, the ILECs have argued that the GDP-PI is most representative of the price change it expects to see going forward.[111]

127 We also agree with AT&T that the productivity factor used by Verizon fails to fully account for the technology-driven productivity gains being experienced by ILECs. The productivity factor proposed by Verizon is based on BLS data for Non-farm Business output per hour. This index is a broad measure of the productivity gains experienced by the business sector of the economy, excluding farms.[112] Because we believe it is reasonable to expect that the telecommunications industry, which is largely technology-driven, will experience larger-than-average productivity gains, we approve AT&T's proposal to use the BLS labor productivity series for Wired Telecommunications Carriers.

128 AT&T calculates the average productivity increase from 1996-2001 to be 5.5% per year.[113] Although Verizon attributes this 'high' value to the peak following the first few years of the Act, the average year-over-year change from 1987-2002 is estimated to be 5.82%.[114] The 2001 value of 1.6% cited by Verizon was likely driven by the recession and consequently is not representative of the productivity gains historically achieved by the industry. Thus, AT&T's proposed productivity factor of 5.5% appears to be a reasonable estimate of the productivity gains Verizon will experience going forward.

---

[110] *See In the Matter of Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Second Report and Order, rel. October 4, 1990, ¶¶ 50-52; *In the Matter of Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Report and Order and Second Further Notice of Proposed Rulemaking, rel. April 17, 1989, ¶¶ 186-189.

[111] *Id.*

[112] *Ex. 1001TC* at 29-33.

[113] *Id.*, at 33.

[114] *Id.*

3. Retail avoided costs

129 Verizon also adjusts its expense levels by removing costs associated with providing retail services.[115] Verizon argues that TELRIC pricing requires only that its marketing expense factor allocate costs in a "reasonable manner."[116] Verizon claims that its UNE expense studies, conducted in 1997, contain almost no such costs, but where they do remain, they are found in Verizon's product management, sales, and customer services accounts.[117] Verizon surveyed all its work centers to develop the level of retail costs that would be avoided in a wholesale-only network. The result is the adoption of Verizon's current retail sales and product management expenses as a surrogate for the same expenses that would be occurred if Verizon were a wholesale-only provider. In support of this approach, Verizon claims that it has already begun actively to promote its wholesale offering, "Wholesale Advantage," to CLECs and that industry-wide advertising, such as the milk industry's "Got Milk" campaign, would be appropriate under its wholesale-only provider assumption.

130 AT&T opposes Verizon's recommended level of retail avoided costs. AT&T argues that Verizon has historically resisted providing wholesale UNEs and currently provides almost no wholesale services. For that reason, AT&T claims that Verizon's use of its retail advertising and sales expenses as a proxy for its hypothetical wholesale-only expenses makes no sense. AT&T further asserts that: Verizon's avoided cost study is outdated; Verizon provided no evidence to support its claim that it advertises or incurs any costs to advertise its wholesale services; Verizon provided no evidence of product management expenses; and use of Verizon's current retail expenses as a surrogate for wholesale is unreasonable because Verizon would be serving far fewer wholesale customers than it does retail. AT&T claims that as a practical matter Verizon is using this methodology to recover all its embedded retail and wholesale costs in UNE prices.

---

[115] Verizon develops its marketing expense factor as a ratio of wholesale marketing expenses to total expenses of a company its current size by excluding retail-related costs and including an estimate of what such a company's wholesale-only marketing expenses would be. *Verizon reply brief* at 18.
[116] *Local Competition Order* at ¶ 696.
[117] *Ex. 276C.*

131 AT&T proposes that Verizon use a combined consumer/business employee headcount study to develop percentages of appropriately avoided retail-only expenses.[118] By using the number of employees directly involved in retail work, the company would more accurately determine the retail costs that would be avoided in wholesale.

132 Verizon claims this method would create an unreliable estimate of retail avoided costs. Verizon contends that many employees do both retail and wholesale work and that some of the work retail employees do would also be required in a wholesale-only scenario. As to AT&T's other arguments in opposition to Verizon's approach, Verizon points out that just because its avoided cost study was done in 1997 doesn't mean that resulting costs are overstated. Verizon's wholesale business has grown since then, making 1997 costs conservative for current purposes. Also, Verizon asserts that it does spend money on UNE product management currently and that its proposed product management expenses for wholesale do not, in fact, mirror its retail costs because it proposes to reduce product management expenses 15% for purposes of this proceeding.

133 ***Discussion and decision.*** We are not persuaded that the TELRIC assumption of full competition leads to a conclusion that Verizon will become a wholesale-only firm. In the face of full competition Verizon would likely seek to keep its margins the highest by serving as many retail customers as possible.
Verizon only has to unbundle those elements without which competitors are impaired. Thus, without any real competition for these elements, it is highly unlikely that an efficient company would advertise such wholesale products to compete with its retail operations. We agree with AT&T that Verizon provided insufficient evidence that it is currently conducting wholesale-related advertising of any type. However, while we find it unlikely that Verizon will advertise UNEs extensively to CLECs in the future, it is possible that the company will engage in some form of industry-wide advertising to end-users, similar to the "Got Milk"

---

[118] *Exhibit 1001TC* at 26.

campaign, to encourage use of a particular service platform that would be beneficial to Verizon.

134 In this light, we conclude that the most reasonable approach to account for an appropriate level of forward-looking, wholesale-related marketing on Verizon's part is to include a portion of Verizon's current retail marketing expenses as a proxy for Verizon's wholesale and competition-related marketing expenses in a hypothetically competitive market. If we are to assume that Verizon faces competition from other wholesale and platform providers, then it is also reasonable to assume that Verizon would advertise its UNEs as it lost retail customers and as CLECs began to lease UNEs from other wholesale providers for CLEC retail voice and data service offerings. It is also reasonable to assume Verizon would incur advertising expenses to encourage end-user purchases of one of its service platforms.

135 Because there is limited evidence on what the proper level of such advertising expense would be, we use our judgment, as we did in determining an appropriate cost of equity for Verizon, and find that 15% of Verizon's retail marketing costs should be used as a proxy for the wholesale marketing expenses Verizon would incur in a hypothetically competitive market.

V. Verizon's Cost Model – VzCost

A. Background

136 There are two cost models proposed in this docket: VzCost, a new Internet-based model sponsored by Verizon; and HM 5.3, the latest iteration of the Hatfield Model sponsored by AT&T. While many versions of the Hatfield Model have been reviewed in previous cost dockets in Washington and other jurisdictions, no jurisdiction has as yet addressed VzCost. In Appendix A to this order, we identify all changes that we make to either model, or to the inputs to the models, as a result of our findings.

B. Overview of VzCost

137 Verizon claims that VzCost and its underlying cost modules offer unique advantages such as the ubiquity of Internet access, the ability to incorporate significant amounts of real-world data through a server rather than a PC-based system, the capability of sharing work among multiple users, and ready access to cost-study documentation and historical cost information.

138 Verizon asserts that the core principle of the VzLoop model within VzCost is the recognition of both the constraints of real-world locations, and the efficiencies derived from relying on the rights-of-way associated with those existing locations.

139 According to Verizon, VzCost's modules (*e.g.*, for loop, switching, and interoffice facilities) first calculate the investments for different portions of the modeled network, which are referred to as investment elements. These investment elements are then converted by VzCost into larger groupings, called basic components (BCs) that can be used to build the costs of UNEs. Finally, VzCost's "costing generator" maps the per-unit BC investments to UNEs and then converts those investments to recurring costs by applying various annual cost factors and expense loadings.

140 Contrary to Verizon's assertions, AT&T argues that VzCost steps away from the requirements of TELRIC. AT&T claims that the model design and inputs proposed by Verizon result in rates for unbundled network elements that are overstated because VzCost relies on the network design, fill factors, loading factors, and other important cost drivers derived from Verizon's existing network. In sum, AT&T claims that VzCost simply reproduces Verizon's embedded network, depriving potential entrants of the efficiencies available under properly developed forward-looking TELRIC costs.

141 Staff takes a similar position, maintaining that because of the decision to assume existing outside plant network design, VzCost does not model the most efficient, lowest-cost network configuration. Rather, VzCost allegedly replicates the existing

network, creating a backward-looking network with inefficiencies that could be avoided in a forward-looking network designed to serve existing demand. Staff asserts that Verizon's network configuration overstates costs and fails to comply with TELRIC.

C. Outside Plant Network Design Issues

1. Background

142 A cost model has to determine how to route cables to customers. Verizon claims that VzCost has solved the problem of how to route a telephone network as efficiently as possible by using the network locations that Verizon's engineers and planners have already identified as solving such problems in the real-world. VzCost allegedly accomplishes this task by relying on a significant amount of historical information that identifies real-world constraints, including rights-of-way, space restrictions, security considerations, zoning ordinances, and geographical features such as bodies of water.

143 This information is purportedly derived from databases that Verizon uses in its day-to-day operations, so the company has a strong incentive to keep this information continually updated and accurate. For example, Verizon uses distribution terminal locations to derive customer locations. This allegedly allows Verizon to provide more accurate and verifiable data about outside plant locations than would be the case if Verizon relied on the limited data it possesses about the actual locations themselves. Verizon asserts that it also uses information from other operational databases for the locations of distribution terminals, serving area interfaces (SAIs), digital loop carriers (DLCs),[119] and control points, and generally follows feeder routes used in Verizon's existing network. To model distribution cable routes,

---

[119] A Digital Loop Carrier is a piece of network transmission equipment used to provide pair gain on a local loop. Pair gain is the multiplexing of a number of phone conversations over a lesser number of physical facilities (multiplexing allows one pair of wires to carry two or more signals or conversations). A DLC deploys high-bandwidth fiber optic facilities from the Central Office Terminal to the Remote Terminal. Newton's Telecom Dictionary, Updated 15th Expanded Edition

Verizon uses a minimum spanning tree algorithm[120] that takes a series of dots that are found in the network (*i.e.* mapped location of SAIs, DLCs, etc.) and connects those dots to bring the route back to the central office.

144 Verizon first claims that its use of real-world customer locations and other actual network data does not mean that Verizon's loop costs reflect its embedded network - because Verizon uses *current* equipment and installation costs. According to Verizon, while the FCC's Local Competition Order prohibits the use of historical costs, it does not preclude the use of existing network routing. Indeed, Verizon argues that the FCC has found a loop study in which "cable routes...follow existing rights-of-way" to be TELRIC compliant.[121]

145 Second, Verizon claims to have made a number of forward-looking modifications to its existing network data. For example, VzLoop is allegedly designed to model the first DLC on each feeder route at the nearest of: (1) the existing DLC that is closest to the wirecenter on that route; (2) the first SAI at which the model determines that it is less expensive to place a fiber-fed DLC (including the cost of fiber cable) than copper feeder cable; or (3) the first SAI location beyond the 12,000-foot limitation for the first DLC.[122] After the first DLC on each route is modeled, lines whose total copper loop length would otherwise exceed the 12,000-foot copper loop length restriction are designed to be served with a fiber-fed DLC.

---

[120] The Commission has defined Minimum Spanning Tree as "a mathematical graph theory construct used to connect a set of points at the least possible length of total connecting lines. When applied to a telephone network, an MST approach may be considered to provide, with some caveats, a lower limit on the amount of distribution cable needed to serve a cluster of customers." *In the Matter of Determining Costs for Universal Service,* Docket No. UT-980311(a), 10th Supplemental Order, ¶¶ 124-127, November 20, 1998.

[121] *Joint Application of BellSouth Corporation, BellSouth Telecommunications, Inc. and BellSouth Long Distance for Provision of In-Region, InterLATA Services in Georgia and Louisiana,* Memorandum Opinion and Order, 17 FCC Rcd 9018, ¶ 36 (2002).

[122] In addition, VzLoop: uses all fiber-fed DLCs; eliminates copper for service to buildings with more than 160 lines; sizes cables for total demand rather than reflecting the multiple cables that currently exist along a given route; and adds DLC facilities necessary to comply with the 12,000-foot restriction on copper loop length necessary for the deployment of advanced services.

146 In sum, Verizon claims that VzLoop does not model embedded costs because it uses current costs for material and labor, and because it assumes different facilities from those that exist in the embedded network.

147 AT&T points out several flaws in the Verizon model that, AT&T asserts, should require its rejection. We address these in the following sections of the order.

2. Modeling Unknown Customer Locations

148 In the instances when Verizon is unable to replicate its existing network because it lacks sufficient information, AT&T maintains that Verizon makes certain assumptions regarding customer location, SAI location, and private line demand that are likely to increase the costs of the network Verizon models. AT&T asserts that in these instances, Verizon takes the investment it develops to serve known demand and multiplies that investment by an adjustment factor. Verizon applies separate adjustment factors for business demand and residential demand. [123]

149 AT&T argues that Verizon's use of these residential and business adjustment factors incorrectly assumes that there are no economies of scale associated with serving additional lines. AT&T claims Verizon could use spare capacity to serve these additional lines, rather than adding incremental investment. Moreover, AT&T maintains that because the adjustment factor for business lines is much greater than the factor for residential lines, the model's potential miscalculation of scale economies is much greater. AT&T claims that business lines are typically less costly because they normally are closer to the central office and are part of larger cables, larger SAIs, and larger DLC systems. AT&T also claims that the potential for scale economies in these larger pieces of equipment is greater than for the smaller equipment typically used to serve residential lines, and thus, Verizon's use of adjustment factors for business lines has a greater effect because it misses scale economies on lines that generally are less costly to begin with.

---

[123] *AT&T initial brief* at 35; *see also TR 1249-1250.*

150 AT&T argues that this problem with Verizon's model is incapable of correction because it is part of the model code that Verizon does not permit other parties to change. AT&T suggests that Verizon's use of these assumptions provides additional justification for rejecting Verizon's model.

151 Verizon claims that there is no evidence to support AT&T's assumption. Verizon argues that regardless of whether these lines are residential or business locations, they could just as easily be located in more remote areas with higher costs, or simply at locations where the additional demand triggers the need for a larger cable, DLC, or other equipment.

3. Co-located SAIs

152 According to AT&T witness Steven Turner, 10% of the SAIs in Verizon's modeled network are co-located with other SAIs. AT&T claims that incorrect placement of SAIs, such as placing them in the same location, overstates distribution cable distance. AT&T asserts that distribution cable typically has a higher per-unit cost than the feeder cable it replaces using Verizon's assumptions. AT&T claims that because there is allegedly no systematic way to correct these errors, the Commission should reject Verizon's model. AT&T contends that if the Commission determines to review the costs derived from Verizon's model, the Commission should recognize that these errors, along with the basic choice by Verizon to model its existing network, lead to an overstatement in costs that must be reduced in order to comply with TELRIC.

153 Verizon claims that its testimony makes clear that all of Verizon's SAIs are separately located physically, but that in its records 10% were placed at the same location as others, because its network engineers locate them in the plant records at a point where the engineers can more efficiently monitor them. Verizon asserts that relying on those records has no significant effect on distribution cable distance or investment. Verizon claims that it identified a way for AT&T' s consultant to move those locations in the Verizon model in a February 2004 meeting. According to Verizon, that he chose not to do so is not an indictment of Verizon's cost model.

4. Modeling drop, NID and distribution terminals

154 AT&T claims that Verizon assumes that each of its non-switched private lines[124] will require its own drop and Network Interface Device (NID). AT&T claims that non-switched private lines, however, are almost invariably business lines and that business customers typically purchase more than one private line per location. Thus, contrary to Verizon's assumptions, AT&T claims that there is no need for a separate drop and NID for each line purchased for a particular location.

155 AT&T also claims that for almost 32,000 of the private lines included within Verizon's model, Verizon was also unable to locate a distribution terminal. In these cases, Verizon assumed that each private line would require a separate distribution terminal. AT&T maintains that this assumption is inefficient, runs counter to the realities of Verizon's network, results in increased cost estimates, and must be rejected.

5. Bench Request No. 16[125]

156 According to Verizon, given the enormous quantity of data about network locations VzLoop has collected for all of Verizon's 99 wirecenters, it is not surprising that some of that data is either imperfect or incomplete. Verizon maintains that AT&T has seized upon a handful of situations where Verizon's network data are either imperfect or missing as ostensible proof that VzCost (and in particular VzLoop) is riddled with errors. Verizon claims that this argument is a pure distraction because Verizon has demonstrated that these situations are neither frequent nor of any consequence for cost modeling purposes. Verizon asserts that in its response to Bench Request No. 16, when Verizon made adjustments to account for all the issues identified by AT&T above, and also adjusted the cost-of-capital, depreciation, and

---

[124] *AT&T initial brief*, ¶¶ 82-84.

[125] Bench Request No. 16 is marked for the record as Ex. 1166.

structure-sharing assumptions requested by the advisor to the Commission, the two-wire loop investment decreased by only 2.33 %.[126]

157 Staff suggests that Verizon's response to Bench Request No. 16 illustrates that VzCost does not appear to be sensitive to substantial input changes. Staff claims that the degree of insensitivity shows that VzCost is designed to produce a very high estimate of UNE costs, regardless of how one adjusts the inputs.

158 ***Discussion and decision.*** In Bench Request No.16, the Commission asked Verizon to: a) address AT&T's concerns identified above; b) provide instructions on how to incorporate Staff's proposed depreciation and cost of capital inputs in the Verizon cost model; and c) provide instructions on how to set the structure-sharing rate[127] for conduit and buried fiber to 5% in the Verizon cost model. We find it reasonable that the two-wire loop investment would decrease by only 2.33% as a result of these adjustments, because the structure-sharing adjustment was a minor change and the changed return and depreciation inputs will affect loop cost estimates, not investment estimates. So while the investment level changed very little, the change in the monthly cost of the loop will be more significant.

159 Verizon suggests that VzLoop has routed Verizon's telephone network as efficiently as possible by using "the network locations that Verizon's engineers and planners have already identified as solving such problems."[128] However, the routing employed in Verizon's model does not actually follow roadways, or existing rights-of-way, but instead linearly connects points defined by the location of existing SAIs and pedestals. Because Verizon is connecting known network nodes rather than actually following roads and other rights-of-way, it applies a factor of 15 % to both its feeder and distribution lengths in order to convert air miles to route miles in its

---

[126] *Verizon initial brief* at 67.

[127] We will address structure-sharing input values in more detail in the Model Inputs section of this order.

[128] *Verizon initial brief* at 64.

modeled network when the air-mile distance between any two points is greater than 500 feet.[129]

160 Verizon also uses the location of existing facilities as a surrogate for real-world geographic and engineering constraints. As we later indicate in our evaluation of the cost models in Part VII of this order, we are concerned that Verizon's approach, while superior in terms of incorporating existing rights-of-way because of the number of nodes it connects, may introduce some cable routes that are less than hypothetically efficient. This concern led us to conclude in that part of this order that reliance on existing routing does not render the routing unreasonable, but causes us to give Verizon's model less weight. On balance, we find that AT&T's claims that Verizon's model merely replicates the company's existing network are overstated, as illustrated by the amount of fiber assumed by the Verizon model.[130]

161 Regarding the modeling of customers whose distribution terminal locations are unknown, we agree with Verizon that, even though we don't know where these customers are actually located, it is reasonable to assume that the average cost of serving these customers will be the same as the average cost of serving customers whose locations are known. AT&T would have us find that the customers served by known distribution terminal locations are sharing terminals with customers whose terminal is unknown. This assumption would reduce average costs through scale economies. However, it is also possible that the number of subscribers whose terminal locations Verizon doesn't know would require the placement of additional terminals or larger cables, etc.[131] Accounting for this additional plant would likely raise cost estimates. In this respect we find Verizon's explanation and modeling approach to be reasonable because it results in a cost estimate that falls between two plausible cost estimates.

---

[129] This issue is further discussed in Part VII. Evaluation of Cost Models, Sections 3 and 4, where we address the appropriateness of including the existing network in a TELRIC cost model in terms of giving greater weight to one or the other cost model presented in this case.
[130] *Ex. 201TC* at 45.
[131] *TR 1250-1251.*

162 We agree with AT&T that as a practical matter Verizon does not permit outside parties to make certain changes to its model code. However Verizon provided AT&T with the VzCost source code.[132] Verizon also agreed that changes requested by AT&T could be made by Verizon's database administrators through the normal procedures applicable to Verizon-initiated changes, in order to ensure that the changes would not disrupt operation of the model or jeopardize the security of Verizon computer networks.[133] AT&T never made such a request, however,[134] nullifying its claim that we should reject the Verizon cost model because of the method Verizon prescribes for changing some elements of its model. Nevertheless, we have used a version of VzCost provided in response to Bench Request No. 16, in which Verizon relocated the 10% of its SAIs that were co-located with other SAIs.

163 Finally, we agree with AT&T that Verizon's modeling of private line loops is incorrect. Verizon assumes that each of its non-switched private lines will require its own drop and NID. This assumption results in overstated costs. We have adjusted this assumption to reflect four lines per location.[135]

D. Verizon Switching Model

164 Verizon relies on the SCIS[136] and COSTMOD programs incorporated in VzCost to model its switch investments and switching UNE rates.

165 AT&T objects that SCIS and COSTMOD are designed to produce a usage-based charge for unbundled local switching. AT&T disputes this approach as inconsistent with the way that Verizon incurs switching costs. We further discuss this rate structure issue below.[137] AT&T contends that Verizon inappropriately includes transport and signaling costs in its switching rate. AT&T also claims that Verizon refused to produce the source code for the SCIS modules until the week the

---

[132] *Ex. 228TC* at 14.

[133] *Id.*

[134] *Id.*

[135] *Id.* at 52. According to Verizon, this adjustment would lower the cost of a 2-wire loop by 1.16%.

[136] Switching Cost Information System.

[137] *See* Part IX, Rate Structure, Section B. Switching Rate.

evidentiary hearings began. In light of these issues, as well as the models' alleged complexity and impenetrability, AT&T recommends that the Commission reject SCIS and COSTMOD.

166 Verizon claims AT&T's arguments regarding the complexity of Verizon's switching cost models are unconvincing. Verizon asserts that SCIS and COSTMOD are well-established switching models, and that all of their algorithms are viewable in readily understandable equations. Verizon asserts that the FCC and state commissions have been using SCIS for many years to establish switching rates for both UNE and access services. Indeed, the SCIS model was adopted in the Virginia Arbitration Order because it better satisfied the cost model criteria identified by the WCB.[138] Verizon also contends that AT&T is familiar with these models, particularly SCIS, because its experts often re-run SCIS to restate switching costs and because a witness for AT&T in other cost proceedings was one of the original developers of SCIS. Verizon maintains that COSTMOD operates similarly to SCIS, and thus, AT&T cannot claim to be at a loss to figure out how either model works.

167 ***Discussion and decision.*** Verizon's failure to produce the source code for the SCIS model sooner than it did is a genuine concern. As we express regarding the HM 5.3 TNS preprocessing algorithms and data,[140] we have greater confidence in models that are open and capable of verification. The parties may expect that in future the Commission will be increasingly skeptical of models that are not open and verifiable. In this instance, where Verizon produced the source code too late to allow evidence about it to be presented on the record by opposing parties, the parties could not adequately verify the model. Later in this order, we explicitly reject the Verizon switching model, in part because of the inability of the parties to adequately test and verify it through cross-examination on the record.[141]

---

[138] *Virginia Arbitration Order,* ¶¶ 359-373.

[140] Part VI. HM 5.3, Section B. Outside Plant Design Issues; Part VII. Evaluation of Cost Models, Section C. Openness and Flexibility

[141] Part VIII. Model Inputs, Section B. Switching Inputs, Number 1. Switch investment.

168 We will address the switching rate design issue and the transport and signaling input issues raised by AT&T in later sections of this order.[142]

VI. HM 5.3

A. Overview

169 AT&T sponsored the HM 5.3 cost model. HM 5.3 is a successor to prior versions of the Hatfield Model presented to the Commission.[143] AT&T contends that HM 5.3 is a TELRIC-compliant costing model that estimates the costs an efficient firm would incur to provide UNEs, universal service, and interconnection.

170 AT&T claims that HM 5.3 designs a network based on the amount and location of current demand, using Verizon's geocoded data for known locations and an algorithm that assigns surrogate locations for unknown locations. The customer location information is incorporated into HM 5.3 by means of proprietary pre-processing conducted by Taylor-Nelson-Sofres Telecom (TNS). AT&T observes that in this pre-processing stage, TNS develops customer "clusters" that consist of adjacent customers associated with serving or distribution areas. According to AT&T, based on these "clusters," HM 5.3 models the network investment required to serve demand using forward-looking technology that an efficient incumbent carrier would deploy today. AT&T claims that HM 5.3 models the entire local exchange network to ensure appropriate synergies between different parts of the local exchange network and to assign shared and common costs in a consistent fashion. AT&T points out that in determining outside plant design, HM 5.3 relies largely on publicly available information and the opinions of subject matter expert (SMEs).

171 AT&T asserts that HM 5.3 ensures provision of sufficient outside plant to connect all customers by using various optimization routines, such as the Strand Distance Multiplier. The Strand Distance Multiplier is a type of "Minimum Spanning Tree"

---

[142] Part VIII. Model Inputs, Section C. Transport; Part IX. Rate Structure, Section B. Switching Rate.
[143] *UT-960369, 8th Supplemental Order*, ¶ 13; *10th Supplemental Order, Docket No.UT-980311(a),* ¶44.

distance adjustment.[144] The Minimum Spanning Tree has been defined by the Commission as a "mathematical graph theory construct used to connect a set of points at the least possible length of total connecting lines."[145] In effect, use of the Minimum Spanning Tree ensures that there is sufficient distribution cable to serve a cluster of customers. Accordingly, AT&T states that the Strand Distance Multiplier is a "measure of the amount of cable required to connect the actual customer locations to each other and to the serving area interface."[146]

172 AT&T also points out that unlike VzCost, HM 5.3 is a stand-alone model that has 2100 user adjustable inputs and that can be run using a version of Excel computer software.

173 Staff supports Commission adoption of HM 5.3 as the model of choice in this proceeding. Staff espouses adoption of HM 5.3 because it is a stand-alone model; users can easily change inputs to reflect local conditions; users can easily and quickly run sensitivity analyses; the model uses largely public data; and the model meets the Commission's criteria of transparency, rationality, stability, consistency, and understandability.

B. Outside Plant Network Design Issues

1. Cluster modeling

174 Verizon raises several objections to HM 5.3's modeling of outside plant network design. Verizon's primary objection is that instead of using actual customer locations to design its network, HM 5.3 spreads customers uniformly into rectangular distribution areas, or clusters, as part of the TNS pre-processing phase. Verizon contends that not only is the TNS pre-processing inaccessible to scrutiny, but it produces a model that is divorced from reality.

---

[144] *Ex. 506T* at 74; *TR 1478-79.*
[145] *UT-980311(a), 10th Supplemental Order*, ¶¶ 124-127.
[146] *TR 1478.*

175 Verizon claims the HM 5.3 cluster design ignores existing rights-of-way and disregards other physical and man-made obstacles that a real network would have to take into account. Verizon points out that by clustering, HM 5.3 organizes its forward-looking network into a system of grills placed without regard to feasible routing. Verizon contends that these grills consist of backbone and branch cables that ignore the reality of different sizes and types of cables required in a real network. Verizon claims that HM 5.3's modeling of these cables (in the grill framework), that are larger than cables typically deployed, creates a lower cost per loop. As a result, Verizon observes that HM 5.3's modeled average investment per pair foot is 20% lower than the investment VzLoop models.

176 AT&T responds that HM 5.3 is not an engineering model, but a cost model. The purpose of clustering in HM 5.3 is to estimate the amount and type of plant required in a forward-looking network to serve existing demand. According to AT&T, because Verizon's modeled network is based on its existing network, Verizon's modeled network will look more like Verizon's existing network, whereas, because the HM 5.3 model is not based on Verizon's existing network (but rather on the appropriate amount of plant required for an efficient, forward-looking network), HM 5.3's modeled network will not reflect Verizon's existing network.

177 AT&T contends that HM 5.3's reliance on a branch and backbone design does not mean that it ignores variation in cable size and type variation. AT&T asserts that HM 5.3 does not model just two cable sizes and types. Rather HM 5.3's cable modeling is unique to each cluster. Moreover, the backbone cable is tapered, so cable is employed in various sizes along a route. AT&T also observes that HM 5.3 does not ignore actual customer locations in modeling costs for its forward-looking network. Instead, according to AT&T, HM 5.3 relies on the Strand Distance Multiplier (SDM) to ensure the amount of distribution cable reflects and connects actual customer locations.

2. Loop Distance.

178 Verizon objects that the SDM does not remedy HM 5.3's failure to model sufficient loop plant to take into account physical and man-made barriers. Verizon claims that the SDM only serves to further distort modeled clusters. Verizon gives as an example the fact that when the SDM calls for less cable in a cluster than modeled by HM 5.3, the cluster is compressed in size, bearing no semblance to a real-world distribution area. Verizon points out that the SDM produces loop lengths in excess of 18,000 feet, with some as long as 38,000 feet. Verizon contends that loop lengths over 12,000 feet hinder provision of high-capacity services, are more costly to maintain and have been rejected by this Commission in the past.

179 Both AT&T and Staff counter that HM 5.3 does not produce such excessive loop lengths. AT&T points out that in the model, the SDM limits the maximum copper loop length to 18,000 feet.[147] When it appears that the amount of cable required to reach the furthest point in a cluster exceeds 18,000 feet, the model splits the cluster.[148] However, in normalizing a cluster to the strand distance, when customers are not uniformly located in a cluster, the strand distance tells the model how much cable it actually takes to connect those customers. In places where streets are closer together, the strand distance may be greater than 1.0.

180 Staff suggests that its own loop length adjustment[149] normalizes HM 5.3 loop lengths to a ratio of 1.0 and that this adequately ensures investments are reconciled to existing loop lengths.[150]

3. Feeder plant design

181 Verizon further argues that HM 5.3's feeder plant design violates standard network design. Verizon contends that HM 5.3 determines whether to install remote

---

[147] *Ex. 956TC* at 13; *see also TR 1522-1530.*

[148] *TR 1522.*

[149] Staff's loop length adjustment ensures that the estimated loop length for each wirecenter comports with the actual loop length reported for each wirecenter.

[150] *TR 1086-1087.*

terminals in controlled environment vaults (CEVs) only when a cluster requires 2,100 lines or more of capacity. Verizon argues that the breakpoint for such installations should depend instead on what is required by local conditions, including zoning requirements. Verizon faults HM 5.3 because it models large clusters that require larger remote terminals. The modeling of large clusters results in the cost of expensive underground clusters being spread across more lines and artificially lowering the cost per line. In contrast, according to Verizon, VzLoop models two times the number of remote terminals because it models distribution areas that are about one third the size of HM 5.3's.

182 In response, AT&T contends that Verizon offers no evidence of local ordinances or conditions that would require underground installations when they are unnecessary. AT&T asserts that its 2,100-line limit is consistent with standard network design principles and ensures that the high cost of such facilities is spread over more lines. AT&T claims that Verizon's assumptions merely serve to artificially increase costs.

4. Amount of feeder cable modeled

183 Verizon also objects to the reduced amount of feeder cable HM 5.3 models. Verizon contends that HM 5.3 models excessive distribution plant and thus improperly reduces the amount of more costly underground feeder required in a network. Verizon argues that this type of modeling ignores the fact that in dense urban areas the most efficient, least-cost approach is to build all feeder loops directly to customer premises and to terminate these feeder loops on an indoor SAI. Verizon faults HM 5.3 because it models a single outdoor SAI and runs distribution cable from the SAI into a building. Verizon contends that this practice, in effect, denies Verizon cost recovery for all its feeder loops.

184 AT&T asserts that Verizon's criticism is unfounded because Verizon offers no alternative amount of feeder plant, other than its own proposed amount, that would properly serve the network. AT&T contends that Verizon's embedded network is not a viable alternative to HM 5.3's feeder modeling. AT&T argues that the amount

of feeder plant modeled can't be isolated from the number and size of clusters because those parameters influence the amount of feeder and distribution required. Again, AT&T contends that Verizon is actually criticizing HM 5.3 because it does not model Verizon's existing network.

5. Other

185 Verizon raises two other issues that are addressed elsewhere in the part of this order devoted to transport:[151] 1) that HM 5.3 overstates fiber feeder strands that are allocated to high capacity services allegedly not at issue in this proceeding; and 2) that HM 5.3 misallocates DLC common equipment, causing Plain Old Telephone Service (POTS) to subsidize DS-1 service.

186 ***Discussion and decision.*** As we discuss further in Part VII below, we find that the HM 5.3 model does not fully meet our cost-model criteria of openness and flexibility. In particular, HM 5.3's lack of openness, associated with the TNS[152] pre-processing of clusters causes us to accord it less weight.

187 In addition, we are concerned about the large cluster sizes produced by HM 5.3. Because the clusters are a result of the TNS pre-processing phase of AT&T's network modeling, we were unable to examine how the cluster sizes were determined because the TNS pre-processing data was not made available in the record. Our discomfort with the size of clusters in HM 5.3 is exacerbated by the fact that such large clusters decrease the amount of feeder plant required. HM 5.3 produces a feeder fill rate of 76.5%, a rate that is achievable only when the cluster sizes are very large. The feeder utilization rate produced by the model suggests that the clusters are too large.[153] Even though AT&T and Staff advance good reasons for larger cluster sizes, we are not convinced that such large clusters are appropriate for a forward-looking network, because they may hinder provision of fiber to the home

---

[151] Part VIII, Model Inputs, C. Transport.

[152] Taylor-Nelson-Sofres (TNS) is a third-party vendor that performs certain model pre-processing steps described in more detail in Part VII.B.

[153] Part VIII, Model Inputs, Section 5. b. Feeder fill (Table: Available Copper Cable Sizes and Potential Achieved Fill).

and high-capacity services. While HM 5.3's cluster sizing is not a sufficient reason to cause us to reject the model, cluster sizing is one of the factors that prompts us to give the model less weight. We discuss other such factors in Part VII of this order where we determine the proper weight to accord each model.

C. Switching Model

188 AT&T's HM 5.3 cost model incorporates switching, as it does other network components, and models costs for local and tandem switching.[154] AT&T recommends the Commission adopt HM 5.3 because it has been adopted in whole or in part by several state commissions to develop costs for switching. To develop switch investment, HM 5.3 relies on switch investments used by the FCC in the FCC's Synthesis Model based on data supplied by several ILECs.[155] By incorporating the FCC's switch investment numbers, HM 5.3 assumes that all switch equipment is purchased new.

189 AT&T also incorporates into its switch investment estimate a $30 per line "analog line offset" which is a reduction in investment that allegedly compensates for increased efficiencies and savings associated with the expectation that a forward-looking network will be comprised of digital, rather than analog facilities.[156] AT&T translates the resulting switch investments into a flat rate for switching, rather than dividing the switching rate into traffic-sensitive and non-traffic sensitive segments as Verizon proposes.

190 Staff supports AT&T's flat-rate switching proposal. Verizon opposes both AT&T's flat-rate switching proposal and AT&T's inclusion of the $30 per-line "analog line offset."

191 ***Discussion and decision.*** We reject AT&T's inclusion of the $30 analog line offset. The FCC already rejected reducing the switch investment figures adopted in its USF

---

[154] *Ex. 851T* at 15-16, 22-23.
[155] *USF Inputs Order*, ¶¶ 226-323.
[156] *Ex. 551TC* at 134.

Inputs Order by means of the analog line offset, because the USF switch investment inputs already accounted for savings associated with digital lines.[157]

192 We otherwise adopt AT&T's switching model for reasons stated in our discussion of the parties' respective switch investment estimates in this order's Model Inputs section.[158] We reject AT&T's flat switching rate proposal in the Switching Rate Structure section of this order.[159]

VII. EVALUATION OF COST MODELS

A. Introduction

193 In the two previous parts of this order we addressed specific problems raised by the parties about each other's cost models. Now we discuss, in the first instance, whether to choose one of the models for setting UNE rates, or, in the alternative, what weight to accord the models if we do not choose one or the other. In determining what weight to accord the models, we rely on various measures, such as openness and flexibility, route miles produced by the models, comparison of model loop length with actual loop length, degree to which the models incorporate existing plant, size of serving units and maximum length of copper loops.

B. Choice of Model

194 Verizon and AT&T each ask the Commission to choose its own cost model, both in this case and for use in future proceedings.

195 Staff notes that this Commission has been engaged in the process of setting UNE rates under the Act since it opened the first cost docket, UT-960369, on November 21, 1996. Staff believes it is reasonable to assume that the Commission will continue to reevaluate the prices for UNEs and interconnection in the years to come, and thus,

---

[157] *USF Inputs Order*, ¶ 325, 327.
[158] Part VIII, B.
[159] Part IX, B.

the time has come for the Commission to choose a model for parties to use in future proceedings. Staff advocates that the Commission choose HM 5.3 because HM 5.3 best complies with TELRIC—it models a network that uses the most efficient technology available and the lowest cost network configuration, given the existing location of Verizon's wirecenters. Staff maintains that the Commission should reject VzCost because the model does not satisfy the Commission's criteria for cost models. Contrary to Verizon's arguments, Staff argues that VzCost is difficult to use[160] and relies on data that reside on mainframe computers that is not available to users.

196 Verizon asserts that Staff decided to endorse HM 5.3 even before seeing VzCost[161] and that VzCost's reliance on data that are not located on Staff's PC does not make the model any less reliable because, as the Commission has found, "[n]o party has cited any case to the Commission that would preclude reliance on a web-based model as long as the Commission can determine the weight to accord to the model, and the results derived from it, based on the evidence taken as a whole."[162]

197 ***Discussion and decision.*** We decline to decide that one model or the other should be the "official model" of the WUTC.[163] It is very likely that the models presented in this proceeding will be different in a few years, perhaps completely redesigned. If we were to choose a model today, it might not be the best one to use to decide rates in a future proceeding. The parties have shown that modeling techniques have improved significantly since the first cost proceeding. We encourage continued improvement.

198 Even though we decline to choose a model, we will evaluate the models presented to us, based on the criteria set forth in the introduction to this section, for their

---

[160] To familiarize users with its new cost model, Verizon conducted a number of VzCost training sessions that were available to all interested parties (including Commission staff) and the Commission's advisor. Verizon also established a help desk to aid in fielding systems related questions regarding VzCost.

[161] *TR 1006:19-22.*

[162] *UT-023003, Fifteenth Supplemental Order,* ¶ 14 (Oct. 16, 2003).

[163] Moreover, we doubt that the Commission could limit the rights of parties in prospective cases based on models before it today.

suitability for setting UNE rates and for determining the weight to accord each model.

C. Models v. Inputs

199 The Commission asked the parties to address the question of whether the selection of one model over the other is necessary or important given the ability of the Commission to modify model inputs.

200 Verizon contends that significant differences between VzCost and HM 5.3 have consequences that cannot be undone simply by changing inputs.[164] Verizon contends that because the type and nature of the inputs are driven by the model chosen, it is important that the Commission adopt the appropriate cost model as well as the right inputs.

201 AT&T places less emphasis on the need to choose the 'correct' model, because it believes that the inputs adopted by the Commission have more influence on cost estimates than the platform to which they are applied.[165] Staff argues that while cost models are valuable analytical tools for estimating costs, they cannot single-handedly determine proper UNE rates.

202 We find that the answer to this question is not clear-cut. Because of the idiosyncratic relationship between model and inputs, the selection of models and inputs cannot necessarily be made as independent decisions. The choice of model and inputs are both important because perfect inputs will not save a bad model and vice versa. In the following sections of this order we address various measures for determining

---

[164] For example, Verizon claims that because HM 5.3 relies on such large distribution areas, it distorts the appropriate allocation between feeder and distribution cable. Verizon argues that the allocation between feeder and distribution is further distorted by HM 5.3 because it allegedly does not route cable along feasible network routes. Verizon also maintains that since HM 5.3 attaches significant differences in structure sharing and structure type to feeder and distribution, the choice of the model affects the choice of the inputs. *Verizon initial brief*, at 42.

[165] *TR 1642-43.*

the quality of the models presented here and the failings that reduce the weight we may accord them.

D. Openness And Flexibility Of Model

203 The Commission has defined an open model as one that "allow[s] parties to proceedings involving cost issues to have the ability to understand assumptions used, to review and analyze the effect of inputs and outputs, and to modify and model different inputs and assumptions."[166] All of the parties to this proceeding agree that "an open model is in the public interest in that it provides all parties with an opportunity to fully explore the advantages and the limitations of the different cost models."[167] However, the parties disagree over the extent to which VzCost and HM 5.3 comply with these principles.

204 Verizon contends that VzCost is the only model in this proceeding that satisfies the Commission's requirements. Verizon maintains that it made available the entire compiled and uncompiled source codes used in VzCost. Verizon claims that it is easy to understand the assumptions and algorithms used in VzCost because the user-adjustable equations do not require an understanding of computer languages. Thus, Verizon argues that no party can claim that any of its formulas represent a black box.

205 Verizon asserts that VzCost, and each of its modules, such as VzLoop, satisfy the Commission's requirement that users be able to modify and model different inputs and assumptions. Verizon claims that parties have all of the tools needed to test and run sensitivities on source code changes, and that various inputs can be changed just as easily. Because the network table in VzLoop purports to contain the location of every terminal in the modeled network, and every linkage between them, Verizon claims that a user can entirely redesign the modeled network by changing the values in this table.

---

[166] UT-960369, *8th Supplemental Order,* fn. 11.

[167] *Id.,* ¶2; *see also Verizon initial brief* at 45-46; *AT&T Brief,* ¶58; and *Staff Brief,* ¶29.

206 AT&T claims that Verizon's model fails to meet the Commission's requirements regarding openness and flexibility because VzCost relies to a large extent on proprietary Verizon databases that reside on Verizon's main-frame computers. According to AT&T, the investment calculations for all elements other than loop elements are performed in pre-processing functions that are not part of the VzCost web-based model, and even the loop investments are developed, in large measure, outside VzCost. Thus, AT&T contends that the underlying basis for the costs developed by VzCost cannot be reviewed within the model.

207 AT&T insists that VzCost also fails to meet the Commission's flexibility requirement. According to AT&T, VzCost is not one unitary model, but actually multiple cost models that are loosely interrelated, exceedingly complex, and difficult to work with. AT&T claims that when its expert, Steven Turner, a witness in this proceeding, tried making simple changes, such as modifying material prices, the process required multiple manual steps and hours to complete and run. AT&T also contends that Mr. Turner was unable to change the location of serving area interfaces (SAIs) in the Verizon model. Moreover, AT&T contends that many changes cannot be made by any party other than Verizon, and because of the web-based nature of the model, Verizon will not permit other parties to change the model code. AT&T argues that the Verizon model's inflexibility provides sufficient basis in itself for the Commission to reject its use.

208 Staff also argues that VzCost is not open, is overly complex, is too difficult to use, and improperly models the network. Staff credits Verizon's Internet-based design for introducing considerable uncertainty into the evaluation of the model. Staff argues that since a party analyzing VzCost cannot maintain physical control over the model, the analyst cannot know whether the data received resulted entirely from changes made by the analyst, or whether the data received was also changed because of changes in model programming, or data errors in the transmission and reception of information. Staff asserts that because Verizon changed the model at least twice during the course of this docket, it was also difficult for users to produce consistent results.

209 Staff claims that the complexity of VzCost compounds the problems associated with the Internet-based mainframe platform. For example, Staff asserts that recalculating VzCost's loop-cost estimates without Verizon's proposed FLC[168] required Staff to follow a list of lengthy instructions and took Staff approximately eight hours to complete. Staff asserts that a cost model should not be so difficult or time-consuming to run.

210 Verizon disputes the claim that VzLoop is so complex that it is difficult for the opposing parties' experts to understand. Verizon asserts there is nothing mysterious about the VzLoop source code to an expert experienced in analyzing loop models because VzLoop is written in a newer version of the same well-known computer language used in the Modified Synthesis Model that AT&T sponsored in other proceedings. Verizon believes it is highly unlikely that AT&T's witness Turner would be stumped by a model using that same language, especially since he was able to trace the VzLoop source code well enough to recommend a revision of the logic relating to the calculation of the fiber-copper economic cross-over point. Thus, Verizon maintains that there is simply no credible argument that AT&T did not have, or could not have retained, experienced experts who had the ability to understand VzLoop.

211 Verizon also dismisses AT&T's assertion that Mr. Turner was unable to change the locations of SAIs. Verizon claims Mr. Turner could have done so by modifying the network table, as Verizon had demonstrated to him at a meeting over two months before he filed his testimony.

212 Both AT&T and Staff believe that HM 5.3 best meets the Commission's requirements for a cost model. AT&T argues that in contrast to VzCost, HM 5.3 relies to the greatest extent possible on publicly available data. AT&T asserts that HM 5.3 can be analyzed using Excel and that approximately 2,100 user adjustable inputs can be changed. AT&T maintains that Verizon's witnesses had no difficulty running numerous scenarios to test the accuracy of the HM 5.3 model. AT&T states that

---

[168] Forward-Looking Calibration factor. This factor is discussed above in Part IV, Annual Cost Factors, Section B. 1.

predecessors of HM 5.3 have been scrutinized by this and other commissions and the current version of the model has benefited greatly from this review.

213 Verizon maintains that HM 5.3 is neither open nor transparent because, in defiance of the Commission's cost-modeling criteria and repeated Commission orders to produce all of the TNS[169] algorithms and data processes yielding the HM 5.3 cluster input database, including the clustering source code, AT&T has refused to allow Verizon, the Commission, or any other party the right of access or review of the most critical aspects of HM 5.3's pre-processing. Absent access to the clustering source code, Verizon claims it cannot fully understand the complex pre-processing conducted by TNS and make changes to the multitude of hard-coded values within the clustering process. Verizon believes this is especially significant in light of AT&T's alleged failure to demonstrate that HM 5.3's cluster input database lives up to its billing, and AT&T's admission that it has never verified the accuracy of the database.

214 Verizon also claims some of HM 5.3's key cost drivers and engineering assumptions are inappropriate and buried, or hard-coded, in its pre-processing platform and algorithms, thereby making them impossible to analyze and modify. Moreover, Verizon contends that AT&T has never provided explanations of how to modify some of HM 5.3's key modeling assumptions.

215 According to Verizon, AT&T's claim that VzCost's use of proprietary data compromises its openness is completely inconsistent with AT&T's own refusal to disclose HM 5.3's clustering processes. Verizon claims that adoption of HM 5.3 under these circumstances would be tantamount to repudiating for future cost cases the very clear requirements for openness established in the Commission's 8th

---

[169] Taylor-Nelson-Sofres (TNS) is a third-party vendor that AT&T relies on to perform model pre-processing that converts customer location data into customer demand for use in HM 5.3's modeling of a forward-looking network. TNS data and algorithms have not been available to the parties, or have been made available only in very limited ways. The Commission has entered orders requiring the TNS pre-processing algorithms and data to be produced in discovery. *See UT-023003, 13th Supplemental Order*, September 8, 2003; *14th Supplemental Order*, October 14, 2003; and *18th Supplemental Order*, December 5, 2003.

Supplemental Order in Docket No. UT-960369. Verizon argues that the TNS clustering process not only occurs outside of HM 5.3 model, but is outside the record in this case entirely because AT&T never disclosed it. Verizon notes that although AT&T produced this data in the Verizon California UNE proceeding[170] it has never been scrutinized by any other state or federal commission.

216 Verizon also claims that the other parties have in fact had access to Verizon's network data and that there is simply no way to conduct UNE proceedings about the costs of an ILEC's network without significant analysis of, and reliance on, such proprietary data. Verizon points out that the Commission recognized at the outset of this case "[i]t is likely that proprietary and confidential information will be required to resolve the issues in this proceeding."[171] Verizon contends that if AT&T's argument were accepted, virtually all company-specific data would be out of bounds in cost cases.

217 Verizon argues that the principal challenge to VzCost is not about openness or flexibility but rather a claim that one aspect of the model, specifically VzLoop, is too complex. Verizon asserts that its cost model is complex because the telephone network is complex. According to Verizon, to address the problem of complexity in the network by replacing it with rearranged customer locations and routing designs that have no relationship to real-world constraints, as AT&T has allegedly done, is the equivalent of throwing up one's hands and conceding that it is impossible to grapple with those complexities. Verizon argues that VzCost shows that it *is* possible to address and incorporate the multifarious aspects of a forward-looking telecommunications network.

218 According to AT&T, Verizon's chief defense of the openness and flexibility of its model is essentially that Staff and AT&T have no one to blame but themselves if they could not retain expert witnesses who could understand VzCost and find it simple and easy to use. AT&T maintains that Verizon's characterization of its model as "open and flexible" is belied by the fact that AT&T's witness Turner, who

---

[170] *Verizon reply brief* at 21.

[171] *UT-023003, 1st Supplemental Order*, ¶ 1, March 25, 2002.

demonstrated his qualifications as an expert on the witness stand, and Staff's witness, Thomas L. Spinks, who has been reviewing, evaluating, and modifying cost models for the Commission since the first cost docket began in 1996, both had extreme difficulty understanding, navigating, and modifying VzCost and its component models.

219 AT&T claims that Verizon's witnesses had little trouble examining HM 5.3 and making specific observations about how the model works. AT&T points out that one of Verizon's witnesses, Christian Dippon, created detailed maps from nothing more than the clustering process information that TNS provided through AT&T. According to AT&T, had it chosen to do so, Verizon could have verified the customer locations used in the model by comparing them with Verizon's customer records. AT&T contends that the record evidence demonstrates that HM 5.3 is more open and flexible than VzCost.

220 ***Discussion and decision.*** We note that both VzCost and HM 5.3 are much improved and more sophisticated than models presented in previous proceedings. We also find that both models are TELRIC-compliant. However, we further find neither model fully meets our criteria for openness and flexibility. We attribute some of the problems with VzCost to its newness. However, both models have nagging flaws of the sort that we have pointed out in this order.

221 VzCost is a significant step forward over prior Verizon and GTE cost presentations. It is superior to HM 5.3 in modeling existing rights-of-way.[172] However, as a model, it strains to be completely forward-looking because it assumes that the number and placement of SAIs will remain the same.[173] This assumption strikes us as inconsistent with the FCC's Local Competition Order.[174] The FCC established costing standards that require the modeling of an efficient network using state-of-

---

[172] Part VIII Model Inputs, Section A. Loop Inputs, Number 7. Other Inputs, subsection b. Rights-of-way. Here we determine that the Verizon model more accurately accounts for existing rights-of-way than does the HM 5.3 model.

[173] *See* Part V. Verizon's Cost Model, Section B. 4. and Part VII, Evaluation of Cost Models, Section 3. of this order for further discussion of this issue.

[174] Fn to Local Competition Order.

the-art technology.[175] Verizon's network has evolved over a long period of time. Its current placement of serving area interfaces and other network access points reflects technology and standards that are not the most efficient in terms of today's network construction procedures and demand levels.[176] The model would ideally use only the existing locations of the central offices (COs), customers, and rights-of-way to design the most efficient forward-looking network possible based on current demand and technological constraints. While this flaw is not sufficient to cause us to find that the model does not comply with TELRIC, it detracts from the weight we can give it.

222 The chief remaining problem with VzCost is the complexity of the model. The complexity of VzCost is demonstrated by the fact that both Mr. Spinks and Mr. Turner had problems with it and they are experts. We attribute some of the problems they experienced to the fact that VzCost is a new model. We do not find compelling Verizon's contention that because Mr. Turner was able to trace the VzLoop source-code logic sufficiently to suggest the need for a revision of that logic (relating to the calculation of the fiber-copper economic cross-over point), it follows that the experts could understand what was going on inside VzCost when necessary.[177] The fact that Mr. Turner was able to identify a problem in one area of the code is not dispositive of the issue. In addition, the Verizon model is cumbersome to use. We concur with Staff that it is unreasonable for a party to spend

---

[175] *Id.*

[176] This criticism of the Verizon cost model is the complement of our concern that AT&T's HM 5.3 model produces clusters that are too large. *See* Part V. HM 5.3, Section B. Outside Plant Network Design Issues, Discussion and decision. Large serving areas are not optimal today because they place network electronics too far away from end-use customers. VzCost uses facility locations that were once optimal in the eyes of its engineers, but are likely sub-standard today. A similar view was expressed by the FCC in its discussion of modeling an efficient network: "Existing incumbent LEC plant is not likely to reflect forward-looking technology or design choices. [footnote omitted] Instead, incumbent LECs' existing plant will tend to reflect choices made at a time when different technology options existed or when the relative cost of equipment to labor may have been different than it is today. Incumbent LECs' existing plant also was designed and built in a monopoly environment, and therefore may not reflect the economic choices faced by an efficient provider in a competitive market. [footnote omitted]" *In the Matter of Federal-State Joint Board on Universal Service Forward-Looking Mechanism for High Cost Support for Non-Rural LECs*, CC Docket No. 96-45; CC Docket No. 97-160, Fifth Report and Order, Released October 28, 1998.

[177] *TR 1168-1170; 1173.*

so much time to make a minor adjustment to one input, the FLC. We, ourselves, in the process of determining appropriate rates in this order, found the process of modifying the VzCost inputs cumbersome.[178] Furthermore, there were areas where we were unable to modify the VzCost inputs because of the inflexibility of the model.[179]

223 We find it difficult to give weight to AT&T's complaint about pre-processing in VzLoop because the TNS pre-processing in HM 5.3 has remained largely closed off from review. Failure to disclose TNS pre-processing information is the primary problem with HM 5.3. For the most part, the remaining problems with HM 5.3 relate to model inputs that can easily be adjusted. We discuss these adjustments in subsequent sections of this order.[180]

---

[178] Subsequent to the evidentiary hearing, the Commission issued several bench requests (Bench Requests 22-31) to Verizon, Commission Staff and AT&T to obtain further information regarding how to run the cost models. Most of the requests were directed to Verizon. Two of the Bench Requests (30 and 31) directed to Verizon were in the nature of conferences conducted via the Commission's conference bridge phone line. In addition, the Commission's advisors attended a tutorial on the Verizon cost model on December 16, 2005. In response to Bench Requests 23, 24, and 26, AT&T indicated it no longer had the resources to respond to such Commission inquiries. On January 7, 2005, Verizon submitted a letter to the Commission purporting to dispute Staff's response to Bench Request 26. AT&T responded that Verizon's letter was an impermissible submission of argument and fact for which the Commission had made no provision. The Commission notes that it has taken into account the parties' responses to the Bench Requests, only. The Commission made no provision for additional fact or argument to be submitted by the parties in response to each other's answers to the Bench Requests, and will not consider those additional submissions.

[179] For example, we were unable to modify the structure placement costs in the manner intended. Part VIII.A.2. Ideally, we would be able to modify the installation activities by density zone, rather than work with the assumption that the activities, such as percent bore cable, are independent of density. We also would have preferred that the model be sufficiently flexible so that we could have used the FCC USF Inputs Order placement cost estimates in the model. Part VIII.A.3. We encountered a similar problem when we attempted to modify inputs for structure sharing. The Verizon model was designed in a manner that makes it extremely cumbersome to modify the inputs to reflect that the level of structure sharing increases as density increases. The model was designed with the implicit assumption that the level of structure sharing is the same in a rural and urban area. This is a faulty assumption because there is more structure sharing in urban areas, where, for example, a cable company is more likely to share a pole, than in a rural area. This limitation in the model results in an understatement of costs in rural areas, *ceteris paribus*. Overall, we found the task of modifying inputs to be much easier in HM 5.3 than in VzCost.

[180] Part VIII, Model Inputs.

224 In our 18th Supplemental Order[181] in this proceeding, we explained that striking the HM 5.3 model was drastic and uncalled-for at the time, because few cost models are perfect and submitting them to the scrutiny of cross-examination and Commission review would indicate the weight the Commission should give to evidence associated with them. We also found that AT&T's offer to provide some TNS information for review could alleviate many, though not all, of the concerns about the transparency of HM 5.3. Verizon noted that even with this compromise, several items would not be provided, including such information as the software and source code used to remove inaccurate geocoding results and duplicates, and the software and source code used to surrogate customer locations.

225 We continue to believe that if our cost proceedings are to result in the most accurate and economic UNE prices, openness of all aspects of supporting cost models is important. We have ruled consistently in past cost dockets that AT&T would meet our openness criteria by producing for examination the TNS pre-processing algorithms and data. AT&T has consistently failed to produce all the TNS information required. While we will continue to weigh the evidence about the cost models based on the record before us, in future proceedings we do not expect to accord much weight to a cost model, that does not meet our criteria for openness. Parties must continue to search for ways to produce third-party confidential information so as to preserve the openness and integrity of our proceedings yet protect the needs of the third-party.

226 In conclusion, we find, overall, that both models are flawed but both are TELRIC-compliant. On balance, we find the lack of transparency in the HM 5.3 pre-processing operations to be a problem that, together with the problem of the large cluster sizes the model produces, causes us to give it less weight than we accord Verizon's model. We further refine our evaluation of the two cost models in the sections that follow.

---

[181] *UT-023003, 18th Supplemental Order*, December 5, 2003.

E. Other Metrics For Evaluating The Reasonableness Of A Model

1. Route miles

227 "Route miles" are a measure of the total distance of the cable segments that comprise the network. A route mile differs from a cable mile, in that the latter measures the total miles of cable between two points, whereas a route mile measures only the actual distance between the two points. Cable miles will exceed route miles wherever two or more cables are installed along a route.

228 According to Verizon, route miles are one determinant of cost, but no less important are where loop facilities are placed, and what types of facilities are placed. Verizon asserts that the mix between feeder and distribution cable is much more important to the determination of total investment and the resulting UNE costs. Verizon claims that the type of cable the model installs, the supporting structure that is used, and where that equipment is located are equally important. Verizon notes that the fact that one model produces more route miles than another says nothing about whether it produces sufficient quantities of the correct types of outside plant, or whether the resulting cost-estimates reasonably represent what Verizon can expect to incur on a forward-looking basis.

229 AT&T contends that while both route miles and average loop length provide some measure of validation for the reasonableness a cost model, route miles are a more meaningful comparison than average loop length. AT&T claims that because any model established to discern Verizon's costs must take the location of its customers as a given, a certain number of route miles will be required, as a matter of mathematics, to connect those customers to each other and to the wirecenter that serves them.

230 According to Staff, both route miles and average loop length help indicate the degree to which a cost model provides sufficient cable to serve existing demand. However, while both factors provide a measure of how closely the modeled lengths compare to existing facilities, Staff maintains that a model should not "live or die"

depending on the closeness of the comparison. Staff believes it is important that a cost model provide a means to adjust the related distance-sensitive investments on a wirecenter basis. Staff maintains that just because a cost model produces cable lengths similar or equal to existing lengths does not necessarily mean that the model produces the most efficient forward-looking cost estimates.

231 ***Discussion and decision.*** We are persuaded that, although both route miles and cable miles are important measures of network facilities, route miles are more consistent with the assumptions used in a TELRIC model. Cable miles reflect the facilities built over time to serve demand as it arose. Route miles better reflect the construction of an efficient, forward-looking network to serve current total demand.

232 We agree with Verizon that aspects of a model in addition to route miles must be considered when determining the reasonableness of the model. However, most of the issues Verizon raises—regarding the type of cable installed, support structure, and mix between feeder and distribution cables—are inputs that can be adjusted within the parameters of both models. They do not relate to the model itself. Therefore we will address these issues in the section of the order devoted to model inputs.[182]

233 Nevertheless, we find that route miles are one valid measure of whether a model produces sufficient plant to serve existing demand. However, matching or exceeding the measure of route miles in the existing network says little about the efficiency of the network designed by the model. Other metrics or combinations of metrics are required for that purpose.

2. Average loop length

234 Verizon maintains that this Commission has repeatedly emphasized: 1) the need for cost models to produce loop lengths that comport with actual loop lengths;[183] 2) the need for parties to address the relationship between their cost studies' average loop-

---

[182] Part VIII. Model Inputs.

[183] *UT-003013, 32nd Supplemental Order,* ¶345.

length estimates and their actual average loop lengths;[184] and 3) the need to explain the basis for the differences in these measures, in order to validate the accuracy of their models.[185] Verizon points out that in this case, the average individual wirecenter ratio of VzLoop's modeled loop lengths to Verizon's actual loop lengths is 0.9922. The same average is 1.4422 for HM 5.3.[186] Verizon claims that this comparison of the actual to modeled loop-lengths for each model demonstrates that its own model more closely meets the Commission's modeling criteria.

235 As noted above, AT&T believes that average loop length is a useful metric but a less meaningful indicator than route miles. According to AT&T, loop lengths are heavily influenced by the way the distribution areas within a wirecenter are configured within the model and by the placement of the SAI within a distribution area. AT&T argues that the fact that a model produces loop lengths that approximate loop lengths found in the existing network may simply be a measure of the extent to which the model replicates the existing network, rather than evidence of an efficient forward-looking network constructed today.

236 ***Discussion and decision.*** In our prior cost orders, we have expressed concern when modeled loop lengths differed significantly from actual average loop lengths. We have rejected Verizon's argument that comparisons between TELRIC loop lengths and actual loop lengths are inappropriate for validating the reasonableness of a model.[187] We recognize that there are many good reasons for the TELRIC loop-length estimates to be different from actual loop lengths. However, when the differences are significant and numerous, they need to be analyzed. In Docket No. UT-003013, Verizon was unable to explain the source of the significant difference between modeled and actual loop lengths.[188] Verizon's cost model at the time, ICM, did not have a mechanism to reconcile wirecenter distance-sensitive investments.[189]

---

[184] *UT-960369, 8th Supplemental Order,* ¶227.
[185] *UT-950200, 9th Supplemental Order,* ¶49.
[186] *Verizon brief* at 52-53.
[187] *UT-003103, 32nd Supplemental Order,* ¶¶ 345-347.
[188] *Id.*
[189] *Id.*

237 In this case, average loop length is an adjustable input, at least in the HM 5.3 model. It is less clear that we can adjust VzCost for loop length or distance-sensitive investment. However, in view of the fact that the average individual wirecenter ratio of modeled loop lengths in VzLoop to actual loop lengths is 0.9922, whereas the same ratio for HM 5.3 is 1.4422, our concern about actual variance from Verizon's modeled average loop length is eliminated.

3. Incorporation of existing network facilities

238 According to Verizon, the Commission has previously recognized that cost models should approximate the real-world.[190] Verizon claims that one of the greatest advantages of VzLoop, as compared to HM 5.3, is the extent to which it does just this, particularly with respect to pedestals (also referred to as distribution terminals) and cabinets (also referred to as SAIs and remote terminals (RTs)). Verizon maintains that VzLoop relies on actual information about real-world facility locations to accommodate the locations of real-world DLCs and distribution areas (DAs). It also relies on data about control points[191] in the real-world network to model feeder routes and additional SAIs and DLCs under appropriate circumstances.

239 Verizon claims that its use of existing pedestal and cabinet locations is economically efficient because it recognizes the value of having already identified and obtained the rights-of-way for those locations and avoids the more expensive option of identifying and obtaining new locations and rights-of-way. Verizon alleges that other Commissions have consistently recognized that an appropriate calculation of an ILEC's forward-looking costs should reasonably capture the design and layout of its network.[192]

---

[190] *UT-960369, 8th Supplemental Order,* ¶21. We note here that the actual quotation from the order cited by Verizon is: "As the Commission Staff has noted, an analytical model is a simplified representation of some aspect of the real-world. Analysts use models to organize the complexity of the real-world into some orderly form."

[191] *Verizon initial brief,* fn. 312. A control point is a point in the existing network, reflected in plant records to help an engineer monitor the network.

[192] *Verizon initial brief* at 54.

240 AT&T contends that the FCC's rules require that TELRIC compliance should be measured based on the use of the most efficient telecommunications technology currently available and the lowest cost network configuration, given only the existing location of the ILECs' wirecenters. AT&T maintains that the rules specify that embedded costs may not be considered in calculating forward-looking economic cost.

241 AT&T notes that Verizon's cost model assumes that all distribution areas, SAIs, DLC locations, and feeder routes replicate Verizon's current network. In contrast, AT&T claims that HM 5.3 is designed to group existing customer locations in an efficient and technologically reasonable manner. Thus, SAIs are placed where they can serve these distribution areas efficiently, rather than at the edges of distribution areas as may have occurred in the past, and these distribution areas are served by efficiently placed feeder routes originating at existing wirecenter locations.

242 AT&T argues it is contrary to basic TELRIC principles to presume, as Verizon's model does, that all distribution areas, SAIs, DLC, and feeder routes should replicate its current network and thus preserve the inefficiencies of the past. AT&T claims that this assumption, which contorts TELRIC to cover every piece of Verizon's existing network, does not comply with the FCC's rules and should be rejected along with Verizon's models.

243 Staff similarly contends that a cost model that adheres to the current locations of pedestals, cabinets, and other plant is less reasonable than a model that assumes efficient placement of plant, given the location of existing wirecenters. Staff maintains that incumbents like Verizon chose existing equipment locations incrementally over a long period of time, and that these locations do not represent the equipment locations that necessarily would be used if the network were rebuilt today to serve existing total demand. Staff believes the use of existing locations constrains the model to produce inefficient cost estimates because it does not allow for the possibility that more efficient network designs exist. For this reason Staff believes the VzCost is severely flawed.

244 Staff also argues that Verizon's assumptions about appropriate network design are inconsistent with its other costing assumptions. Staff claims that Verizon's position is that the better cost model is one that most accurately replicates the existing network. However, Staff argues that where it better suits Verizon to adopt hypothetical assumptions, rather than real-world information, Verizon is quick to adopt hypothetical inputs. For example, Verizon proposes a purely hypothetical cost of capital and state of competition. Staff also faults Verizon for, on the one hand, arguing that the Commission should *not* adopt the company's currently authorized depreciation lives because those lives were established in order to allow Verizon to recover its embedded costs; but on the other hand, arguing that those same embedded costs *be used* to judge the validity of a cost model. Staff insists that Verizon cannot have it both ways.

245 ***Discussion and decision.*** Because in HM 5.3, modeling is based on existing wirecenters and customer locations, we find that it is TELRIC compliant. However, this conclusion is not as easily reached for Verizon's cost model.

246 We recognize that because Verizon's assumptions rely on existing locations, which may not be efficient, it is possible that these assumptions will introduce some of the inefficiencies of its existing facilities into its TELRIC cost estimates. Because we cannot assume that Verizon has incrementally constructed the most efficient cable routes to serve existing demand, we conclude that there are other plausible network layouts that could result in both fewer route miles and shorter average loop lengths. Nevertheless, based on the evidence in this case, it does not appear that Verizon's existing cable lengths are unreasonably inefficient or that its cost model does not comply with TELRIC principles. Furthermore, given TELRIC constraints requiring carriers to model their TELRIC networks based on existing central offices, customer locations, and rights-of-way,[193] we find that, while Verizon's adherence to its

[193] We note that FCC rules do not explicitly require that UNE rates take into account existing rights-of-way. We find, though, that such a requirement is implicit in the objective of modeling the costs that would be incurred in building a network that serves the existing set of customers from the current central offices. *See 47 C.F.R. §51.505(b)(1) and (d).*

existing network node locations is acceptable, its approach is not a mandatory condition for acceptance of a cost model.

247 In conclusion, with respect to incorporation of existing network facilities, we find both models to be TELRIC compliant. However, we are concerned that Verizon's modeling of existing network locations (apart from central offices, customer locations and rights-of-way[194]) may include some of the inefficiencies inherent in its preexisting network that escape our evaluation. This possibility causes us to reduce the weight we give to the Verizon model.

4. Number of lines in a serving area

248 Verizon argues that a forward-looking model should reflect real-world constraints and build distribution areas (DAs) that generally conform to the established industry guideline of 200 to 600 living-units per distribution area. Verizon claims that much-larger distribution areas are improper because they would be extremely difficult (if not impossible) to manage in the real-world and would result in disproportionately long distribution cables.

249 AT&T and Staff claim that an efficient forward-looking model will place up to 5,000 access lines in a single distribution area. Staff believes that this assumption is more reasonable and consistent with long-run incremental cost principles than the previous practice of building distribution areas to serve 200 to 600 living-units. The larger distribution areas result in longer distribution and shorter feeder lengths than are proposed by Verizon.

250 Verizon observes that a California Administrative Law Judge recently concluded that designing a network with longer distribution cables and shorter feeder cables, as advocated by Staff and AT&T, is inefficient because the physical characteristics of distribution cable generally make it more susceptible to service problems, and thus

---

[194] We discuss the two models' incorporation of existing rights-of-way and find Verizon's methodology regarding rights-of-way to be superior in Part VIII. A.7.b.

add considerably to its maintenance costs.[195] Verizon maintains that trading distribution for feeder cable within a model fundamentally distorts the cost-benefit analysis traditionally conducted by outside plant engineers. Verizon also points out that in the Virginia Arbitration Order, the WCB agreed with deployment of 200 to 600 line distribution areas.[196]

251 AT&T disputes Verizon's claim that existing engineering guidelines size distribution areas at between 200 and 600 households. AT&T alleges that Verizon's most recently proposed engineering guidelines do not contain such a restriction.[197] AT&T claims these guidelines indicate that it is appropriate to place larger SAIs to serve a given area, instead of establishing many smaller ones to serve the same area. According to AT&T, these guidelines support its witnesses' testimony that forward-looking distribution areas are likely to be structured substantially differently from those in the existing embedded network. AT&T also maintains that the WCB recognized that larger distribution areas represent a more efficient plant design.[198] AT&T contends that larger distribution areas permit the use of larger equipment that is readily available today and is often more economical on a per line basis.

252 ***Discussion and decision.*** We are not persuaded that the number of lines per distribution area is a measure that, by itself, would help us determine whether one model is better than another. We agree with the parties that there are cost-benefit tradeoffs that must be considered when determining the size of DAs. No party was able to explain why a certain number of lines per distribution area is the only appropriate or even the best assumption. Nevertheless, we are concerned that

---

[195] *Joint Application of AT&T Communications of California, Inc. (U 5002 C) and WorldCom, Inc. for the Commission to Reexamine the Recurring Costs and Prices of Unbundled Switching in its First Annual Review of Unbundled Network Element Costs Pursuant to Ordering Paragraph 11 of D.99-11-050, et al.*, Docket Nos. 01-02-024, 01-02-035, 01-02-031, 02-02-032, 02-02-034, and 02-03-002, Proposed Decision of ALJ Duda (ALJ Order), August 19, 2004 at 76-77. We are unable to find the language to which Verizon refers in this section of the California ALJ's Proposed Decision. Moreover, we note that an ALJ decision is of very limited value to us in reaching a decision because of its lack of finality.

[196] *Virginia Arbitration Order*, ¶ 237. We note that in this paragraph, the WCB agreed with AT&T that DAs need not always be sized at 200-600 working lines, but that these were "general deployment goals."

[197] *See Ex. 265.*

[198] *Virginia Arbitration Order*, ¶ 237.

AT&T's placement of up to 5,000 access lines in a single distribution area is directly related to the TNS pre-processing of large clusters in the HM 5.3 model that we found problematic in Part VI of this order. We find that HM 5.3's placement of such large numbers of access lines in its distribution areas causes us to accord the HM 5.3 model less weight than we give the Verizon model.

5. Maximum length of copper cable

253 Verizon asserts that its 12,000-foot maximum copper loop length is consistent with the FCC's TELRIC requirements; with industry standards; with the California ALJ's draft decision; and with the previous testimony of AT&T's own witness. Verizon claims that this limit ensures that the modeled network will not impede the provision of advanced services (such as xDSL[199]), and is therefore consistent with the FCC's requirements of forward-looking and efficient technology. Verizon argues that the Carrier Service Area (CSA) design standards relied on by AT&T limit copper cable length to 12,000 feet and most, if not all, equipment vendors default to this same standard. Thus, Verizon claims any deployment of copper beyond this length would encounter significant compatibility problems.

254 HM 5.3 assumes an 18,000 foot maximum length of copper cable. According to AT&T, the maximum length of copper cable can be adjusted in both cost models, and does not, therefore, provide an appropriate basis for choosing one model over the other.

255 ***Discussion and decision.*** We agree with AT&T. Because the maximum length of copper cable is an adjustable input in both models, it does not provide an appropriate basis for choosing one model over the other. However, further address this issue in the Model Inputs section of this order, where we adopt 12,000 feet as the maximum copper loop length.[200]

---

[199] High-speed digital subscriber line (internet connection).

[200] *See* Part VIII. Model Inputs, Section A. 7. Other inputs.

6. Other Metrics

256 The parties have presented proposals for the three following additional metrics for determining the reasonableness of a cost model.

a. Comparison to industry trends and actual costs

257 Verizon asserts that this Commission emphasized in the 8th Supplemental Order the importance of evaluating whether a cost model produces valid estimates of the economic costs of providing UNEs[201] based on algorithms that capture the salient characteristics of the network.[202] Verizon notes that in establishing whether a model satisfies the requisite standard of validity, the Commission agreed that both the model's inputs and selected outputs should be subject to validation.[203] According to Verizon, HM 5.3 repeatedly fails such tests.

258 For example, Verizon suggests that a useful validation test is whether successive releases of the Hatfield Model are consistent with reasonable trends in the industry. Verizon asserts that even though AT&T and other CLECs have conceded that the costs of loop plant are not declining, and for many non-switch elements costs are rising,[204] the loop costs AT&T proposes in this proceeding are less than 40 % of Verizon's current loop rate and 48 % less than the loop cost produced by HM 3.1 just seven years ago. Verizon maintains that there is no reasonable explanation for these significant cost reductions.

259 Verizon contends that a further validation indicator is whether a model includes enough equipment and ongoing expenses to pay for the material and labor costs needed to run the network. As with average loop lengths, Verizon argues that any

---

[201] *UT-960369, 8th Supplemental Order,* ¶27.
[202] *Id.* ¶14.
[203] *Id.* ¶37.
[204] *WorldCom, Inc. v. Verizon Communications, Inc.*, Reply Brief for Petitioners WorldCom, Inc., the Association for Local Telecommunications Services, and Competitive Telecommunications Association, No. 00-555 (July 23, 2001) at 6; *see also* Comments of AT&T Corp, FCC CC Docket Nos. 01-338, 96-98, 98-147 (filed Dec. 16, 2003) at 99-100.

substantial deviation between the cost model and reality should be explained with specificity. Verizon claims that HM 5.3 generates cost and expense estimates that are significantly lower than Verizon's actual experience, yet AT&T offers no explanation for this wide difference. Verizon argues that based on the 8th Supplemental Order's validation criteria, HM 5.3 should be rejected as inherently unreliable.

260 AT&T maintains that any decline in the loop cost attributable to the model (as opposed to the inputs) merely reflects the greater accuracy and sophistication of the model. AT&T argues that VzCost fails Verizon's own test, given that it produces a loop rate that is almost double the rate the Commission previously established, and despite declining costs due to improvements in technology. Moreover, AT&T asserts that Verizon's complaints go to the HM 5.3's inputs, not to the model itself.

261 AT&T believes that Verizon's proposal that AT&T justify any cost calculation that is significantly different from Verizon's embedded costs directly conflicts with the FCC's requirements that Verizon bears the burden to prove the nature and magnitude of any forward-looking cost that it seeks to recover in the prices of network elements.

262 Staff contends that current investment levels are not good indicators of the reasonableness of a model because current investment represents the embedded costs of the network that may include investment in excess plant and equipment that are not forward-looking.

263 ***Discussion and decision.*** We agree with AT&T that many of Verizon's validation arguments go to the inputs to the model and not HM 5.3 itself. We discuss model inputs in Part VIII of this order. While we agree that it may be reasonable to consider the relationship between a model's output and real-world investment data, such an imprecise test is insufficient grounds to invalidate a model, especially if the efficiency of the cost data is in question.[205]

b. Model sensitivity to changed assumptions

264 Verizon also contends that HM 5.3 is insensitive to changes in significant cost drivers, particularly the number and size of clusters used to aggregate demand in distribution areas. Verizon claims to have replaced HM 5.3's clustering algorithm with the clustering rule used in HM 2.2— a change that increases the number of clusters by 147 % (from 1,019 clusters to 2,517 clusters) but only has a modest impact on total loop costs, increasing them by only 10 %, from $7.87 to $8.66.

265 This result causes Verizon to maintain that HM 5.3 is almost entirely insensitive to the number of clusters produced by the model. According to Verizon, this finding does not mean that the clustering algorithm or the size of distribution areas have no effect on the total costs produced by the model. Rather, it means that other modeling flaws override the results of the clustering algorithm. That is, Verizon claims that HM 5.3 is insensitive to the clustering algorithm because it models outside plant incorrectly, not because the clustering algorithm is unimportant.

266 Verizon also claims that HM 5.3's alleged insensitivity to cluster size makes no sense from an engineering perspective. The engineering expectation would be that feeder lengths and costs should increase when the size of a cluster is decreased. The reason for the increase is that smaller clusters require more, but smaller, SAIs, increasing the need for feeder plant. On the other hand, distribution lengths should not decrease when cluster size is decreased because customer locations are "fixed" in distribution areas, and the same amount of distribution plant would be required to serve them regardless of cluster size. According to Verizon, although HM 5.3's feeder costs increase when the size of its clusters decreases, its distribution costs inexplicably decrease to a corresponding degree, thereby offsetting any associated increase in feeder costs. Verizon claims that this result defies common sense.

267 AT&T argues that the specific 10% difference in loop cost (between $7.87 and $8.66) that Verizon cites is hardly modest, and that it is Verizon's preconceptions, not HM 5.3, that are flawed. AT&T maintains that the results Verizon criticize as modest are

---

[205] *See* Part X, Section B. Cost Evidence.

what one would expect because Verizon compared the total loop costs before and after a sensitivity run in which only one of many cost drivers was examined.

268 ***Discussion and decision.*** We agree with Verizon that the sensitivity of a model to changes in significant cost drivers is an important metric. However, we do not believe that Verizon's analysis in that regard survives careful scrutiny. It is likely that the sensitivity of HM 5.3 to changes in cluster size will also depend on the value of other loop-related inputs like structure mix, placement cost, and structure sharing. Again, we will evaluate these in the Model Inputs section of this order.[206]

c. Model's prior use in other regulatory proceedings

269 AT&T claims an additional factor that the Commission should consider in determining its choice of a model is the extent to which the models presented here have been used and analyzed in other proceedings. AT&T contends that its model has a long history with this and other Commissions, and that the model has benefited from this review and improved over time. AT&T suggests that because VzCost is new, not all of the bugs have been worked out yet.

270 ***Discussion and decision.*** We reject AT&T's suggestion that HM 5.3 is superior because it is a more mature model. While it may be reasonable to expect that a brand new model will have more "bugs" than subsequent versions of the same model, this fact alone says little about the underlying reasonableness of HM 5.3. Subsequent versions of a model can also generate concern from commissions and opposing parties. This is certainly true of the Hatfield Model, especially regarding the customer location algorithm in the most recent versions of that model.

7. Conclusion

271 In summary, after considering all of these metrics, we find both Verizon's cost model and AT&T's model to be flawed. We find that VzCost may import some of the inefficiencies related to Verizon's existing network into the model because of the

heavy reliance on existing network data to model a forward-looking network. Also, the Verizon models are very cumbersome to use.

272 With regard to the HM 5.3 model, we find problematic the lack of openness in the pre-processing phase of its network modeling and the large cluster sizes the model produces as a result of the pre-processing.

273 Balancing all of the factors just discussed, we conclude that both models have merits and demerits but that we should give greater weight to the Verizon cost model. In this proceeding, we will weight the Verizon and AT&T models 60% and 40% respectively. In Part VIII of this order, we make adjustments to each model's inputs and address the need for further changes to our weighting determination based on the difficulty in adjusting inputs to the models.[207] Ultimately we determine, according to the weight we give the respective models, appropriate UNE rates for Verizon.

VIII. MODEL INPUTS

274 Determining which are the appropriate inputs to a model is the next step in the process of deriving recurring rates for UNEs. Each model incorporates inputs related to the loop, transport, and switching UNEs. Loop inputs include plant mix, structure sharing, placement and material costs, fill factors, DLC[208] assumptions, and various other inputs.

---

[206] Part VIII. Model Inputs.

[207] *See* ¶¶ 303 (structure sharing), 316 (contract prices), 323 (hand-digging and boring), 337 (material costs).

[208] Network transmission equipment used to provide pair gain on a local loop. Newton's Telecom Dictionary, Updated 15th Expanded Edition.

A. LOOP INPUTS

1. Plant Mix

275 Plant mix refers to the mixture of outside plant that is used to provide support for local loops. There are three basic types of outside plant: 1) aerial (usually poles, but sometimes other structures like block cable[209] and risers[210]); 2) buried (laid in trenches or directly plowed into the earth); or 3) underground (placed in conduit or vaults). It is generally least expensive to place cable on aerial structure and most expensive to place it in underground conduit.

276 Verizon states that its plant mix inputs are based on data from its outside plant records that show the type of structure used for every single route segment in its network as it currently exists.[211] Verizon sets a maximum of three cables per aerial route segment and two cables per buried route segment. The three-cable limit ensures that aerial cables do not sag below an 18-foot clearance space.[212] The two cable limit implements the standard practice to use underground conduit instead of direct buried cable when multiple cables are being placed below the surface.[213] If these limits are exceeded for any route segment, VzLoop models underground cable for that segment.[214] Verizon contends this approach reflects the limits a network planner would face in designing a network from scratch, taking into account existing soil characteristics, rights of way, congestion, and natural barriers. Verizon points out that the Commission has agreed that reflecting such an actual structure mix is appropriate.[215]

---

[209] Block cable is aerial cable that is attached to the outside of buildings in very dense urban areas.
[210] Risers are the spaces between floors of a multi-unit building.
[211] *See AT&T initial brief* at ¶ 99. AT&T alleges that Verizon models 18.6% aerial structure; 21.08% buried structure; and 60.3% underground structure but supplies no citation to the record for these percentages. Nevertheless, Verizon has not disputed these numbers.
[212] *Exhibit 201TC* at 49.
[213] *Id.*
[214] *Verizon initial brief* at 83.
[215] *32nd Supplemental Order*, Docket No. UT-033013, ¶ 358.

277 AT&T complains that Verizon's plant mix inputs are based on Verizon's existing network plant mix and thus, are not TELRIC compliant. AT&T also faults Verizon for including more expensive underground conduit than necessary, contradicting its own engineering guidelines. AT&T asserts that Verizon ignores the fact that when a developer wants underground conduit, Verizon requires the developer to pay for it.

278 AT&T claims that the HM 5.3 model assumes a plant mix that varies by density zone. The overall distribution mix is 43.3% aerial, 55.7% buried, and 1% underground. The feeder mix is 29% aerial, 27% buried, and 44% underground. But in the three highest density zones, HM 5.3 assumes 5-35% underground distribution cable and 80-100% underground feeder cable. HM 5.3 develops its plant-mix inputs based on Automated Reporting Management Information System (ARMIS) data that Verizon reports to the FCC. HM 5.3 then adjusts that data by means of an optimization routine that shifts cable between aerial and buried depending on local terrain conditions.

279 Verizon contends that by assuming only 1% underground plant, HM 5.3 exacerbates the problem created by HM 5.3's modeling of large distribution areas and further drives down network costs in the model. Verizon asserts that where HM 5.3 shows wirecenters with no underground plant, Verizon's records show that existing underground cables are 15-30% of the structure. Verizon argues that AT&T ignores the fact that underground cable is often preferable in spite of the cost. Verizon points out that HM 5.3 on occasion does not assume buried or underground cable even when it models 2,700 to 3,000-pair cable.

280 Verizon's second major complaint about HM 5.3's plant-mix assumptions is that the ARMIS data AT&T relies on is an aggregation of all cable in the existing network by construction type. Verizon claims that the data reported do not differentiate between feeder and distribution and that there is no geographic correlation between the data and HM 5.3's density zones. As a result, Verizon argues that AT&T merely guesses about how to disaggregate the data to assign plant by density zone or to feeder and distribution. Verizon further argues that AT&T also improperly discards ARMIS data related to underground plant increases in the last eleven years.

281 AT&T counters that underground plant is simply not used outside dense urban areas and that HM 5.3 does not place 2,700-pair or larger cable aerially on poles. Although HM 5.3 may classify cable as aerial, such cable may actually be "laterals, block or riser cable" that include larger cable sizes.

282 Commission Staff takes a different approach to plant mix than either Verizon or AT&T. Staff relies on inputs from the Universal Service Cost Order in UT-980311(a), pointing out that these were actual Verizon[216] values at the time.

283 ***Discussion and decision.*** The Commission has concluded in prior orders that a pure "cost minimization" approach to plant-mix assumptions is not adequate for setting UNE rates. In the Universal Service docket, the Commission stated:

> While the Commission takes cognizance of the cost minimization arguments advanced by AT&T and MCI...we are persuaded by US West's reasoning...[that the] type of facility placed by a company is a factor of engineering economic planning which is frequently tempered by the realities of local zoning ordinances, localized weather conditions, and the like. This being the case, a reliance on purely cost minimization considerations in modeling a network would likely result in a plant facility mix that would not reflect the actual type of plant facility that would have to be placed.[217]

284 The Commission also stated:

> The Commission concludes that the models should be populated with a facility mix that reflects the companies' placement decisions in the state of Washington, rather than with national default values. Use of the HAI 5.0a cost minimization option is not appropriate.[218]

---

[216] Verizon was known at the time as GTE Northwest, Inc.

[217] *UT-980311(a), 10th Supplemental Order*, ¶ 101.

[218] *Id.*, ¶ 106; *see also UT-030013, 32nd Supplemental Order*, ¶358.

285 We conclude that this reasoning remains valid for this proceeding. However, our review of the amount of underground plant produced by Verizon's model demonstrates that its placement of underground structure exceeds significantly its actual underground plant in Washington.[219] For this reason, we reject Verizon's plant mix assumptions and adjust Verizon's model to better reflect its actual placement of underground facilities. We do this by changing the restriction in Verizon's model that requires placement of underground facilities when a certain amount of aerial or buried plant is exceeded.

286 We also reject AT&T's plant-mix modeling, because it is based primarily on the cost-minimization principles that we rejected in our prior orders and does not adequately balance the engineering and social constraints Verizon would face if it were actually to build a new network in Washington. It is not possible to adopt Verizon's adjusted granular plant-mix data for use in HM 5.3 because the two models are not compatible in this regard. However, Staff's proposed inputs are generally consistent with the company's inputs and with the state specific inputs adopted by the Commission in UT-980311(a). Verizon did not dispute Staff's proposal. We adopt Staff's plant-mix assumptions for use in HM 5.3 in place of AT&T's proposed assumptions.

2. Structure sharing

a. Overview

287 Structure sharing is shorthand for inputs that account for how much of the cost of outside plant Verizon shares (or should share) with other utilities, or with other parts of its own network. For example, Verizon may share its poles with telephone or cable companies, and can recover part of the cost of the poles by charging them a pole attachment fee. Or, Verizon may place a distribution and feeder cable along the same route. In these instances, the costs for placing poles or conduit, or digging trenches, would be shared by the distribution and feeder cables. The following

---

[219] *See Ex. 201TC* at 49-50; *TR 1281-1283; Ex. 226T, Attachment B,* at 15-16; *see also Ex. 951T* at 13; *Ex. 856* at 31.

kinds of sharing are possible: aerial sharing (poles and other aerial structure), buried, underground (cables placed in conduit), feeder/distribution, and loop/interoffice facility (IOF). The table below provides a summary of the sharing assumptions recommended by the parties.

TABLE 4

Structure Sharing Proposals

	Verizon (Structure Assigned to Other Firms)	**AT&T (Structure Assigned to Other Firms)**	**Staff**
Aerial	Actual percent of foreign and shared poles	50-75%	Sharing inputs from 8th Supp Order in Docket No. UT-960369
Buried	0%	Distribution: 66% Feeder: 60%	8th Supp
Underground	9.22%[220]	Distribution: 66% Feeder: 50-66%	8th Supp
Feeder/Distribution	Actual	55%	8th Supp
Loop/IOF	50% (VZ shares fiber network structures among all segments of network)	IOF fiber cable (24 fibers) shared between feeder and IOF - 75%	8th Supp

288 This table illustrates the divergence among the parties on the issue of structure sharing. Generally speaking, Verizon proposes sharing percentages that reflect its claimed experience of sharing, which is represented as being relatively low. Verizon claims that it already is subject to competitive pressure, and this pressure has not allowed it to overcome the hurdles to substantial sharing. According to Verizon, the fully competitive market posited by TELRIC would not likely lessen the barriers to increased sharing because a competitive market "does not necessarily mean . . . competition for every line," since "[c]ompetitors rationally stay out of certain markets."[221] Verizon also argues that it is hard to envision situations where the

[220] *See Verizon initial brief* at 87, n. 429. Verizon claims it erroneously used a 9.22% underground sharing input in its cost studies, rather than the 1% based on its actual records.
[221] *TR 511:19-22.*

marketing division of a new entrant would regularly provide its competitor with clues as to where it might design and locate its plant.[222] For example, Verizon claims that extensive competition in the Alaska market has not led to greater sharing.[223]

289 AT&T recommends that the Commission look at what would exist in a competitive market rather than at Verizon's claimed "actual" sharing because in the past, Verizon and other regulated monopolists had little incentive to participate in structure-sharing arrangements, since such sharing would have reduced the underlying rate base upon which their rates of return were computed. AT&T argues that in a forward-looking environment, an efficient new competitor would actively seek to reduce its outside plant costs by spreading those costs across users and other utilities. According to AT&T, Verizon admits that this is the case, and in Verizon's most recent proposed plant engineering guidelines, joint trenching must be used wherever appropriate, making "every effort . . . to coordinate with other utility companies to accomplish this."[224]

290 Staff recommends that the Commission adopt structure-sharing values based on an amount of sharing that reasonably could be expected to occur in the modeled forward-looking network, rather than on either actual or purely hypothetical values. Staff believes that the structure-sharing values that could be expected in a forward-looking network are those that the Commission adopted in UT-960369.[225] Staff claims that in a competitive market, facilities-based competitors would require the use of common structure (*i.e.*, conduits, poles, trenches) for their facilities, which Staff did not fully contemplate in its testimony in Docket UT-960369. Staff claims its recommended sharing levels in this proceeding are therefore conservative.

291 Verizon claims that there is no basis for Staff's view that input assumptions were established for all future proceedings in the 8th Supplemental Order, particularly with respect to structure sharing. Verizon contends that in that order the Commission was addressing a record in which its predecessor company, GTE, had

---

[222] *TR 1418:14-15.*
[223] *TR 511:2-512:20.*
[224] *See Ex. 265* at 16, ¶3.5.2.

not provided the kind of actual and reliable evidence that Verizon has produced in this proceeding to support the sharing percentages it has proposed. Verizon further argues that the sharing inputs the Commission essentially adopted by default in the 8th Supplemental Order were derived from recommendations Staff now concedes were not based on empirical data or studies of any kind. Verizon also asserts that AT&T's sharing assumptions bear no resemblance to the real-world and thus should be rejected.

292 In light of these arguments, we address the parties' specific sharing proposals.

b. Aerial Sharing

293 Verizon asserts that its model relies on the percentages of foreign and shared poles in its existing network, because these data reflect its experience of the actual extent of pole-sharing opportunities with other utilities in the areas that Verizon serves. Verizon claims its real-world data is far more reliable than the opinions of AT&T's engineering witness, which are not Washington-specific.

294 Verizon contends that AT&T's suggestion, through sharing, Verizon will be able to recoup at least 50%[226] of the cost of the poles in its network, and in some areas up to 75% of those costs, is unreasonable because the instances in which two or more other companies are located on the poles is quite rare. Verizon argues that even when cable companies or CLECs are on Verizon's poles, the costs of the poles are not borne equally by the parties, but rather are borne almost exclusively by Verizon, given the very low pole attachment rates of $3.60 per year.

295 AT&T claims that Verizon has no one to blame but itself if its pole attachment rates are not cost-based and do not represent a proportional share of Verizon's structure costs. According to AT&T, the FCC formula for setting those rates allocates the total cost of the pole among the users of the pole according to their share of the usable

---

[225] *UT-960369, 8th Supplemental Order,* ¶ 76; *see also UT-98-311(a), 10th Supplemental Order,* ¶ 108.
[226] A sharing assumption of 50% signifies two parties share a pole; 75% sharing assumes four parties share the pole.

space. AT&T maintains that if Verizon were using that formula to set its attachment rates Verizon would be recovering other users' proportional share of Verizon's structure costs.

c. Buried Sharing

296 Verizon asserts that its experience has been that opportunities to share its trenching costs with third parties in Washington are uncommon. As a result, Verizon claims that VzLoop does not assume any sharing of buried placement costs.[227]

297 Verizon claims that despite the incentives for Verizon to share buried facilities, in practice such coordination is and will continue to be extraordinarily difficult, and often impossible. Verizon contends that AT&T itself recognized that for these reasons, its own opportunities for co-trenching are "slim" since "most [companies] extend fiber when customers order it."[228]

d. Feeder-Distribution Sharing

298 Verizon claims that in VzCost all cables which share a structure are assigned structure costs, whether copper or fiber, distribution or feeder, on a route-by-route basis. Thus, where copper feeder and copper distribution are in the same sheath, the structure investment for that sheath is assigned to feeder and distribution elements in proportion to the capacity requirements of each.[229]

299 According to Verizon, AT&T bases its feeder-distribution sharing percentage of 55% not on any empirical evidence, but on its characterization of data in a Kansas study that was never made a part of the record in this proceeding.[230] AT&T's unsupported assertion is contrary to empirical data gathered by Verizon about the actual extent of feeder-distribution sharing in its Washington network, which no party has challenged. Verizon provided a sample of 251 cable sections involving 28 different

---

[227] *Ex. 201C* at 53.
[228] *Ex. No. 551TC* at 85:20-21.
[229] *See Ex. No. 226T, Attachment B* at 16.

wirecenters, taken from a wide variety of density zones. Verizon asserts that this sample showed that only 8.37% consisted of both feeder and distribution. Of the 147 sections containing feeder cable, only 14.29% included distribution cable as well. Since VzLoop takes feeder-distribution sharing into account on a segment-by-segment basis, Verizon claims that it captures the information involved in such real-world data. Verizon argues that there is no basis for relying on AT&T's unsupported speculation rather than on Verizon's actual (and expected) feeder-distribution sharing.

e. Loop-IOF Sharing

300 Verizon asserts that the Local Competition Order permits reasonable allocations of sharing between loop and IOF. Verizon asserts that its model reflects such sharing by placing 12 fibers for each DLC modeled in the local loop network, and then assigning only one-half of the total fiber investment (including the corresponding support structure) to the local loop network. The IOF fiber-facility costs, including the supporting structure, are based on a per-fiber, per-foot cost of the entire fiber network modeled by VzLoop. In this way, VzCost allegedly captures the economies of providing local loops, IOF transport, and high-capacity loops using shared facilities.

301 Verizon claims that HM 5.3 develops costs for the IOF network in a vacuum, disregarding completely the design of the loop network and using the overly-simplistic assumption that every IOF fiber cable contains 24 fibers, and that feeder and IOF facilities will share structure 75% of the time.

f. Impact of structure sharing in a competitive market

302 We asked the parties to address whether, if full facilities-based competition were assumed, structure-sharing would require an adjustment to the level of demand, as measured by telephone line counts.

---

[230] *Ex. No. 951T* 24:15-25:2; *Ex. 451T* at 32:8-10 & n. 46.

303 Verizon opposes an adjustment, on the basis that wireless competitors would not need to use its network and wireline competitors would not want to share the information necessary to make use of Verizon's network.

304 AT&T asserts that TELRIC does not permit spreading the cost of current demand over fewer lines to account for lines that might be lost to competition. AT&T maintains that neither TELRIC nor HM 5.3 assume that structure will be shared with competitors because the purpose of TELRIC is to attempt to estimate the costs of a monopolist, assuming that it behaves as though it is in a competitive market.

305 Staff claims that if the Commission makes changes to the structure-sharing levels based on the assumption that more sharing could be expected in a fully competitive market, then some adjustment to line counts may be warranted. Staff maintains that the Commission made such an adjustment in UT-960369. Staff did not propose a specific adjustment in this case but contends such an adjustment would be negligible because the losses would be to intermodal competitors and Verizon has, to date, experienced minimal line losses overall.

306 ***Discussion and decision.*** We reject Verizon's proposal to base aerial structure sharing on what actually occurs currently in its network. This approach is inconsistent with TELRIC assumptions such as basing capital costs on what Verizon would pay if it were faced with full facilities-based competition. Overall, we find that Staff's proposal—to incorporate structure-sharing inputs from the first cost order—is reasonable, consistent with our cost of capital findings in this order, and finds the middle ground between Verizon's current experience and the maximum achievable rate of sharing in a fully competitive market. We note that in the FCC's USF Inputs Order, the FCC cited our prior orders in establishing its own similar structure sharing inputs.[231] We find that the magnitude of sharing that results from Verizon's current pole attachment fee does not affect our decision here, because we are estimating costs for a forward-looking, competitive environment where all LECs and firms that need poles are on an equal footing, as opposed to the current

---

[231] *USF Inputs Order*, ¶¶ 246-249, fn. 510, 511.

environment where cable television firms arguably do not pay an equal share for attaching to poles.

307 The chart below shows the structure-sharing percentages adopted in both the FCC's USF Inputs Order and in our 8th Supplemental Order:[232]

TABLE 5

Structure-Sharing Comparison

Density	Underground (8th Supp)	Underground (FCC)	Buried (8th Supp)	Buried(FCC)	Aerial(8th Supp)	Aerial(FCC)
0	87.50%	100.00%	87.50%	100.00%	62.50%	50.00%
5	87.50%	100.00%	87.50%	100.00%	62.50%	50.00%
100	87.50%	85.00%	87.50%	85.00%	62.50%	50.00%
200	62.50%	65.00%	67.50%	65.00%	50.00%	50.00%
650	62.50%	65.00%	67.50%	65.00%	50.00%	50.00%
850	62.50%	65.00%	67.50%	65.00%	50.00%	50.00%
2550	62.50%	55.00%	55.00%	55.00%	35.00%	35.00%
5000	62.50%	55.00%	55.00%	55.00%	35.00%	35.00%
10000	62.50%	55.00%	55.00%	55.00%	35.00%	35.00%

308 As shown, the FCC and the 8th Supplemental Order structure-sharing inputs are quite similar. We see no compelling reason to replace the sharing assumptions previously approved in the 8th Supplemental Order, with the exception of the percentage of buried and underground structure. We are persuaded that there are few if any opportunities to share these structures in the two lowest density zones and adopt the FCC percentages for buried and underground structure in those zones. We adopt these rates for HM 5.3. However, the Verizon cost model does not permit variation in sharing percentages by density zone. VzCost was designed to have one sharing percentage for each type of structure regardless of the density. We consider this a major shortcoming of the model, because it leads to an overstatement

[232] *USF Inputs Order, Appendix A, Part 1, Sharing; UT-980311(a), Appendix D* at 7 *citing to UT-960369* at ¶ 76.

of sharing in rural areas and to an understatement of sharing in urban areas. This flaw in the Verizon model causes us to reduce the weight we give it.[233]

309 With regard to Feeder-Distribution sharing, neither Staff nor AT&T challenged Verizon's proposed Feeder-Distribution sharing assumption. We believe that Verizon has properly accounted for this type of sharing in its model, and we approve Verizon's proposal.

310 With regard to Loop-IOF sharing, we note that Verizon assigns 50% of the total fiber investment (including sheath, poles, conduit, and placement) to the local loop network and the remaining 50% to interoffice facilities.[234] We find this a reasonable assumption for sharing this type of structure.

311 We reject AT&T's Loop-IOF sharing assumption of 75%. Although AT&T suggests that Verizon's engineering guidelines support[235] the premise that IOF facilities share structure with loops, this suggestion is insufficient to support the magnitude of sharing proposed by AT&T. We find Verizon's 50% sharing assumption also reasonable for use as an input in HM 5.3.

312 On the issue whether a line reduction is appropriate under the assumption of structure sharing in a fully competitive market, we are convinced that it would be reasonable to implement some reduction in demand for Verizon. We disagree with AT&T's argument that TELRIC does not permit us to spread the cost of current demand over fewer lines. Nothing in 47 C.F.R. 51.505(b) or the Local Competition Order specifically prohibits such an adjustment. The FCC has instructed us to

---

[233] In Appendix A, we describe how we modify the Verizon inputs for buried and underground structure to partially reflect the sharing values that we feel are appropriate for a TELRIC model. Due to the cumbersome design of the Verizon model, we are able to use only one sharing value for each type of structure. Moreover, we are unable to vary the structure sharing density without incurring substantial processing time costs. For aerial structure, due to the interrelationship between pole ownership and the annual charge factor for poles, we have decided not to modify the Verizon inputs. We recognize that this results in an overstatement of costs due to our inability to modify the VzCost sharing inputs.

[234] *Ex. 201TC* at 56; *see also Verizon Initial Brief* at 90.

[235] *Ex. 956TC* at 18.

assume that there is widespread facilities-based competition when deriving Verizon's cost of capital.[236] Therefore, it follows that we should assume that these hypothetical rivals will serve a portion of the market currently served by the incumbent. We are persuaded that a 5% line-count reduction would reflect a forward-looking, fully competitive market. However, implementing this reduction in VzCost proved too difficult to accomplish. Therefore, we have only implemented the change in HM 5.3. The 5% line reduction increases the HM 5.3 loop price by 3.1 %.[237] We have adjusted the VzCost loop cost estimate upward by the same percentage.

3. Placement costs

313 Placement costs are those incurred to pay contractors for their work in placing poles and cables, digging or boring trenches and laying conduit. The primary placement cost issues are: 1) whether contract prices for this work should be bid out based on a "large-construction-work/complete network rebuild" assumption; 2) what percentage of hand-digging and boring should be assumed in constructing the modeled network; and 3) whether Verizon's added 30% engineering factor is reasonable.

a. Contract prices

314 Verizon claims its placement inputs are based on the actual single-source contract prices that its pays for the tasks required to construct a network, such as placing poles, digging trenches, or laying conduit. These contracts allegedly cover a wide range of construction tasks and are available for any type of work necessary. While there are some construction tasks that might fall outside the scope of these contracts, and therefore be bid to other contractors, Verizon maintains there is no evidence on the record that the costs of such work would generally be cheaper than the contracts used in Verizon's cost study, which were competitively bid by Verizon.

---

[236] *TRO* ¶681.

[237] *See Appendix A.*

315 According to AT&T, HM 5.3 assumes that buried cable will be placed as if it were part of a large scale project while Verizon, in contrast, bases its placement assumptions largely on how cable would be placed in small-scale repair and augmentation procedures.[238] AT&T argues that Verizon's assumption is directly contrary to TELRIC methodology and Verizon's placement costs must therefore be rejected. AT&T maintains that the FCC determined in the USF Inputs Order that it is not appropriate to use the costs of small projects or maintenance-type projects in developing placement costs. AT&T claims that the FCC determined that large-scale growth projects were those whose costs were at least $50,000 and that these were the types of projects to use as a benchmark for placement costs. AT&T claims that single-source contracts for the state of Washington are not typically used for large projects and that Verizon's latest proposed engineering guidelines specifically recommend that large-scale new construction should be put out to bid to reduce the average cost.[239]

316 Verizon claims that AT&T's placement tasks and cost estimates are based almost entirely on sheer speculation, national averages, or the kind of undocumented experience that this Commission has consistently found unacceptable. Verizon contends that HM 5.3's contractor surveys were conducted some years ago with unspecified contractors; have already been rejected by this Commission and the FCC; and have not even been updated. Verizon also contends that AT&T provides no record support for the claim that Verizon's single-source contracts are not typically used for the large projects AT&T describes. Verizon maintains that its single-source contracts are the result of a competitive bidding process.

317 AT&T maintains that it validated its input values and assumptions, including placement costs, by comparing them to the values and assumptions the FCC developed in the USF Inputs Order and that were included in a Verizon filing in Massachusetts. AT&T claims that in most cases, the costs included in HM 5.3 are comparable to, or higher than, the costs that the FCC adopted or that Verizon proposed. AT&T argues that the only validation that Verizon offered for its

---

[238] Verizon, unlike AT&T, varies the placement cost depending on the length between terminals.
[239] *TR 1276-1277.*

proposed inputs and assumptions was a comparison with its embedded network costs and practices, which are virtually identical to its proposed UNE costs.

318 In turn, Verizon responds that AT&T's speculative claims about crew size and rates of work strain credulity and are flatly at odds with real-world requirements. For example, with respect to copper-cable labor costs, Verizon claims that HM 5.3 labor cost reductions (from early HAI model cable inputs recommended by its engineering advisors) range from 90.7% (for a 400-pair cable) to 97.1% (for a 4,200-pair cable).[240] Verizon contends that such large decreases in labor costs are simply implausible. Verizon maintains that accepting HM 5.3's cable labor inputs suggests that approximately 260 Verizon employees could engineer, splice, and place on poles and in buried or underground facilities all the cable necessary to serve Verizon's customers throughout the state of Washington in one year.[241]

319 ***Discussion and decision.*** We find that Verizon's proposed placement costs are unreasonable because the data Verizon relies on does not reflect the TELRIC stricture to assume rebuilding the entire network. Verizon's single-source contracts ignore the possibilities for economies of scope and scale that would be available in larger construction contracts.

320 Alternatively, AT&T's inputs and assumptions for placement costs are too low, particularly with respect to labor. Most of AT&T's labor cost and placement assumptions are based on estimates provided by Mr. Fassett, despite our prior direction to the parties that we prefer using data that can be validated.[242] Moreover, AT&T failed to justify the significant placement-cost reductions assumed by HM 5.3 as compared to earlier versions of the model.

---

[240] *Ex. No. 501T* at 62: Table 8.

[241] *Ex. No. 501T* at 62:13-63:2.

[242] *UT-003013, 32nd Supplemental Order*, ¶ 124; *42nd Supplemental Order*, ¶¶ 46-70. In UT-003013, the Commission required both Qwest and Verizon to carry out time-and-motion studies to support the work time estimates they used to support non-recurring costs, because the Commission found the SME opinions the parties previously relied on to be biased and unreliable.

321 In light of the flaws in each parties' placement cost proposals, we find the most reasonable approach is to adopt the inputs from the USF Inputs Order for both models.[243] We adjust the HM 5.3 model using the USF Inputs placement data. However, VzCost lacks the flexibility to use density zone specific data. We conclude that some adjustment to Verizon's placement costs is warranted because the contract data on which the costs are based does not adequately reflect TELRIC economies of scale. We therefore reduce Verizon's placements costs by 5%.
Moreover, our inability to use the USF Inputs to adjust the Verizon model is an additional factor that causes us to accord its reduced weight.

b. Hand-digging and boring

322 The hand-digging and boring[244] inputs at issue here are related to the trenching activities associated with buried cable placement. Verizon relies on its actual hand-digging and boring percentages in Washington for the three years prior to the time the model was finalized to estimate placement costs.

323 AT&T faults this approach. AT&T claims that the FCC requires that placement costs be based on the cost today to install cable as if building a local network using current technology, rather than on performing small-scale or maintenance placement projects.[245] AT&T argues that this assumption precludes significant use of hand-digging or boring, unless it can be associated with the degree of those activities performed during the original construction of Verizon's network. AT&T further argues that in UT-960369, US WEST made assumptions similar to Verizon's in this case—that 21% of all outside plant (50% of buried plant) would be placed using expensive boring techniques. AT&T claims that the Commission rejected this approach and found, instead, that five percent of buried cable installations in

---

[243] *USF Inputs Order, Appendix A, Input Values.* We have used the Turner Price Index to trend the capital costs forward.
[244] Boring involves drilling or tunneling a hole through the earth to go under pavement or other obstructions. Boring is relatively expensive but is used to minimize damage to streets, sidewalks, and landscaping.
[245] *USF Inputs Order,* ¶¶ 109, 118.

developed areas would require boring.[246] AT&T further contends that new plant is typically placed in trenches by developers. According to AT&T, Verizon's Washington tariff requires developers to pay for trenching in new development.

324 AT&T maintains that the Commission's determination in UT-960369 is in line with inputs used by HM 5.3 in this case. The HM 5.3 inputs assume higher placement costs in high density areas; include the need to go around obstacles in all density zones; and assume that, because there will be some obstacles in all density zones, pushing pipe, a form of boring, will be required 2% of the time even in the least dense areas.[247] AT&T claims that in the highest density areas, HM 5.3 assumes that hand trenching, boring, and pushing pipe will be required 21% of the time.

325 Verizon dismisses AT&T's argument that the Commission should reject Verizon's inputs for boring percentages because these inputs are similar to those of U S WEST rejected in UT-960369. Verizon counters that the Commission rejected U S WEST's proposals not because they were unreasonable, but because they were based on extrapolations from data outside of Washington.[248]

326 Verizon also contends that developers pay for only a small portion of buried structure and that, contrary to AT&T's assertions, in a TELRIC network rebuild, developer-provided trenching would not be an issue.[249]

327 ***Discussion and decision.*** We find Verizon's hand-digging and boring inputs to be reasonable. The mix of hand-digging and boring in a given project, whether large or small, would likely be similar because Verizon would still have to maneuver around obstacles, both man-made and natural, no matter what the size of the project. For this reason, Verizon's recent history of placement costs related to hand-digging and boring is the best indicator of what the company would experience in a forward-looking network.

---

[246] *UT-960369, 8th Supplemental Order*, ¶ 45.
[247] *See Ex. 856* at 156.
[248] *8th Supplemental Order* ¶¶ 45-46, 52-53, and 55.

328 Our chief concern about Verizon's hand-digging and boring modeling is that VzCost does not allow us to vary the percentages attributable to hand-digging and boring by density zone. Also, we acknowledge that in the 8th Supplemental Order,[250] the Commission determined that 5% of the buried cable installations in developed areas require boring. However, that determination was based on the evidence presented in that proceeding. It is more reasonable to base our determinations of hand-digging and boring based on the evidence presented by Verizon in this case because Verizon's recent experience of these activities is more indicative of Verizon's forward-looking network. However, as we found with regard to aerial and buried sharing and contract prices, the failure of the Verizon model to permit adjustment to inputs based on density zone causes us to accord the model less weight.

329 We also note that Verizon testified that some portion of its distribution trench is provided at no cost by developers. Verizon's witness stated that a cost reduction due to developer-provided trenching would only reflect developer-provided trenches at the very end of the distribution network. He testified that since the reduction would be applied to all buried trench, the adjustment would have to be a very small percentage.[251] Based on this testimony, we believe it is reasonable for Verizon's model to assume that 0.5% of the distribution distance in its modeled network is placed in another party's trench at no cost to Verizon.

c. Thirty percent engineering factor

330 Verizon adds to its placement costs a 30% engineering factor. AT&T contends that Verizon provided no evidentiary support for this factor. Verizon responds that AT&T cross-examined Verizon's panel on the cost study that was provided to AT&T in discovery, but AT&T declined to offer the study in evidence.

331 AT&T's engineering costs are based on the specific engineering tasks required for specific installations, rather than on a blanket single cost factor. AT&T contends that

---

[249] *Verizon reply brief* at 44, n. 153.
[250] *UT-960369*, ¶ 55.
[251] *TR 1289-1290.*

Verizon's own documents call for a much lower total installed factor[252] and that the FCC Inputs Order found 10% an appropriate factor.[253]

332 ***Discussion and decision.*** Neither Verizon nor AT&T provided convincing evidence in support of their proposed engineering factors. On the one hand, AT&T's provides no record evidence to support its contention that Verizon's own documents support a lower factor. On the other hand, Verizon's witness was unable to explain the origin of the 30% factor. In addition, AT&T's proposal is based on multiple assumptions supported by SME opinion, which we have accorded little weight or rejected in the past.

333 We are persuaded that a flat 10% factor is appropriate for the HM 5.3 model. This is the level that was approved in the FCC USF Inputs Order as a fair representation of provider engineering costs.[254] Because we are using the FCC's placement and material costs, it follows that in order to reflect the proper level of engineering costs, adoption of the FCC's 10% engineering factor for use in HM 5.3 is appropriate.

334 However, we cannot readily apply the 10% factor to Verizon's numbers. Verizon's 30% engineering factor is applied to its placement costs. Multiplying Verizon's placement costs alone by the 10% factor would result in an understatement of engineering costs. Nevertheless because similar results are obtained by using either model's approach,[255] we accept Verizon's 30% engineering loading factor.

---

[252] *AT&T initial brief*, ¶ 120.
[253] *USF Inputs Order*, ¶ 225.
[254] *Id.*
[255] The two approaches can result in similar cost estimates. Consider, for example, the cost of installing a 200-pair aerial cable. The FCC, in the USF Inputs Order, determined that the material and installation cost was $3.12, while the placement cost was just $1.31. The 10% loading factor suggests that the installation cost is approximately $0.30 ($1.31 – 1.3/1.3), a value similar to the $0.28 value derived from the 30% loading factor ($3.12 – 3.12/1.3). We have used a 200-pair aerial cable in this example because it corresponds to the average size aerial distribution cable used in VzCost. VzCost uses larger aerial feeder cables and therefore would include a higher installation cost than the $0.30 value derived here.

4. Material costs

335 Material costs encompass both the cost of physical plant (for the most part, cable) purchased from suppliers. Verizon claims that all of its proposed material inputs reflect prices that it has actually been able to negotiate with its vendors. The majority of such prices come from vendor contracts in effect at the time the filing was made. Where Verizon did not have a current contract price, it allegedly relied on recent invoices.

336 AT&T's material prices were derived from a Florida commission order.[256] AT&T claims that most of the material costs used by HM 5.3 and VzLoop are not strikingly different, and, in many cases, the materials cost used by HM 5.3 exceed those assumed by Verizon. However, AT&T claims that Verizon has proposed excessively high copper cable costs, driven in large part by its decision to use 24-gauge cable ubiquitously throughout its modeled network rather than using 26-gauge cable where appropriate.

337 Verizon disputes AT&T's claim that material costs in HM 5.3 are roughly the same or higher than those used by Verizon. Verizon claims to have shown that there are large differences between Verizon's prices (provided to AT&T in response to data requests in this case) and those AT&T decided to use instead. For example, Verizon contends that AT&T continues to use a significantly lower Class 4, 40-foot pole price, with no justification for doing so.[257]

338 AT&T maintains that Verizon neglects to mention that once the labor costs to install the pole are included, the resulting total pole investments are virtually identical.[258]

339 According to Verizon, because AT&T claims that some of the material prices used in HM 5.3 exceed those assumed by Verizon, AT&T should have no objection to using

---

[256] *Florida Public Service Commission, Order No. PSC-99-0068 FOF* at. 149-155; *see also Ex. 228TC* at 54, fn. 87; *Ex 889 (AT&T Response to Verizon DR No. 7-21).*

[257] *Eh. No. 401TC 3:14-23; see also Ex. 201TC, CD No. 2.* AT&T uses an older HAI default. *Ex. No. 856* at 25.

[258] *Ex. 956TC* at 22.

actual Verizon material prices rather than the purely hypothetical ones relied upon in HM 5.3. Verizon contends that AT&T should not be permitted to select Verizon's material prices for only those items where Verizon's actual prices are lower than those used in HM 5.3.

340 Verizon claims that its proposal is more consistent with the Commission's prior orders that have directed parties to root their inputs in objective data wherever possible. Verizon asserts that it has done so by using extensive real-world data as a basis for its material and placement costs. Verizon maintains that AT&T has continued to rely heavily on unsupported SME opinions while entirely ignoring the real-world information that Verizon has provided to AT&T and the other parties.

341 ***Discussion and decision.*** With regard to material costs, we note that AT&T did not challenge the cost data extracted from the Verizon contracts as an input to VzCost,[259] but rather, relied on data published in a Florida Public Service Commission decision. AT&T could as easily have relied on numbers from the FCC's USF Inputs Order, since it relied on that order for other inputs in this proceeding. The record before us is devoid of information about how the Florida numbers were derived. However, we do know that the FCC's USF inputs were derived from actual contracts.[260] We are persuaded that USF Inputs Order material cost data would still return reasonable results, provided they are converted to current dollars. For this conversion, we rely on the Turner Price Index.[261] We adjust the AT&T model accordingly.

342 However, we cannot similarly employ the USF Inputs Order material cost data in the Verizon cost model. VzCost is constructed in such a way as to preclude this type of adjustment.[262] Accordingly, we reduce the weight given to the Verizon model based on the inability to adjust material and placement cost inputs.

---

[259] *Ex.228TC* at 53-55; *see also Ex. 201TC* at 30.
[260] *USF Inputs Order* at ¶ 113.
[261] The Turner Price Index provides an index for the annual change in the cost of digital switching.
[262] If we had been able to modify the VzCost placement inputs it would have been appropriate to use the same alternative data source, the USF Inputs Order, for material costs.

343 With regard to pole costs, Verizon maintains that HM 5.3 estimates lower costs for a pole than Verizon pays. However, AT&T's witness Fassett contends that once the labor costs to install a pole are included, the resulting total pole investments for both models are virtually identical.[263] Our review of AT&T's pole-cost modeling finds that HM 5.3 models $201 in material and $216 in labor for a class 5 pole.[264] This is similar to Verizon's modeled average cost of $400 for poles. We find both models' pole cost assumptions to be reasonable because both reflect what Verizon actually pays for poles.

344 With regard to installation costs, our primary concern with AT&T is its reliance on SME inputs. As noted in our discussion of contract prices and the proposed 30% engineering factor, we have rejected such inputs in the past because they are inaccessible to cross-examination and verification. The bench's cross-examination of AT&T witness Fassett suggests that his labor inputs are biased downward and result in unreasonably low costs. For example, based on his assumptions, Mr. Fassett claims that 12-strand aerial fiber optic cable can be engineered, furnished, and installed for approximately 76 cents per foot. However, the comparable input value adopted by the FCC in the USF Inputs Order, which was based on actual local exchange carrier contracts, suggests that this cost should be approximately $1.50.[265] AT&T has not provided verifiable data to support this difference amounting to a 50% reduction in costs since the evidence used in the USF Inputs Order.[266]

345 Finally, we address later in this order the parties' dispute about the proper gauge of copper cable to assume for network design.[267]

---

[263] *Ex. 956 TC* at 22.
[264] *Ex. 951T* at 29.
[265] *TR 1584-1585.*
[266] While Mr. Fassett did not explain the source of the large difference, we believe that some of the difference is attributable to explicit loading in HM 5.3 for such activities as fiber Operator Service Provider (OSP) engineering cable productivity (ft/day) and splicing. The activities that are explicitly modeled in HM 5.3 are already included in the FCC values.
[267] *See* Part VIII. Model Inputs, Section 7.d. Gauge of copper cable.

5. Fill Factors

a. Background

346 Three terms are often used when discussing the quantity of components necessary to model a telephone network: breakage, sizing factors, and fill factors.

347 Breakage describes the excess capacity assumed by a cost model because network components are only available in discreet sizes. For example, because copper cables are not available in 550-pair increments a model will assume, at a minimum, the next larger size cable is used. Because cable is available in 50, 100, 200, 300, 400, 600 and 900-pair sizes, the next highest cable size would be 600-pair. The 50 remaining pairs that are unused are the result of breakage.

348 However, the decision to choose cable sizes is more complicated than merely picking the smallest cable large enough to serve a given level of demand. The 600-pair cable chosen above has only 50 spare pairs, so it is unlikely to accommodate short-term growth (even in the face of possible demand reductions due to competition) and the administrative needs of the network. For this reason, cables sizes are chosen by applying a sizing factor to the current demand. The sizing factor inflates demand estimates, and thus inflates cable sizes, to accommodate short-term growth and administrative needs. Applying the sizing factor proposed by Verizon, 1.2, a cable with at least 660 pairs [550 * 1.2 = 660] would be required. Again, since 660-pair cables are not available the model will shift upward to a 900-pair cable.

349 The final term, fill factor, can be used to describe a model's output, or it can be used as an input that takes the place of a sizing factor. In the example above, the actual or "achieved" fill (output) assumed by the model is 61% (550 / 900 = 0.6111). That is, 550 pairs, or 61% of the 900-pair cable are actually in service. Because of breakage, the actual fill the model returns can be different for each cable segment or component modeled even when using the same sizing factor. For example, if demand on another segment of feeder cable is 490 POTS pairs, the model will

assume the same 600-pair cable [490 * 1.2 = 588] but the achieved fill will be 82% [490 / 600 = 0.82].

350 Fill factors can also be used as inputs in a model. When used as an input, a fill factor or "targeted" fill ensures a minimum percentage of excess capacity. For example, if a model assumes a "targeted" fill factor of 75%, then a maximum of 75% of a facility can be used and a minimum of 25% is spare capacity. Fill factors, when employed as inputs, result in usage ceilings and spare capacity floors because of breakage.

351 The use of sizing factors, rather than fill factors, is arguably more representative of how outside plant engineers actually design a network. Fill factors may cause distortion in the number of spares available to serve the network. For example, a 25-pair cable with a "targeted" fill of 60% will have 15 pairs in service and only 10 pairs for growth and administrative needs. However, a 2,400-pair cable designed to the same "targeted" fill will have 1,440 pairs in service and 960 spare pairs. Since the administrative need for cable pairs does not grow linearly with demand, the 960 spare pairs in this cable segment is likely more than actually needed.

352 Both fill factors and sizing factors can be referred to as "utilization" factors.

353 VzLoop and HM 5.3 both use sizing factors rather than fill factors to determine how much distribution and copper feeder cable to model in a forward-looking network. Verizon argues that such a method makes sense because fill factors may vary considerably from one point in the network to another, and from one time to another. Verizon claims it is for those reasons that engineers use sizing factors to ensure that feeder and distribution cable is sized appropriately to meet customer needs and reasonably foreseeable demand.

354 AT&T contends that in designing outside plant, network engineers include a certain amount of spare capacity to accommodate functions such as testing and repair and some expected amount of growth. AT&T also asserts that for a TELRIC model, the FCC has expressly stated that the proper fill factors should be based on current

demand rather than ultimate demand.[268] AT&T claims that this Commission held in its Universal Service proceeding that fill factors must provide a level of spare capacity to meet current demand while allowing for growth, and that "[r]eliance on a company's actual fill factors...may not provide a good estimate of the economic cost production."[269]

355 AT&T claims that the sizing factors used by HM 5.3 are designed specifically to provide spare capacity for breakage, administration, and some amount of growth while Verizon's model relies on actual network fill in assuming fill factors, which produces a fill even lower than the one Verizon proposed and that was rejected by the Commission in the first cost proceeding. On this basis, AT&T recommends that the Commission adopt the utilization factors used in HM 5.3.

b. Feeder fill

i. Copper feeder

356 According to Verizon, with respect to copper feeder cable, the parties essentially are in agreement. Verizon uses a feeder cable-sizing factor of 1.2. By comparison, AT&T divides current demand by 0.80, which is the same as multiplying by 1.25. Thus, other things being equal, HM 5.3 will model slightly larger copper feeder cables than does VzLoop.

357 However, AT&T claims that the copper feeder "achieved" fill produced by Verizon's model is 51.93%, far below the levels adopted by the FCC in the USF Inputs Order[270] and by the WCB in the Virginia Arbitration Order.[271] AT&T maintains that HM 5.3, in contrast, assumes an 80% copper feeder sizing factor, resulting in a 76.5% "achieved" fill. According to AT&T, this is far below the fill level that will trigger a review by Verizon for relief under its engineering guidelines.[272]

---

[268] *USF Inputs Order*, ¶58; *Local Competition Order*, ¶682.
[269] *UT-980311(a), Tenth Supplemental Order*, ¶257.
[270] *USF Inputs Order*, ¶ 207.
[271] *Virginia Arbitration Order*, ¶¶ 257-259.
[272] *See AT&T initial brief*, ¶¶ 130-131.

358 Verizon maintains that since neither model employs fill factors, AT&T's effort to invoke prior FCC orders with respect to fill factors is off the mark. Furthermore, Verizon asserts that those FCC decisions did not even address the use of sizing factors' consistency with the engineering guidelines, an issue that was addressed in this record. Verizon claims that the FCC squarely rejected a challenge to a comparable distribution fill factor of 41% because it noted that where fill factors are "not inputs" but rather "an output of the cost model based on [the carrier's] existing network," it will not reject them absent a showing that the output has a flawed basis.[273]

ii. Fiber feeder

359 With respect to fiber feeder, AT&T claims that fiber feeder cable is normally installed with 100% redundancy. That is, for every fiber strand installed, a separate stand-by strand is installed. On this basis, AT&T claims that even the use of a 100% fill factor provides substantial excess capacity. Furthermore, AT&T asserts that the FCC has twice approved 100% fill factors for fiber feeder.[274] AT&T has adopted this input assumption in HM 5.3.

360 According to AT&T, Verizon produces an "achieved" fiber feeder fill of slightly more than 86% with 100% redundancy already built into the fiber feeder network. AT&T claims that there is no need for the additional capacity Verizon's fill assumptions would require, and therefore Verizon's fill factor assumption should be rejected in favor of those used in HM 5.3.

361 Verizon claims that AT&T's argument ignores Verizon's testimony that purportedly redundant pairs in fiber cable cannot simply be treated as spare unless one is willing

---

[273] *Memorandum Opinion and Order, Joint Application of BellSouth Corporation, Bellsouth Telecommunications, Inc., and BellSouth Long distance for Provision of In-Region, InterLATA Services in Georgia and Louisiana, 17 FCC Rcd 9018 (BellSouth Georgia/Louisiana § 271 Order)*, ¶¶ 68-69.
[274] *USF Inputs Order* ¶¶ 92, 208; *Virginia Arbitration Order*, ¶ 264.

to gamble with needs for ongoing service. However, Verizon claims that AT&T "gets to the same place" because HM 5.3 "start[s] with a minimum 6-fiber cable."[275]

362 ***Discussion and decision.*** With regard to copper feeder, there is not much dispute about the sizing factor used by the parties. As Verizon notes, its model actually uses a smaller sizing factor than HM 5.3. Our chief concern with Verizon's 1.2 sizing factor is that it causes the model to produce an "achieved" fill of only 51.93%. There is insufficient discussion in the record to discern why this effect occurs, when the "achieved fill" that HM 5.3 models is substantially higher, 76.5%, using a sizing factor input similar to Verizon's.

363 The table below shows available copper cable sizes and potential "achieved" fill.[276] The table shows the worst-case scenario for copper cable sizes, assuming they are based on a sizing factor of 1.2. As the cable size decreases, so does the achieved fill. Therefore an "achieved fill" of 51.93% is possible,[277] but unlikely, given that the first set of averages (column four) is based on the worst-case scenario. More likely fill values appear in the last column, because larger cables are typically employed in feeder facilities.

---

[275] *Verizon initial brief* at 46-47.

[276] The larger size cables are not used by Verizon in its cost model but are deployed by telephone companies in their networks. Verizon's decision to exclude large size cables from the model may explain why VzCosts produces a lower fill factor than HM 5.3.

[277] The low utilization levels are associated with small cables. For feeder facilities, large cables would typically be installed. As pointed out elsewhere in this order, Verizon contends that distribution areas typically contain 200 to 600 living units. A living unit averages more than one line per unit. Hence, the distribution area would be served by a large copper cable. Furthermore, a feeder cable typically leaves the central office and connects with multiple distribution areas. Consequently the size of the copper cable is not determined by the demand from just an individual distribution area. We were surprised to see VzCost report that the average copper feeder cables were approximately 450, 500, and 900 for buried, aerial, and underground cables, respectively. See VzCost CopperCableMix DensityCell.rpt. This report is not an exhibit in this proceeding but is produced when one runs the VzCost model. HAI would produce a higher feeder fill rate because it permits a larger number of customers to be served from a distribution area. As the table suggests, the large number of lines within a distribution area will typically raise the effective fill rate in the feeder plant.

TABLE 6

Available Copper Cable Sizes and Potential Achieved Fill

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Copper cable size	Worst case sizing estimate = demand * 1.2	Based on demand of	Achieved fill = demand ÷ size	Midpoint sizing estimate	Based on demand of	Achieved fill
4200	3601	3001	71.45%	3900	3250	77.38%
3600	3001	2501	69.47%	3300	2750	76.39%
3000	2401	2001	66.70%	2700	2250	75.00%
2400	1801	1501	62.54%	2100	1750	72.92%
1800	1201	1001	55.61%	1500	1250	69.44%
1200	901	751	62.58%	1050	875	72.92%
900	601	501	55.67%	750	625	69.44%
600	401	334	55.67%	500	417	69.50%
400	201	168	42.00%	300	250	62.50%
200	101	84	42.00%	150	125	62.50%
100	51	43	43.00%	75	63	63.00%
50	26	22	44.00%	37.5	31	62.00%
25	13	11	44.00%	18.5	15	60.00%
12	7	6	50.00%	9	8	66.67%
6	1	1	16.67%	3	3	50.00%
Sizing factor			52.09%	average all cables		67.31%
1.2			50.71%	average 3600pr max		66.59%
			49.26%	average 3000pr max		65.84%
			47.81%	average 2400pr max		65.07%
			46.47%	average 1800pr max		64.36%

364 Verizon advocates modeling distribution areas that have between 200 and 600 lines. Assuming a mid-point of 400, the sizing factor would require selecting a cable with 400* 1.2 = 480 lines. A 600-pair cable would be used to satisfy this level of demand and therefore the "achieved" fill would be 400/600 = 66.6%.

365 Elsewhere in this order, we have changed the maximum size of copper cables.[278] After making this modification to VzCost, as well as other changes described in Appendix A, the copper-feeder fill rate increases to 72.22% for the average segment fill, and 60.04% at the head of the route. We find these values to be reasonable and therefore accept Verizon's copper-feeder sizing factor.

366 By using a 1.25 sizing factor, HM 5.3 produces an achieved fill of 76.5%. Although we note that this fill rate seems very high, we are persuaded that it is a likely outgrowth of modeling large distribution areas. In our earlier discussion of metrics for evaluating cost models,[279] we discussed the sizing of distribution areas and found that neither party had provided convincing reasons for rejecting the other's model based on the modeled size of distribution areas, However, our concern about the TNS pre-processing of large clusters (the HM 5.3 equivalent of a distribution area) caused us to give the HM5.3 model less weight. In this order, we accept the HM 5.3 sizing factor for use in that model because our lower weighting of the AT&T model compared to Verizon's model compensates for any anomaly in the "achieved" fill result.

367 Turning to fiber feeder, since neither model actually employs fill factors, we find AT&T's reliance on FCC orders approving 100% fill factors inapposite. As Verizon notes, both Verizon's model and HM 5.3 essentially "get to the same place" because they both assume that a fiber-fed DLC will have 2 hot fibers, and 2 backup fibers, and will be served by a fiber ribbon containing 6 strands. For example, Verizon models 12 fibers per DLC in order to reflect economies of scope with the IOF network. However, Verizon only assigns half of this investment to the local loop.[280] Both proposals are consistent with the engineering requirement of six fibers per DLC for local service—two hot, two warm spare and two cold spare.[281]

---

[278] Part VIII, Model Inputs, Section A. Loop Inputs, Number 7.a. Cable sizes.
[279] Part VII, Evaluation of Cost Models, Section D. Other Metrics for Evaluation the Reasonableness of a Model, Number 4. Number of lines in a serving area.
[280] *Ex. 201TC* at 42.
[281] *Ex. 265C* (NPG-99-001 — Issue 3, Sept. 2001, 00625-OSP.pdf).

368 We are persuaded that Verizon's methodology is consistent with our prior orders.[282] Since both models' fiber feeder inputs are essentially the same, we conclude that both are acceptable.

c. Distribution fill

369 Verizon asserts that it uses a 2.19 distribution sizing factor, which is based on an assumption of 2.5 pairs per customer location,[283] while HM 5.3 divides demand by 0.75, which is the same as multiplying by 1.33. According to Verizon, HM 5.3's value is consistent with an assumption of 1.52 pairs per customer location, and is at the very low end of the range recommended by AT&T's own witness.[284] Verizon claims AT&T's input is inconsistent with the testimony of other AT&T witnesses in proceedings in Florida,[285] and inconsistent with AT&T witness Fassett who testified in the first Washington cost proceeding that two pairs per customer location was the correct number.[286] Additionally, Verizon maintains that AT&T's Outside Plant Engineering Handbook, on which AT&T allegedly relied in its Inputs Portfolio and engineering testimony, recommends that engineers build 2 pairs per residence. Thus, Verizon argues that its proposal is reasonable given the need for higher sizing factors for business locations.

370 AT&T asserts that Verizon's approach to distribution fill is that distribution plant should be built to meet ultimate demand, and consistent with this approach, Verizon's sizing factor was calculated to ensure that there will be 2.5 pairs modeled per working pair in Verizon's current network.[287] AT&T notes that under Verizon's

---

[282] *UT-003013, 32nd Supplemental Order*, ¶205. The Commission found that "the FCC's assumption of 100% fill (based on 2 "lit" fibers and 2 standby fibers per 4-fiber DLC connection) is a reasonable starting point," if breakage is also taken into account.

[283] Verizon's engineering guidelines call for between 2 and 3 pairs per residential living unit. The sizing factor 2.19 is the midpoint of the number of pairs per residential living unit (2.5) divided by the average number of working lines per residential living unit (1.14). E*x. 201TC* at 40-41.

[284] *Ex. No. 951T* at 60.

[285] Mr. Riolo testified that two pairs per dwelling unit "was something of a minimal guideline" and that in very affluent areas that "five and six pair would be the proper number per household." *Ex. No. 451T* at 61:16-62:1.

[286] *TR 1308:21-1309:4.*

[287] *TR 1306-07.*

approach, Verizon's sizing factor will increase (decreasing distribution fill) as demand on its network decreases, and the cost per line will increase as demand decreases.

371 According to AT&T, both the FCC and this Commission have rejected Verizon's "pairs-per-location" approach in determining fill factors on a forward-looking basis, because using such an approach means that the purchaser of an unbundled loop today will be required to pay the cost of all growth that may occur in the future within the network.[288] AT&T claims the FCC determined that distribution fill assumed by a TELRIC model should be sized to meet current demand, including an amount of excess capacity to accommodate short-term growth.[289]

372 AT&T also claims that this Commission rejected a proposal by US WEST in the first cost proceeding that fill factors should be calculated based on an assumption of three lines per household in suburban areas because the "achieved" distribution fill was only 33%. AT&T maintains that Verizon has proposed a similar figure here of a little over 38%, far below the 55% fill factor for both feeder and distribution it proposed in the first cost proceeding.[290] AT&T claims that the "achieved" distribution fill in HM 5.3 is 47.3%, close to the 50% distribution fill approved by the Commission in the first proceeding.[291] On this basis, AT&T argues that the Commission should approve the sizing factors for distribution cable used by HM 5.3.

373 Verizon contends that, in assuming 1.33 pairs per customer location, HM 5.3 excludes the very real and current costs of growth, customer churn, and fluctuations in demand, in direct violation of the Commission' s requirement that a cost model "make[s] realistic assumptions about capacity utilization rates, spare capacity, field conditions, and fill factors."[292]

---

[288] *USF Inputs Order,* ¶ 197.
[289] *USF Inputs Order,* ¶¶ 199-201.
[290] *UT 960369 8th Supplemental Order,* ¶¶ 176-179, 182.
[291] *UT-960369, 8th Supplemental Order,* ¶¶ 178-179.
[292] *UT 960369 8th Supplemental Order,* ¶10.

374 Verizon disputes AT&T's claim that VzLoop's input of 2.5 distribution pairs per location is inconsistent with the FCC' s prohibition on serving "ultimate demand" as a mere word game. Verizon claims that, as noted by AT&T witness Donovan, serving ultimate demand is "[t]he generally accepted engineering practice."[293] Verizon claims that VzLoop' s sizing factors serve reasonably foreseeable demand by accommodating not only unanticipated fluctuations in demand from area to area and residence to residence, but also some amount of growth. Verizon's sizing factors are allegedly designed to avoid the need to rip up streets or string extra cable, such as occurred in the Thai network Verizon witness Richter helped to design, which was initially built only to fill an existing customer wait list. Contrary to AT&T's assertion, Verizon maintains that such sizing factors benefit existing customers by accommodating their additional demand without digging up the streets.

375 ***Discussion and decision.*** With regard to distribution fill, we find neither party's recommendation appropriate. Once again, AT&T is comparing the Commission's prior ruling on a fill factor used as a model input to a fill factor determined as a model output. When used as an input, a fill factor of 50% results in an actual modeled fill that is less than 50% because of breakage. Thus, AT&T is not providing an apples-to-apples comparison.

376 Similarly, Verizon's experience in Thailand is not relevant. While Verizon is correct that it was inappropriate for a firm in a nascent telecommunications market with pent-up demand (like Thailand) to build its network to satisfy current demand, the Thai experience is not relevant to this proceeding given the requirements of TELRIC and the advanced state of the telecommunications market in Washington.

377 Verizon's sizing factor assumes 2.5 lines per location. We find this to be too high a number to assume for residential service, given that DSL, cable modems, and cell phones have reduced the number of residential customer orders for second lines. Verizon currently serves 1.14 lines per location,[294] suggesting that current demand

---

[293] *Ex. No. 951T* at 58.

[294] *Ex. 228TC* at 40-41.

plus allowances for customer migration and churn could be adequately served by assuming 2 lines per location to serve residential locations. Assuming only 2 lines per location, the sizing factor becomes 1.75 (2 divided by 1.14 =1.75). Two is the low end of Verizon's engineering guideline and a value once supported by AT&T. We are persuaded that an assumption of 2 distribution pairs per location is reasonable for both models. For HM 5.3 this would equal a sizing factor [or fill] of 50%.

d. DLC fill

378 Verizon claims that HM 5.3 misallocates DLC common equipment costs and that this causes POTS services to subsidize DS-1s along the modeled feeder routes. Verizon maintains that HM 5.3's DLC common equipment investment allocation to DS-1 services is unfounded, internally inconsistent, and at odds with the principles of cost causation because it allocates DLC common investments to DS-1 services based on the relative space occupied by the DS-1 plug-in unit within the channel bank assembly, rather than on the relative proportion of the common equipment circuit capacity that the DS-1 services consume.[295]

379 According to Verizon, by allocating DLC investment on the basis of space occupied by a DS-1 line card, HM 5.3 in effect subsidizes DS-1 services by erroneously shifting cost recovery away from the DS-1 loops onto the POTS loops. To ensure that Verizon recovers its total costs from the services that cause the costs, Verizon recommends that common equipment investments be apportioned based upon the capacity used (as is the case with VzCost and the FCC's Synthesis Model), and not upon the space occupied by the DS-1 channel unit card.[296]

380 AT&T asserts that HM 5.3 uses a sizing factor of 90% for DLC equipment, resulting in an overall "achieved" fill of 80.2%. AT&T states that the fill for common equipment is 72.8% while the fill for channel units is 89.5%. According to AT&T, Verizon's model, which does not allow separate fill factors for channel units and common equipment, has an overall "achieved" DLC fill of 84.85%. AT&T believes

---

[295] *Ex. 551TC* at 55.

[296] *Id* at 53-56.

that HM 5.3 appropriately recognizes that fill levels are likely to be higher on channel units that can be more easily replaced.

381 ***Discussion and decision.*** We agree with Verizon that HM 5.3's cost estimates should be adjusted so that the cost of DLC common equipment investments are apportioned based upon the capacity used and not upon the space occupied by the channel unit card. Verizon provided a convincing explanation of the effect of improperly apportioning these investments.[297]

382 Otherwise, we find both parties' DLC fill proposals to be reasonable. We find that rejection of Verizon's DLC fill proposal is not warranted, even though it fails to provide different sizing factors for common equipment and channel units. We note that the overall DLC fill in Verizon's study is higher than the fill assumed by AT&T.

e. Switching fill

383 Verizon claims that AT&T's assumption that all switches are purchased as new, rather than some new and some as upgrades, is at odds with HM 5.3's assumption that switches have an economic life of 16 years. Verizon claims that if it actually installed switches with 16-year lives, with no plans ever to purchase additional lines, the switches would need substantial excess capacity -- much higher than assumed by HM 5.3.

384 According to AT&T, Verizon's switch fill factor and associated trunking utilization is substantially understated. HM 5.3, as proposed by AT&T, assumes a fill factor—*i.e.,* the line capacity of the switch—of 94%. This fill factor allegedly recognizes the need for administrative fill and the ease and speed with which switch additions can be placed, if necessary. Verizon allegedly assumes a significantly lower factor based on the historic utilization in Verizon's existing network. AT&T recommends that the Commission reject Verizon's proposed switching fill factors.

---

[297] *Id.*

385 ***Discussion and decision.*** Later in this order, we adopt AT&T's switching model that relies on the FCC USF Inputs Order switch investment inputs,[298] although we update the investment inputs employing the Turner Plant Index. With regard to switching fill, we note that HM 5.3 models a 94% switch port administrative fill factor, the same as the fill factor from the USF Inputs Order.[299] We are persuaded that this particular USF Inputs Order fill factor is too high. We have previously adopted fill factors for switching of approximately 92%[300] and do so again in this order for the HM 5.3 Model.

f. Interoffice fill

386 The parties dispute the appropriate utilization rate or fill for fiber optic cables that provide interoffice transport.[301] Verizon's model estimates the costs per unit of capacity of typical network configurations used to provide interoffice transport service, rather than trying to estimate the total cost of the network used to provide those services. The cost per unit of capacity is then divided by a utilization factor to take into account the cost of spare capacity on the network.[302] Verizon's utilitization rate is below 40%.[303]

387 According to AT&T, Verizon has included four fibers per remote terminal system in its transport model but only two of these fibers are equipped, providing 100% redundancy. AT&T claims that a 100% fill factor for fiber results in "achieved" fill of only 50%, so the appropriate fiber fill in a TELRIC model is 100%, as recognized and adopted by the FCC.[304]

---

[298] Part VIII, Model Inputs, Section B, Switching Inputs.
[299] *Ex. 856* at 96. AT&T proposes a switching fill (the line capacity of a switch) of 94%; *see also USF Inputs Order,* ¶ 332.
[300] *UT-980311(a), 10th Supplemental Order,* ¶ 159; *UT-960369, 8th Supplemental Order,* ¶312..
[301] Verizon also assumes a 75% fill for the electronics supporting the transport network. AT&T does not dispute this fill rate. We accept Verizon's number as reasonable given growth, churn, breakage and maintenance requirements.
[302] *Verizon Initial Brief* at 116.
[303] *Id.*
[304] *USF Inputs Order* ¶¶ 92, 208; *Virginia Arbitration Order,* ¶ 264.

388 Verizon maintains that AT&T's proposal rests on the unsupportable assumption that a real-world network could be operational without any significant margin of spare capacity for fiber facilities. Verizon argues that spare fiber facilities are absolutely essential for administrative and maintenance purposes, such as preventing ribbon failures and allowing for the staging of necessary splicing for cable movements and rearrangements, and to account for breakage.

389 Verizon claims that while AT&T relies on the FCC' s USF Inputs Order to support its position, the FCC has made clear that "we continue to discourage states from using the nationwide inputs (developed in the universal service context) for the purpose of developing UNE prices."[305]

390 ***Discussion and decision.*** We are persuaded that Verizon's proposed fill factor is unreasonably low—below 40%--chiefly because it reflects a network built to accommodate ultimate demand, instead of current demand plus some growth.

391 To better reflect an assumption of current demand, we adjust the fiber utilization rate input to Verizon's model to 40%. In order to have two standby fibers ready to go at each DLC location, there must be a utilization rate of 50%, which does not allow for breakage, administrative use, or growth. A utilization rate of 40% better approximates inclusion of the allowance for breakage, administration and an appropriate growth level. We approve a similar result for AT&T, which sets HM 5.3's fill input to 100% and allows breakage to take care of the rest.

392 Finally, we reject Verizon's argument that it is improper to use the nationwide inputs adopted in the federal USF Inputs Order in UNE cost proceedings. The FCC discouraged the use of these inputs in UNE proceedings because it did not intend to provide systematic guidance to state commissions on this subject. [306] The FCC did not prohibit state commissions from adopting similar or identical inputs based on the arguments and record before them.[307]

---

[305] *TELRIC NPRM*, ¶ 46.
[306] *Id.*
[307] *USF Inputs Order*, ¶ 32.

6. DLC Assumptions

393 Apart from DLC sizing and fill issues, which we have just discussed, the parties have two principal disputes with respect to the cost of DLC facilities. The first dispute involves the mix of integrated DLC (IDLC) and universal DLC (UDLC) technologies used by their models. IDLC loops connect directly to the switch at the DS1 level. UDLC loops are multiplexed from individual DS0 loops to the DS1 level at the remote terminal, sent to the central office, and then de-multiplexed back to the DS0 level before being terminated on the switch. UDLC is less efficient because it requires additional equipment to multiplex and de-multiplex traffic at the central office. The second dispute involves DLC engineering and installation costs.

a. UDLC v. IDLC

394 Verizon assumes that 90.2% of the loops served by DLC would use IDLC, with the remaining 9.8% using UDLC.[308] Verizon's 9.8% UDLC assumption allegedly reflects the need to provide UDLC lines for non-switched services and stand-alone unbundled loops, because it is not possible to unbundle individual DS0 loops in a multicarrier environment. Verizon claims that this is consistent with the FCC's requirement that a TELRIC network must employ currently available technologies and not those that may become available in the future.

395 AT&T asserts that a new entrant employing the least-cost technology would deploy only IDLC because the cost savings of using this technology are substantial. According to AT&T, Verizon's own draft engineering guidelines recognize the overall economic advantages of IDLC and call it "the preferred design choice over the wholesale use of UDLC."[309]

---

[308] Because some loops are not served on DLC systems the total percentage of loops using UDLC under Verizon's proposal is less than 9.8% of all loops.

[309] *See Ex. 265* at 11, ¶ 2.4.5.

396 The HM 5.3 model assumes 100% use of IDLC, based on AT&T's assertion that multi-hosting is feasible in a multi-carrier environment. AT&T claims that it is not necessary to assume any use of UDLC to allow for the unbundling of individual loops because both VzCost and HM 5.3 presume that the IDLC will use GR 303 technology. AT&T argues that if this technology is used, the most efficient method for unbundling loops is on a DS1 level using the multiple interface group feature. AT&T claims that at least one ILEC is using this technology today to provide unbundled loops[310] and that the WCB has also recognized that GR 303 technology can be used to provide access to unbundled loops.[311]

397 Verizon disagrees that the multi-hosting capabilities of GR-303 allow interface groups from one DLC system to connect to more than one switch. Verizon asserts that interface between two different DLC systems is permitted under GR-303 only if all the switches belong to the same carrier. Allegedly, the problem with employing IDLC today for the delivery of a stand-alone loop to a CLEC switch is that such a connection provides the CLEC with full access to the operations functionality (e.g., provisioning, alarm report, test access, etc.) of the DLC system for all of the lines served on that system, not just those served by the CLEC. Verizon maintains that such access creates significant risks of conflict between instructions sent by the different carriers' switches to the DLC system and of compromising the security and functionality of any carrier's services.

398 According to Verizon, these unresolved technical issues are documented by DLC vendors such as Alcatel, as well as by Telcordia.[312] Telcordia allegedly confirms that IDLC unbundling using separate interface groups for CLECs presents a variety of issues (provisioning, alarm reporting, sharing of test resources, etc.) that have yet to be resolved.[313]

---

[310] *TR 1495; but see also Ex. No. 892 (AT&T response to DR 11-7).* Verizon asserts that AT&T's witness acknowledges that the ILEC referred to was not in fact provisioning stand-alone unbundled loops to multiple CLECs.

[311] *Virginia Arbitration Order* ¶¶ 315-18.

[312] Telcordia Technologies provides information-networking and operations software, network engineering and consulting services to telecommunications companies. www.bellcore.com.

[313] *Ex. 459* at 2.

399 Verizon asserts that the FCC recognized in the Triennial Review Order that, in requiring incumbent LECs to provide access to a transmission path over hybrid loops served by IDLC systems, "in most cases this will be either through a spare copper facility or through the availability of Universal DLC systems."[314]

400 According to Verizon, HM 5.3 models all fiber-based voice-grade level loops using GR-303 on the erroneous assumption that stand-alone UNE loops provisioned on IDLC can be individually unbundled. Verizon claims that even AT&T's witnesses recognize that loops carried over GR-303 IDLC systems are delivered to the switch (or to CLECs under HM 5.3's modeling assumptions) in a multi-channel digital format, packaged within DS-1 signals, thereby eliminating the need for, and cost of, central office POTS channel unit plug-ins and main distribution frame (MDF) appearances. Thus, Verizon argues that individual IDLC-provisioned loops do not have a physical appearance in the central office, and do not have a physical switch port appearance in the switch, so stand-alone UNE loops provisioned on IDLC cannot be individually unbundled.

401 Verizon asserts that compounding the aforementioned problems is the fact that current technology limits the maximum number of GR-303 interface groups available for such access to four. Since at least one interface group must be assigned to the ILEC that owns the system, the maximum number of CLECs that could theoretically obtain wholesale access to customers served on these GR-303/IDLC systems is three. Verizon argues that this limitation is problematic since there could be as many as twelve different CLECs requesting UNE access in Washington.

402 AT&T claims that while it would be extremely inefficient and unrealistic for a CLEC to want to unbundle a single UNE loop provisioned over DLC, it is very efficient to unbundle loops fed via IDLC as a DS1. AT&T maintains that the capability exists for CLECs to share an interface group should the situation arise. AT&T suggests that Verizon does not understand the technology that enables this to occur.[315]

---

[314] *Triennial Review Order,* ¶ 297.

[315] *Ex. 956TC* at 28-29.

403 Verizon asserts that the most efficient and economic way to provision unbundled access to DLC-served stand-alone loops is with UDLC because unlike IDLC systems, UDLC provides per-line equipment and physical access to individual, stand-alone loops at the central office MDF. In the UDLC configuration, physical access to individual loops is accomplished in exactly the same manner as access to all-copper loops. Verizon claims that GR-303 IDLC, on the other hand, does not (and indeed cannot) provide the discrete loop access that non-switched loops require.[316]

404 ***Discussion and decision.*** We reject AT&T's proposal to model 100% IDLC technology. Although AT&T admits that it would be extremely inefficient and unrealistic for a CLEC to want to unbundle a single UNE loop provisioned over DLC, AT&T maintains that it is very efficient to unbundle loops fed via IDLC as DS1s. Thus, AT&T's own argument suggests that it is not reasonable for Verizon to assume 100% IDLC in its network in those situations where the CLEC is requesting less than one DS1-level connection. Furthermore, AT&T has not shown that individual DS1 loops could be efficiently provisioned as UNEs via IDLC. We are also persuaded that there are security concerns with AT&T's proposal to unbundle individual interface groups and that there are limitations to the number of CLECs that could use the technology along with Verizon.

405 We are also convinced that it is reasonable to assume use of UDLC when individual POTS loops are unbundled. The assumption that less than 10% of loops will be provisioned over UDLC renders its influence on total loop costs minimal. The influence of UDLC costs is reduced further by the fact that some loops are not provisioned over DLC systems so the percentage of total loops using UDLC will be smaller than the 9.8% proposed by Verizon.

b. EF&I Markup

406 Verizon employs a markup of 46% over the material cost of the DLCs to account for the costs of engineering, furnishing, and installing (EF&I) them.

407 Verizon's EF&I factor for DLC installation is based on its actual experience. Verizon claims that the cost of an individual DLC installation can vary markedly, based on environmental conditions and terrain. For that reason, Verizon uses data from its digital circuit equipment account (which includes DLC equipment) from a two-year period, across the entire Verizon nationwide footprint. Verizon used this method in order to reduce any anomalies that might occur with respect to a DLC installation at a particular time or in a particular location. Verizon maintains that this average-factor approach ensures that CLECs pay a price that reflects a fair measure of the cost generally involved in a DLC installation.

408 AT&T maintains that Verizon's use of EF&I factors substantially departs from the way Verizon actually incurs costs and also from the way Verizon derives the installed cost of all other loop elements in its cost study. According to AT&T, these factors rely entirely upon Verizon's embedded network and provide no basis for estimating costs in a forward-looking network.

409 AT&T claims that in the Virginia Arbitration Order, the WCB expressed a preference for a bottom-up approach to determining the installation costs for network equipment. Under this approach, a model identifies the labor and other costs that would be incurred in installing each piece of equipment. HM 5.3 employs such an approach to estimate DLC engineering and installation costs. AT&T also claims that the FCC determined that factors such as those used by Verizon may not be based on historical costs unless it can be demonstrated that those historical costs are relevant to the study of forward-looking costs.[317]

410 Verizon claims that the efficiency of its methodology has been corroborated by Verizon's survey of the five most recent Alcatel DLC installation work orders that were provided to AT&T in discovery. Verizon asserts that these show that the average EF&I costs associated with those installations would yield a higher EF&I factor (52 percent) than the 46 percent Verizon uses in its studies.

---

[316] *Ex. No. 551TC* at 46-49.
[317] *AT&T initial brief*, ¶ 142.

411 AT&T further objects that Verizon's EF&I factors are overstated because the material in Verizon's database does not include all of the material that Verizon pays for in placing equipment in the central office or at the remote terminal. The cost included in the denominator of the factor calculation allegedly includes only major material costs while minor materials costs are included in the numerator, along with the major material costs, installation, and engineering.[318] AT&T asserts that this error makes Verizon's EF&I factors unreliable.

412 According to Verizon, AT&T's engineering and installation cost assumptions are based on the undocumented experience of its witness. Verizon claims that AT&T's work time estimates are wholly unreliable and ignore all of the site selection and acquisition requirements that an engineer must address — tasks Verizon alleges are especially time consuming in the case of DLC equipment, given the need for housings, AC power, generator capacity, sophisticated grounding schemes, additional inspections and permits, and the need for a boom or crane. Verizon claims AT&T also underestimates site preparation work, and wrongly assumes that all of the installation work for components within the RT can be done at the factory instead of on site. Finally, Verizon contends that AT&T's work time estimates ignore the extensive testing process that is required following installation.

413 ***Discussion and decision.*** We are persuaded that Verizon's EF&I costs are reasonable. Verizon relies on actual data as opposed to SME opinions.[319] We have rejected AT&T's reliance on SME opinions for purposes of determining engineering factors and material costs and we also reject it for purposes of determining EF&I costs.

---

[318] Verizon agrees that there was a problem with its EF&I factor for the reason identified by AT&T. However, Verizon claims it resulted in an overstatement of costs of less than 1% and that this error was corrected in an erratum to its rebuttal testimony. *See Ex. No. 228TC* at 130 (erratum filed May 26, 2004.)

[319] We do not rely on actual data if the input values are unreasonable. Elsewhere in this order we determine that it is inappropriate to use Verizon's actual contract data for small construction jobs because this scenario is inconsistent with the TELRIC assumption of a total network rebuild.

7. Other inputs

a. Cable sizes

414 Aerial cable (cable hung on poles) is the least expensive type of cable to purchase and install. Buried and underground cable each incur higher investment and installation costs. Verizon sizes cable by first determining demand and then applying a sizing factor, according to the type of cable involved, as explained earlier in this part of this order.[320] AT&T asserts that HM 5.3 calculates the number of cable pairs required to serve existing demand plus enough spare for breakage, administration and growth. Once demand is calculated, the model sizes cable, based on current available cable sizes, to the next size cable able to accommodate the demand.

415 Verizon faults HM 5.3 because its sizing process doesn't correspond to the structure used. Verizon cites an instance where HM 5.3 models 4,200-pair cable on a pole structure. AT&T counters that it does not put 2,700-pair or larger cables on pole line structure. Rather, such cables would be placed on other aerial structure that may include "laterals, blocks or riser cable."[321]

416 ***Discussion and decision.*** We find it necessary to adjust cable-sizing inputs in both models. Verizon assumes that the maximum sizes of copper cables are 900-, 1,200-, and 1,800-pair for aerial, buried, and underground cables, respectively. This assumption reflects values that are lower than those common in the industry[322]. We have adjusted the Verizon cable sizes to be consistent with industry practice.[323]

417 We also find it necessary to adjust cable-sizing inputs for HM 5.3. We reject AT&T's claim that HM 5.3 does not place inappropriately large copper cables on poles.[324]

---

[320] *See* Part VIII. Model Inputs, Section A.5. Fill Factors.
[321] *AT&T reply brief* at 22.
[322] *USF Inputs Order*, Appendix A.
[323] Material costs for Verizon's larger size cables were obtained by applying regression analysis to the material costs included in the Verizon model. See Appendix A.
[324] *Ex. 267; TR 1454 et seq.*

Given AT&T's explanation that it "misclassifies" as aerial large cables that are used as laterals, blocks, and risers, we would expect a very low percentage of the total cable feet of a 4,200 pair cable to be aerial. However, the evidence does not bear this expectation out. Instead it appears that the average 4,200-pair aerial backbone cable is over 2,200 feet long.[325] By cluster, HM 5.3 models either 43% or 50% of total distribution backbone distance using 4,200-pair cables as aerial. By comparison, the average 4,200-pair buried cable segment is 2,500 feet long, and the average underground segment is only 250 feet long. If AT&T's explanation is correct, we would have found that aerial would comprise the smallest percentage of placement type assumed by the model for 4,200-pair cables.

418 HM 5.3 already assumes that the largest riser cable is 2,400 pairs,[326] so only the amount of 'block cable' would need to be adjusted to make sure that very large cables are not assumed to be supported by aerial structure (poles). HM 5.3's Block/Building Fraction of Total Distance is set forth in the chart below:

TABLE 7

Block/Building Fraction of Total Distance

Density Zone	Fraction
0-5	0
5-100	0
100-200	0
200-650	0
650-850	0
850-2,550	0
2,550-5,000	0
5,000-10,000	.10
10,000+	.30

419 Since we are unable to find a way to limit HM 5.3's "Block/Building Fraction of Total Distance" input to cable sizes 2,400-pair and smaller,[327] we have set this input to zero in all density zones for purposes of running the HM 5.3 Model.

---

[325] *Ex. 267.*

[326] *Ex. 856*, section 3.3

[327] *Id.*, section 3.5.3

b. Rights-of-way

420 Both Verizon and AT&T claim that their cost models do not generally include explicit inputs for rights-of-way. Nevertheless, the company asserts that its model is superior because it does a better job of placing plant along existing roads and other rights-of-way currently used by the ILEC.

421 Verizon asserts the only exception to including explicit inputs for rights-of-way is in its EFI for remote terminal (RT) placement costs. Otherwise the value of rights-of-way is captured in the existing plant property records the model uses to develop UNE investment levels.

422 AT&T claims that HM 5.3 assumes plant will be placed in existing rights- of-way and easements. Verizon disputes this claim, based on its criticism that the HM 5.3 model ignores real-world constraints.

423 ***Discussion and decision.*** We have already touched on this issue in Part VII of this order, where we evaluate the two cost models. We noted that ideally a model will use only existing central office, customer and right-of-way locations to design a forward-looking network.[328] We find that the Verizon model does a superior job of modeling right-of-way locations. VzLoop assumes that cables go from one cross-connect point to another using an air-route methodology. Verizon then applies a 15% adder for all distances of 500 feet or greater to account for cable sag, elevation changes, etc.

424 HM 5.3 estimates the cable necessary to connect two points by employing right-angle routing. In making this estimate, HM 5.3 relies on a smaller sample of connection points but also effectively applies a larger adder, approximately 27%, to its cable length estimates.

---

[328] Part VII, Evaluation of Cost Models, Section C. Openness and Flexibility, Discussion and decision.

425 We find that both models provide sufficient cable to connect the assumed locations of Verizon's customers to Verizon's central offices over Verizon's existing rights-of-way. Thus, each model adequately accounts for the cost of obtaining those rights-of-way. However, we conclude that Verizon's model does a better job of that accounting because it assumes a larger number of cross-connect points and hence, more accurately accounts for existing rights-of-way. We take Verizon's superior ability to incorporate existing rights-of-way into account in our weighting of the models.[329]

c. Air to route-mile factors

426 As discussed in the immediately preceding section, Verizon adjusts feeder and distribution cable lengths by 15% to convert air-to-route miles whenever the air miles distance exceeds 500 feet.[330] Verizon contends this methodology is sufficient to capture elevation changes and curves along cable routes and to account for sagging cable. AT&T does not specifically adjust air-to-route miles, but rather relies on rectilinear routing. As noted above, this results in an effective 27% adjustment to air miles. AT&T claims the FCC has determined that this assumption provides a close estimate of the actual road distance required to connect customers.[331] AT&T indicates in its post-hearing brief that it proposes no change to Verizon's adjustment factor.[332]

427 Because there is no dispute on this issue, we need not address it. However we note that even though Verizon's adjustment factor is lower than AT&T's, because the parties' modeling techniques are so different, Verizon's loop length estimates, all else equal, produce lower cost estimates than AT&T's methodology.

---

[329] We expect that Verizon's use of existing cross-connect points is an interim approach and that in future submissions it will model placing cables along existing roads rather than between existing cross-connect points.

[330] For distances less than 500 feet, Verizon employs a straight-line distance without adjustment.

[331] *USF Inputs Order* ¶¶ 81-82.

[332] *AT&T initial brief* ¶ 149.

d. Gauge of copper cable

428 Verizon assumes use of 24-gauge copper cable throughout its network. AT&T assumes use of 24-gauge for 400-pair cable or less and 26-gauge for cable above that cutoff point.

429 Verizon claims that use of 26-gauge cable is inefficient because it is vulnerable to environmental damage and would require a reduction of maximum copper loop length from 12,000 feet to 7,000 feet. This in turn would create significant problems in providing advanced telecommunications services. AT&T asserts that deploying 24-gauge cable network-wide results in unnecessary expense and higher loop costs. AT&T points out that the FCC recognized the higher costs that would result from use of only 24-gauge cable and rejected the 24-gauge input assumption in its Inputs Order.[333]

430 ***Discussion and decision.*** We are persuaded that assuming placement of 24-gauge cable network-wide is most appropriate in light of the engineering concerns raised by Verizon. In addition, Verizon's panel testified that the substitution of 26 for 24-gauge cable had virtually no effect on the VzCost loop cost estimate.[334] A small cost saving does not justify sacrificing the potential of superior service and of superior ability to more easily provide non-POTS services.

431 Furthermore, in the instance of determining the proper gauge of network cable, it is inappropriate for us to rely on the FCC's USF Inputs Order. As noted by Verizon, in the USF proceeding the FCC did not model a network that was universally capable of providing advanced telecommunications services, but rather sought to estimate costs for POTS alone. That scenario does not reflect our need to provide forward-looking rates for network elements that are used to provide high-speed telecommunications services.

---

[333] *Id.* ¶ 95.

[334] *Ex. 228TC* at 56, lines 5-11.

e. Length of drop wire

432 Drop wire is the wire that connects the Verizon distribution network to individual customer premises. Drop wire usually runs from a network interface device (NID) at a residence to a nearby pedestal, although different arrangements may apply when a drop is run to businesses or multi-unit premises. In the 8th Supplemental Order in Docket UT-960369, the Commission directed the parties to file drop-length studies to support their drop-length inputs.

433 In this proceeding, Verizon proposes a range of drop lengths from 68 feet to 200 feet, depending on whether the plant is aerial or buried. These inputs are user-adjustable and only slightly longer than those prescribed in the 8th Supplemental Order. AT&T proposes a range of 50-150 feet, depending on density. AT&T faults Verizon for failing to provide a drop-length study to support its proposed inputs, in accord with the Commission's direction in the 8th Supplemental Order. AT&T points out that: 1) in the FCC USF Inputs Order, the FCC approved a range of 50 to 175 feet for drop lengths; 2) nationwide studies indicate a 73-foot average drop length; and 3) Alaska conducted a study that produced an average 61.3-foot drop length.

434 Verizon responds that it did provide a drop-length study in a discovery response, but that no party made the study an exhibit in the proceeding. Verizon argues that, in any event, its proposed drop lengths are close to the range approved in this Commission's 8th Supplemental Order in Docket No. UT-960369. Verizon argues, on the other hand, that AT&T's proposed lengths are based on a drop-length study from Telcordia that is irrelevant to this proceeding because it draws on outdated nationwide data rather than being Washington-specific.[335]

435 Staff recommends adoption of drop-wire lengths approved in the 8th Supplemental Order[336] and also faults Verizon for failing to perform a drop-length study.

---

[335] *Ex. No. 856* at 18, n. 4

[336] *UT-960369, 8th Supplemental Order,* ¶¶ 133-134.

436 ***Discussion and decision.*** We are unable to verify the drop-length proposals presented in this case because no drop-length study has been provided in the record. It appears that the parties' various proposals are not far apart, nor are they very different from the drop-wire lengths we adopted in the 8th Supplemental Order. Absent empirical evidence in the form of a drop-length study, we will again rely on our findings in the 8th Supplemental Order and require that the drop lengths adopted in that order—50 to 175 feet—should be employed in each model.

f. Buried drop sharing

437 HM 5.3 assumes that Verizon will bear 50% of the cost of buried drops. AT&T claims that this assumption is supported by Verizon's own local exchange tariff. Verizon's tariff requires that customers be responsible for paying the cost of trenching, conduit, or other structures required for placing drop wire for service extensions and other new construction.[337]

438 Verizon claims that AT&T's argument confuses costing with pricing, since Verizon's past recovery of embedded drop investment is irrelevant.

439 ***Discussion and decision.*** We agree with Verizon that its current retail rates do not necessarily reflect the cost of providing drop facilities in a TELRIC environment. AT&T's citation to Verizon's retail tariff is not persuasive because the tariff identifies the charges to Verizon's retail customers. Under TELRIC, we are obligated to identify the cost of building a new network that may be used to provide wholesale service. We note that Staff used the following inputs[338] for sharing buried drop in running the HM 5.3 model:

---

[337] *See Ex. 266* (Verizon General and Local Exchange Tariff) ¶C.13.C; *see also AT&T Brief*, ¶154
[338] *Ex. 1058.*

TABLE 8

Buried Drop Sharing Fractions

Buried Drop Sharing Fraction - 0	0.875
Buried Drop Sharing Fraction - 5	0.875
Buried Drop Sharing Fraction - 100	0.875
Buried Drop Sharing Fraction - 200	0.675
Buried Drop Sharing Fraction - 650	0.675
Buried Drop Sharing Fraction - 850	0.675
Buried Drop Sharing Fraction - 2550	0.55
Buried Drop Sharing Fraction - 5000	0.55
Buried Drop Sharing Fraction - 10000	0.55

These sharing assumptions are more consistent with a TELRIC-based sharing environment and we adopt them for use in the HM 5.3 Model, except that consistent with our finding on buried and underground sharing, we assign all costs to Verizon in the first two density zones.

g. Copper/fiber breakpoint

440 Verizon claims its 12,000-foot maximum copper loop length is consistent with TELRIC requirements, industry standards, the California ALJ's draft decision in the SBC proceeding,[339] and prior testimony of AT&T's own engineering witness. This limit allegedly ensures that the modeled network will not impede the provision of advanced services by permitting transmission speeds of up to 6.1 megabits per second.

441 Verizon further asserts that the 18,000 foot maximum relied upon in the FCC's USF Inputs Order model, and advocated by AT&T, is not relevant here because the universal service model is designed for the purpose of ensuring the delivery of only a basic level of voice service, while for UNE purposes the network must also accommodate advanced services. In addition, Verizon argues that the Carrier

---

[339] *Proposed Decision of ALJ Duda, Joint Application of AT&T Communications of California, Inc. (U 5002C) and WorldCom, Inc. for the Commission to Reexamine the Recurring Costs and Prices of Unbundled Network Element Costs Pursuant to Paragraph 11 of D. 99-11-050, Docket Nos. 01-02-024, 01-02-035, 01-02-031, 02-02-032, 02-02-034, and 02-03-002 (Cal. P.U.C. May 3, 2004)(SBC California Proposed Decision) at 76-77.*

Service Area (CSA) design standards relied on by AT&T limits copper cable length to 12,000 feet, and most, if not all, equipment vendors default to this standard, so deployment of copper beyond this length would cause compatibility problems. Verizon claims that HM 5.3 produces copper distribution lengths in excess of 18,000 feet in 239 of its 829 main clusters, with some as long as 38,000 feet and the average over 22,000 feet.

442 AT&T maintains that the copper/fiber breakpoint is an input to both models and can be changed if desired by the Commission. According to AT&T, there is no need to prohibit copper loop lengths from exceeding 12,000 feet because an 18,000 foot copper/fiber breakpoint will permit both the HAI and Verizon models to select the most efficient alternative between all copper loops and fiber-fed DLC loops.

443 ***Discussion and decision.*** We adopt a 12,000-foot copper/fiber breakpoint as an input for both the Verizon and HM 5.3 models. This input accords with our findings in UT-960396,[340] was adopted by the California Commission in its final SBC UNE rate order,[341] and is the current engineering standard of the industry.[342] Moreover, a 12,000-foot breakpoint assumption is consistent with a forward-looking network that will need to provide ever increasing high-speed services to customers.

8. Conclusion.

444 Earlier in this order[343] we indicated that we would attribute a 60%/40% weighting to the Verizon and AT&T's models respectively, based on the problems we discerned with the models themselves. We found that Verizon's model may have incorporated some of the inefficiencies of its existing network, although it excelled at

---

[340] *UT-960369, 8th Supplemental Order,* ¶ 198.

[341] *Joint Application of AT&T Communications of California, Inc. (U 5002C) and World Com, Inc. for the Commission to Reexamine the Recurring Costs and Prices of Unbundled Switching in its First Annual Review of Unbundled Network Element Costs Pursuant to Ordering Paragraph 11 of D.99-11-050., et al, Application 01-02-024, 01-02-035, 02-02-031,* 02-02-032, 02-02-034, and 02-03-002. Opinion Establishing Revised Unbundled Network Element Rates for Pacific Bell Telephone Company DBA SBC California, October 1, 2004, at 177.

[342] *See, for example, Ex. 228TC* at 21, lines 9-13.

[343] *See* ¶ 262 supra.

modeling existing rights-of-way. We also found that Verizon's model was cumbersome to operate and adjust. This caused us to reduce the weight we accorded the Verizon model.

445 On the other hand, we found that AT&T's pre-processing was not open to scrutiny and that the HM 5.3 produced very large clusters or distribution areas as a result of that pre-processing. The lack of openness in the model, in violation of our direction to produce information related to the pre-processing functions, caused us to reduce the weight we accorded the HM 5.3 model in greater proportion than the reduction in weight accorded the Verizon model.

446 In this Model Inputs part of the order, we have found that it is not possible to adjust the Verizon model to reflect a 5% line count reduction, to vary structure sharing percentages and placement costs by density zone, and to make adjustments to the model using the USF Inputs Order material cost data. Although we were precluded from making our preferred adjustments to the Verizon model, we conclude that we were able to adjust the model sufficiently to be confident that our initial 60%/40% weighting remains appropriate.

447 As a result of our modeling assumption adjustments and our model input adjustments, we adjusted each model as described in Appendix A and ran each model based on those adjustments. Our model runs resulted in a loop rate from the HM 5.3 model of $16.90 ($16.39 before taking into account the 5% reduction in the number of loops due to competition).[344] The resulting loop rate for the Verizon model is $18.86. Based on our 60%/40% weighting of the model results, we derive an average loop cost of $18.43.[345] The current loop rate for Verizon, established in 1997, is $23.94.[346]

448 We believe that an increase in the number of loops since 1997 is the primary reason for the decline in the cost of the loop. When the $23.94 rate was established, the

---

[344] Part VIII, Model Inputs, Section A. Loop Inputs, Number 2. Structure sharing, f. Impact of structure sharing in a competitive market.

[345] *See Appendix A.*

Commission used data from 1995.[347] In this proceeding, input values are from the year 2002.[348] Between 1995 and 2002, the number of Verizon's total access lines increased from 766,423 to 1,769,353, or over 130%.[349] Due to economies of scale, this increase in the level of demand should lead to a significant reduction in the cost of providing a loop.[350]

449 To illustrate the impact of the growth in demand, we have run a scenario in which we assumed that the level of demand is approximately 25% higher today than when the models were run in 1997.[351] If we reduce the current demand in the HM 5.3 model by 25%, the cost estimate increases from $16.39 to $19.44, or approximately $3.00. Hence, $3.00 of the approximately $5.00 decline in the UNE loop rate can be explained by a 25% change in demand. Although we are not certain what the exact cause is for the remainder of the difference in loop rates between 1997 and now, we are confident that our adjustments to the models and our weighting of the models produce a UNE loop rate that is fair, just, sufficient and reasonable.

B. Switching Inputs

1. Switch investment

450 Verizon and AT&T each take a different approach to determining an appropriate level of switch investment to incorporate in their cost models. The two-fold issue with Verizon's switch investment proposal is the level of discount to apply and the mix of old and growth lines to assume in the model. The issue with AT&T's investment is the vintage of the switch investment data that AT&T incorporates in its model.

---

[346] *UT-960369, 17th Supp.* ¶ 528.
[347] *UT-960369, 8th Supp.* ¶ 348.
[348] *See ARMIS report 43-08*, row 580.
[349] *Id.*
[350] We recognize that due to the growth of multiplexed lines, the increase in facilities is less than the increase in DS0 equivalents. *See UT-960369, 8th Supp.* ¶199
[351] *See Appendix A.*

451 Switches are priced in a manner that is similar to new car pricing—there is a manufacturer's suggested price, but few units are actually sold at that price. Instead, consumers negotiate a discount on the sticker price. In both markets, consumers are likely to pay different prices based on purchasing power and negotiating skill.

452 Determining the appropriate discount on switch prices that should be incorporated into Verizon's model is complicated by the fact that the switch discount is not easily observed. It can be different for each firm, and it can vary within a single firm with each purchase made.[352] Verizon claims to have used the actual switch discount that it will likely receive when purchasing the latest available digital switching technology in the future.[353]

453 In addition, Verizon's switch investment is influenced by the mix of new and growth lines assumed by Verizon's model. Although some ILEC contracts have the same price for both new and growth lines,[354] ILECs often face higher per-line costs for growth than they do for new investments. Verizon's model assumes that a percentage of lines are purchased new, at a deep discount, and that additional lines are purchased at a lesser discount to satisfy increases in demand.

454 Verizon contends that its methodology represents the most accurate indicator of forward-looking costs, and has been ratified by the FCC, which has concluded that predictions based on information other than current contracts would be inherently inaccurate.[355]

455 AT&T switch modeling sidesteps the discount-and-equipment mix issues because it relies on the FCC's USF Inputs Order[356] for switch inputs. The USF inputs were

---

[352] *Ex. 201TC* at 85-87; *Ex. 304C*
[353] *Id.*
[354] *TR. 965.*
[355] *See, Joint Application by SBC Communications Inc., Southwestern Bell Telephone Company, and Southwestern Bell Communications Services, Inc. d/b/a Southwestern Bell Long Distance for Provision of In-Region, InterLATA Services in Kansas and Oklahoma,* 16 FCC Rcd 6237(2001), ¶ 77.
[356] *USF Inputs Order,* ¶¶ 286-323.

derived from data reflecting actual switch purchases for which a discount was already included. AT&T notes that the extensive efforts undertaken by the FCC to develop these switch-cost investment inputs are described in detail in the USF Inputs Order. AT&T maintains that the information relied on by the FCC included information gathered on a nationwide basis from a variety of carriers regarding the cost of switches of various sizes and the discounts that those carriers received from their switching vendors. The chief problem with AT&T's inputs is that significant adjustment is required to make them forward looking, since they are approximately 10 years old.

456 According to AT&T, Verizon's approach to calculating the switch discount is unreasonable and based on an erroneous interpretation of TELRIC principles. AT&T claims that Verizon essentially proposes that its existing switches remain in place, and that future switch purchases will largely be growth additions. AT&T maintains that Verizon's proposal is inconsistent with the assumption that—but for the wirecenter locations—Verizon's network is rebuilt using the least-cost, most efficient, forward-looking technology available. AT&T argues that the assumption of a complete network rebuild necessarily includes replacing most, if not all, existing switches with the most current models available that are sized to serve a reasonable estimate of anticipated demand.

457 AT&T claims it is not surprising that Verizon's calculations result in switch investments that are more than double the amounts that Verizon and other ILECs pay for switches on a per line basis. AT&T maintains that while Verizon agrees that switch prices are declining, it proposes switch investments that are radically higher than current prices.

458 According to AT&T, Verizon's assumption that switch investment will consist largely of growth additions, rather than new switches, artificially increases costs because Verizon assumes that it receives substantially lower discounts from its vendors for growth additions than the discounts available for new switches. AT&T claims that Verizon's own witnesses and data refute such an assumption. For example, Verizon testified that Nortel applies the same discount to all switching

equipment, regardless of whether it is a new switch or a growth addition.[357] Thus, AT&T argues that the record demonstrates that Verizon's assumptions about the relative cost of growth additions are incorrect.

459 Verizon argues that vendors only offer the very deep new-switch discounts because they expect carriers to purchase a much larger percentage of growth additions, which are not discounted. Thus, if a carrier attempted to purchase all, or most, of its switching capacity at new-switch prices, vendors would have no choice but to reduce the discount levels for new switches from those they offer today. Furthermore, Verizon claims that AT&T's all new approach conflicts with the FCC's pronouncement that such an assumption is not required under TELRIC and would in fact understate forward-looking costs.[358]

460 Verizon claims HM 5.3's switch-cost estimates are uneconomically low for the following reasons. First, contrary to the purchasing patterns of actual carriers, who buy some new equipment purchased at deep, new-equipment discounts and other equipment purchased at less generous growth discounts, HM 5.3 incorporates the FCC's switch-cost inputs, which assume that all equipment is purchased new. Second, Verizon argues that HM 5.3's switch inputs are based on old data that are not representative of current switches because the following costs are allegedly excluded: (1) costs associated with capabilities such as ISDN,[359] SS7,[360] and CLASS[361] and (2) costs for OC-3/DS-1 add-drop multiplexing (ADM) equipment. Finally, Verizon claims that HM 5.3 incorrectly reduces switching costs by an additional $30 per line to account for an "analog line offset," even though the FCC rejected this proposal in its USF Inputs Order.

---

[357] *TR 965.* AT&T maintains that although the witness could not specifically identify the equipment included in the list of vendor equipment that Verizon has purchased, at least one item that could have been a growth addition had a discount that vastly exceeded the overall discount that Verizon assumed in its cost study. *See also TR 961-64; Ex. 304C* at 10 (top line) & 96.

[358] *Verizon Communications, Inc. v. FCC*, 535 U.S. 467, Reply Brief for Petitioners United States and FCC, (2002), 2001 WL 881216, at 9 n.7.

[359] Integrated Services Digital Network.

[360] Signaling Service 7.

[361] Custom Local Area Signaling Services

461 According to Verizon, AT&T's analysis, which purports to show that Verizon's calculations result in investments per line that are more than double actual costs, relied on a select number of new switch purchases that do not represent the costs Verizon will actually incur. In addition, Verizon claims that AT&T failed to provide any explanation or support for the per-line investment for the other ILEC switches in its analysis. Verizon contends that this lack of documentation precludes scrutiny of the particular circumstances or contracts associated with these alleged switch purchases.

462 ***Discussion and decision.*** We cannot accept the switch investments of either party as proposed. A significant number of the switch investments in Verizon's study[362] are associated with growth or upgrades, rather than new switches. Verizon's witness asserted that he could not differentiate between the study's new and growth investments, because the study did not distinguish prices for Verizon's purchases in that regard.[363] Thus we are unable to adjust Verizon's switch investment figures to better reflect our conclusion that under TELRIC, the majority of switch purchases assumed for switching rates should be associated with new switches rather than growth upgrades.[364] Verizon's proposed switching rate proposal suffers because of this failure to disaggregate purchase prices for its switches, provision of inadequate documentation to support additional charges for switch features,[365] and because Verizon failed to timely provide information to the other parties regarding the SCIS model, as we discussed earlier in this order.[366] For these reasons, we reject Verizon's switching model and the resulting switching rate proposal. We expect that in future cases, Verizon will provide documentation identifying disaggregated discounts for its new and upgrade switch investments.

463 AT&T's switch cost estimates, based on the FCC's USF Inputs Order data, are not fully representative of current switches, because the switches associated with the FCC analysis are possibly of a different vintage than would be deployed today.

---

[362] *Ex. 304C.*
[363] *TR 964.*
[364] *TR 936.*
[365] Part VIII, Model Inputs, Section B. Switching Inputs, Number 2, Vertical switch features.
[366] Part V, Verizon's Cost Model – VzCost, Section D, Verizon Switching Model.

However, we find that AT&T's switch investment estimates are more in line with TELRIC network building assumptions because the FCC USF Inputs Order switch inputs assume the installation of all new switches. We believe that the problematic vintage of the FCC switch inputs information can be adequately addressed by updating the FCC's Inputs with the Turner Price Index provided by Verizon pursuant to bench requests issued subsequent to the hearing.[367] For purposes of setting UNE rates in this case, we adopt AT&T's switch investment estimates and update them by applying the Turner Price Index.

2. Vertical switch features

464 Verizon proposes to recover costs for vertical switch features that allegedly require specific hardware (*e.g.*, the three-port conference circuit for the three-way calling feature) through separate monthly port additive charges.

465 AT&T claims that its proposed switching rates are consistent with the Commission's 8th Supplemental Order[368] because they include the costs of all features. AT&T maintains that neither the law nor the record supports Verizon's separate monthly port additive for features. AT&T argues that the FCC has expressly concluded that vertical features are part of the functionality of the switch and that allowing new entrants to purchase switching and vertical switch features as part of the local switching UNE is integral to Congress's intent to promote competition. AT&T asserts that the FCC expressly included Call Waiting, Three-Way Calling, Remote Call Forwarding, and Caller ID among the vertical features that are included in the local switching UNE, and thus Verizon's proposal to charge separate rates for these features is contrary to federal law.[369]

466 Verizon claims that AT&T ignores the Commission's suggestion in the 8th Supplemental Order that a separate charge for a vertical feature could be imposed if

---

[367] Verizon supplied the Turner Price Index to the Commission and the parties pursuant to a Bench Request issued on November 30, 2004, and herewith numbered Bench Request No. 21. Verizon supplied the Turner Price Index for the period 1946 through 2004.
[368] *UT-960369*, ¶ 281.
[369] *Local Competition Order*, ¶ 816.

the ILEC could show the degree to which the service provided by the feature would require more investment than ordinary voice services. Verizon asserts it has provided significant documentation to that effect.

467 AT&T believes that Verizon's proposal lacks factual support because Verizon's testimony does not identify the unique hardware that it contends is necessary to provide these features, much less justify the need for, or price of, such hardware. AT&T claims that Verizon was not able to identify any "features" hardware or prices among the equipment included on the lists of switching equipment that Verizon recently purchased from its vendors. According to AT&T, the only references to the hardware or its cost are in Verizon's SCIS model documentation.

468 AT&T claims that the FCC's Wireline Competition Bureau[370] rejected the same Verizon proposal under virtually identical circumstances. AT&T recommends that this Commission do the same.

469 ***Discussion and decision.*** We have reviewed the documentation[371] provided by Verizon that purports to justify its proposed separate charges for certain vertical switch features. We conclude from our review that Verizon has failed to adequately identify the "unique" hardware required by these features, or the prices for that hardware. We reject Verizon's vertical feature switch charges and reiterate our holding in the 8th Supplemental Order that, should Verizon be able to present to us in a future case adequate support for similar vertical feature charges, we will consider them. Verizon's failure to provide adequate documentation for its vertical switching cost estimates was an additional factor that led us to conclude in the previous section of the order that the pricing of the switching should be based on HM 5.3 outputs.

---

[370] *Virginia Arbitration Order*, ¶ 492.

[371] *Ex. 228TC* at 88 and CD No. 2 of 5. *See also Verizon reply brief* at 55.

3. Umbilicals/SS7

470 An umbilical is a link between a host switch and a remote switch.[372] SS7 is a signaling system that monitors the status of a line, indicates the arrival of an incoming call, and transmits routing and destination signals.[373] Verizon claims it is appropriate to include costs for umbilicals and SS7 in its proposed switching rates. AT&T argues that these are not properly recovered through switching rates and should instead be recovered through transport rates.

471 Verizon contends that a remote switch module has no central processor and depends on the host switch for all processing of calls that travel through the remote. Thus, contrary to AT&T's claims, the umbilicals are not transport facilities, but are simply intra-switch links that provide functions like the links that connect switch peripherals and the central control units located in the same physical building. For this reason, Verizon asserts that umbilical costs are properly recovered through UNE switching rates.

472 Verizon also included signaling costs in its proposed usage-sensitive switching rates. According to Verizon, "Out-of-band" signaling, performed on the SS7 network, checks ahead to ensure that the called party is available before setting up the circuit-switched path through the network, and is therefore an integral part of switching services.

473 ***Discussion and decision.*** Verizon's Panel Rebuttal testimony[374] provides a convincing explanation of how umbilicals work and why these costs are not transport-related, even though the facilities appear to be similar to transport facilities. Unfortunately, Verizon did not identify how this change should be implemented. Therefore, we require Verizon to submit the calculations implementing this change as part of its compliance filing.

---

[372] *Verizon initial brief* at 114.
[373] *Newton's Telecom Dictionary, 15th Expanded Edition.*
[374] *Ex. 228TC* at 83.

474 We also conclude that SS7 functions are central to switching and that SS7 costs should be recovered through switching rates rather than through transport charges. Moreover, we find it appropriate that SS7 costs be recovered in the usage-sensitive switching rate, not the flat port rate, since signaling is dependent on traffic levels.

4. Minutes of Use

475 To calculate its usage-sensitive rates, Verizon assumes 2,000 monthly minutes per line. Although AT&T originally disputed this calculation, Verizon clarified that because the FCC eliminated the obligation that ILECs measure Dialed Equipment Minutes (DEMS) in their Automated Reporting Management Information System (ARMIS) filings, the total DEMS on ARMIS reports filed after this change have been frozen at year-2000 levels. Since Verizon is still required to file updated switched-access line counts in its annual ARMIS reports, AT&T mistakenly divided total DEMS in 2000 by the number of switched access lines in 2003. Verizon claims that because switched access lines have been steadily declining since 2000, this mismatch overstated the total annual minutes per line.

476 AT&T acknowledged the mismatch noted by Verizon and revised its testimony to use only data from the year 2000.

477 This issue has been resolved[375] and no Commission action is required.

C. TRANSPORT

478 Transport is the UNE that consists of trunks carrying calls from one central office to another or between switching systems. The parties dispute the appropriate fill factor for fiber transport and the proper level of installation costs for DLC transport facilities.

---

[375] We have implemented the changes described in Verizon's December 29, 2004, response to Bench Request No. 26 to modify HM 5.3 to correct for AT&T's error.

1. Fiber fill factor

479 According to Verizon, its transport cost model assumes bi-directional line switched SONET[376] rings to provide Inter Office Facility (IOF) transport between Verizon wirecenters. Verizon then uses a capacity costing approach to estimate the forward-looking costs of providing IOF transport. Verizon asserts that its methodology identifies the costs per unit of capacity for typical network configurations used to provide service, rather than trying to determine the total cost of the network used to provide those services. The estimated cost per unit of capacity is then divided by a utilization factor to take into account the cost of spare capacity on the network.

480 AT&T maintains that Verizon's transport cost model is flawed because the fiber fill factor is too low. According to AT&T, in the USF Inputs Order the FCC recognized that a 100% fill factor is appropriate for fiber. AT&T recommends that a 100% fill factor should be used in Verizon's cost model.[377]

481 Verizon claims that AT&T's only support for its proposed 100% fill factor is that the FCC adopted this input in the USF Inputs Order. Verizon maintains that the both the FCC and this Commission have since made clear that a 100% fill factor is inappropriate. According to Verizon its proposed fill factor reflects the fact that spare fiber facilities are absolutely essential for administrative and maintenance purposes, such as preventing ribbon failures and allowing for the staging of necessary splicing for cable movements and rearrangements, and to account for breakage.

482 ***Discussion and decision.*** We acknowledge that in a prior order we rejected a proposal to use the 100% fiber utilization rate adopted in the USF Inputs Order.[378] However, our decision to reject this input was specific to the model and to the record before us in that case, and not, as Verizon suggests, because the input is

---

[376] Synchronous Optical NETwork—a family of fiber optic transmission rates created to provide the flexibility needed to transport many digital signals with many different capacities. *Newton's Telecom Dictionary, Updated 15th Expanded Edition.*

[377] *USF Inputs Order*, ¶¶ 98, 208.

[378] *UT-003013, 32nd Supplemental Order*, ¶ 205.

inappropriate for estimating the cost of UNEs. Thus, our earlier decision on the issue does not now foreclose us from using a 100% fill factor if it is appropriate, based on the record, to do so. We further address fiber-fill rates in the inputs section of this order, where we approve the 100% fill factor used in HM 5.3.[379]

2. DLC multiplexer installation cost

483 AT&T also finds fault with Verizon's transport study, because it uses the same type of linear loading factors it applies to DLCs to estimate the costs for installing add/drop multiplexers and other equipment required to provide interoffice transport. AT&T maintains that applying linear loading factors rather than providing a bottom-up study of costs fails to reflect the economies of scale that are associated with reconstruction of the transport network. AT&T recommends that the Commission reject Verizon's linear loading factors when determining transport costs.

484 Verizon argues that AT&T's criticism of the loading factors used in Verizon's transport study is without merit and also untimely, because it was raised for the first time in AT&T's post-hearing brief. Verizon complains that AT&T asks the Commission to reject Verizon's linear loading factors but fails to offer an alternative.

485 ***Discussion and decision.*** We find that Verizon's use of linear loading factors for DLC installation costs is reasonable. We agree with Verizon that AT&T's criticism of the linear loading factors used in the transport study is untimely. In addition, AT&T's bottoms-up approach to installation costs relies on estimates by a team of experienced outside plant experts. This is the same type of subject matter expert (SME) opinion testimony that is contrary to our previously expressed preference for inputs based on hard data.[380] We reject this type of evidence here, as we did earlier in this order.

---

[379] *See* Part VIII. Model Inputs., Section A. Loop Inputs, 5. Fill Factors, f. Interoffice fill.

[380] *UT-003013, 32nd Supplemental Order,* ¶ 124; *42nd Supplemental Order,* ¶¶ 46-70.

D. Other UNEs

486 Consistent with the Commission's revised issues list appended to the 21st Supplemental Order in this docket, Verizon also proposed rates for four-wire analog loops, copper and multi-unit dwelling subloops, ISDN loop extenders, dark fiber, high-capacity DS1 and DS3 loops, intrabuilding riser cables, and NIDs. Verizon claims that no party has filed testimony challenging any of these rates, except for DS1 and DS3 loops, and NIDs.

1. DS 1/DS 3 Loops

487 According to Verizon, it has identified numerous problems with AT&T's proposed rates for DS-1 and DS-3 loops. Verizon argues that AT&T has inappropriately excluded from its cost and demand estimates those DS-1s that are currently provisioned on an all-fiber basis, thereby inappropriately excluding millions of dollars in investment and costs, as well as thousands of units in DS-1 demand, from its DS-1 UNE cost estimates. Verizon claims that while DS-1 and DS-3 loops are the only high-capacity loops for which costs are being developed in the instant proceeding, the existence (or absence) of other high-capacity loops (*e.g.*, OC-3, OC-12, OC-48, and OC-192), and their associated equipment, has a profound effect on the way in which the DS-1 and DS-3 loops are modeled and costed. Verizon asserts that completely fiber-based DS-1 and DS-3 loops are generally provisioned as part of loop systems with much higher capacities, and typically use the same fiber strands as other high-capacity loops and loop systems. Verizon maintains that only by accounting for the total capacity of these loop systems (which HM 5.3 allegedly fails to do) can accurate DS-1 and DS-3 UNE costs be developed.

488 Verizon claims that HM 5.3 lacks demand information relating to the total quantities of the specific types (*i.e.*, speeds) of high-capacity loops ordered by Verizon's customers, and to the location for this demand. Verizon maintains that this type of information is essential to properly sizing, designing, and costing the loop systems from which the DS-3 and DS-1 loops, and their associated costs, are derived. As such, Verizon argues that HM 5.3 essentially guesses at where these high-capacity

services are located, and in the process significantly underestimates the facilities and equipment needed to provision the DS-1 and DS-3 loops being modeled.

489 According to AT&T, Verizon incorrectly claims that no party has filed testimony challenging any of the additional elements for which Verizon has proposed prices. AT&T claims that all of the elements that Verizon lists, in whole or in part, raise the same problematic issues as unbundled loops raise.

490 Regarding HM 5.3's estimation of DS1 and DS3 loop costs, AT&T asserts that Verizon does not even attempt to specify the adjustments that Verizon believes would be required, much less quantify the effect on the model if any such adjustments were made. AT&T claims that Verizon's failure to do so means that the effect would be minimal, given that Verizon did quantify other proposed adjustments if they were significant. Furthermore, AT&T maintains that these factors are user-adjustable in HM 5.3, so the Commission can make whatever adjustments, if any, it believes should be made.

491 ***Discussion and decision.*** We conclude that the parties' presentations on this issue were insufficient to permit us to make a decision. However, to the extent we have adopted specific inputs and assumptions with respect to loops, or general network design, that have an effect on other UNEs in this proceeding, we have relied on the cost models to pass through the changed inputs and assumptions so that all UNEs are treated uniformly.

IX. RATE STRUCTURE

A. Loop-Rate Deaveraging

492 In the first cost docket, the Commission ordered that UNE loop rates in Washington be deaveraged into five rate zones.[381] This loop-rate deaveraging is still in effect.

---

[381] *See UT-960369, 24th Supplemental Order,* ¶ 81.

493 Verizon asserts that the FCC's Local Competition Order found that a cost-based deaveraging plan that contains three zones is "presumptively sufficient to reflect geographic cost differences in setting rates for interconnection and unbundled elements."[382] Verizon's argues that its three-zone deaveraging methodology reflects these principles, and produces density zones that, to the greatest extent possible, share common cost characteristics.[383]

494 Verizon explains that to determine its rate zones, it first identified a significant break in the wirecenter costs, beginning with the LATAH wirecenter, so it placed that wirecenter and the 17 others with higher loop costs in density Zone 3. Verizon then split the remaining 81 wirecenters in Washington into density Zones 1 and 2 in a manner that minimizes the line-weighted root mean square error (RMSE) measure of dispersion.[384] By using this method, Verizon claims to have minimized the dispersion from the average, per-line cost in each density zone.

495 AT&T also proposes three-zone deaveraging. AT&T established its rate zones by using an algorithm that minimizes the overall weighted averaged deviation divided by the mean for the three deaveraged zones. AT&T's approach compares average deviations relative to the average zone loop cost, rather than simply relying on the deviation by itself. AT&T claims that because high cost wirecenters have by their nature higher deviations (whether absolute or squared), taking into account this deviation dependency on underlying costs will create deaveraged zone costs that more closely reflect the underlying wirecenter costs.

496 Staff recommends that the Commission maintain the current five-zone deaveraging and proposes an updated five-zone deaveraged loop-rate structure that is calculated by weighting the sum of squared errors across all zones.[385] This is the same RMSE

---

[382] *Local Competition Order,* ¶ 765.

[383] However, if the Commission opts for a five-zone proposal, Verizon has also proposed a five-zone rate structure using the RMSE methodology described in its testimony.

[384] Mean Square Error or MSE(c) is a weighted average of the squares of the difference between the calculated mean cost "c" and all other cost estimates with the relative frequencies as the weight factors. Thus, the best measure of the center, relative to this measure of error, is the value of c that minimizes MSE. The root mean-square error, RMSE, is the square root of MSE.

[385] *Ex. No. 1104.*

methodology Verizon uses for zones 1 and 2. Staff maintains that deaveraging loop prices into five zones reflects a balance between price accuracy and administrative convenience. While recognizing that the prices for Zone 5 are high, Staff recommends that the Commission address any concerns it may have about those prices through Universal Service policy, not by including additional, lower-cost wirecenters into Zone 5.

497 AT&T claims that because the purpose of creating deaveraged rates is to ensure that loop costs are more reflective of the underlying cost in each wirecenter, minimizing actual loop-cost differences is superior to Verizon's nonmathematical method and to Staff's method that seeks to minimize the square of the deviations.

498 Verizon contends that AT&T's approach produces a strong bias towards minimizing the dispersion in the lower cost zones, and as a result, leads to relatively fewer wirecenters and lower UNE rates in these zones, while virtually ignoring the much higher disparity among costs in zones with the higher-cost wirecenters. Verizon also claims that AT&T's proposed rates are unreliable because its proposed Zone 1 lacks enough wirecenters to be statistically reliable.

499 According to Staff, while AT&T assigned wirecenters to zones in an unbiased manner (by minimizing weighted errors), it introduced a bias into its method by dividing the error by the average cost within the zone. This allegedly gives more accuracy to the rates in Zone 1, relative to Zone 5, and results in the assignment of more wirecenters to the high-cost zones, and fewer to the low-cost zones, which skews prices downward across all zones, without affecting the weighted average loop price.

500 ***Discussion and decision.*** We adopt the deaveraging methodology proposed by Staff. The existing loop-rate structure consists of five zones. Neither Verizon nor AT&T has provided convincing reasons for using a three-zone structure. We are persuaded that AT&T's approach should be rejected because it biases costs downward. We also reject that part of Verizon's proposal to "eyeball" the data in

order to separate the rate zones. Staff's mathematical approach is sound and consistent with our decision on the issue in the first cost docket.[386]

B. Switching Rate

501 The primary issue in dispute here is whether Verizon should charge CLECs a flat port rate plus a per-minute of use (MOU) rate for the switching UNE. This rate structure has been in effect for some time and Verizon recommends that the Commission retain it. The flat port rate is intended to cover the cost of terminating an access line on a switch. The per-MOU rate is designed to recover the traffic-sensitive cost of using the switch.

502 AT&T and Staff contend that there should no longer be a traffic-sensitive rate. AT&T and Staff propose recovering all of the costs of local switching on a flat-rated basis through a port charge, rather than the traditional port-plus-MOU rate structure.

503 Staff maintains that a port charge that includes a flat-rated usage charge is consistent with an earlier Commission decision where the Commission stated that a flat-rate capacity charge would better reflect the cost structure of the telecommunications network.[387]

504 Verizon claims that significant portions of switching resources *are* traffic sensitive, and that recovering those costs through MOU rates ensures they are recovered in the manner in which they are incurred, that is, based on each carrier's proportionate amount of usage.

505 According to Verizon, when a new switch is planned, engineers account for the estimated usage they expect the switch to experience. Verizon claims that the traffic-sensitive parts of the switch are those that have usage capacity limitations, including the switch periphery, switch fabric, and switch processor, among others. Verizon

---

[386] *UT-960369, 24th Supplemental Order*, ¶ 81.

[387] *UT-960369, 17th Supplemental Order, August 30, 1999*, ¶ 421.

notes that AT&T's witness agreed that carriers purchase switches with different capacity levels, according to specific forecasts for demand at a given location, and that switches with greater capacity cost more.[388]

506 Verizon maintains that simply because usage estimates are made before deployment does not demonstrate that switching costs are not usage-sensitive or that Verizon will not incur additional costs based on increases in usage. Verizon acknowledges that these costs are often incurred once and prior to deployment, but, in some cases, upgrades and additional capacity may be needed to account for higher-than-expected usage. Absent these additions, call blocking may occur.

507 According to Verizon, the notion that switching costs are usage-sensitive is also supported by the fact that switch vendors have included tools in their switches to monitor capacity, and to identify and prevent capacity from being exhausted. Furthermore, Verizon allegedly uses an in-house tool that requires employees to enter usage-related information, monitor the amount of traffic-sensitive resources on a switch, and determine when additional equipment is needed. Verizon claims that if switches were not usage-limited, none of the extensive monitoring and planning procedures noted above would be necessary. Verizon maintains that despite these planning tools, it has experienced situations where the capacity of traffic-sensitive switch resources were exhausted or nearly exhausted

508 AT&T argues that setting prices for unbundled local switching on a flat-rated basis is appropriate, because such a pricing structure most closely reflects how Verizon incurs switching costs. According to AT&T, it is undisputed that when Verizon purchases a switch, it pays for that switch and equipment on a flat basis. That is, Verizon does not make ongoing payments to the switch vendor that depend on how much the switch is used. Given that Verizon pays once for its switches based upon the full capacity of those switches, AT&T believes that there is no reason CLECs should have to pay more, depending on how much *their* consumers use the switch, in order to obtain access to the same capacity.

---

[388] *TR 1122.*

509 AT&T contends that the usage-based price component of local switching is an historical artifact, held over from switching cost studies developed to justify rates under rate-of-return regulation. AT&T maintains that there is no technical justification for recovering UNE local switching costs on a per-MOU basis. AT&T notes that the WCB and a number of other state commissions have agreed that local switching costs should be recovered on a flat-rated basis.

510 AT&T argues that regardless of the initial cost of the switch, unless there is evidence that Verizon must pay its vendors a separate charge for each minute that the switch is used, it is unreasonable to assess CLECs with such a charge. AT&T contends that Verizon has presented no such evidence in this case. Indeed, AT&T claims the evidence, including Verizon's switching vendor invoices, is precisely to the contrary.[389]

511 AT&T criticizes, as unsupported and irrelevant Verizon's claim that it may have to purchase additional equipment and incur greater costs to account for increased usage. AT&T maintains that Verizon failed to present any evidence that the traffic thresholds for which Verizon's switches in Washington have been designed have been, or are even likely to be, exceeded. AT&T claims, to the contrary, that Verizon conceded that none of its switches in Washington have exhausted their capacity, nor could Verizon's witnesses provide any details on the three switches whose capacity allegedly was exhausted in Virginia and New Jersey. AT&T notes that Verizon even took issue with AT&T's usage calculations because they did not reflect recent decreases traffic that Verizon has experienced since 2000. AT&T asserts that this trend is likely to continue, given the increasing popularity of DSL, cable modems, and wireless modes of competition, all of which reduce traffic on Verizon's circuit switches.

512 According to Verizon, because a flat-rate structure requires all users to pay the cost of an average customer's usage level regardless of their actual usage levels, such a rate structure would violate the principle of cost causation and create artificial and inefficient subsidies. As a result, carriers who have customers with higher-than-

average usage would allegedly avoid paying their fair share of traffic-sensitive switching usage costs while carriers with low-volume customers would pay for more than their fair share and effectively subsidize the high-volume customers. Verizon claims that because CLECs such as AT&T generally serve high-volume customers, the failure to allocate usage-sensitive costs to AT&T's high-volume customers would provide AT&T an unfair subsidy and allow AT&T to serve those customers without bearing the full costs of doing so. Verizon also claims AT&T has recently announced that it will serve only higher-usage business customers.

513 Verizon maintains that although AT&T now claims that modern switches are limited only by the number of lines that they can serve, and not by processor or switch fabric capacity, AT&T's witnesses acknowledged that AT&T has traditionally advocated the combined port and per-MOU rate structure for unbundled switching, and that AT&T has recognized that some switching costs are traffic-sensitive. Verizon asserts that in the Virginia arbitration, for example, AT&T opposed a flat-rate switching structure because it "d[id] not properly align rates and costs."[390] Furthermore, Verizon contends that even AT&T's current model has an input for "Switch Traffic Limit," defined as the "maximum amount of traffic . . . the switch can carry in the busy hour."[391] Verizon argues that this contradicts AT&T's argument that switches are only port-limited.

514 Verizon claims that AT&T and Staff have failed to provide a valid reason to abandon the switching rate structure upon which the FCC and this Commission have traditionally relied. Verizon claims that Staff improperly ignores the per-minute usage rates set for switching in the 8th Supplemental Order in Docket No. UT-960369,[392] and instead points to a later order in that docket dealing with transport and termination pricing.[393]

---

[389] *Ex. 304C.*

[390] *See* Direct Testimony of Robert J. Kirchberger on Behalf of AT&T in the Verizon Arbitration proceeding, CC Docket Nos. 00-218, 00-251, at 15 (filed July 31, 2001).

[391] *See Ex. No. 856* at 96.

[392] *UT-960369, 8th Supplemental Order,* ¶ 498.

[393] *Id., 17th Supplemental Order* at 100.

515 ***Discussion and decision.*** We disagree with Staff's contention that a flat-rated usage charge is consistent with our earlier decision in the 17th Supplemental Order in Docket No. UT-960369. In UT-960369, the flat-rate charge was to be set to recover the peak-usage costs on the network. The rate was to reflect the cost of terminating a trunk on the switch during the peak demand period. The peak usage of an interconnecting carrier would determine the number of trunk terminations required on the switch. Hence, the charges to a CLEC would have properly recovered the costs that were associated with the carrier's traffic.[394]

516 In this proceeding, AT&T and Staff have instead proposed a flat-rate charge to recover customer-related usage-sensitive costs. The same charge would apply regardless of whether the CLEC customers were low—or high-usage subscribers. This proposed rate structure fails to meet the objective of aligning rates with costs.[395] We believe that the correlation is higher between peak cost responsibility and a per-minute rate, than between a flat-rate charge and usage-sensitive costs, where the bill to the user is independent of usage. By definition, if the usage charge to all customers is the same, the correlation between responsibility for peak costs and charges is zero. But with a per-MOU rate, intensive users of the network will pay more, and the payments will be better correlated, in a wholesale environment, with responsibility for peak usage costs than a flat-rated charge.

517 In addition, we are not persuaded that because Verizon makes no additional payments to the vendor once the switch is installed, a flat usage rate is required. With most investments, once the facilities are installed, no additional payments are made to the vendors. For example, once an interoffice fiber cable is buried in the ground, no additional payments are made to Verizon's cable vendor. This doesn't negate the fact that interoffice traffic was the activity that caused Verizon to build the facility. The timing of the payments does not affect the cause of the costs.

---

[394] *Id.*, ¶¶ 410-424.

[395] "Traffic sensitive investments should be recovered from traffic sensitive rate elements." *UT-960369, 8th Supp.*, ¶ 290.

518 In summary, we approve Verizon's flat-rate plus usage-sensitive switching rate proposal. We do not find convincing the arguments in favor of a flat-rate-only switching rate structure. A switch engineered to handle higher-peak usage costs more than a switch designed to service a lower-peak traffic volume. Given that switches are designed to accommodate certain levels of busy-hour traffic, and that this capacity is both finite and shared, it is appropriate to recover the cost of this usage-sensitive investment through a usage-sensitive rate structure.

C. Switching Rate Deaveraging

519 As discussed above, AT&T and Staff propose a flat rate for switching. In addition, Staff also proposes that the flat switching rate be deaveraged by zones, similar to its deaveraging proposal for loop rates. Staff witness Spinks recommends deaveraging of switching rates, based on his perception of "material differences in costs between zones."[396]

520 Verizon and AT&T each oppose switch rate deaveraging.

521 ***Discussion and decision.*** We decline to deaverage switching rates. Staff offered no persuasive justification for its proposal. It is not clear on this record that cost differences across zones are t sufficiently different so as to support deaveraging.

D. Reciprocal Compensation

522 The only issue disputed by XO and Pac-West (referred to herein as XO) is the reciprocal compensation rate for the exchange of local traffic. XO contends that the Commission should establish a per-MOU reciprocal compensation rate based on the entire cost that Verizon incurs to provide local and (as applicable) tandem switching. XO argues that the Commission used just such a methodology to establish Verizon's current reciprocal compensation rates, as well as to establish the

---

[396] *Exhibit 1065T* at 16.

reciprocal compensation rates for local traffic exchanged with Qwest, and that nothing in the record in this docket justifies departure from that methodology.

523 XO opposes Verizon's proposal to establish a reciprocal compensation rate that is significantly lower than the rate Verizon proposes for UNE local switching. According to XO, Verizon attempts to justify its proposal by claiming that the additional cost-recovery standard for reciprocal compensation under Section 252(d)(2) is different from the UNE cost-recovery standard in Section 252(d)(1).[397] XO notes that it is Verizon's position that the "additional costs" to be recovered through reciprocal compensation do not include "getting started" switching investments, such as "switch processor and memory, test equipment, maintenance equipment, office spares, and other miscellaneous equipment."[398] XO claims that Verizon's proposal finds support in neither the law nor the record.

524 XO argues that Verizon provided no empirical basis for determining that the level of reciprocal compensation does not affect switching "getting started" costs. XO claims that a Verizon switching panel witness testified that Verizon does not even know the number of reciprocal compensation minutes that cross Verizon's switches in Washington, but rather conceded, "If you were to remove reciprocal compensation traffic from the traffic mix, certainly the demand would go down and this may require less resources, because you're building a smaller switch."[399] Thus, XO maintains that Verizon agrees that it would incur lower "getting started" costs, which therefore must be considered "additional costs" to be recovered in reciprocal compensation rates.

525 XO argues that the methodology that Verizon uses to determine overall switching costs is also inconsistent with Verizon's proposal because Verizon determines such costs by dividing the total switching investment by the total number of minutes—including local, toll, and reciprocal compensation minutes – that cross Verizon's switches. According to XO, Verizon concedes that because it calculates the same

---

[397] *Ex. 201TC* at 94-95.
[398] *Id.* at 95, n. 43.
[399] *TR 916.*

cost for every minute of use, Verizon would under-recover its switching costs by charging a lower rate for reciprocal compensation. XO maintains that Verizon simply shrugs off this loss.[400] XO asserts that Verizon is not nearly so complacent when it comes to allegedly under-recovering costs through UNE rates. Indeed, Verizon claims that any UNE rates that are substantially lower than those proposed by Verizon would result in the taking of Verizon's property without just compensation. Because reciprocal compensation rates the Commission establishes will also apply to payments that Verizon must make to CLECs, XO maintains that Verizon obviously derives a benefit from reciprocal compensation rates that are substantially below Verizon's costs.

526 XO recommends that the per-MOU charge that Verizon proposes for UNE local switching should be used as the reciprocal compensation rate, regardless of the Commission's determination of the appropriate rate structure for UNE local switching. XO claims that every intercarrier compensation mechanism is structured on a per-MOU basis, including compensation for ISP[401]-bound traffic and both intra- and inter-state switched access. XO argues that reciprocal compensation for the exchange of local traffic should use the same structure to ensure competitive neutrality, as well as to minimize potential arbitrage opportunities. XO claims that other state commissions that have adopted flat-rate for UNE local switching have maintained per-MOU reciprocal compensation rates.[402]

527 Verizon responds that XO did not provide any testimony to support its recommendations and that it raised its reciprocal compensation proposal for the first time in its post-hearing brief. Commission Staff and AT&T did not address this issue.

528 ***Discussion and decision.*** We reject XO's proposal to align the per-MOU reciprocal compensation rates for local and tandem switching with the UNE switching rate established in this proceeding. XO's proposal was not properly supported on the

---

[400] *TR 913-914.*

[401] Internet Service Provider

[402] *XO Brief* at 1-3.

record, nor timely raised in this proceeding. Moreover, we agree with Verizon that the Act makes a distinction between switching and termination rates.[403] The Act allows the price of call termination to be lower than the cost of ordinary switching. Termination involves a call originating on another carrier's switch and terminating on the ILEC's switch. The Act indicates that this activity can be priced at the incremental cost of service with no markup for common or shared costs.[404] On the other hand, if the call originates and terminates on the ILEC's switching platform, via UNE-P, the price can be the incremental cost of switching plus a common and shared cost mark-up.[405]

X. TAKINGS

529 The Fifth Amendment of the United States Constitution prohibits the government from taking private property for public use without fairly compensating the owner—hence the term "Takings Clause."[406]

530 Verizon asserts it has shown that AT&T's proposed UNE rates would fail to allow Verizon to recover its existing un-recovered investments, as well as the actual operating costs, that it incurs in providing UNEs. Verizon contends this would violate the U.S. and Washington Constitutions, and the Telecommunications Act.

---

[403] Sections 252(d)(1) requires state commissions to establish just and reasonable rates for network elements "(i) based on the cost (determined without reference to a rate-of-return or other rate-based proceeding) of providing the interconnection or network element (whichever is applicable), and (ii) nondiscriminatory, and (B) may include a reasonable profit."
Section 252(d)(2) applies to charges for transport and termination of traffic and requires state commissions to set such charges at just and reasonable rates so that "(i) such terms and conditions provide for the mutual and reciprocal recovery by each carrier of costs associated with the transport and termination on each carrier's network facilities of calls that originate on the network facilities of the other carrier; and (ii) such terms and conditions determine such costs on the basis of a reasonable approximation of the additional costs of terminating such calls.
We acknowledge that the Commission has reached different conclusions on this issue in the past. In Docket No. UT-003013 we set the termination rate equal to the UNE switching rate. *Thirty-Second Supplemental Order* at ¶92. However, in Docket No. UT-950200 the Commission found, consistent with Verizon's position in this case, that shared costs should not be included in the estimate of the incremental cost of a service.

[404] Section 252(d)(2).

[405] Section 252(d)(1).

[406] *Black's Law Dictionary, 7th Edition.*

Verizon claims that if the Commission were to adopt AT&T's proposed rates, they would result in a monthly loss to Verizon of $30.19 for every UNE-P and $19.80 per month for every UNE loop.

531 Neither AT&T nor Staff believes that the record in this docket has raised a takings issue.

A. Legal Arguments

532 Verizon asserts that this Commission is required under the 1996 Act to establish UNE rates that are just and reasonable, and that the U.S. Supreme Court has recognized that rates can be just and reasonable only to the extent they are compensatory.[407] Verizon maintains that the Supreme Court recently emphasized that the 1996 Act prohibits confiscatory UNE rates.[408]

533 Staff argues that UNE rates cause an unconstitutional taking only if the end result of the Commission's decision is confiscation of private property.[409] Staff asserts that the takings clause does not guarantee Verizon a profit,[410] nor is Verizon constitutionally protected from a loss.[411]

534 Verizon contends that constitutionally sufficient rates must provide not only for unrecovered past prudent investment, but also for all costs reasonably and necessarily incurred to provide the regulated service—including the operating costs that the regulated entity necessarily incurs. According to Verizon, when the government compels the ongoing production of service by a private party, the compensation provided must cover the unavoidable costs of producing that service.

---

[407] *See In re Permian Basin Area Rate Cases*, 390 U.S. 747, 769-70 (1968); *Federal Power Comm'n v. Natural Gas Pipeline Co.*, 315 U.S. 575, 586 (1942).

[408] *Verizon Communications, Inc. v. FCC*, 535 U.S. 467, 489 (2002) (The Act permits " novel rate setting designed to give aspiring competitors every possible incentive to enter local retail telephone markets, short of confiscating the incumbents' property").

[409] *Duquesne Light Co. v. Barash*, (Duquesne) 488 U.S. 299, 310, 109 S. Ct. 609, 102 L. Ed. 2d 646 (1989).

[410] *Federal Power Comm'n v. Hope Nat. Gas Co.*, 320 U.S. 591, 603, 64 S. Ct. 281, 88 L. Ed. 333 (1944).

[411] *See Market Street R. Co. v. Railroad Comm'n*, 324 U.S. 548, 565-67, 65 S. Ct. 770, 89 L. Ed. 1171 (1944) (a rate is not necessarily confiscatory even if it compels a regulated utility to operate at a loss).

In the case of UNEs, Verizon claims it will incur unavoidable operational and investment costs that the government is not constitutionally free to ignore.[412]

535 Verizon claims that the mere fact that rates might comply with TELRIC does not establish that those rates are constitutional. Verizon believes that this separate inquiry that the Supreme Court has recognized begins with the actual rates determined by the rate-setting methodology. Verizon contends the Supreme Court's holding in Duquesne confirmed that in conducting that analysis, recovery of prudent investment is the appropriate constitutional benchmark.[413]

536 AT&T claims that Verizon failed to support its legal theory that Commission adoption of any rates other than those that Verizon proposes will result in an unconstitutional taking of Verizon's property without just compensation. According to AT&T, based on the evidence that Verizon has presented, Verizon suggests that any UNE rate set below Verizon's calculation of its historic costs represents a taking. AT&T maintains that Supreme Court precedent would not support any such claim because the Court has already determined that a regulated entity must demonstrate that the company's operations as a whole—not a select few of its services—are unable to generate sufficient revenues to cover its prudently incurred costs.[414] AT&T contends that Verizon presented no such evidence in this case and thus cannot legitimately claim that any Commission action in this proceeding would constitute an unlawful taking of Verizon's property.

537 Staff maintains that Verizon has not discussed how any decision in this docket will affect the company beyond the UNEs at issue.

---

[412] *United States v. Pewee Coal Co.*, 341 U.S. 114, 117-18 (1951) ("When a private business is possessed and operated for public use, no reason appears to justify imposition of losses sustained on the person from whom the property was seized"); *United States v. General Motors Corp.*, 323 U.S. 373, 379-83 (1945) (holding that when property is occupied by government mandate, the owner is entitled to recover his actual costs based on his particular circumstances).

[413] *See also Duquesne* at 317 (Scalia, J., concurring).

[414] *Duquesne* at 310.

538 Verizon disputes AT&T's claim that Verizon must show that its operations as a whole are unable to generate sufficient revenues. Verizon claims that this argument fails for two reasons. First, Verizon asserts that relying on revenues earned by Verizon from other businesses to justify maintaining UNE rates that do not cover costs would violate the Act' s requirement that UNE rates themselves must be just and reasonable and based on cost. Second, Verizon claims that it is well established that a regulator may not rely on revenues from competitive services (or from other jurisdictions) to justify confiscatory rates for the regulated services subject to its jurisdiction. Verizon maintains that the Supreme Court has expressly acknowledged that a "particular, actual TELRIC rate" can be challenged on the ground that it is confiscatory.[415]

B. Cost Evidence

539 Verizon contends that the rates proposed by AT&T are confiscatory because they do not enable Verizon to recover the costs that it necessarily incurs to provide UNEs, including its unrecovered past prudent investment and its actual operating costs. Specifically, Verizon claims its study shows that its monthly recurring cost to provide CLECs with UNE-P is $42.16, and with a stand-alone loop is $27.44.[416] Verizon describes these costs as substantially above the $11.97 UNE-P and $7.64 loop recurring rates proposed by AT&T.[417] If the Commission adopts AT&T's proposed rates, Verizon claims it would result in a monthly shortfall of $30.19 for every UNE-P, and $19.80 for every UNE loop Verizon provides. Verizon believes this evidence proves that AT&T's proposed UNE rates would not even come close to enabling Verizon to recover its actual operating costs, let alone its unrecovered past prudent investment. According to Verizon, because AT&T's proposed rates would provide compensation that falls far short of the constitutional benchmark, these rates must be rejected.

---

[415] *Verizon Communications, Inc. v. FCC*, 535 U.S. 467, 524 (2002).

[416] *Ex. No. 57T* at 2:3-6.

[417] *Id.* Verizon claims that although AT&T has now increased its proposed loop rate, the increase is less than $1 and still leaves a gaping shortfall. *See Tr. 1478:15-18* (Mercer) (indicating that the change to HM 5.3 increased the loop cost from $7.64 to $8.50 (an 84 cent difference).

540 AT&T asserts that Verizon's cost evidence not only fails to support any takings claim, but also lacks credibility on its face because the network elements that comprise the UNE-P, which Verizon claims cost it $42.16[418] are those same elements that comprise Verizon's basic local residential and business exchange service for which Verizon charges $13.00 and $29.70 per month, respectively. Thus, AT&T argues that even with the addition of revenues for subscriber line charge, switched access, toll, and features, Verizon would be suffering a significant shortfall in its provisioning of retail services using these figures and, if that were true, Verizon would have filed its retail rate case long before now.

541 AT&T alleges that Verizon's overstatement of historic costs is associated with major flaws in its cost study, including failure to disaggregate the costs of different types of loops (e.g., lumping two-wire loops together with vastly more expensive DS3 loops to develop an average loop price), the use of a higher FCC-prescribed cost of capital, rather than the cost of capital for intrastate services established by the Commission, and excessive allocation of land and support investments to loop costs.[419] AT&T testifies that Verizon also fails to produce any evidence that its historic costs were prudently incurred, rather than simply assigned to various ARMIS accounts.

542 Verizon asserts that it has been forced to seek retail rate relief due to the Commission's recent reduction of access charges.[420] Verizon claims AT&T's more specific criticisms of Verizon's cost study miss the point because even if Verizon's study were adjusted to account for each of AT&T' s proposed changes, AT&T's proposed rates would still be dramatically below Verizon's costs. For example, leaving aside the legitimacy of its criticisms, if AT&T's proposed adjustments were made to Verizon's model, Verizon claims that the resulting estimate of Verizon's

---

[418] *Ex. 57T* at 12.

[419] *Ex. 1004TC* at 8-17.

[420] *See* Direct Testimony of Nancy W. Heuring, Petition of Verizon Northwest Inc. for an Order Approving Commencement of Bifurcated General Rate, Docket No. UT-040788 (filed April 30, 2004).

cost of providing a UNE loop would still be approximately $23.66—roughly three times AT&T's proposed UNE loop rate.[421]

543 AT&T insists that Verizon failed to present any evidence that lower UNE rates, in conjunction with Verizon's other regulated rates, jeopardize the financial integrity of the company, either by leaving it insufficient operating capital or by impeding its ability to raise future capital. Nor has Verizon demonstrated that these rates are inadequate to compensate current equity holders for the risk associated with their investments under a "modified prudent investor scheme."[422]

544 Furthermore, AT&T asserts that the Constitution does not recognize Verizon's assumption of a wholesale-only company in support of its claim of confiscation, because the Constitution requires scrutiny of Verizon's actual operations as they are today. Thus, according to AT&T, with a 97% share of the market in its local service territory in Washington, Verizon cannot plausibly claim that lower UNE rates will have any significant impact on Verizon's overall intrastate revenues. Finally, AT&T contends that Verizon could not even make such a claim based on the record in this proceeding because there is no evidence on the record regarding the revenues that Verizon generates in the state of Washington.

545 ***Discussion and decision.*** We reject Verizon's takings argument. In Duquesne, the Supreme Court said it is "not the theory, but the impact of the rate order which counts." [423] This order constitutes our reasoned effort to determine just and reasonable UNE rates for Verizon.

---

[421] Verizon claims that this calculation does not account for AT&T's proposed adjustment concerning the allocation of land and support investment but that Verizon's preliminary calculations show this adjustment would have a *de minimis* effect on the results of Verizon's study. *Verizon Brief,* fn. 612.
[422] *Duquesne* at 312. The U.S. Supreme Court here refers to Pennsylvania's standard for inclusion of utility investment in rate base upon which the utility may earn a rate of return. Pennsylvania allowed inclusion of prudent plant investment in rate base at historical cost, but only permitted amortization of prudent plant expenses if the plant was not used and useful for providing utility service. That is, for plant found not used and useful, the utility could receive a return of investment but not a return on investment. Ultimately, the Duquesne Court found constitutional Pennsylvania's statute that prohibited even the amortization of plant not used and useful.
[423] *Duquesne* at 310.

546 In Duquesne, the Court indicated that a rate order is not constitutionally objectionable unless it is shown to jeopardize the financial integrity of the company or fails to provide equity holders with adequate compensation for their risks.[424] No such showing was made on the record in this case because no evidence of the overall revenue effect of any parties' proposed rates was made part of the record. Nor was Verizon's cost evidence presented in this case sufficient to demonstrate a taking would occur unless we adopted Verizon's proposed rates.

547 In addition, Verizon argues that recovery of its prudent investment is the appropriate benchmark to determine whether a "takings" has occurred. First, we disagree that a "prudent investment" standard is the appropriate criterion to use. In Duquesne, the Supreme Court relied on the "used and useful" standard, and even permitted disallowance of some investment that met that standard. Nevertheless, there has been no examination on the record in this case whether the investments Verizon made to provide UNEs meet either of those standards. Moreover, the "used and useful" standard was applied in the context of a traditional rate-setting proceeding where a full review of the revenue effect of rates was conducted. We have not conducted such a review in this case, nor is such a review called for under FCC costing standards. In short, we reject as unfounded Verizon's takings arguments.

XI. FINDINGS OF FACT

548 Having discussed above in detail the written testimony and the documentary evidence concerning all material matters, and having stated findings of fact in the text of the order, the preceding detailed findings are incorporated by this reference. The preceding findings are summarized in the following findings of fact.

549 (1) The Washington Utilities and Transportation Commission is an agency of the state of Washington, vested by statute with authority to regulate rates, rules, regulations, practices, accounts, securities, and transfers of public service companies, including telecommunications companies.

---

[424] *Id.*, at 312.

550 (2) Verizon Northwest, Inc. is engaged in the business of furnishing telecommunications service within the state of Washington as a public service company.

551 (3) The purpose of this proceeding is to establish Verizon's unbundled network element recurring rates for loop, switching, transport, and termination.

552 (4) The rates established for Verizon are based on the Total Element Long Run Incremental Cost (TELRIC) methodology.

553 (5) Recurring rates are based on investments in unbundled network element facilities which are then adjusted to reflect cost of capital, depreciation and expenses.

554 (6) Verizon's cost of capital, based on a capital structure consisting of 25% debt and 75% equity, a cost of debt of 6.26%, a cost of equity of 11.22% (based on the Discounted Cash Flow methodology), is 9.98%.

555 (7) Adoption of a risk premium of 3.95% as an adder to the cost of capital in this proceeding is not warranted because an appropriate level of risk is incorporated in the determination of Verizon's cost of equity of 11.22%.

556 (8) Economic depreciation rates currently in effect pursuant to the Commission's final order in UT-992009 are appropriate for use in establishing rates in this proceeding.

557 (9) Verizon's Forward-Looking Calibration factor should be increased from .85 to .90.

558 (10) The Gross Domestic Product-Price Index should be used to adjust for inflation in the Verizon cost model; Bureau of Labor Statistics Telephone

Productivity series rate of 5.50% should be used to adjust for productivity in the Verizon cost model.

559 (11) A reasonable proxy for the advertising expenses Verizon would experience in a forward-looking TELRIC network is 15% of Verizon's current retail advertising expense.

560 (12) Cost models are the best means of developing the level of investments in facilities necessary to provide unbundled network element and to which the cost of capital, depreciation and expense factors will be applied. A cost model should be open, flexible, readily capable of adjustment, and easily verifiable.

561 (13) Regarding development of an appropriate unbundled loop rate, neither Verizon's cost model nor AT&T's HM 5.3 cost model fully meet the Commission's requirements for openness, flexibility, adjustability and verifiability.

562 (14) Based on the flaws exhibited by each cost model, it is appropriate to weight them, 60% for Verizon's model and 40% for HM 5.3, in order to determine unbundled network element loop rates that are fair, just reasonable and sufficient.

563 (15) Taking into account the flaws in the parties' respective models and the Commission's determinations regarding appropriate inputs to the models, and applying the 60%/40% weighting to the loop rates resulting from the Commission's changes to the models as shown in Appendix A, the average cost of a loop determined as a result of this proceeding is $18.43.

564 (16) Loop rates should be deaveraged into five zones, in order to reflect differences in loop costs across zones, using the weighted sum of squared errors methodology to determine which wire centers fall into each of the five zones.

565 (17) Switching rates are also developed using cost models that incorporate switch investment inputs.

566 (18) AT&T's switching model, which relies on switch investment inputs from the FCC's Universal Service Inputs Order, and which we adjust based on the Turner Price Index, (excluding the $30 analog line offset proposed by AT&T), is appropriate for establishing switching rates in this proceeding.

567 (19) Verizon's switching rate structure, including both a flat rate to cover non traffic-sensitive switching costs and a per-MOU rate to cover traffic-sensitive switching costs is the most reasonable structure to apply to switching unbundled network element rates.

568 (20) Deaveraged switching rates should not be adopted.

569 (21) It is not appropriate to align the per-minute of use reciprocal compensation rates for local and tandem switching with the unbundled network element switching rate established in this proceeding.

570 (22) This rate proceeding and rate order constitute the Commission's determination of fair, just, reasonable, and sufficient unbundled network element rates for Verizon.

XII. CONCLUSIONS OF LAW

571 Having stated the legal basis for its decision in the Memorandum section of this order, the Commission makes the following conclusions of law.

572 (1) The Washington Utilities and Transportation Commission has jurisdiction over the subject matter of these proceedings and the parties.

573 (2) Cost models that are open, flexible, adjustable and verifiable are in the public interest because they permit a full exploration of their advantages and limitations and because they allow the public and the Commission to evaluate all the information which is used to set rates.

574 (3) Cost models that do not meet the Commission's requirements of openness, flexibility, adjustability and verifiability may be accorded reduced weight by the Commission and may be subject to rejection in their entirety.

575 (4) The proper cost methodology to use in determining unbundled network element rates is the Total Element Long Run Incremental Cost methodology.

576 (5) Unbundled network element rates that are filed with the Commission pursuant to the findings, conclusions and directions of this final order will be fair, just, reasonable, and sufficient and in accord with the pricing standards stated in Section 252(d) of the Telecommunications Act of 1996, and fair, just, reasonable, and sufficient in accordance with RCW 80.36.080.

XIII. ORDER

The Commission orders as follows:

577 (1) The rates proposed by Verizon Northwest, Inc. are rejected in accord with the findings and conclusions contained in this final order.

578 (2) As to each unbundled network element rate that is identified in Appendix A to this order, Verizon shall make compliance filings consistent with this order, including instructions contained in Appendix A, no later than ten business days after the service date of the order, unless additional time is specifically requested and granted by letter of the Commission's executive secretary. The compliance filing shall provide rates that are a weighted average of the values produced by HM 5.3 and VzCost found in Appendix A, with the exception of switching rates. The switching rates shall be derived

exclusively from HM 5.3. For all other rates, except switching, the weighted average will be based on a 60% weighting to the VzCost ouput and a 40% weighting to the HM 5.3 output. The VzCost output shall be adjusted upward by a factor of 1.03149% to reflect prospective line loss due to competition, discussed in the Part VIII, Section A.2.f. Each compliance item must be accompanied by a brief description of what is accomplished by the filing, must cite each paragraph of the final order with which it complies, and must identify each model input modified. For any rate that Verizon contends would violate the FCC's interim unbundling rules[425] or the FCC's permanent rules,[426] Verizon is directed to provide a statement identifying the rule it contends would be violated and the reasons the rule applies to the particular element. In addition, Verizon must include a complete updated checklist and additional documentation about the Verizon cost model in accord with our directions in Appendix A to facilitate other parties' ability to run the Verizon model and to verify Verizon's and the Commission's model runs.

579 (3) Other parties may respond to Verizon's compliance filings no later than ten business days after Verizon files them, unless additional time is specifically requested and granted by letter of the Commission's executive secretary. If the other parties claim that Verizon has failed to comply with the terms of the final order, they must cite the paragraph of the order with which Verizon has not complied and describe how Verizon's filing fails to comply. If the other parties dispute Verizon's claim that a particular unbundled network element rate ordered by this Commission would violate the FCC's orders, they must provide a statement of the reasons for their contentions.

580 (4) A copy of each filing with the Commission must be served on counsel for other parties so that it is received on the date filed with the Commission.

---

[425] *In the Matter of Unbundled Access to Network Elements, FCC 04-179, August 20, 2004 (Interim Rules Order).*

[426] *In the Matter of Unbundled Access to Network Elements Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, WC Docket No. 04-313, CC Docket No. 01-338, Order on Remand, Released February 4, 2005.*

581 (5) The Commission retains jurisdiction over all matters and the parties in this proceeding to effectuate the provisions of this order.

Dated at Olympia, Washington, and effective this 9th day of February, 2005.

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

MARILYN SHOWALTER, Chairwoman

RICHARD HEMSTAD, Commissioner

PATRICK J. OSHIE, Commissioner

NOTICE TO PARTIES: This is a final order of the Commission. In addition to judicial review, administrative relief may be available through a petition for reconsideration, filed within 10 days of the service of this order pursuant to RCW 34.05.470 and WAC 480-07-850, or a petition for rehearing pursuant to RCW 80.04.200 or RCW 81.04.200 and WAC 480-07-870.

APPENDIX A

This appendix has three parts:

1. A description of the adjustments made to the inputs and assumptions within HM 5.3 and VzCost to reflect the decisions of this Commission.
2. The resulting cost estimates produced by HM 5.3 and VzCost.
3. A commentary on VzCost.

1. Model Adjustments

HM 5.3

In order to maintain consistency with the Commission's previous orders the HM 5.3 inputs proposed by Staff were used as a starting point. This starting point was chosen because these choices best reflected the inputs the Commission found appropriate in Dockets Nos. UT-960369 and UT-980311(a). The inputs were then adjusted to reflect the decisions reached in this order.

The Commission adopted the following general adjustments to HM 5.3:

1. The default distribution module was replaced by the loop length adjusted distribution module proposed by Staff witness Spinks.
    a. ¶381 - This module was also adjusted to reflect Verizon's proposed allocation of DLC common equipment.
2. ¶312 - Line counts were reduced by 5% in the 'Cluster Data' table found in MS Access file hm.db.
3. Placement costs were adjusted to reflect the inputs adopted by the FCC in the FCC Inputs Order after making the following adjustments:
    a. FCC 'Normal Buried Feeder' costs were updated from mid 1999 to mid 2002 using the Turner Plant Index and inserted into the feeder module.
    b. FCC Normal Buried Distribution costs updated from mid 1999 to mid 2002 using the Turner Plant Index and inserted into the distribution module.
4. Material costs were adjusted to reflect the inputs adopted by the FCC in the Inputs Order after making the following adjustments:

a. Costs were updated using the Turner Plant Index provided by Verizon using mid 1999 and mid 2002.
b. Cable prices for those sizes used in HM 5.3 but not the FCC's Synthesis Model were estimated based on the following equation:

Cost = a + b * (number of pairs).

5. Usage switching inputs are based on Verizon's response to Bench Request 26, page 3.

Inputs that differ from the HM 5.3 default inputs are reflected in the following table:

Module/Table	Scenario Input	Scenario Value	Default Value	Order Reference
Distribution	Distribution Cable Fill - 0	0.5	0.75	¶377
Distribution	Distribution Cable Fill - 5	0.5	0.75	¶377
Distribution	Distribution Cable Fill - 100	0.5	0.75	¶377
Distribution	Distribution Cable Fill - 200	0.5	0.75	¶377
Distribution	Distribution Cable Fill - 650	0.5	0.75	¶377
Distribution	Distribution Cable Fill - 850	0.5	0.75	¶377
Distribution	Distribution Cable Fill - 2550	0.5	0.75	¶377
Distribution	Distribution Cable Fill - 5000	0.5	0.75	¶377
Distribution	Distribution Cable Fill - 10000	0.5	0.75	¶377
Distribution	Buried Fraction - 0	0.85	0.57	¶286
Distribution	Buried Fraction - 5	0.63	0.57	¶286
Distribution	Buried Fraction - 200	0.48	0.57	¶286
Distribution	Buried Fraction - 650	0.37	0.57	¶286
Distribution	Buried Fraction - 850	0.39	0.57	¶286
Distribution	Buried Fraction - 2550	0.25	0.52	¶286
Distribution	Buried Fraction - 5000	0.25	0.35	¶286
Distribution	Buried Fraction - 10000	0.25	0.15	¶286
Distribution	Aerial Cable Fraction - 0	0.15	0.43	¶286
Distribution	Aerial Cable Fraction - 5	0.35	0.43	¶286
Distribution	Aerial Cable Fraction - 100	0.39	0.43	¶286
Distribution	Aerial Cable Fraction - 200	0.47	0.43	¶286
Distribution	Aerial Cable Fraction - 650	0.1	0.43	¶286
Distribution	Aerial Cable Fraction - 850	0.42	0.43	¶286
Distribution	Aerial Cable Fraction - 2550	0.59	0.43	¶286
Distribution	Aerial Cable Fraction - 5000	0.59	0.5	¶286
Distribution	Aerial Cable Fraction - 10000	0.59	0.5	¶286
Distribution	Pole Spacing, feet - 0	175	250	Exh. 1058
Distribution	Pole Spacing, feet - 5	175	250	Exh. 1058
Distribution	Pole Spacing, feet - 100	175	200	Exh. 1058
Distribution	Pole Spacing, feet - 200	175	200	Exh. 1058
Distribution	Pole Spacing, feet - 2550	175	150	Exh. 1058
Distribution	Pole Spacing, feet - 5000	175	150	Exh. 1058
Distribution	Pole Spacing, feet - 10000	175	150	Exh. 1058
Distribution	Drop Distance, feet - 0	175	150	¶436
Distribution	Drop Distance, feet - 5	175	150	¶436
Distribution	Drop Distance, feet - 100	125	100	¶436
Distribution	Drop Distance, feet - 200	125	100	¶436
Distribution	Drop Distance, feet - 650	75	50	¶436
Distribution	Drop Distance, feet - 850	75	50	¶436
Distribution	Aerial Drop Placement (total) - 0	155.75	23.33	Exh. 1058
Distribution	Aerial Drop Placement (total) - 5	155.75	23.33	Exh. 1058
Distribution	Aerial Drop Placement (total) - 100	111.25	17.5	Exh. 1058
Distribution	Aerial Drop Placement (total) – 200	111.25	17.5	Exh. 1058
Distribution	Aerial Drop Placement (total) - 650	66.75	11.67	Exh. 1058
Distribution	Aerial Drop Placement (total) - 850	66.75	11.67	Exh. 1058
Distribution	Aerial Drop Placement (total) - 2550	44.5	11.67	Exh. 1058
Distribution	Aerial Drop Placement (total) - 5000	44.5	11.67	Exh. 1058
Distribution	Aerial Drop Placement (total) - 10000	44.5	11.67	Exh. 1058
Distribution	Buried Drop Placement (total) - 0	0.89	0.6	Exh. 1058
Distribution	Buried Drop Placement (total) - 5	0.89	0.6	Exh. 1058

Module/Table	Scenario Input	Scenario Value	Default Value	Order Reference
Distribution	Buried Drop Placement (total) - 100	0.89	0.6	Exh. 1058
Distribution	Buried Drop Placement (total) - 200	0.89	0.6	Exh. 1058
Distribution	Buried Drop Placement (total) - 650	0.89	0.6	Exh. 1058
Distribution	Buried Drop Placement (total) - 850	0.89	0.6	Exh. 1058
Distribution	Buried Drop Placement (total) - 2550	0.89	0.75	Exh. 1058
Distribution	Buried Drop Placement (total) - 5000	0.89	1.5	Exh. 1058
Distribution	Buried Drop Placement (total) - 10000	0.89	5	Exh. 1058
Distribution	Buried Drop Sharing Fraction - 0	1	0.5	¶439
Distribution	Buried Drop Sharing Fraction - 5	1	0.5	¶439
Distribution	Buried Drop Sharing Fraction - 100	0.875	0.5	¶439
Distribution	Buried Drop Sharing Fraction - 200	0.675	0.5	¶439
Distribution	Buried Drop Sharing Fraction - 650	0.675	0.5	¶439
Distribution	Buried Drop Sharing Fraction - 850	0.675	0.5	¶439
Distribution	Buried Drop Sharing Fraction - 2550	0.55	0.5	¶439
Distribution	Buried Drop Sharing Fraction - 5000	0.55	0.5	¶439
Distribution	Buried Drop Sharing Fraction - 10000	0.55	0.5	¶439
Distribution	Buried Drop Fraction - 0	0.85	0.57	¶286
Distribution	Buried Drop Fraction - 5	0.63	0.57	¶286
Distribution	Buried Drop Fraction - 200	0.48	0.57	¶286
Distribution	Buried Drop Fraction - 650	0.37	0.57	¶286
Distribution	Buried Drop Fraction - 850	0.39	0.57	¶286
Distribution	Buried Drop Fraction - 2550	0.25	0.52	¶286
Distribution	Buried Drop Fraction - 5000	0.25	0.35	¶286
Distribution	Buried Drop Fraction - 10000	0.25	0.15	¶286
Distribution	Pole Investment	216.35	201	¶341
Distribution	Drop cable investment per foot buried	0	0.14	Exh. 1058
Distribution	Drop cable investment per foot aerial	0	0.095	Exh. 1058
Distribution	Buried fraction available for shift - 0	0	0.75	¶286
Distribution	Buried fraction available for shift - 5	0	0.75	¶286
Distribution	Buried fraction available for shift - 100	0	0.75	¶286
Distribution	Buried fraction available for shift - 200	0	0.75	¶286
Distribution	Buried fraction available for shift - 650	0	0.75	¶286
Distribution	Buried fraction available for shift - 850	0	0.75	¶286
Distribution	Buried fraction available for shift - 2550	0	0.75	¶286
Distribution	Block/Building fraction total of distance - 5000	0	0.1	¶419
Distribution	Block/Building fraction total of distance - 10000	0	0.3	¶419
Distribution	Local RT - Maximum Total Distance	12000	18000	¶255
Distribution	UDLC fraction of total DLC lines	0.098	0	¶404
Feeder	Copper Aerial Fraction - 0	0.27	0.37	¶286
Feeder	Copper Aerial Fraction - 5	0.43	0.37	¶286
Feeder	Copper Aerial Fraction - 100	0.5	0.37	¶286
Feeder	Copper Aerial Fraction - 200	0.49	0.37	¶286
Feeder	Copper Aerial Fraction - 650	0.08	0.37	¶286
Feeder	Copper Aerial Fraction - 850	0.38	0.2	¶286
Feeder	Copper Aerial Fraction - 2550	0.52	0.1	¶286
Feeder	Copper Aerial Fraction - 5000	0.52	0.05	¶286
Feeder	Copper Aerial Fraction - 10000	0.52	0	¶286
Feeder	Copper Buried Fraction - 0	0.73	0.58	¶286
Feeder	Copper Buried Fraction - 5	0.54	0.58	¶286
Feeder	Copper Buried Fraction - 100	0.41	0.58	¶286
Feeder	Copper Buried Fraction - 200	0.36	0.43	¶286

Module/Table	Scenario Input	Scenario Value	Default Value	Order Reference
Feeder	Copper Buried Fraction - 650	0.46	0.33	¶286
Feeder	Copper Buried Fraction - 850	0.15	0.3	¶286
Feeder	Copper Buried Fraction - 2550	0.13	0.1	¶286
Feeder	Copper Buried Fraction - 5000	0.13	0.05	¶286
Feeder	Copper Buried Fraction - 10000	0.13	0	¶286
Feeder	Pole Materials	216.35	201	¶341
Feeder	Pole Spacing, feet - 0	175	250	Exh. 1058
Feeder	Pole Spacing, feet - 5	175	250	Exh. 1058
Feeder	Pole Spacing, feet - 100	175	200	Exh. 1058
Feeder	Pole Spacing, feet - 200	175	200	Exh. 1058
Feeder	Pole Spacing, feet - 2550	175	150	Exh. 1058
Feeder	Pole Spacing, feet - 5000	175	150	Exh. 1058
Feeder	Pole Spacing, feet - 10000	175	150	Exh. 1058
Feeder	Buried fraction available for shift - 0	0	0.75	¶286
Feeder	Buried fraction available for shift - 5	0	0.75	¶286
Feeder	Buried fraction available for shift - 100	0	0.75	¶286
Feeder	Buried fraction available for shift - 200	0	0.75	¶286
Feeder	Buried fraction available for shift - 650	0	0.75	¶286
Feeder	Buried fraction available for shift - 850	0	0.75	¶286
Feeder	Buried fraction available for shift - 2550	0	0.75	¶286
Feeder	Buried fraction available for shift - 5000	0	0.75	¶286
Feeder	Buried fraction available for shift - 10000	0	0.75	¶286
Switching	Switch Port Administrative Fill	0.925	0.94	¶385
Switching	Analog Line Circuit Offset for DLC lines, per line	0	30	¶191
Switching	Local DEMs, thousands	21289263	14531831	¶477
Switching	Intrastate DEMs, thousands	1465916	2943383	¶477
Switching	Interstate DEMs, thousands	2323315	2099127	¶477
Switching	Fiber, pole spacing, feet	175	150	Exh. 1058
Switching	Fraction Poles and Buried/Underground Placement Common with Feeder	0.5	0.75	¶311
Switching	End Office Amalgamated Switching Investment per Line Term	80.04	87	¶463
Switching	Use host - remote assignments	TRUE	FALSE	Exh. 1058
Expense	Cost of Debt	0.0626	0.079	¶49
Expense	Debt Fraction	0.25	0.444	¶40
Expense	Cost of Equity	0.1122	0.1125	¶78
Expense	Corporate Overhead Factor	0.1225	0.104	Exh. 1058
Expense	Other Taxes Factor	0.05	0.0465	Exh. 1058
Expense	EO Traffic Sensitive Fraction	0.6417	0	¶518
Expense	Distribution Aerial Sharing Fraction - 0	0.625	0.5	¶308
Expense	Distribution Aerial Sharing Fraction - 5	0.625	0.33	¶308
Expense	Distribution Aerial Sharing Fraction - 100	0.625	0.25	¶308
Expense	Distribution Aerial Sharing Fraction - 200	0.5	0.25	¶308
Expense	Distribution Aerial Sharing Fraction - 650	0.5	0.25	¶308
Expense	Distribution Aerial Sharing Fraction - 850	0.5	0.25	¶308
Expense	Distribution Aerial Sharing Fraction - 2550	0.35	0.25	¶308
Expense	Distribution Aerial Sharing Fraction - 5000	0.35	0.25	¶308
Expense	Distribution Aerial Sharing Fraction - 10000	0.35	0.25	¶308
Expense	Distribution Buried Sharing Fraction - 0	1	0.33	¶308
Expense	Distribution Buried Sharing Fraction - 5	1	0.33	¶308
Expense	Distribution Buried Sharing Fraction - 100	0.875	0.33	¶308
Expense	Distribution Buried Sharing Fraction - 200	0.675	0.33	¶308
Expense	Distribution Buried Sharing Fraction - 650	0.675	0.33	¶308

Module/Table	Scenario Input	Scenario Value	Default Value	Order Reference
Expense	Distribution Buried Sharing Fraction - 850	0.675	0.33	¶308
Expense	Distribution Buried Sharing Fraction - 2550	0.55	0.33	¶308
Expense	Distribution Buried Sharing Fraction - 5000	0.55	0.33	¶308
Expense	Distribution Buried Sharing Fraction - 10000	0.55	0.33	¶308
Expense	Distribution Underground Sharing Fraction - 5	1	0.5	¶308
Expense	Distribution Underground Sharing Fraction - 100	0.875	0.5	¶308
Expense	Distribution Underground Sharing Fraction - 200	0.625	0.5	¶308
Expense	Distribution Underground Sharing Fraction - 650	0.625	0.4	¶308
Expense	Distribution Underground Sharing Fraction - 850	0.625	0.33	¶308
Expense	Distribution Underground Sharing Fraction - 2550	0.625	0.33	¶308
Expense	Distribution Underground Sharing Fraction - 5000	0.625	0.33	¶308
Expense	Distribution Underground Sharing Fraction - 10000	0.625	0.33	¶308
Expense	Feeder Aerial Sharing Fraction - 0	0.625	0.5	¶308
Expense	Feeder Aerial Sharing Fraction - 5	0.625	0.33	¶308
Expense	Feeder Aerial Sharing Fraction - 100	0.625	0.25	¶308
Expense	Feeder Aerial Sharing Fraction - 200	0.5	0.25	¶308
Expense	Feeder Aerial Sharing Fraction - 650	0.5	0.25	¶308
Expense	Feeder Aerial Sharing Fraction - 850	0.5	0.25	¶308
Expense	Feeder Aerial Sharing Fraction - 2550	0.35	0.25	¶308
Expense	Feeder Aerial Sharing Fraction – 5000	0.35	0.25	¶308
Expense	Feeder Aerial Sharing Fraction - 10000	0.35	0.25	¶308
Expense	Feeder Underground Sharing Fraction - 0	1	0.5	¶308
Expense	Feeder Underground Sharing Fraction - 5	1	0.5	¶308
Expense	Feeder Underground Sharing Fraction - 100	0.875	0.4	¶308
Expense	Feeder Underground Sharing Fraction - 200	0.625	0.33	¶308
Expense	Feeder Underground Sharing Fraction - 650	0.625	0.33	¶308
Expense	Feeder Underground Sharing Fraction - 850	0.625	0.33	¶308
Expense	Feeder Underground Sharing Fraction - 2550	0.625	0.33	¶308
Expense	Feeder Underground Sharing Fraction - 5000	0.625	0.33	¶308
Expense	Feeder Underground Sharing Fraction - 10000	0.625	0.33	¶308
Expense	Feeder Buried Sharing Fraction - 0	1	0.4	¶308
Expense	Feeder Buried Sharing Fraction - 5	1	0.4	¶308
Expense	Feeder Buried Sharing Fraction - 100	0.875	0.4	¶308
Expense	Feeder Buried Sharing Fraction - 200	0.675	0.4	¶308
Expense	Feeder Buried Sharing Fraction - 650	0.675	0.4	¶308
Expense	Feeder Buried Sharing Fraction - 850	0.675	0.4	¶308
Expense	Feeder Buried Sharing Fraction - 2550	0.55	0.4	¶308
Expense	Feeder Buried Sharing Fraction - 5000	0.55	0.4	¶308
Expense	Feeder Buried Sharing Fraction - 10000	0.55	0.4	¶308
Expense	Motor Vehicles - Economic Life	12	9.3	¶95
Expense	Garage Work Equipment - Economic Life	12	18	¶95
Expense	Other Work Equipment - Economic Life	12	15	¶95
Expense	Furniture - Economic Life	15	20	¶95
Expense	Office Support Equipment - Economic Life	10	15	¶95
Expense	Digital Electronic Switching - Economic Life	16	16.5	¶95
Expense	Operator Systems - Economic Life	10	12	¶95
Expense	Digital Circuit Equipment - Economic Life	11.4	12	¶95
Expense	Aerial Cable - non metallic - Economic Life	25	30	¶95
Expense	Underground Cable - metallic - Economic Life	25	26	¶95
Expense	Underground Cable - non metallic - Economic Life	25	30	¶95
Expense	Buried - non metallic - Economic Life	25	30	¶95

Module/Table	Scenario Input	Scenario Value	Default Value	Order Reference
Expense	Garage Work Equipment - Net Salvage %	0	0.05	¶95
Expense	Other Work Equipment - Net Salvage %	0	0.1	¶95
Expense	Furniture - Net Salvage %	0.05	0.1	¶95
Expense	Office Support Equipment - Net Salvage %	0	0.1	¶95
Expense	Company Comm. Equipment - Net Salvage %	0	0.02	¶95
Expense	General Purpose Computer - Net Salvage %	0	0.05	¶95
Expense	Digital Electronic Switching - Net Salvage %	0	0.03	¶95
Expense	Operator Systems - Net Salvage %	0	-0.02	¶95
Expense	Digital Circuit Equipment - Net Salvage %	0.05	0.04	¶95
Expense	Aerial Cable - metallic - Net Salvage %	-0.17	-0.27	¶95
Expense	Aerial Cable - non metallic - Net Salvage %	0	-0.05	¶95
Expense	Underground Cable - metallic - Net Salvage %	-0.22	-0.15	¶95
Expense	Underground Cable - non metallic - Net Salvage %	0	-0.05	¶95
Expense	Buried - metallic - Net Salvage %	-0.07	-0.05	¶95
Expense	Buried - non metallic - Net Salvage %	0	-0.05	¶95
Expense	Intrabuilding Cable - metallic - Net Salvage %	-0.1	-0.3	¶95
Expense	Intrabuilding Cable - non metallic - Net Salvage %	-0.1	-0.3	¶95
Expense	Conduit Systems - Net Salvage %	-0.1	-0.05	¶95
Cable Investment Input	Copper Cable Material $/ft - 4200 - Aerial	42.23	15.15	¶341
Cable Investment Input	Copper Cable Material $/ft - 3600 - Aerial	36.4	12.97	¶341
Cable Investment Input	Copper Cable Material $/ft - 3000 - Aerial	30.56	10.81	¶341
Cable Investment Input	Copper Cable Material $/ft - 2400 - Aerial	24.73	8.23	¶341
Cable Investment Input	Copper Cable Material $/ft - 1800 - Aerial	18.89	6.63	¶341
Cable Investment Input	Copper Cable Material $/ft - 1200 - Aerial	13.06	4.48	¶341
Cable Investment Input	Copper Cable Material $/ft - 900 - Aerial	10.14	3.45	¶341
Cable Investment Input	Copper Cable Material $/ft - 600 - Aerial	7.22	2.47	¶341
Cable Investment Input	Copper Cable Material $/ft - 400 - Aerial	5.28	1.69	¶341
Cable Investment Input	Copper Cable Material $/ft - 200 - Aerial	3.33	1.31	¶341
Cable Investment Input	Copper Cable Material $/ft - 100 - Aerial	2.36	0.72	¶341
Cable Investment Input	Copper Cable Material $/ft - 50 - Aerial	1.87	0.45	¶341
Cable Investment Input	Copper Cable Material $/ft - 25 - Aerial	1.63	0.29	¶341
Cable Investment Input	Copper Cable Material $/ft - 12 - Aerial	1.5	0.29	¶341
Cable Investment Input	Copper Cable Material $/ft - 6 - Aerial	1.45	0.29	¶341
Cable Investment Input	Copper Cable Material $/ft - 4200 - Buried	43.35	16.08	¶341
Cable Investment Input	Copper Cable Material $/ft - 3600 - Buried	37.25	13.79	¶341
Cable Investment Input	Copper Cable Material $/ft - 3000 - Buried	31.16	11.49	¶341
Cable Investment Input	Copper Cable Material $/ft - 2400 - Buried	25.06	9.19	¶341
Cable Investment Input	Copper Cable Material $/ft - 1800 - Buried	18.97	7.16	¶341
Cable Investment Input	Copper Cable Material $/ft - 1200 - Buried	12.87	5.32	¶341
Cable Investment Input	Copper Cable Material $/ft - 900 - Buried	9.83	3.56	¶341
Cable Investment Input	Copper Cable Material $/ft - 600 - Buried	6.78	2.76	¶341
Cable Investment Input	Copper Cable Material $/ft - 400 - Buried	4.75	1.75	¶341
Cable Investment Input	Copper Cable Material $/ft - 200 - Buried	2.72	1.17	¶341
Cable Investment Input	Copper Cable Material $/ft - 100 - Buried	1.7	0.62	¶341
Cable Investment Input	Copper Cable Material $/ft - 50 - Buried	1.19	0.35	¶341
Cable Investment Input	Copper Cable Material $/ft - 25 - Buried	0.94	0.21	¶341
Cable Investment Input	Copper Cable Material $/ft - 12 - Buried	0.81	0.21	¶341
Cable Investment Input	Copper Cable Material $/ft - 6 - Buried	0.75	0.21	¶341
Cable Investment Input	Copper Cable Material $/ft - 4200 - U/G	42.07	14.05	¶341
Cable Investment Input	Copper Cable Material $/ft - 3600 - U/G	36.82	12.13	¶341
Cable Investment Input	Copper Cable Material $/ft - 3000 - U/G	31.56	10.23	¶341

Module/Table	Scenario Input	Scenario Value	Default Value	Order Reference
Cable Investment Input	Copper Cable Material $/ft - 2400 - U/G	26.31	8.28	¶341
Cable Investment Input	Copper Cable Material $/ft - 1800 - U/G	21.05	6.33	¶341
Cable Investment Input	Copper Cable Material $/ft - 1200 - U/G	15.8	4.41	¶341
Cable Investment Input	Copper Cable Material $/ft - 900 - U/G	13.17	3.39	¶341
Cable Investment Input	Copper Cable Material $/ft - 600 - U/G	10.54	2.27	¶341
Cable Investment Input	Copper Cable Material $/ft - 400 - U/G	8.79	1.51	¶341
Cable Investment Input	Copper Cable Material $/ft - 200 - U/G	7.04	1.05	¶341
Cable Investment Input	Copper Cable Material $/ft - 100 - U/G	6.16	0.52	¶341
Cable Investment Input	Copper Cable Material $/ft - 50 - U/G	5.73	0.26	¶341
Cable Investment Input	Copper Cable Material $/ft - 25 - U/G	5.51	0.13	¶341
Cable Investment Input	Copper Cable Material $/ft - 12 - U/G	5.39	0.13	¶341
Cable Investment Input	Copper Cable Material $/ft - 6 - U/G	5.34	0.13	¶341
Cable Investment Input	Fiber Cable Material $/ft - 288 - Aerial	8.95	8.51	¶341
Cable Investment Input	Fiber Cable Material $/ft - 216 - Aerial	7.04	6.42	¶341
Cable Investment Input	Fiber Cable Material $/ft - 144 - Aerial	5.14	4.3	¶341
Cable Investment Input	Fiber Cable Material $/ft - 96 - Aerial	3.87	2.97	¶341
Cable Investment Input	Fiber Cable Material $/ft - 72 - Aerial	3.23	2.3	¶341
Cable Investment Input	Fiber Cable Material $/ft - 48 - Aerial	2.6	1.6	¶341
Cable Investment Input	Fiber Cable Material $/ft - 36 - Aerial	2.28	1.12	¶341
Cable Investment Input	Fiber Cable Material $/ft - 24 - Aerial	1.96	0.89	¶341
Cable Investment Input	Fiber Cable Material $/ft - 12 - Aerial	1.65	0.59	¶341
Cable Investment Input	Fiber Cable Material $/ft - 6 - Aerial	1.49	0.36	¶341
Cable Investment Input	Fiber Cable Material $/ft - 288 - Buried	9.74	8.51	¶341
Cable Investment Input	Fiber Cable Material $/ft - 216 - Buried	7.48	6.42	¶341
Cable Investment Input	Fiber Cable Material $/ft - 144 - Buried	5.21	4.3	¶341
Cable Investment Input	Fiber Cable Material $/ft - 96 - Buried	3.71	2.97	¶341
Cable Investment Input	Fiber Cable Material $/ft - 72 - Buried	2.95	2.3	¶341
Cable Investment Input	Fiber Cable Material $/ft - 48 - Buried	2.2	1.6	¶341
Cable Investment Input	Fiber Cable Material $/ft - 36 - Buried	1.82	1.12	¶341
Cable Investment Input	Fiber Cable Material $/ft - 24 - Buried	1.45	0.89	¶341
Cable Investment Input	Fiber Cable Material $/ft - 12 - Buried	1.07	0.59	¶341
Cable Investment Input	Fiber Cable Material $/ft - 6 - Buried	0.88	0.36	¶341
Cable Investment Input	Fiber Cable Material $/ft - 288 - U/G	10.28	8.51	¶341
Cable Investment Input	Fiber Cable Material $/ft - 216 - U/G	8.49	6.42	¶341
Cable Investment Input	Fiber Cable Material $/ft - 144 - U/G	6.69	4.3	¶341
Cable Investment Input	Fiber Cable Material $/ft - 96 - U/G	5.5	2.97	¶341
Cable Investment Input	Fiber Cable Material $/ft - 72 - U/G	4.9	2.3	¶341
Cable Investment Input	Fiber Cable Material $/ft - 48 - U/G	4.3	1.6	¶341
Cable Investment Input	Fiber Cable Material $/ft - 36 - U/G	4	1.12	¶341
Cable Investment Input	Fiber Cable Material $/ft - 24 - U/G	3.7	0.89	¶341
Cable Investment Input	Fiber Cable Material $/ft - 12 - U/G	3.4	0.59	¶341
Cable Investment Input	Fiber Cable Material $/ft - 6 - U/G	3.26	0.36	¶341

VzCost

The following VzCost input tables were adjusted to reflect the decisions contained in this order:

Cost_of_Money

¶40, ¶49, and ¶78 – The Cost of Money table was adjusted to reflect the following.

COST_OF_DEBT	0.0626
COST_OF_EQUITY	0.1122
DEBT_RATIO	0.25

EXPENSE_ADJUST

¶135 - The wholesale marketing account proxy was reduced by 85%.

RETAIL_AVOID_ADJUST	0.85

Future_net_salvage

¶95 - Adjusted to reflect inputs consistent with those adopted by the Commission in UT-99-20-09.

Inflation_Indices

¶126 - The inflation and productivity indices were adjusted to reflect the following.

CPI	WA	1999	0.01664
CPI	WA	2000	0.04053
CPI	WA	2001	0.00824
CPI	WA	2002	-0.00669
CPI	WA	2003	0.02543
CPI	WA	2004	0.012269
CPI	WA	2005	0.012269
CPI	WA	2006	0.012269
CPI	WA	2007	0.012269
CPI	WA	2008	0.012269
CPI	WA	2009	0.012269
CPI	WA	2010	0.012269

CPI	WA	2011	0.012269
CPI	WA	2012	0.012269
PRD	WA	1999	-0.072
PRD	WA	2000	-0.067
PRD	WA	2001	-0.016
PRD	WA	2002	-0.054
PRD	WA	2003	-0.054
PRD	WA	2004	-0.054
PRD	WA	2005	-0.054
PRD	WA	2006	-0.054
PRD	WA	2007	-0.054
PRD	WA	2008	-0.054
PRD	WA	2009	-0.054
PRD	WA	2010	-0.054
PRD	WA	2011	-0.054
PRD	WA	2012	-0.054

Investment Calibration Indices

¶120 – The investment calibration indices table was adjusted to reflect the following for accounts 22xxxx through 24xxxx.

FL_CALIBRATION	0.9

IOF_CONSTANT_VALUE

¶390 - The fiber utilization rate was adjusted to reflect the following.

FIB_UTIL_FACT	.40
FIB_LIT_VS_UNLIT_FAC	.53333

LOOP_DEMAND

¶163 - To correct for the non-switched private line issues raised by AT&T the Commission used a copy of the Loop Demand table adjusted by AT&T witness Turner.

Master

¶416 - The maximum available copper cable sizes were adjusted to reflect the following

FEED_MAX_A_SIZE	FEED_MAX_B_SIZE	FEED_MAX_U_SIZE
2400	4200	4200
DIST_MAX_A_SIZE	DIST_MAX_B_SIZE	DIST_MAX_U_SIZE
2400	4200	4200

¶285 - The maximum number of aerial and buried cables per route was adjusted to reflect the following.

MAX_NUM_ACABLES	MAX_NUM_BCABLES
10	10

Pole spacing was adjusted to reflect the following.

POLE_SPACE
175

¶436 – The Commission adjusted drop lengths used in VzCost to be consistent with the inputs used in the 8th Supplemental Order. Each wirecenter was first mapped to one of HM 5.3's 9 density zones based on line density. The appropriate drop length for that density zone was then applied to each wire center.[427]

Material

The Commission adjustments required the use of aerial and buried cables in excess of 1200 pairs and underground cable in excess of 2100 pairs. The cost of these materials was estimated based on a regression of Verizon's existing cable data and added to the Materials table.

¶411 - The following minor material items were zeroed out in the Excel file used to create the material table.

---

[427] A table representing these zone assignments is at the end of this appendix.

Item	Part Number
Expansion Bank Fibers (3M length pair)	04100003
23" CBA Projection Mount (5") Adapt.Kit	2100005
DMAX1120 Front Cover Kit	2100118
MESA 2 Pad Mounting Template	F1003888
MESA 4 Pad Mounting Template	F1004238
MESA 6 Pad Mounting Template	F1004239

Options

¶329 – The options table was adjusted to reflect the following.

PER_TRENCH
0.005

¶308 - Because VzCost only allows for structure sharing inputs to be adjusted by jurisdiction a weighted average structure sharing rate was developed. Wirecenters were first mapped to HM 5.3's 9 density zones based on line density.[428] Line weighted averages for buried and underground structure sharing were calculated to determine the composite input shown below.

SB	SC
0.5338	0.5754
STU	SCU
2	2

Notes: SB- Percent of trench owned by Verizon that is shared with other companies.
SC- Percent of Conduit owned by Verizon that is shared with other companies.
STU- Number of users in each shared trench.
SCU- Number of users in each shared conduit.

¶ 377 – The Options table was adjusted to reflect the following.

DIST_CA_FILL
1.75

[428] A table representing these zone assignments is at the end of this appendix.

Placement

¶321 - Where Verizon proposed placement that varied by distance the lowest placement cost input was chosen for all related labor rates. All placement costs were then reduced by 5%.

Service_life

¶95 – Adjusted to reflect inputs consistent with those adopted by the Commission in UT-99-20-09.

WireCenter	density zone	drop length	WireCenter	density zone	drop length	WireCenter	density zone	drop length
ACMEWAXA	3	125	FRTNWAXX	1	175	NWPTWAXX	3	125
ALGRWAXX	3	125	GERGWAXX	2	175	OKDLWAXX	2	175
ANCRWAXX	4	125	GRFDWAXX	1	175	OKHRWAXX	4	125
ARTNWAXX	3	125	GRFLWAXX	3	125	PALSWAXX	2	175
BGLKWAXX	2	175	GRLDWAXX	3	125	PLMNWAXX	3	125
BLANWAXB	4	125	HLLKWAXX	7	50	QNCYWAXX	3	125
BNCYWAXX	2	175	HMTNWAXA	3	125	RCBHWAXX	6	75
BOTHWAXB	6	75	JUNTWAXA	6	75	RCFRWAXB	2	175
BRBAWAXA	3	125	KNWCWAXA	4	125	RCLDWAXA	4	125
BRPTWAXX	1	175	KNWCWAXB	3	125	RCLDWAXB	4	125
BRWSWAXA	2	175	KNWCWAXC	3	125	RDMDWAXA	6	75
BURLWAXX	4	125	KRLDWAXX	7	50	ROSLWAXA	2	175
CAMSWAXX	4	125	LACNWAXX	3	125	RPBLWAXA	2	175
CHLNWAXX	3	125	LARLWAXX	3	125	SKYKWAXX	1	175
CLVWWAXA	3	125	LATHWAXA	3	125	SLLKWAXA	6	75
CMISWAXA	4	125	LKGWWAXA	3	125	SMSHWAXA	4	125
CNCRWAXX	1	175	LKSTWAXA	4	125	SNHSWAXX	3	125
CNWYWAXX	3	125	LKWNWAXA	1	175	SOLKWAXX	3	125
CPVLWAXX	3	125	LOMSWAXA	1	175	STPSWAXA	1	175
CRLWWAXA	1	175	LVWOWAXX	3	125	STWDWAXX	3	125
CSHRWAXX	3	125	LYNDWAXX	3	125	SULTWAXX	3	125
CSTRWAXA	3	125	MLDNWAXA	1	175	SUMSWAXX	3	125
DMNGWAXA	3	125	MLSNWAXA	4	125	SWLYWAXX	3	125
DRTNWAXX	1	175	MNFDWAXX	1	175	TEKOWAXX	2	175
DVLLWAXX	3	125	MNSNWAXA	3	125	THTNWAXA	1	175
EDSNWAXX	3	125	MONRWAXX	3	125	TNSKWAXA	1	175
ENTTWAXX	1	175	MPFLWAXA	1	175	WDLDWAXA	3	125
EVRTWAXC	6	75	MRBLWAXX	1	175	WNTCWAXX	3	125
EVRTWAXF	6	75	MRWYWAXA	6	75	WRLDWAXA	3	125
EVSNWAXX	3	125	MTVRWAXX	4	125	WSHGWAXA	3	125
EWNCWAXA	3	125	MYVIWAXX	4	125	WSPTWAXA	4	125
FNDLWAXA	3	125	NCHSWAXX	3	125	WSRVWAXA	3	125
FRFDWAXA	2	175	NILEWAXX	1	175	WTVLWAXA	1	175

2. Cost Estimates

In the attached spreadsheet, we provide the cost estimates generated by the Commission's runs of VzCost and HM 5.3. We direct Verizon to use these cost estimates from the two models to calculate UNE rates for its compliance filing. As described in the order, the revised UNE rates will be a weighted average of the VzCost and HM 5.3 results. The weighted average will be calculated by giving a 60% weight to the VzCost estimate and a 40% weight to the HM 5.3 estimate. For example, the new statewide 2-wire loop price produced by this process will be:

VzCost weight * VzCost estimate * Adj. factor + HM 5.3 weight * HM 5.3 estimate.

0.60 * $18.86 * 1.03149 + 0.40 * $16.90 = $18.43.

For each of the rates filed pursuant to these instructions, Verizon shall identify the cost elements from each model that were used to create the filed rate.

3. VzCost Commentary[429]

During the course of this proceeding the parties offered sharply contrasting assessments of Verizon's new cost model, VzCost. Staff and AT&T, who supported HM 5.3 in this proceeding, generally criticized VzCost for its complexity, the time it takes to operate, and its reliance on what Staff and AT&T generally described as embedded data. Verizon, on the other hand, claims that VzCost and its underlying cost modules are a significant step forward in cost modeling and offer unique advantages such as the ubiquity of Internet access, the ability to incorporate significant amounts of real-world data through a server rather than a PC-based system, and the capability of sharing work among multiple users.[430]

After its own detailed analysis the Commission finds some truth in the assessments of VzCost provided by other parties.[431] While in many respects VzCost is a significant step forward from Verizon's previous cost models and constitutes a reasonable approach to solving difficult modeling issues such as customer location, VzCost's unique attributes – its Internet-based format and reliance on granular information – are not without cost to the user. Although the difficulties identified in using VzCost do not cause the Commission to alter the weight accorded the model in the body of

---

[429] This commentary is limited to VzCost because this proceeding provided the Commission its first look at Verizon's new cost model. We note that this Commission has expressed its opinion of HM 5.3 and its predecessors in great detail in this order and prior proceedings. For these reasons the Commission will only address VzCost in this appendix.

[430] See Section V.B of this Order.

[431] The Commission acknowledges that some of the difficulties the Commission, Commission Staff, and/or AT&T encountered while running the model can be attributed to the fact that VzCost is a relatively new construct. These types of difficulties are to be expected of any new model.

this order, the Commission finds that VzCost is cumbersome,[432] and at times, laborious and very time consuming to operate.[433] While no individual step or procedure is exceedingly difficult to complete, taken as a whole, VzCost can appropriately be described as difficult, because it requires significant amounts of manual intervention to progress from the point at which all of the user's input tables have been properly adjusted to the point where VzCost returns the desired cost estimates. VzCost clearly needs to be set up and actively managed by the user, as opposed to being set up and allowed to run, as is the case with other cost models. Although it appears that Verizon is in the process of automating some of the manual calculations and processes currently required by VzCost,[434] in its current state VzCost requires too many disparate tasks and affords too many opportunities for users to introduce bad or inconsistent data for it to be considered an integrated and easy-to-use model.[435]

Based on our experience of running VzCost and of the overall complexity of this model, we infer that Verizon assumed its own staff would make any Commission-ordered changes to VzCost and would then submit those results in a compliance filing, rather than having the Commission run VzCost as part of its deliberations and then release the results for the parties to review and comment on in their compliance filings.[436] The Commission has successfully utilized both of these approaches to compliance and believes that both would generally produce the same ultimate results. However, in this

---

[432] This trait is mainly due to the fact that browser windows often load slowly even when using a broadband connection. Furthermore, VzCost users are generally limited to viewing one browser window page at a time and must use multiple mouse clicks and wait for each page to load before continuing to navigate back and forth between sections of the model to complete a single task.

[433] We note that for the state of Washington it takes approximately 7 hours of VzCost run time for the model to return 2-wire loop cost estimates at the wire center level once the user's inputs and assumptions are properly set up in the cost study. The Commission also experienced run times for a report that lasted in excess of 28 hours prior to failing. A similar report was later rerun successfully in just over 17 hours.

[434] For example, Verizon recently added reports to assist with performing "ECF Calculations" and creating a "Loop Constants Table." However, these processes still require the user to perform manual calculations outside of VzCost prior to editing input tables.

[435] We note that inputs and calculations for IOF/HiCap facilities and the Forward-Looking Calibration factor take place in spreadsheets and other programs outside of VzCost whose results then have to be imported into the model.

[436] Statements in Verizon's Panel Rebuttal Testimony also support this conclusion. For example, when discussing a data mismatch discovered in Verizon's switching cost study Verizon testified that "Verizon NW will make this correction in the compliance phase of this proceeding, when it resubmits its cost studies." *See* Ex. 228TC at page 91.

case, the Commission concluded that it should run VzCost first, in order to directly assess the capabilities and limitations of the new cost model, since it is likely that Verizon will sponsor the same model in future proceedings.[437]

In running VzCost, the Commission set out to recreate Verizon's June 2003 filing in this proceeding, but incorporating the inputs and assumptions contained in the body of this order. Verizon's June 2003 filing was chosen because it contains all of the rate elements at issue in this proceeding and because it was determined to be the most efficient starting point.[438] However, starting with the June 2003 filing required the Commission to complete a number of time-consuming, and often manual processes to reconcile certain data and template version mismatches that were created as a result of the enhancements made to Verizon's loop model [VzLoop][439] during the course of this proceeding.[440]

We note that during this process Verizon was very attentive to the Commission's needs, twice meeting with the Commission's advisors to provide a general tutorial and discuss how to manipulate various inputs and assumptions within the framework of VzCost.[441] Verizon also made its panel of experts available on short notice for two conference calls and provided timely responses to a series of Bench Requests which addressed the specific steps to follow when replicating Verizon's June 2003 filing using the Commissions inputs.[442] However, the Commission is of the opinion that without this assistance it would not have been able to complete its task in a timely manner or with much confidence in the results. Thus, the important question elicited by the Commission's experience running this model is: 'Does VzCost meet

---

[437] *See* Direct Testimony of Kevin C. Collins, filed August 23, 2004, WUTC v. Verizon, Docket No. UT-040788.

[438] The Commission's consultations with Verizon indicated that starting with the June 2003 filing, as opposed to the January 2004 or March 2004 filings, was the best way to ensure that the Commission's inputs and assumptions flowed through all applicable rate elements in this proceeding.

[439] *See* Ex. 226T.

[440] In the parlance of VzCost, these additional steps involved removing 'old' BC Runs, running and posting 'new' BC Runs to the proper filing control sheet, deleting 'old' Cost Studies and running 'new' Cost Studies individually against the appropriate filing to properly associate the new Cost Study and data with that filing. Verizon characterized these steps as parallel to the process its staff undertakes to produce a filing in VzCost.

[441] All Commission contacts with Verizon mentioned in this Appendix were duly noticed to all parties and open to the participation of all parties.

[442] These responses were both written and filed with all parties, and oral responses to questions posed by the Commission's advisors were made during duly noticed conference calls convened on January 5th, January 14th, and January 21st. *See also Verizon's response to Bench Requests 22 through 30.*

the WUTC's requirement that a cost model provide all parties with an opportunity to fully explore the advantages and the limitations of the model?'[443] As it is currently configured, VzCost arguably does not.

The Commission believes that Verizon needs to provide additional VzCost documentation so that in the future neither the parties nor the Commission encounter so many challenges when running the model. C uring the proceeding we asi ed Verizon to provide some written guidance on running the model. Verizon's πKoop Checi listΣ provided in response to Aench Qequest 2/ was useful for this purpose, but not comprehensive enough. We conclude from our review of the checi list information provided that additional information on how to run the Verizon cost model needs to be made available. Verizon is ordered to provide within ten days of the date this order is issued the following material9

- Verizon must update the information provided in this checi list so that it provides a comprehensive and fully integrated description of the steps and processes Verizon implements (for all VzCost 'teams') to set up and run VzCost once 'pre-processing' is complete.[444]
- Verizon must provide a concise narrative of the purpose and goal of each step.
- For all applicable steps Verizon must provide input and output table descriptions explaining the source of the input [i.e. user adjustable table and/or upstream process cross referenced by step number] and the destination of the output [i.e. posted to control sheet or used in downstream processes such as AC run, Cost Study, FKC calculation, etc. cross-referenced by step number.]
    - The instructions must also indicate when output tables must have their status changed prior to being used in downstream processes.
- Where applicable Verizon must provide the generic template and/or table name used in VzCost, and the actual template or table Version Name used in Verizon's filing.
    - These names must include Version Name, and Source C escription, Koad C ate or other unique identifier.

---

[443] *UT 960369, 8th Supplemental Order,* ¶24.

[444] The purpose of this updated checklist is to outline and explain the steps necessary to set up and run VzCost from the beginning. VzCost's current documentation is extensive and provides an adequate description of the VzCost interface. Thus, unless indicated elsewhere is not necessary to include a detailed 'click-by-click' description of how a user completes each step in the model interface.

- Steps requiring reports to be run must include the report's full file name, and creation date, or other unique identifier.
    - Verizon must identify the source of the inputs necessary to run each report [i.e. Element Calculator Run from step X.]
- Steps requiring users to copy and edit data tables must include the table's full file name, and source description, load date or other unique identifier.
- Steps requiring manual calculations must provide a detailed explanation of how to complete the necessary calculations.
- Steps requiring tables to be manually edited must provide column and row references for the input to be edited, and the source of the data being used. [*i.e.* insert value X from report Y at location Z]
- Steps requiring the use of spreadsheets or programs outside of VzCost must provide the file names and a reference to the exhibit number(s) for the associated program(s) and documentation.
- Steps requiring the use of inputs provided by another 'team' or steps that result in outputs created for another 'team' must be explicitly cross-referenced to the appropriate step number in the updated checklist.

The Commission believes that this additional documentation is necessary to ensure that parties other than Verizon have a meaningful opportunity to operate VzCost and ensure that the input and assumption adjustments being investigated are consistent and flow through all downstream processes.[445] Given the rapid pace with which Verizon is updating both VzCost and VzCost's underlying cost modules, it is likely that the Commission's experience running VzCost in this proceeding is not isolated or unique.[446] Furthermore, while not all users will find it necessary to reproduce a given filing

---

[445] The Commission acknowledges that there is a function in VzCost that allows users to copy an existing filing and to revise and rerun that filing with different inputs and assumptions. However, it is our understanding that using the 'Revise and Rerun' function still requires users to manually complete all processes that take place prior to the 'Element Loading Run" stage. It is also the Commission's understanding that swapping a loop-element loading run would require that the appropriate loop constants and placement tables be manually updated and rerun in succession. See also VzCost User's Manual - Release 3.2.3, Section 9.1.13 for a description of the capabilities of the Revise and Rerun function.

[446] VzLoop version 6 was filed in June 2003 and version 7ra in 2004. According to the VzCost Help Desk Verizon has since progressed through versions 7rb and 9, so that it is currently supporting version 10.

from the point at which 'pre-processing' is complete, all parties should be given the opportunity to do so without having to rely on acquiring detailed instructions through the discovery process.[447]

In addition to our concerns about how the model is run, the Commission also recommends that the structure and operation of the model be modified in the future along the following lines:

1. A report should be available that identifies all input changes that have been made relative to the input values sponsored by Verizon (*i.e.*, a report that identifies each of the input values that differ from the scenario sponsored by Verizon).
2. Placement inputs are currently inputted at the central office level of observation. The user should have the option of inputting these values by density zone (using the same density classifications adopted by the FCC in its *Inputs Order*).
3. An intermediate table should be created that provides the weighted placement costs by density zone or by wire center. For example, suppose that the placement cost of bore and trenched cable are $8 and $3 respectively. Further, assume that the likelihood of using each of these activities is 15% and 85%, respectively. An intermediate table should be made available that shows the resulting weighted average placement cost, $3.75 ($8 * 0.15 + $3 * 0.85) and provides the user the opportunity to run the model with an alternative weighted cost for buried plant (*e.g.*, $4.25). This procedure is currently available to users of the Hatfield Model and we have used the option in our runs of that model.
4. Currently the sharing percentages can only be entered on a state-wide basis. An input mechanism should be created that allows the user to vary the sharing percentages by density zone. Here, too, the density zones should be the same zones used in the FCC's USF cost model.

---

[447] *See Ex. 1062T*, pages 2-5.

COST ESTIMATE SPREADSHEET

DOCKET NO. UT-023003
FINAL ORDER

HM 5.3		VzCost	
CLLI	Cost Estimate	CLLI	Cost Estimate
ACMEWAXA	$ 49.75	ACMEWAXA	$ 31.14
ALGRWAXX	$ 36.86	ALGRWAXX	$ 36.89
ANCRWAXX	$ 4.15	ANCRWAXX	$ 18.53
ARTNWAXX	$ 25.58	ARTNWAXX	$ 23.71
BGLKWAXX	$ 49.04	BGLKWAXX	$ 25.44
BLANWAXB	$ 20.59	BLANWAXB	$ 18.91
BNCYWAXX	$ 40.12	BNCYWAXX	$ 34.15
BOTHWAXB	$ 8.40	BOTHWAXB	$ 14.84
BRBAWAXA	$ 18.71	BRBAWAXA	$ 25.37
BRPTWAXX	$ 79.50	BRPTWAXX	$ 41.27
BRWSWAXA	$ 44.89	BRWSWAXA	$ 91.76
BURLWAXX	$ 15.59	BURLWAXA	$ 17.72
CAMSWAXX	$ 17.51	CAMSWAXX	$ 23.04
CHLNWAXX	$ 35.92	CHLNWAXX	$ 40.78
CLVWWAXA	$ 19.09	CLVWWAXA	$ 18.80
CMISWAXA	$ 23.37	CMISWAXA	$ 20.19
CNCRWAXX	$ 75.83	CNCRWAXX	$ 47.02
CNWYWAXX	$ 36.94	CNWYWAXX	$ 32.84
CPVLWAXX	$ 24.69	CPVLWAXX	$ 28.12
CRLWWAXA	$ 180.78	CRLWWAXA	$ 109.99
CSHRWAXX	$ 27.64	CSHRWAXX	$ 39.42
CSTRWAXA	$ 30.21	CSTRWAXA	$ 38.23
DMNGWAXA	$ 49.00	DMNGWAXA	$ 36.15
DRTNWAXX	$ 42.90	DRTNWAXX	$ 30.81
DVLLWAXX	$ 21.13	DVLLWAXX	$ 21.60
EDSNWAXX	$ 44.11	EDSNWAXX	$ 46.61
ENTTWAXX	$ 81.93	ENTTWAXX	$ 68.06
EVRTWAXC	$ 8.20	EVRTWAXC	$ 11.50
EVRTWAXF	$ 7.14	EVRTWAXF	$ 9.26
EVSNWAXX	$ 32.37	EVSNWAXX	$ 34.10
EWNCWAXA	$ 20.64	EWNCWAXA	$ 29.06

FNDLWAXA	$	23.95		FNDLWAXA	$	25.93	
FRFDWAXA	$	94.10		FRFDWAXA	$	111.57	
FRTNWAXX	$	94.49		FRTNWAXX	$	181.60	
GERGWAXX	$	105.43		GERGWAXX	$	120.98	
GRFDWAXX	$	94.85		GRFDWAXX	$	110.41	
GRFLWAXX	$	29.32		GRFLWAXX	$	24.48	
GRLDWAXX	$	28.52		GRLDWAXX	$	25.09	
HLLKWAXX	$	8.55		HLLKWAXX	$	12.10	
HMTNWAXA	$	50.89		HMTNWAXA	$	35.98	
JUNTWAXA	$	10.37		JUNTWAXA	$	11.95	
KNWCWAXA	$	13.36		KNWCWAXA	$	16.75	
KNWCWAXB	$	15.20		KNWCWAXB	$	18.58	
KNWCWAXC	$	20.43		KNWCWAXC	$	22.12	
KRLDWAXX	$	8.50		KRLDWAXX	$	10.87	
LACNWAXX	$	20.80		LACNWAXX	$	22.58	
LARLWAXX	$	24.21		LARLWAXX	$	29.51	
LATHWAXA	$	79.96		LATHWAXA	$	85.70	
LKGWWAXA	$	21.67		LKGWWAXA	$	3.44	
LKSTWAXA	$	14.70		LKSTWAXA	$	20.03	
LKWNWAXA	$	64.58		LKWNWAXA	$	47.73	
LOMSWAXA	$	139.36		LOMSWAXA	$	122.68	
LVWOWAXX	$	50.48		LVWOWAXX	$	28.13	
LYNDWAXX	$	20.38		LYNDWAXX	$	23.73	
MLDNWAXA	$	14.67		MLDNWAXA	$	132.43	
MLSNWAXA	$	69.22		MLSNWAXA	$	201.83	
MNFDWAXX	$	136.58		MNFDWAXX	$	180.56	
MNSNWAXA	$	37.23		MNSNWAXA	$	51.30	
MONRWAXX	$	16.40		MONRWAXX	$	18.19	
MPFLWAXA	$	71.50		MPFLWAXA	$	32.18	
MRBLWAXX	$	91.54		MRBLWAXX	$	46.72	
MRWYWAXA	$	8.24		MRWYWAXA	$	12.17	
MTVRWAXX	$	12.06		MTVRWAXX	$	14.36	
MYVIWAXX	$	11.84		MYVIWAXX	$	16.14	
NCHSWAXX	$	39.57		NCHSWAXX	$	28.00	
NILEWAXX	$	61.66		NILEWAXX	$	64.34	
NWPTWAXX	$	53.60		NWPTWAXX	$	66.74	

OKDLWAXX	$ 101.87		OKDLWAXX	$ 116.65	
OKHRWAXX	$ 14.92		OKHRWAXX	$ 17.07	
PALSWAXX	$ 55.02		PALSWAXX	$ 72.24	
PLMNWAXX	$ 19.87		PLMNWAXX	$ 30.55	
QNCYWAXX	$ 55.72		QNCYWAXX	$ 65.32	
RCBHWAXX	$ 7.28		RCBHWAXX	$ 10.61	
RCFRWAXB	$ 98.96		RCFRWAXB	$ 141.24	
RCLDWAXA	$ 16.47		RCLDWAXA	$ 16.12	
RCLDWAXB	$ 9.16		RCLDWAXB	$ 12.49	
RDMDWAXA	$ 7.94		RDMDWAXA	$ 13.87	
ROSLWAXA	$ 129.32		ROSLWAXA	$ 164.86	
RPBLWAXA	$ 92.50		RPBLWAXA	$ 59.15	
SKYKWAXX	$ 51.31		SKYKWAXX	$ 39.36	
SLLKWAXA	$ 8.52		SLLKWAXA	$ 14.41	
SMSHWAXA	$ 13.54		SMSHWAXA	$ 19.59	
SNHSWAXX	$ 20.43		SNHSWAXX	$ 17.82	
SOLKWAXX	$ 44.29		SOLKWAXX	$ 52.87	
STPSWAXA	$ 60.55		STPSWAXA	$ 53.45	
STWDWAXX	$ 22.78		STWDWAXX	$ 24.96	
SULTWAXX	$ 32.64		SULTWAXX	$ 22.20	
SUMSWAXX	$ 34.18		SUMSWAXX	$ 42.10	
SWLYWAXX	$ 23.28		SWLYWAXA	$ 18.92	
TEKOWAXX	$ 82.39		TEKOWAXX	$ 129.80	
THTNWAXA	$ 210.85		THTNWAXA	$ 285.93	
TNSKWAXA	$ 120.13		TNSKWAXA	$ 97.12	
WDLDWAXA	$ 28.29		WDLDWAXA	$ 27.52	
WNTCWAXX	$ 14.75		WNTCWAXX	$ 22.06	
WRLDWAXA	$ 19.75		WRLDWAXA	$ 26.45	
WSHGWAXA	$ 20.26		WSHGWAXA	$ 22.34	
WSPTWAXA	$ 17.31		WSPTWAXA	$ 15.42	
WSRVWAXA	$ 46.29		WSRVWAXA	$ 48.75	
WTVLWAXA	$ 123.54		WTVLWAXA	$ 105.47	
Note: the VzCost cost estimates shown above have not been adjusted					
to reflect prospective line loss as discussed at ¶312 of the Order.					