STATE OF VERMONT
PUBLIC SERVICE BOARD

Docket No. 5713

Investigation into New England Telephone and)
Telegraph Company's (NET's) tariff filing re:)
Open Network Architecture, including)
the unbundling of NET's network, expanded)
interconnection, and intelligent networks in re:)
Phase II, Module 2 – Cost Studies)

Order entered: 2/4/2000

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Hearing Officer

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I. INTRODUCTION

This proposal for decision draws to a close the third of the four principal stages that this investigation initially devised for itself. In the first phase, the parties and the Board directed their efforts to the development of broad policy objectives and general rules that will govern the competitive provision of services in local exchange telephony. In the first part of the second phase, we examined the complex non-price issues — both technical and policy-related — whose resolution is critical to the smooth functioning of interconnected networks. Then, in this second module, we turned to the details of costs and prices at wholesale, and it is to this complicated array of issues that today's recommendations respond. What are the true economic costs of the network? How should they be reflected in prices, so as to best serve the several objectives of efficiency, fairness, and simplicity? What analytical methods are best suited to this undertaking? And what procedures should be put in place that will hasten — and improve — the regulatory review of prices, terms, and conditions of wholesale service offerings in the future?

This docket is the regulatory precipitate of remarkable technological changes, changes that have created powerful economic pressures to reorganize the manner in which many telecommunications services — including those associated with the public switched network — are provided to end-users. In 1994, when the Board opened this docket, it saw — and foresaw — a vibrant and innovative telecommunications industry, inhabited by many providers fairly competing and making use of a network backbone open to all. That vision has been shared by every party here, by policymakers in other states, and by various branches of the federal government, most notably Congress and the President, who in 1996 signed into law the Telecommunications Act. The Act imposed obligations upon carriers and regulators to open their markets to competitive providers and, while weathering legal assaults, it has in many instances successfully combined with state endeavors to reform this essential industry. Today's recommendations fulfill certain of those regulatory obligations, by setting prices for the

unbundled network elements required by providers of competitive services in the local exchange.

In brief, today's proposed decision recommends that the Board adopt particular analytical approaches to the costing and pricing of those components of Vermont's telecommunications network to which competitors must have access, if there is to be meaningful competition in the local exchange. I recommend that the Board accept, with modifications, Bell Atlantic's models for outside plant (the loop, feeder system, and related investments), central office switching, interoffice transport, and tandem switching.[1] For those one-time service costs incurred when customers change local service providers, referred to as non-recurring costs, I recommend that the Board make use of the model prepared by AT&T Communications of New England, Inc. ("AT&T"). But for the costs of BAVT's investments in operations support systems, those systems that enable carriers and incumbents to process service orders and related requests, I recommend that the Board deny, at this time, their recovery through wholesale rates charged to competitive providers. Lastly, I recommend that, with a final order in this module, the Board close this docket. The issues that remain from the originally conceived scope for investigation — universal service and alternative methods of regulation — can be more easily and productively taken up in other dockets.

II. BACKGROUND AND HISTORY

The previous Orders in this docket, in particular those dated May 29, 1996, and February 4, 1999, set out the statutory authority of the Board to conduct this docket, and

1. The largest of Vermont's local exchange companies is referred to under a variety of names herein. New England Telephone and Telegraph Company, formerly doing business under the name of its corporate holding company, NYNEX, has since merged (as a part of NYNEX) with the Bell Atlantic Corporation. The entity operating in Vermont is known as Bell Atlantic-Vermont, or "BAVT." I also refer to it as "Bell Atlantic" or the "Company."

describe as well the essential prior orders that bear on it.[2] Here I summarize only the relevant events that have occurred in the past year.[3]

A. Recent Board Orders in This Docket

On August 20, 1997, the Board issued an Order in this docket approving a stipulated plan for the implementation of intraLATA presubscription ("ILP Order"). ILP denotes the capability of a caller to make in-state long distance toll calls by dialing one plus the ten-digit number of the party with whom the caller wishes to speak, irrespective of the carrier providing the service. The ILP Order also directed BAVT to perform a total service long-run incremental cost ("TSLRIC") study of the investments and actions necessary to effect changes of customers' intraLATA presubscribed interexchange carriers ("LPIC"), as a basis for setting a rate for LPIC changes. Bell Atlantic filed such a study and recommended a fee of $5.00 per LPIC-change. Several aspects of the study were contested by other parties. After evidence and testimony were taken on the matter, the Board issued an Order on August 10, 1998, setting the LPIC-change fee at $2.10 per change.

In late 1997, Bell Atlantic, AT&T, and the Department asked the Board to determine whether it has authority under Vermont law to regulate the manner in which incumbent local exchange carriers ("LECs") provide unbundled network elements ("UNEs") to competitive local

2. The Order of May 29, 1996, is referred to as the "Phase I Order." The Order of February 4, 1999, is referred to as the "Phase II-1 Order."

3. There are twenty-seven parties to this proceeding, not all of whom have participated actively. They are the Vermont Department of Public Service ("DPS" or "Department"), Bell Atlantic-Vermont, Frontier Communications of New England, Inc., Sprint Communications Company, L.P. , Atlantic Cellular Company, L.P. ("Atlantic Cellular"), Hyperion Telecommunications of Vermont, Inc. ("Hyperion", together with Atlantic Cellular, the "Alternative Technology Providers" or "ATP"), AT&T Communications of New England, Inc. ("AT&T"), MCI Telecommunications Corporation, Design Access Network, Chittenden Community Television, Inc., Enhanced 911 Board ("E-911 Board"), Chittenden County Cable Access Advisory Board, Channel 17 Policy Board, Lake Champlain Access Television, Inc., Vermont Access Network, RCN Network Services, Inc., U.S. Cellular Corporation, and VBV-Online.

Also parties are Vermont's nine independent local exchange companies. Eight of them participated jointly: Shoreham Telephone Company; Waitsfield-Fayston Telephone Company, d/b/a Waitsfield Telecom and d/b/a Champlain Valley Telecom; Northfield Telephone Company; Ludlow Telephone Company; Perkinsville Telephone Company; Franklin Telephone Company; Topsham Telephone Company; and STE/NE Acquisition Corporation, d/b/a Northland Telephone Company of Vermont. The ninth is Vermont Telephone Company ("VTel"). The eight-party independents are referred to as the "independent LECs," or "ILECs"; however, I note that, in certain clear contexts, the reference also includes VTel.

exchange carriers ("CLECs") and other telecommunications providers. At issue was whether, under the Act and Vermont law, the Board has authority to require incumbent LECs to provide UNEs[4] on a recombined basis (rather than as merely part of a resold retail service) to competitive LECs. On October 8, 1998, the Board issued an Order in which it concluded that:

> [it] is not precluded by federal law from examining whether incumbent LECs should be required to offer combined UNEs to competitive providers; furthermore, under Vermont law the Board is authorized to do so. However, we also conclude that the factual basis for determining whether such a conclusion is consistent with the public interest is lacking. In order to develop a UNE-combination policy that appropriately balances the objectives of economic efficiency, fairness, improved service, and creative product development, a full factual record must be developed.[5]

The Board directed me to take evidence and testimony on the matter; this aspect of the investigation is still ongoing.

B. The Act, the FCC, the US Supreme Court, and Other Board Orders

On February 8, 1996, the Telecommunications Act of 1996 ("Act") was signed into law by President Clinton. It is the first comprehensive national telecommunications legislation to be passed since 1934. It implements significant legal and regulatory reforms at the state and federal levels, and imposes new duties and responsibilities on carriers for the purpose of opening telecommunications markets to competitive entry. In so doing, the Act seeks to subject telecommunications providers to the discipline of the marketplace, thereby stimulating technological innovation, efficiency, and improvements in service quality and reliability.

Since February 1996, the Federal Communications Commission ("FCC") has initiated several rulemakings to implement various sections of the Act. In its First Report and Order, the FCC set out a broad and detailed set of rules designed to open the local exchange system to competition, rules relating to the manner and degree of network unbundling, costing and

4. As the telecommunications industry has changed over the past decade, so has its lexicon. In earlier Orders in this and other dockets, UNEs have been variously referred to as *essential facilities*, *bottleneck monopoly inputs*, and *basic network functions*. These terms should be considered synonyms.

5. Order of 10/8/98 at 14.

pricing methodologies, interconnection, and resale of retail services.[6] That Order was appealed by many of the FCC parties to the Eighth Circuit Court of Appeals. The Eighth Circuit stayed several provisions of the Order and, on July 18, 1997, issued a decision making the stays final. That decision was amended on rehearing, October 14, 1997.[7] Like the LCO itself, the Eighth Circuit's Rehearing Order was controversial, and parties appealed from it, this time to the U.S. Supreme Court.

On January 25, 1999, the U.S. Supreme Court ruled on the appeals.[8] In large measure, the Court upheld the LCO, but with respect to certain aspects remanded it to the FCC for further action. It is not necessary here to describe in detail the Court's decisions; to the extent that they effect my recommendations today, they are discussed in the relevant sections below.

Finally, in several other dockets, the Board has issued orders that relate, either directly or indirectly, to the development of a competitive local exchange market in Vermont. Those dockets have dealt with the interconnection agreements and certifications of individual competitors, and generally have not taken up the broader policy questions that this docket has been examining.[9] Where appropriate, I have striven here to maintain consistency with the Board's rulings in those cases.

C. Positions of the Parties

In light of the arcane and technical nature of the issues taken up in this module, it would be difficult and wasteful to summarize the various positions of the parties. Instead, they are described as appropriate in the relevant sections following. As I had come to expect in this docket, the issues have been well elucidated. I again thank the parties for their efforts.[10]

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6. First Report and Order, *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, CC Docket No. 96-98 (August 8, 1996) ("LCO").

7. *Iowa Utilities Board v. FCC*, 120 F3rd 753 (8th Cir. 1997) ("Rehearing Order").

8. *AT&T v. Iowa Utilities Bd.*, 119 S. Ct. 721 (1999) ("*AT&T Corp.*").

9. With the exception of Docket 5903, *Investigation into Service Quality Standards, Privacy Protections, and other Consumer Safeguards for Retail Telecommunications Service*.

10. I thank also my colleagues at the Board for their careful consideration of the issues examined in this proposed decision. In particular, I am grateful to Riley Allen and David Farnsworth, who more than assisted in reviewing the record and drafting this report.

III. FINDINGS OF FACT AND DISCUSSION

Based on the testimony and evidence presented in this phase of the docket, I hereby report, pursuant to 30 V.S.A. § 8, the following findings of fact and discussion.

A. Total Element Long-Run Incremental Costs: Methodology

In Phase I of this investigation, the Board adopted the *total service long-run incremental cost* ("TSLRIC") methodology for the purposes of establishing prices for wholesale basic service elements.[11] Section 252(d)(1) of the Act requires that unbundled network elements and interconnection be priced at "cost." In one of the first significant rule-makings to implement local competition under the Act, the FCC reached a conclusion similar to that of the Board, when it adopted the *total element long-run incremental cost* ("TELRIC") methodology for setting UNE prices[12] As AT&T notes, the TELRIC of a network element begins with its TSLRIC, and it "includes a reasonable return on investment (*i.e.*, 'profit'), plus a reasonable share of the forward-looking joint and common costs."[13]

Under TELRIC, one starts by estimating the "forward-looking, long-run incremental costs" of providing "the entire quantity of the network element."[14] The aim of a TELRIC study is to replicate costs and prices in a way which "simulates the condition in a competitive environment."[15] "In dynamic competitive markets, firms take action based not on embedded costs, but on the relationship between market-determined prices and forward-looking economic costs."[16] The forward-looking network required under the TELRIC methodology is "the most efficient and least cost network that does the job," using the current wire center locations.[17] Then, after estimating the total cost of providing a network element in this manner does one

11. Phase I Order at 25 and 27.
12. LCO, ¶¶ 672-703.
13. *Id.* AT&T Brief at 8.
14. Anglin pf. at 3. See also Taylor pf. at 8-9 and the LCO at ¶ 690.
15. LCO at ¶ 679.
16. *Id.* at ¶ 620.
17. Tr. 12/19/97 at 58-59 (Vander Weide).

derive a per-unit cost, "by dividing the total cost associated with the element by a reasonable projection of the total usage of the element." [18]

Because a TELRIC cost estimate is required to be forward-looking, the incumbent LEC is not entitled to recover its historic, embedded costs.[19] The TELRIC of an element has three components: operating expenses; depreciation cost; and an appropriate risk-adjusted cost of capital. The methodology also allows for recovery of a reasonable measure of common costs.[20] Under TELRIC the incumbent LEC must be presumed to use the most efficient technology that is "currently available," even if it has not yet been deployed in the local exchange network.[21]

The DPS recommends that the Board adopt the TELRIC methodology for setting UNE rates. Indeed, all parties agree that UNE rates should be set in accordance with the TELRIC methodology.[22] The DPS points out that TELRIC is a "cost-based pricing standard,"[23] and then goes on to argue that, "Since the methodology captures all forward-looking costs, UNE rates should be set *at* cost as measured by TELRIC—no additional mark-up or additional proceeding is necessary."[24]

While I conclude, as AT&T argues, that in Phase I the Board essentially adopted the TELRIC standard when it established the TSLRIC plus "mark-up" pricing method, I recommend here, as do the parties, that the Board formally adopt and apply the TELRIC methodology as established by the FCC. The FCC has already required that TELRIC be used for setting interconnection prices, and that directive has withstood judicial scrutiny.[25]

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18. Anglin pf. at 11, quoting the LCO at ¶ 682. See also tr. 12/10/97 at 17-18 (Anglin).
19. Tr. 12/1/97 at 53-55 (Vander Weide); LCO at ¶¶ 704-705.
20. LCO at ¶ 694.
21. Tr. 3/17/98 at 193-195 (Anglin).
22. DPS Brief at 5.
23. *Id*. at 6, citing the LCO at ¶ 673.
24. DPS Brief at 17, citing *GTE South Incorporated v. Theodore V. Morrison, et al.*, Civ. No. 3:97CV493 (E.D. Va. May 19, 1998) (the forward-looking cost methodology can provide the incumbent LEC the opportunity to earn a reasonable profit because it includes a forward-looking cost of capital as well as the costs of purchasing, installing, maintaining, and operating the necessary assets).
25. *AT&T Corp.*

Production of TELRIC costs for UNEs is also a condition of the Bell Atlantic–NYNEX merger.[26] The benefits of a consistent approach to costing and pricing are obvious.

B. Recurring Costs

1. Bell Atlantic's Models and Their Inputs

a. The Network

i. Outside Plant: the Loop

Outside plant consists of the physical transport facilities that connect end-user locations (from the network interface device, or "NID," on the customer's premises) to the serving wire center or central office ("CO," where the switch equipment resides); these facilities are generally referred to as "loops" or "access lines."[27] Pursuant to the Phase I Order, the Act, and the LCO, incumbent LECs must provide unbundled local loops to requesting carriers.[28]

In its loop cost model (which it calls "LinkCoster"), BAVT assumed that all of its COs remain at their current (or planned) locations.[29] The loop plant extends from the existing offices and is modeled using forward-looking technologies (which is to say, state-of-the-art technologies that would be deployed today, if the network, though based on the existing wire centers, were to be built anew). Bell Atlantic proposes a network made up of 100 percent fiber in the feeder portion of the loop, digital electronics, and copper distribution plant.[30]

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26. As a condition of approval of Bell Atlantic Corporation's acquisition of NYNEX, the FCC required the merged company to propose rates for interconnection, UNEs, and transport and termination that are based on the forward-looking economic costs of providing these elements. *In the Application of NYNEX Corporation, Transferor and Bell Atlantic Corporation, Transferee, for Consent to Transfer Control of NYNEX Corporation and Its Subsidiaries ("Merger Order")*, File No. NSD-L-96-10, Memorandum Opinion and Order, FCC 97-286 (rel. August 14, 1997) at ¶ 185. For a definition of "forward-looking economic cost," the merger order refers to the TELRIC discussion in the LCO. *Id.* at n. 345, citing 11 FCC Rcd. At ¶¶ 618-732.

27. Fraine pf. at 6-7; Anglin pf. at 36-37.

28. Phase I Order at 19-20; Act, § 251(b)(3); LCO, ¶¶ 377-387.

29. As required by the Phase I Order at 32. See also LCO at ¶ 685.

30. Exh. ATT-IIB-1. The wireline telephony network built in this country over the past century is often referred to as the public switched network: *public* because it is available to any and all end-users on a common-carrier basis, and *switched* because it routes each transmission over a dedicated circuit between the caller and the called. Thus, in an abstract sense, the network creates through the switching process a "virtual" pair of wires for each call between end-users.

The local exchange system is one component of this national network. In its simplest manifestation, a user's phone is physically connected by a pair of thin copper wires (the loop) to the central office switch.

(continued...)

A. Feeder Facilities

BAVT modeled fiber-optic Digital Loop Carrier ("DLC") transmission systems for all feeder routes to the remote terminals. The model placed RTs at fixed distances from the COs, beginning at 3,000 feet and increasing generally in increments of 6,000 feet, with minor variations depending on the density zone — urban, suburban, or rural (see Section III.B.3.c, following).[31] The RTs then subdivide the feeder into distribution routes by terminating the optical system, converting the digital signal to analog, and providing any required multiplexing functions for the individual lines or channels serving customers. Ideally, the model places the RTs as close to customer locations as possible, in order to minimize the length of the distribution cable and maximize that of the fiber feeder. Each individual customer line or channel has a port on the RT that is connected by copper cable through a nearby Serving Area Interface ("SAI") to the copper distribution cable pairs that extend to each customer location.[32] In the central office, the fiber cable terminates on the fiber distribution frame, which is then connected by fiber cable to the central office terminal ("COT"). The COT provides an interface to the local switching equipment or to other transmission systems, as appropriate.[33]

B. Distribution Plant

The distribution portion of the local loop provides the connection between the SAI and the "drop wire" at the customer location. The drop wire connects the distribution cable to the NID. Bell Atlantic modeled a copper distribution system, except in instances where fiber

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30. (...continued)
All the numbers served by a switch constitute an "exchange." A call originating on that phone travels to the switch via that pair of wires and, by the switch, is directed either to another phone served by that switch or to another switch (or series of switches and transmission lines, called "trunks") until it is finally terminated at called party's phone.

Loop configurations are, however, generally more complex than that described here. Usually they consist of wire pairs emerging from end-users' premises and coming together in cables leading to the CO, unless and until there is a sufficient accumulation of such wire pairs to justify the deployment of a technology that can concentrate, or "multiplex," calls (that is, their electronic signals) on fewer facilities, or "feeders," from which they are then transmitted to the CO. Multiplexers used in this fashion are called remote terminals, or "RTs." Fraine pf. at 6-7.

31. Exh. BA-IIB-5; tr. 12/10/97 at 125-126.

32. Fraine pf. at 6-9.

33. *Id.* at 10.

distribution plant already exists or is currently planned.[34] In the main, BAVT assumed that its distribution facilities, like the feeder plant, will be aerially deployed, but that there would be some small percentage of the facilities placed underground.[35]

C. Bell Atlantic's Loop Study

To estimate feeder length, distribution cable length, and total loop length of the average loop in each density zone, Bell Atlantic performed a study of "representative loop characteristics" in each of three density zones — urban, rural, and suburban.[36] The critical drivers of loop costs are, as one would expect, cable length and customer density, and it is therefore necessary to differentiate loops according to these properties, in order ultimately to set wholesale prices in a competitive market.[37]

Bell Atlantic's loop study examines loops by central office. Each CO was characterized by density, *i.e.*, by the number of access lines per square mile within the exchange served by the central office.[38] The densest zone, the urban, consists of two exchanges, Burlington and Winooski. Thirteen exchanges make up the suburban density zone. The remaining 67 exchanges fall into the low-density rural zone.[39]

Originally, Bell Atlantic sampled a total of 240 loops distributed among the three density zones. The samples were not, however, drawn randomly from all central offices, but rather from only 25 of the Company's 82 Vermont COs.[40] In response to criticisms of this study, BAVT performed a second one in which it sampled additional loops from among all of

34. *Id*. at 6-9.

35. Exh. BA-II-1, Workpaper, Part A, at 7; Anglin pf. at 9.

36. Fraine pf. at 13.

37. Weiss pf. at 22. This simple statement almost glibly ignores the host of policy challenges that the economics of the loop pose. That is not my intention. Questions surrounding the "deaveraging" of wholesale prices and its effects upon retail prices and universal support are crucial matters of public policy. They were touched on in the Phase I Order and again elsewhere in this Order, but will be taken up in earnest in a follow-on phase or docket.

38. Fraine pf. at 13.

39. Exh. BA-IIB-5 at Attachment 1.

40. Fraine pf. at 13.

the Company's Vermont exchanges and added these newly sampled loops to the original group of 240.[41]

The Department and AT&T contend that both the original and amended studies are seriously flawed and should not be relied upon for setting UNE rates. First, they argue that both studies' sample loop populations are inadequately small. In addition, they maintain that, by drawing loops from two different population sets, the statistical usefulness of the second study's sample is compromised. Third, they contend that, since loops associated with unpublished phone numbers were not included in the population from which samples were drawn, the overall sample "suffers from selection bias" — the loops were not randomly picked. Fourth, they argue that Bell Atlantic's decision to rank whole COs, rather than (presumably smaller) sets of similarly situated loops, according to density and loop length is not analytically justified, since it assumes that line density is uniform throughout each exchange. This, asserts the Department, is not true. Lastly, the DPS argues that any costing model that the Board adopts for pricing purposes should also be capable of underpinning universal service support calculations; the Department claims that Bell Atlantic's model, because it fails to sufficiently differentiate costs among loops, will be inadequate to the task.[42]

The evidence in the record supports the opposing parties' contentions. The loop sampling procedure used by Bell Atlantic does not yield statistically reliable results, for the reasons enumerated by the Department. The inadequate sizes of the samples create confidence ranges around the mean loop length that are too broad to be used for estimating loop length.[43] Also, the manner in which the samples were combined contaminates them for statistical purposes.[44] Moreover, the failure to draw samples from all eligible loops suggests that "selection bias" may further affect the usefulness of the study.[45]

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41. Fraine reb. pf. at 1-2.
42. DPS Brief at 54-60; AT&T Brief at 44-45.
43. Weiss pf. at 24.
44. Tr. 12/11/97 at 234-36 (Weiss).
45. *Id*. at 237 (Weiss). Among the set of loops served by unpublished numbers are not only those of residential consumers seeking some added measure of privacy but also those associated with CENTREX service. While it may be reasonable to surmise that such access lines are usually associated with businesses located in areas of greater customer density and, therefore, are of relatively shorter lengths, I cannot reach

(continued...)

The disaggregation of loops by central office poses its own set of difficulties. As the DPS rightly points out, this approach is only reasonable if customer density is uniform throughout an exchange, which, of course, is not necessarily the case.[46] The DPS cites the example of the Bennington exchange, whose CO serves a densely populated and urban area in southern Vermont, but is, by BAVT's model, deemed a rural area because the downtown's urban density is mathematically overwhelmed by the surrounding large and lightly populated area also served by the CO.[47] The consequence is that the weighted average cost that the model calculates is not sufficiently representative of either the downtown links or the rural ones, and the prices based on those costs are likewise dubious.

Winooski, an urban area with access line densities similar to those of downtown Bennington, is served by its own CO; however, the exchange does not include a lower density rural area. Under Bell Atlantic's model, Winooski's unbundled loop costs are significantly lower than those of Bennington as a whole, but it is certainly conceivable that Bennington's downtown loop costs are in the same range as those of Winooski.[48] If the costs of a service or functionality are the same, so presumably should be their prices.[49] I cannot be confident that the Company's model sets reasonable, cost-based link prices, at least for those exchanges

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45. (...continued)
such a conclusion on the basis of this record. I can, however, conclude that their absence from the samples seriously jeopardizes the study's validity.

46. Also implicit here, and in the loop study generally, is the assumption that the economics of cable and pole deployment are characterized by flat cost curves, which is to say that the incremental costs of investment do not vary significantly as additional facilities are put in place. This assumption appears to be reasonable.

47. DPS Brief at 56-57. In the rural density zone, the mean loop length 19.3 kilofeet ("kft") and the standard deviation is 15.8 kft; in the suburban density zone, the mean loop length is 14.9 kft and the standard deviation is 13.8 kft; and in the urban density the mean loop length is 13.3 kft and the standard deviation is 10.2 kft. Fraine supp. reb. pf., Attachement 1. The distribution of link costs around the mean is too great to assure that the links included in each group are sufficiently similar in their cost characteristics to justify their being priced at the same rate.

48. Exh. ATP-IIB-1.

49. The record gives other examples of this problem. In the Burlington exchange, loops range in length from 600 to 43,300 feet, and the average length is 13,300 feet. The Company proposes charging the same rate for all unbundled loops that exchange. In the suburban density zone, the average loop is 14,900 feet long, but the price will be the same whether it is 800 feet long or 77,000 feet long — and that price is greater than the Burlington loop price, which means that a CLEC or customer would pay more for an 800-foot loop in Montpelier than for a 40,000-foot loop in Burlington. Fraine supp. reb. pf., Attachment 1.

characterized by heterogeneous customer densities.[50] If prices are to more accurately reflect the costs of providing service, then it will be necessary to adopt a modeling approach that identifies and costs loops according to their driving economic properties. The DPS's proposal that loops should be grouped on the basis of their customer densities has obvious appeal.[51]

As for the argument that Bell Atlantic's loop study fails to meet the universal service costing obligations set out by the FCC,[52] I concur. The USF Order requires that a cost study or model must deaverage universal service support calculations to the wire-center serving area at least, and perhaps to smaller areas. A plausible argument can be made that BAVT's study meets this requirement, though minimally. However, for the reasons given above, the Company's study, though perhaps satisfying the wire-center criterion, nevertheless fails to calculate accurate costs for the loops in each density zone. The loop populations in the wire centers are too various to allow for disaggregation on this basis.

D. The Configuration of Feeder and Distribution Facilities

Bell Atlantic's model is premised on the assertion that the DLC, all-fiber system is the most cost-effective feeder technology for the local network.[53] The Company asserts that fiber systems provide greater reliability, operating flexibility, lower maintenance costs, and lower incremental capacity costs than do copper feeder systems.[54]

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50. The effect that such pricing can have on competitive markets and the efficient use of networks is potentially quite deleterious. The logic of cost-based pricing was set out in detail by the Board in the Phase I Order and need not be revisited here. Suffice it to say that there is no economic justification for charging a significantly higher price in one area for a service that is similar (if not identical) to a lower-priced service offered elsewhere. Moreover, in the absence of an economic or other compelling public policy reason for doing so, such a pricing anomaly would likely be found to be unjustly discriminatory. 30 V.S.A. § 218(a).

51. Weiss supp. pf. at 5. This does not mean that more than three density zones should be created, although analysis may justify a greater breakdown. Simply the conclusion is that the attempt to catagorize loops by CO must be discarded. It is not enough to say that a particular loop is found in a particular exchange to then know what its costs are; whether it should be grouped with high- or low-cost loops is a function of characteristics unrelated merely to its exchange.

52. Report and Order, *In the Matter of Federal-State Joint Board on Universal Service*, CC Docket No. 96-45 (May 8, 1997) ("USF Order") at ¶ 250.

53. Fraine pf. at 8.

54. Tr. 12/11/97 at 139.

The Department and AT&T challenge the Company's contention that an all-fiber feeder network is most economically efficient, arguing first that, in the absence of any evidence in support of the Company's contention, it remains simply a contention. Next they argue that the model's placement of RTs at least 3,000 feet from COs is inconsistent with the stated principle that RTs should be placed as close to customer locations as possible, since, in Vermont, population concentrations are greatest surrounding COs. The modeling consequence, argue AT&T and the DPS, is that, in many instances, feeder cable extending more than a half mile from a CO is matched by copper distribution plant "backhauling" to customers near the CO. This, they assert, results in outside plant facilities whose total length exceeds that of the existing system by hundreds of millions of feet. They argue that a more cost-effective network would emerge if the minimum length of fiber feeder routes were increased to 9,000 feet, and that customers closer than 9,000 feet to the CO be served as appropriate by copper feeder and distribution facilities. Third, the Department and AT&T contend that the "fill" factors assumed by Bell Atlantic — inputs that reflect the degree to which capacity is utilized — are unreasonably low and, when combined with the allegedly excessive amounts of capacity deployed, further increase the per-unit costs of the network. They recommend that fill factors in the range of 70-80 percent, instead of BAVT's 40-60 percent, be used. [55]

AT&T takes issue with Bell Atlantic's assumption that any cable not deployed aerially (that is, strung from poles) would be placed "underground," which is to say threaded through conduit that is itself set underground. AT&T argues that BAVT arbitrarily ignored the possibility that cable could be buried directly, without conduit, and that, by doing so, the Company has overstated the costs of this (albeit small) portion of its outside plant. Lastly, AT&T argues that BAVT has overstated the amount of DLC facilities needed to meet expected growth — that the Company's modeling is inconsistent with its own engineering practices — and that the resulting 40 percent share of loop cost imposed by DLC facilities is unrealistic.[56]

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55. DPS Brief at 44-49, 58-60; AT&T Brief at 44-50; Globerson at 10-11.
56. AT&T Brief at 48.

BAVT based its local loop design on existing feeder and distribution routes.[57] The Company argues that the existing routing from the current central office locations is a sensible configuration of a new network, insofar as it reflects certain practical constraints (*e.g.*, physical and legal) to the deployment of a network.[58] Although the model assumes the use of existing routes, it does not lay out feeder systems and copper distribution plant in the same configurations as existing facilities.[59] Nor should one expect it to do so, since new technologies are being contemplated. However, the model does create a network that appears, in certain respects, unlikely.

Most notable among them is the requirement that distribution facilities (wire pairs connected to NIDs) terminate at RTs at the ends of feeder routes that are themselves a minimum of 3,000 feet in length. While this may make sense for customers located more than 3,000 feet from a CO, it does not seem reasonable for customers located closer to the CO, who presumably could be served by distribution facilities running directly to the wire center. The case for "backhauling" was not made. While there was no dispute that fiber cable is cost-effective in the longer feeder routes, the evidence casts strong doubt as to the wisdom of deploying fiber feeder in lengths of less than 9,000 feet.[60]

The consequence of Bell Atlantic's modeling approach is that some 159 million feet of outside plant, over and above that which is currently in place, will be installed in the rural density zone. Similarly, 54 million feet of feeder and distribution facilities will be deployed in

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57. Anglin pf. at 8.

58. BAVT Brief at 11.

59. Globerson pf. at 10-11.

60. Tr. 12/10/97 at 133-140, 146-147; Globerson pf. at 10-11; tr. 12/16/97 at 78-79 (Globerson). In certain areas, however, it may make sense to install fiber distribution plant in shorter lengths — in, say, downtown Burlington. The distinction between *feeder* and *distribution* plant in such instances may be more semantic than technical, but this should not deter us from determining what is the most cost-effective network, given the topography of Vermont and the demand characteristics of its telecommunications users. As Bell Atlantic reasonably notes, at least one of its competitors is deploying fiber in commercial centers. BAVT Brief at 12.

the suburban zone.[61] On their face, these are unrealistic outputs, and Bell Atlantic has not established that such a network is more cost-effective than other plausible alternatives.[62]

The evidence also supports the opposing parties' contention that the Company has unreasonably understated the utilization, or "fill," factors of its outside plant. It assumes 36-69 percent for copper feeder and 60 percent for fiber feeder plant.[63] However, feeder typically averages fill rates of around 80 percent.[64] Morever, even BAVT itself, for its own planning purposes, projects feeder utilization rates of between 70 and 90 percent over the next ten years, averaging around 80 percent.[65] As for distribution plant, the Company uses a 40 percent fill factor, but here again this estimate is low in relation to BAVT's own planning assumptions and when compared to practices elsewhere.[66] A more reasonable distribution utilization factor is 50 percent.[67] And, lastly, Bell Atlantic assumes low utilization of NIDs — 15 percent. This flows from its low estimate of demand for second lines. Correcting for this deficiency results in a NID fill factor of 62.5 percent.[68] Because the modeled network is designed to reasonably meet present and future demand for service in a competitive market — that is, it is not being "overbuilt" in an environment where cost recovery is less sure — and, because the TELRIC methodology calls for measurements based on entire increments of demand, it is appropriate to

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61. Tr. 12/11/97 at 162-165 (Fraine).

62. The Company concedes that, in certain cases, fewer feet of distribution copper would be required if the cable were to run directly to a CO rather than to an RT, but counsels that "whether a customer is served from the SAI [at the RT] or the CO directly depends on the location of the customers and engineering design issues. The Board should rely on the expertise and experience of BAVT's engineers and design process." BAVT Brief at 13, fn. 17.

To an overwhelming degree, regulators *do* rely on the Company's expertise in designing and installing its network: and this is appropriate, since the Company bears the risk of failed investments. However, here we are trying to construct a model that replicates the future behavior of a cost-minimizing telecommunications provider, and it is not enough to simply rely on unsupported assertions that its proposals will best serve economic efficiency. Reasoned support of those proposals is needed.

63. Exh. BA-IIB-7; Weiss pf. at 26.

64. Weiss pf. at 26-27; exh. DPS-IIB-9.

65. Tr. 12/10/97 at 248-252 (Fraine); tr. 12/16/97 at 50-54 (Globerson); tr. 12/11/97 at 245 (Weiss).

66. Weiss pf. 28-29. The debate turns in part on assumptions about demand for second phones. The Company estimates that only 15 percent of subscribers connected by wire pairs will want a second line. The evidence persuades me that a more reasonable expectation is 33 percent. *Id.*

67. *Id.*

68. *Id.* at 38.

use fill factors that reflect the full use of capacity (with reasonable reserves). Bell Atlantic's factors in this instance are implausibly low, and I adopt the DPS's recommendations.[69]

The evidence on the virtues of buried cable, in place of underground facilities, is less persuasive. In 1995, Bell Atlantic had greater investment in buried cable in Vermont than it did in underground cable, and it continued to add to its buried cable investment.[70] However, the Company has had problems with buried cable in Vermont's rocky terrain and generally avoids doing so, except where soil conditions allows for it.[71] Fiber feeder, if not strung aerially, is always placed in conduit.[72] The cost of underground facilities is approximately twice that of buried plant, but maintenance and replacement costs may be measurably reduced.[73] On this matter, BAVT's assumptions appear to be reasonable.[74]

Finally, it is Bell Atlantic's usual practice to invest in enough modular "plug-in" digital loop carrier units to meet the next six months of increased demand.[75] In this way, the Company incurs costs at the time of new need and does not carry an inventory for an extended period. In its modeling, however, BAVT assumes that DLC units sufficient to meet demand over the planning horizon are installed at the start. The consequence of this assumption is to unnecessarily increase the up-front capital costs of the outside plant network.[76]

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69. I accept the recommended fill factors of 80 percent for feeder plant, 50 percent for distribution facilities, and 62.5 percent for NIDs. However, I note that, as competition develops, these factors may prove to be conservatively underestimated. DPS witness Weiss pointed out that, in competitive markets, firms are generally unwilling to invest in new capacity until it is actually needed and can generate revenues. *Id*. at 27-28. I believe that there is merit to this expectation, and, when considering UNE cost studies in the future, the Board should reevaluate the fill factor assumptions.

70. Tr. 12/10/97 at 218-219; exh. ATT-IIB-6; exh. BA-IIB-1.

71. Tr. 12/10/97 at 210.

72. *Id*.

73. *Id*. at 209-210.

74. But they may be challenged in the future. An analysis of the longer term savings resulting from the up-front investment in conduit was not provided here, but would have been of help.

75. Tr. 12/10/97 at 150-151.

76. *Id*. at 205-206; exh. BA-IIB-1, Workpapers Part A at 1-2.

E. Outside Plant Investment Costs

Investments in outside plant were derived from the Company's Engineering Construction Records Information System ("ECRIS") and Costing Tool databases.[77] The investment costs are based on recent equipment and installation costs incurred. The investment costs include the discounted vendor prices for materials, sales tax, average installation labor, capitalized expenses such as local police details, and right-of-way expenses.[78]

These costs were not disputed by other parties. They are reasonable estimates of forward-looking investments in outside plant.

F. The Hatfield Model's Treatment of the Loop

Bell Atlantic argues that the Hatfield Model creates an outside plant architecture that, on a forward-looking basis, is unsuitable for Vermont. First, the Company asserts that the 9,000-foot minimum for feeder routes is "unsupported in practice and is inconsistent with the assumptions under which BAVT is actually designing its network in Vermont."[79] Second, BAVT contends that Hatfield's use of buried cable would, in fact, be cost-prohibitive in this state.[80]

These two issues have already been addressed. A minimum feeder length of 9,000 feet is reasonable. Extensive use of buried cable, however, is not.

G. Conclusion re: Outside Plant

Both the Department and AT&T recommend that the Board reject Bell Atlantic's loop study and costing model. AT&T urges the Board to employ the Hatfield Model in its stead. The Department suggests an alternative approach, if the Board decides to make use of the Company's model:

> [B]ecause Bell bears the burden of proof, the Board should calculate loop rates using the loop element lengths at the lower end of the confidence interval. Weiss pf. at 29. Loop rates based on the lower end of the confidence and based on reasonable fill factors,

77. Anglin pf. at 11.
78. Exh. BA-IIB-1, Workpapers, Part A.
79. BAVT Brief at 12.
80. *Id.* at 15.

common costs, and annual carrying charge factors, are shown in DPS -IIB-9 (THW-3). If the Board uses Bell's LinkCoster model — which the Department does not recommend — these rates — adjusted for merger and process reengineering savings — would be appropriate. Weiss pf. at 29. At best, these rates should be adopted on an interim basis only.[81]

The evidence persuades me that Bell Atlantic's modeling approach does not yield a reasonable representation of the total element long-run incremental costs for outside plant facilities in Vermont. I also conclude that the Hatfield model is inadequate to this task as well; see Section III.B.2., below, for a detailed discussion of the Hatfield Model. A number of refinements are needed to give the Board assurances that the models' outputs can be relied upon. In the meantime, however, I recommend that the Board adopt the DPS's recommendation. The Company should re-run LinkCoster with the adjustments described and, within sixty days, should submit a compliance filing of the new results. Upon review by the parties and the Board, the revised outputs can serve as interim prices for unbundled link elements, until new filings under the process envisioned in Section IV.A., below, are made and approved.

ii. Local Switching

The local switching systems of a telecommunications network provide the basic functions of dial tone, dialed-digit collection, number translation, line-to-line and line-to-trunk connections, ringing, and supervision for disconnection. Switch software also provides "vertical features" such as call waiting, call forwarding, and conferencing. Today, all of BAVT's Vermont CO switches are digital (of the 5ESS type), and the TELRIC study is based on this all-digital local switching network.[82]

The components of a digital switch are: (a) the ports that terminate lines and trunks; (b) the switch hardware that provides connections; and (c) the processor and its software that control all switch operations. The Company assumed that digital interfaces would be used for most line ports, in order to assure compatibility with the DLC carrier systems in the feeder component of the local loop. This is consistent with BAVT's current practices: most of its line

81. DPS Brief at 55 (footnote omitted).
82. Fraine pf. at 14.

port additions today provide digital interface capability (the exception is ISDN, which is configured slightly differently).[83]

Switch-related investments used in the TELRIC study were based on current discounted vendor material prices. Unit investments were developed using Bellcore's Switching Cost Information System ("SCIS"), an engineering cost model. BAVT used SCIS to develop switching costs for each switch in Vermont, on the basis of its actual operational characteristics, including usage.[84] In addition, BAVT used vendor-discounted software prices and right-to-use fees in developing the per-line costs for switching.[85]

The DPS raises several concerns about Bell Atlantic's study of switch costs. Briefy summarized, they are:

- BAVT's study separately costs basic switching functions and vertical switching features (such as call waiting, caller ID, three-way calling, and call-fowarding). This, argues the DPS, violates the LCO, which found that the incremental costs of vertical switching features were too small to justify disaggregation and, therefore, those features should be included in the unbundled per-line switch element made available to CLECs.
- The SCIS model is proprietary and, as such, cannot be used to establish costs for the purposes of universal service support.
- The SCIS model overstates the usage costs of local switching.[86]

For these reasons, the DPS recommends that the SCIS model not be used to set permanent UNE rates. The Department states that it may, however, be used to set interim rates, if its inputs are modified to reflect the carrying charge adjustments and merger and process reengineering savings that the DPS recommends.[87] For permanent UNE switch costs and rates, the Department suggests that the Board rely on the Hatfield Model, once its defects are corrected.[88]

AT&T too urges the Board to reject the SCIS model. It raises three general objections to Bell Atlantic's approach:

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83. *Id.* at 14-16.
84. Anglin pf. at 14-20; exh. BA-IIB-1, Workpapers, Part B; tr. 12/8/97 at 55 (Anglin).
85. Exh. BA-IIB-1, Workpapers, Part B.
86. DPS Brief at 61-62.
87. *Id*. at 62.
88. *Id*. at 63-64.

- BAVT used actual current line usage and demand data for each switch, rather than reasonable projections of *future* demand. By calculating a per-minute-of-use fee based on current usage, without recognizing expected growth, the Company overstates the costs, and thus the price, of switching. However, BAVT estimated its switch investment costs, in part, by accounting for access line growth.
- Bell Atlantic's switch prices are not supported by appropriate documentation. The discounts that switch vendors offer a LEC differ depending on whether the work performed is simply an upgrade to an existing switch or the installation of an entirely new one. BAVT's cost study may recognize only the lesser savings associated with upgrades, rather than the deeper discounts which accompany a new installation. The TELRIC methodology requires that new installations be assumed.
- The installation and power factors used by the Company, which are intended to reflect the costs of actually installing and supplying power to a switch, are based on ratios developed from 1995 data. Bell Atlantic offers no analysis to suggest that the 1995 ratios will reasonably project these costs on a forward-looking basis.[89]

AT&T recommends that the Board adopt the Hatfield Model for determining switching costs — as well as costs for the local exchange network altogether.[90]

The concerns raised by the DPS and AT&T have some merit. The evidence supports several of their contentions, and I am not sanguine that the SCIS outputs in this case do not exaggerate the costs of unbundled switching. I address each of the parties' concerns in turn.

The Act, the LCO, and the Phase I Order all require incumbent LECs to offer the unbundled switching element to competitive providers.[91] BAVT's study separates basic switching functions from vertical switching features (such as call waiting, caller ID, three-way calling, and call-forwarding).[92] While the LCO does not require this, and even speculates that incremental costs of vertical features are too small to justify incurrence of the cost of their unbundling, the LCO does not prohibit doing so.[93] Thus, the DPS's argument that, by unbundling vertical features, Bell Atlantic "has failed to carry its burden of proof on switching

89. AT&T Brief at 52-55.
90. *Id.* at 59-76.
91. Act at § 251(c)(3); LCO at ¶ 410; Phase I Order at 19-21.
92. Anglin pf. at 14-20; Globerson pf. at 7.
93. LCO at ¶ 414.

costs" is unpersuasive.[94] What matters rather is whether it makes sense to unbundle these particular elements and, if so, whether the costs identified are reasonable. On these points the evidence is inconclusive, but I do not reject BAVT's attempt out of hand. The availability of unbundled elements will promote the competitive provision of services (an express policy of the state of Vermont[95]) and spur innovation. I see no reason at this time to proscribe the Company from offering vertical features separately from basic switch functions.[96]

The SCIS model is proprietary and, therefore, cannot be "opened up" for examination by regulators and competitors.[97] Given the directives of the FCC, this lack of transparency makes the model unsuitable for the double duty of determining high-cost areas for the purposes of universal service support.[98] However, since the state of Vermont is not currently intending to submit its own universal service cost calculations to the FCC, but will rely instead on the FCC's own modeling, this difficulty is immaterial at this time.[99] However, the fact that the SCIS model is fundamentally unknowable raises other concerns and, without rigorous testing, one cannot be altogether confident that its outputs, given a reasonable set of inputs, are themselves reasonable. Interestingly, for the most part the parties do not argue that the SCIS model would fail to meet this test. Instead, they present evidence that the inputs and assumptions used by Bell Atlantic are themselves unreasonable and therefore, by extension, the outputs must necessarily be unreasonable too.[100]

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94. DPS Brief at 62.

95. 30 V.S.A. § 227a; Phase I Order; and the Vermont Telecommunications Plan, May 1999, Ch. 1.

96. It may very well be that vertical features cannot be offered independently of basic switch functions; indeed, I'm not sure how they could be. Nevertheless, if a CLEC (or its customer) does not desire those features, it seems reasonable to enable it to avoid incurring their costs. Unbundling does just that. Of course, if there truly is virtually no incremental cost to providing the features, it may simply be impractical to offer them separately.

97. Tr. 12/8/97 at 165 (Anglin).

98. USF Order, ¶ 250.

99. Letter of Richard H. Cowart, Chair of the Public Service Board, to Magalie Roman Salas, Office of the Secretary, FCC, 5/20/98.

100. DPS Brief at 61-62; AT&T Brief at 50-55; Weiss pf. at 31; see also tr. 12/8/97 at 166 (Anglin). The DPS does suggest that the model "systematically overstates the usage-cost of local switching," and cites a finding of the Illinois Public Utilities Commission to this effect. DPS Brief at 62. The evidence in this docket, however, does not allow me to reach a conclusion, one way or another.

The TELRIC methodology requires that costs be calculated on the basis of the *total* increment of demand associated with the service or function in question. This means that demand, as well as operating and investment costs, must be projected for the entire study period. In its study, Bell Atlantic estimated that its investment in switching facilities and software would, apart from any changes in vendor prices themselves, grow in part as a function of growth in access lines.[101] This appears in keeping with the TELRIC methodology. In contrast, however, the Company assumed that usage would remain at current levels in the future, an assumption that is, in light of the expectation of growth in the number of loops, hardly reasonable.[102] The consequence of this choice is a unit (per minute of use) cost for switching that is higher than reason dictates.

The investment costs themselves — the prices that Bell Atlantic would pay to vendors — were also controversial. AT&T suggests that the switch prices used by BAVT in SCIS may have been discounted, not by the percentage reductions that vendors offer when an entire facility is purchased, but rather by the lesser discounts associated with add-ons and up-grades.[103] The evidence on this point is simply that the switch prices reflect the discounts that Bell Atlantic expects to receive from its vendors, but does not establish whether they are those associated with whole switch purchases.[104] Since the TELRIC methodology rightly assumes that the efficient prices for unbundled elements are those necessary to cover the costs of a newly deployed network, it follows that the fully discounted costs of new switches be modeled. I cannot tell if they were.[105]

Lastly, the installation and power factors used by the Company, which are intended to reflect the costs of actually installing and supplying power to a switch, are based on ratios

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101. Fraine amended pf. (originally Stokes pf.) at 13, 22; exh. BA-IIB-5; tr. 12/11/97 at 135 (Fraine).
102. Tr. 12/8/97 at 166 (Anglin).
103. Tr. 12/16/97 at 114-115 (Siwek).
104. Anglin pf. at 16.
105. AT&T describes events in New Hampshire and Maine, which occurred after hearings in this docket, in which Bell Atlantic's operating companies in those states acknowledged that the lower up-grade discounts were applied in its TELRIC studies in those states. AT&T raises the possibility that BAVT may have also done the same. This allegation is disturbing, however, I will not rely on it to support a conclusion that BAVT's switch investment costs are overstated. Simply, as a matter of compliance, I direct BAVT to demonstrate that it has applied the appropriate discounts to its switch costs and, if it has not, to do so.

developed from 1995 data.[106] AT&T asserts that, in the absence of an analysis demonstrating why the 1995 ratios are reasonable predictors of future installation and power costs, the Board should not rely on them.[107] I might be willing to do so, if there were plausible evidence to suggest that the 1995 data are not representative of expected future costs, but the record is silent here: and the mere assertion that these data might be unreliable is not, in my view, enough to overcome the presumption favoring the Company's position.

The Department recommends that the Hatfield Model, once corrected for certain defects, be used to establish UNE switching costs and rates, but the DPS also allows that the SCIS model, adjusted for carrying charge factors and merger and process reengineering savings, can be used to set interim rates.[108] For reasons stated elsewhere, I do not recommend that the Board adopt the Hatfield Model. Instead, I recommend that several adjustments be made to the inputs of the SCIS model, and that its outputs be used for the setting of interim UNE rates. Those adjustments are as urged by the DPS and AT&T: one, carrying charges should be adjusted as described in Section III.B.3.f., below; two, merger and process reengineering savings should be accounted for; three, switching minutes-of-use should be projected for the entire study period; and, four, BAVT shall use (if it has not already done so) switch prices discounted fully, according to vendor practices when complete switch purchases and installations are made.

iii. Signaling and Associated Databases

In its TELRIC study, BAVT modeled a signaling network, which consists of Signal Transfer Points ("STPs") that enable the "out-of-band" or "common channel" signaling between two end office switches (*i.e.*, SS7, see the following section). The STPs provide access to a Service Control Point ("SCP"), the database containing pertinent call handling information and

106. Tr. 12/8/97 at 175-176 (Anglin); exh. BA-IIB-1, Workpaper Part B at 74.
107. AT&T Brief at 54-55.
108. DPS Brief at 62.

"A Links" and "C Links" (types of interoffice transport links).[109] There was no dispute that the STP and SCP systems would be components of a forward-looking network.[110]

iv. Interoffice Transport

Interoffice transport facilities link local wire centers to each other and to tandem switches, to the networks of other telecommunications providers, and to large private networks. The interoffice network is composed of high-capacity transport systems and the Signaling System 7 ("SS7") network. BAVT's TELRIC study assumes interconnection facilities that are all-digital, fiber-optic, high-capacity systems. This is consistent with BA-VT's practice that all new interoffice transport facilities are fiber optic systems utilizing the industry "SONET" standard that defines the physical interfaces, signal rates, and signal protocols used by manufacturers when building high capacity fiber optic systems.[111]

The Department contests Bell Atlantic's estimate of the utilization factor (fill) for interoffice transport. The DPS argues that 50 percent understates the fill that will accompany growing competition. The Department asserts that, with mature competition in the local exchange, the Company should achieve interoffice fill rates of 70 percent and higher. The DPS recommends that an appropriate average fill factor for interoffice transport and electronics is 60 percent, for the early years of competition.[112]

AT&T also opposes the Company's assumptions for interoffice transport. It makes three arguments:

- The fill factors are too small and, with respect to dedicated transport, no fill factors at all should be applied;
- The installation factor is unjustifiably high; and
- As it did with switching, BAVT based its usage charge upon current, rather than projected average, minutes of use.[113]

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109. Fraine pf. at 33-38; Anglin pf. at 2, 5-6, 27-28.

110. The modeled cost of the STP system (after accounting for applicable vendor discounts) is approximately $7.4 million. Exh. BA-IIB 1, Workpaper Part D, at 1; Anglin pf. at 21, 27, 29, and 34.

111. Fraine pf. at 26; Anglin pf. at 23.

112. DPS Brief at 49.

113. AT&T Brief at 55.

AT&T recommends that the fill factor be increased to 70 percent, that the installation factor be rejected, and that projected minutes of use be employed to calculate a usage-based charge for interoffice transport.[114]

I am persuaded that the fifty percent utilization factor is unreasonably low. I reach this conclusion for the same reasons that I concluded that the outside plant fill factors are too low, and I recommend that the Board direct the Company to use a sixty percent figure at this time.[115]

As for dedicated transport — facilities that are used by one competitor only — the application of a fill factor does not make sense. Dedicated transport is not priced on a usage basis, but by mile of facility deployed,[116] and a competitor will pay the same price for the facility regardless of how much it is utilized, or is not. Consequently, a fill factor is methodologically inappropriate.

BAVT marks up the investment cost of interoffice transport by forty percent, to account for the costs of installation. AT&T asserts that this figure is too high. The evidence, however, does not give credible support to an alternative — indeed, no alternative is even offered. I recommend, therefore, that the Board adopt the 1.4 installation factor for interoffice transport.

Lastly, on the question of expected usage, as with switching here again I conclude that minutes of use should be projected for the study period, rather than merely assuming that current usage levels continue into the future. With this number, an average cost of interoffice transport per minute-of-use can then be derived.[117]

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114. AT&T Brief at 56-58.

115. Weiss pf. at 34-35.

116. Exh. BA-IIB-1, Part C at 1-2.

117. Exh. BA-IIB-1, Part C at 3 and Workpapers Part C at 7.1-7.5; Anglin pf. at 26; tr. 12/10/97 at 17-18; tr. 12/9/97 (Meredith); LCO at ¶ 682. The difficulty posed by understating of minutes of use is similar to that resulting from an understatement of fill factors — that is, a higher average per-unit cost than is reasonable. Moreover, the two calculations are conceptually similar, insofar as they relate a given amount of capacity to a specified amount of usage: but, in BAVT's model, they and their effects are separable. The Company used fill factors to determine the amount of facilities it would need to serve a given level of projected demand (*i.e.*, to "size" its investment). It then divided this total investment figure by a certain number of minutes of use over the study period (in this case, a figure based on current, not projected, usage). Each step in this procedure has the effect, when the fill and usage assumptions are understated, of raising the per-unit cost of the functionality. Tr. 12/10/97 at 206 (Fraine); AT&T Brief at 58.

v. Tandem Switching

Tandem switches route calls between switches. The tandem office equipment consists of the switch and trunk termination equipment necessary to route calls to and from the tandem and other switches. BAVT's TELRIC study places tandems at their current locations in Vermont. In addition, the study assumes all-digital office equipment and, in most cases, digital trunk interfaces.[118] The Company's modeling of tandem switching was not challenged by any party. It is reasonable.

b. Cost of Capital and Capital Structure

Under the TELRIC pricing methodology, the cost of obtaining debt and equity financing is one of the forward-looking costs of providing network elements.[119] In establishing guidelines for determining costs of capital, the FCC concluded that a company's currently authorized rate of return is a reasonable starting point for determining the proper forward-looking rate of return for use in the TELRIC model.[120] As set out in the LCO, an incumbent LEC that requests a rate of return higher than its currently authorized return bears the evidentiary burden of demonstrating that the business risks associated with providing unbundled network elements justifies a different risk-adjusted cost of capital.[121] The FCC also recognized that, for purposes of TELRIC cost calculations, the risk-adjusted cost of capital "need not be uniform for all elements."[122]

In the docket, the parties disagree as to what constitutes the appropriate cost of capital for Bell Atlantic, and it appears that the root of their disagreements lies in differing

118. Anglin pf. at 20-21.

119. LCO at ¶ 700.

120. The Company's authorized rate of return may be regarded, in part, as "backward-looking," as Bell Atlantic asserts, but it is, in large measure, in fact a forward-looking concept. See BAVT Brief at 22. In practice, the authorized rate of return for a company should reflect a forward-looking view of the capital structure and the cost of equity capital.

121. LCO at ¶ 702.

122. *Id.*

interpretations of the LCO.[123] The position of BAVT is that the FCC, in adopting "forward-looking economic cost" standards to set rates that are representative of a competitive marketplace, necessarily requires the use of a cost of capital that is also representative of a competitive market and the associated risks that are inherent in such a market.[124] This is reasonable enough. However, the FCC clearly places upon the incumbent the burden of proving "with specificity" that such a business risk premium is required.[125]

i. Cost of Equity

The witnesses' estimates of the cost of equity capital vary substantially. The analysis of Dr. Vander Weide (for BAVT) is premised on the existence of a competitive environment.[126] The analyses of Mr. Hubbard (for AT&T) and Mr. Hill (for the DPS) are based on groups of companies, in character similar to BAVT, that are also in the midst of a restructuring of their markets — but whose markets have not yet competitively matured.

Dr. Vander Weide calculated a discounted cash flow ("DCF") cost of eqity of 14.91 percent, based on the Standard & Poor's Industrials.[127] The witnesses generally agreed that the DCF methodology is widely relied on by regulatory commissions, but that other models are often used to corroborate the results of the DCF analysis.[128] Department witness Hill provided estimates after analyzing four methods of equity cost evalution: DCF; modified

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123. As Bell Atlantic notes, "the specific values of the cost of debt, cost of equity, and capital structure must reflect the risks of companies operating in a competitive marketplace." BAVT Brief at 21. This is consistent with Dr. Vander Weide's conclusion that BAVT's investment risk is at least equal to that of the average industrial company. Vander Weide pf. at 29. The evidence presented here, however, does not demonstrate that the services in question (UNEs and interconnection in Vermont) face any significant level of competition and associated risks that would justify a cost of capital based on a competitive market. I conclude that the factors identified by the Company's witness are broad and general in nature and do not satisfy the FCC's standards for application of an added risk premium. *See* Vander Weide pf. at 26.

124. *See*, for example, BAVT Brief at 21 and 39, and also the discussion, at 22, on the selection of S&P industrials.

125. LCO at ¶ 702.

126. Dr. Vander Weide argues, for example, that the cost of capital calculated here should be based on a proxy of competitive firms. In developing his estimate of an appropriate capital structure, he uses the Standard and Poor ("S&P") list of the 400 major industrial companies in the United States. Vander Weide pf. at 32.

127. Vander Weide pf., 7/31/97 at 34.

128. *See*, for example, Hubbard pf. at 9.

earnings to price ratio ("MEPR"); market-to-book ratio ("MTB"); and the capital asset pricing model ("CAPM"), although for technical reasons he did not rely on the MEPR in reaching his conclusions.[129] Dr. Hubbard made use of the DCF and CAPM methods in his calculations.

The DCF analyses of the three witnesses differ in their chosen sample groups. Dr. Vander Weide employed the S&P Industrials in his DCF analysis. Mr. Hill used two "similar sample groups" in conducting his analysis: the Regional Bell Holding Companies ("RBHCs," of which BAVT is one) and a group of natural gas local distribution companies ("LDCs").[130] Dr. Hubbard selected various telecommunications companies (RBHCs and certain major long distance service providers) facing market conditions comparable to those that BAVT faces.[131]

I conclude that, taken all in all, the sample group used in Mr. Hill's analysis is more representative of BAVT than is the sample group used by Dr. Vander Weide, and it is appropriate for use in the development of the cost of equity capital, pursuant to the LOC. As Dr. Hubbard notes, the business of selling network elements should present relatively low risks in the intermediate term. The companies used in the analysis of Dr. Vander Weide are large firms operating in competitive markets, and I am not persuaded that they are comparable to BAVT in its Vermont local exchange business.[132]

In fact, Dr. Vander Weide acknowledged this difference when he discussed several factors that may increase BAVT's investment risks — in particular, *expected* competition.[133] Dr. Vander Weide notes, for example, that large business customers in urban markets will be a primary focus of competition as it unfolds.[134] New technologies, such as wireless, are generally lowering the cost of entry.[135] He points out that cable TV and interexchange companies

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129. Hill pf. at 40.

130. *Id*.

131. Hubbard pf. at 7.

132. See Vander Weide pf. at 31-32 and reb. pf. at 45. The S&P industrials is an extraordinarily diverse group of businesses, ranging across every industry in the American economy,and the only determinant of membership in the group is size (*ie.*, the 400 largest industrial firms in the United States). See generally Hubbard pf. at 22-24.

133. Vander Weide pf. at 24.

134. *Id.* at 24.

135. *Id*. at 24 and 26. It bears mentioning that another BAVT witness stated that "at this point there is no demonstrated, viable wireless alternative that could be useful for the vast majority of loops." Fraine pf. at 5.

present competitive risks. He comments on implicit cross-subsidies in incumbents' rates, the historically hidden universal service support for high-cost areas, and notes that the incumbent LECs may continue to face unique regulatory obligations in high-cost areas or operate under other forms of asymmetric regulation.[136] Dr. Vander Weide asserts therefore that the risk of leasing UNEs is identical to the risk of BAVT's retail local exchange service and is *greater* than the risk the Company faces in its overall competitive operations.[137] Additionally, Dr. Vander Weide asserts that the risk of investing in BAVT's local exchange business is greater than the risk of investing in BAVT generally, because BAVT's "[l]ocal exchange business in Vermont has less geographic diversity, less diversity of products and services, less ability to realize economies of scale and scope, and less access to capital markets."[138]

AT&T and the Department maintain that BAVT has not met its burden of proof.[139] I concur. Even Dr. Vander Weide acknowledges that competition for "[l]ocal exchange service is just beginning in Vermont. . . ." The capital markets conclude that Bell Atlantic's local telephone operations constitute the least risky part of its business.[140] While BAVT may lose a small share of its retail market through "service bypass," it is unlikely that a new entrant will build a parallel, end-to-end telephone network.[141] And the FCC acknowledges that there are mitigating factors to the added risks that market entry has on the cost of capital.[142] As the Department notes, growth in the local exchange market in Vermont has been slow to occur and growth in the market will assure demand sufficient to retain the value of equipment.[143]

The Department also contends that perhaps the best indication that there is little evidence that Bell Atlantic is facing greater risk from competition in its local exchange business is its failure to show that competition has adversely impacted revenues or earnings.[144]

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136. *Id.* at 25 and 27.
137. BAVT Brief at 25-26.
138. *Id.* at 28.
139. AT&T Reply Brief at 8; DPS Brief at 20.
140. Hill pf. at 20-21.
141. Hill reb. pf. at 6.
142. For example, growth in overall market demand will increase the potential of the incumbent LEC to use displaced facilities for other purposes. LCO at ¶ 687.
143. DPS Reply Brief at 7.
144. *Id.* at 8.

Revenues and earnings are not suffering.[145] The cost of capital estimates of Messrs. Hubbard and Hill were informed by the understanding that unbundled network elements are now, and will be for the immediately foreseeable future, monopoly services, in the provision of which BAVT faces little current, and only slowly developing future, competition.[146]

I also conclude that Bell Atlantic-Vermont is incorrect in asserting, first, that the risk of leasing UNEs is identical to the risk of its retail local exchange service and, second, that it is greater than the risk the Company faces in its overall competitive operations. The opening of competition in the retail service that uses the same facilities as the wholesale services may enhance the wholesale operation's outlook by stimulating use of the network. Moreover, I find that the UNE business of BAVT is less risky than that of the entire enterprise. The rate of return demanded by investors in Bell Atlantic implicitly weights the lower risks of its regulated operations with the higher risks of its unregulated (competitive) businesses.[147] That the witnesses for AT&T and the Department did not differentiate between these risk considerations in their analyses (by using costs of equity that reflect the firms' competitive risks) argues in favor of their conservative analyses.[148]

While the business environment that BAVT describes may indeed represent the market of the future and is therefore "forward looking," it seems premature to conclude that investors are currently demanding premiums for bearing the risks inherent in that future. On the basis of the record before me, I conclude that today's UNE market is more monopoly in nature than competitive. In addition, I conclude that the Company has not met its burden of demonstrating "with specificity" the existence of new business risks. For these reasons, I conclude that BAVT's currently authorized rate of return is appropriate for use in determining the costs and setting the prices of the UNEs and interconnection services under review here.

In the last fully litigated investigation of BAVT's rates (Docket 5702), a rate of return on equity of 11.0 percent and an an overall return on investment of 8.5 percent were set.[149]

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145. Tr. 12/19/97 at 42-43 (Hill).
146. Hubbard pf. at 26-27, 30-31; Hill pf. at 10-11, 52.
147. Tr. 12/18/97 at 219 (Hill).
148. See DPS Reply Brief at 14.
149. Dockets 5700/5702, Order of 10/5/94; DPS Brief at 20.

After that, a stipulated increase in the Company's rates was approved by the Board; in that docket (5853), a rate or return on equity of 11.50 percent was authorized.[150]

In this docket, the DPS recommends that the Board set a cost of equity that resides between 10.75 percent and 11.75 percent. Within that range can be found the 11.0 percent of Docket 5702, the stipulated 11.5 percent of Docket 5853, and the FCC authorized rate of 11.25 percent.[151]

As a practical matter, there should be little difference between the return on equity component of the cost of capital established here and that established in a typical retail rate case unless, of course, the risk associated with capital investment in UNEs can be differentiated from that with investment in regulated services generally. That difference has not been established here. But the point to be made is that, in a rate case, the equity component of the return on investment is set to reflect investors' expectation and thus is forward-looking, even while other components may be based on embedded or, in some cases, forward-looking data. Therefore, in the absence of differentiated risks, it follows that the return on equity established in setting UNE rates should logically resemble that established in a traditional rate case.[152]

As for the equity risk premium itself, I am not persuaded by Bell Atlantic's arguments. As the Department notes, today the cost of capital is low in relation to historic experience and it is expected to remain low in the future.[153] True, the risk environment for local exchange carriers is changing, but little evidence of a significant increase in competitive risk has been provided in this proceeding. If anything, there are low-risk business opportunities confronting incumbents: in the provision of unbundled network elements, BAVT faces considerably less business risk than it does in its corporate operations as a whole, and a risk-adjusted cost of capital for its wholesale products is undoubtedly less than a cost of capital for its entire range of business activities.[154]

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150. Docket 5853, Order of 2/13/96 at 4 and 10.

151. LCO at ¶ 702.

152. At least to the extent that the UNE services reflect the same risk to the enterprise as that associated with regulated services generally.

153. DPS Brief at 26.

154. Hubbard pf. at 19-20.

For all these reasons, I recommend that the Board adopt a return on equity of 11.5 percent, which is within the ranges provided by Mr. Hill and Dr. Hubbard. It falls nearer the upper end of the range recommended by Mr. Hill, as a hedge against the effects of the incipient competition that we all hope for, and which may present some additional (though not particularly overwhelming) risks to a company in providing network element services.

Since the risks facing Bell Atlantic in its wholesale local exchange business do not vary significantly from those that it faces in that retail market, I recommend that the Board adopt a return on equity for the purposes of setting wholesale prices that is identical to that which the Board authorized in its most recent review of BAVT's retail rates — that is, the 11.5 percent set in Docket 5983. This rate will afford the Company an opportunity to earn reasonable returns, consistent with the laws of Vermont and the dictates of LCO. In addition, I recommend that, for the future, the Board adopt the practice of setting the "wholesale" return on equity at the same rate as that which it set in the most recent review of the Company's retail costs and rates. This presumption of the equality of rates of return should remain in effect until sufficient evidence has been presented to demonstrate that the wholesale and retail markets for local exchange services are characterized by distinctly different risk profiles.

ii. Cost of Debt

The parties generally agree on the approximate cost of debt to BAVT.[155] Mr. Hill offered an estimate of 7.34 percent, based on Moody's average daily yield for AA-rated corporate bonds for the period August 27 to October 6, 1997.[156] Dr. Vander Weide also used Moody's AA-rated bonds in estimating BAVT's cost of debt: 7.63 percent for September 1996.[157] Mr. Hill's estimate was based on more recent information than Dr. Vander Weide's comparable estimate. Dr. Hubbard looked to actual NYNEX bond issues outstanding, as

155. AT&T Brief at 25; BAVT Brief at 25; DPS Brief at 26.
156. Hill pf. at 21.
157. Vander Weide pf. at 34.

reported in S&P's Bond Guide for September 1996, and calculated a weighted average of 7.7 percent for the Company's outstanding debt.[158]

I recommend that the Board use of 7.34 percent for the cost of debt in this proceeding. Each of the witnesses relied on the same methodological approach in estimating Bell Atlantic's forward-looking cost of debt, an approach that assumes that recent historical costs reflect investors' continuing demands, at least in the nearer term. I see no reason here to defy augury, and turn to Mr. Hill's estimate as the most reliable, being the most recent. Moreover, as the Department notes, this figure should be conservatively high, thus favoring Bell Atlantic, because it accounts only for long-term debt, yet short-term debt, generally less expensive than long-term, comprises a significant share of the Company's total debt.[159]

iii. Floatation Costs

"Floatation costs" are the legal, administrative, and other costs and fees that a borrower incurs to issue, or "float," equity in the financial markets. The Company argues that floatation costs of approximately 20 to 30 basis points must be added to the cost of equity necessary to the building and financing of a new network.[160] The Department's witness, however, asserts that adjusting the cost of capital for equity flotation costs is unnecessary for several reasons.[161] The cost in question here represents the difference between the price an underwriter receives for stock and the price the utility receives from the underwriter.

As a general matter, I conclude that, under certain circumstances, floatation costs should be included in a utility's cost of service and an explicit adjustment may be necessary to fully reflect those costs. I conclude, as Dr. Vander Weide notes, that underwriter fees are indeed costs associated with the building and financing of a network.[162] I am persuaded, however, that at least some share of the issuing costs has been recognized by the Department in its calculation of the cost of equity and, therefore, it would amount to double-counting to

158. Hubbard pf. at 7-8.
159. DPS Brief at 26.
160. Vander Weide reb. pf. at 11. A *basis point* is one one-hundredth of a percent.
161. Hill pf. at 53.
162. Vander Weide reb. pf. at 11.

account for those costs here. Also, the "dilution" effect (*i.e.*, reduction in the value of the stock) caused by floatation costs is mitigated by sales of shares at market prices above the Company's book (or accounting) value.[163] Mr. Hill testified that telecommunications common stock carries a premium in the market of roughly 400 percent of book value.[164]

To the extent that some residual component of issuing costs is not reflected in rates, it is necessary to understand the precise nature and frequency of the expense before allowing its recovery in rates. In the record in this case, I find inadequate basis to justify a separate and additional adjustment for floatation costs. Equity capital can be raised either through the issuance of new stock or through retained earnings. Bell Atlantic has not established whether it will tap financial markets or its own earnings to secure investment capital to support its wholesale operations. It is unclear to me why equity raised through retained earnings should reflect in rates a cost for issuance expenses.

If the issuance of new stock is a common occurrence each year, I would expect it to be appropriately included as an expense item in the Company's cost of service or in the cost of equity capital after appropriate adjustment is made for the use of retained earnings, so as not to overstate the issuance costs. If, on the other hand, new stock issuance is an infrequent event, then I would expect such an expense to be treated, for rate-making purposes, as an unusual expense item and amortized over time.

iv. Weighted Average Cost of Capital and Capital Structure

The overall cost of capital is a weighted average of the costs of debt and equity, where the weights, or shares, are the percentages of debt and equity that make up a firm's capitalization, or capital structure.[165] The Company recommends a weighted average cost of capital ("WACC") of 13.18 percent.[166] The DPS recommends a WACC ranging from 9.22 to

163. Hill, pf. at 54.

164. *Id.*

165. Vander Weide pf. at 7.

166. BAVT's overall weighted average cost of capital for use in its forward-looking economic studies is 13.18 percent, based on a 7.63 percent market cost of debt, a cost of equity of 14.91 percent, and a market-value capital structure of 23.77 percent debt and 76.23 percent equity. Dr. Vander Weide pf. at 33-34.

10.45, well above the 8.5 percent litigated in Dockets 5700/5702.[167] AT&T recommends a WACC of 10.2 percent.[168]

The significant differences between these estimates of total capital cost are due largely to differences in the estimates of equity capital.[169] However, capital structure also has an impact on the WACC, since it determines the shares of the equity and debt costs.

The Company's witness, Dr. Vander Weide, argues that, in setting a forward-looking capital structure, financial theory requires the imputation of a structure that reflects the capital-raising behavior of the Company in a mature, competitive market. He describes this as a *market*-value structure, in contrast to a *book*-value one.[170] The analysis of Dr. Vander Weide reflects a capital structure of a mature competitive market. The basis for his estimate of capital structure is the S&P 500.[171]

In contrast, Department witness Hill argues for a weighting of both a market-based and a book-value capital structure. Specifically, he recommends that the Board rely on a book-value based on post-regulatory financial accounting standards as reported to investors.[172] Mr. Hill argues that, while he agrees with the Company that a market-based capital structure is appropriate to consider, the determination of a structure should be based on booked cost considerations. He points out that the financial managers and corporate executives who actually make capital budgeting decisions use book value as well as market value weights when

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167. DPS Brief at 21.

168. Hubbard pf. at 26.

169. As noted above, Professor Vander Weide uses a cost of equity of 14.91 percent, whereas Professor Hubbard and Mr. Hill estimate it to be 11.5 percent and 11.25 percent, respectively. Vander Weide pf. at 34; Hubbard pf. at 15; Hill pf. at 53.

170. Dr. Vander Weide pf. at 10-11. The market value of a company's equity is simply the market price of the company's stock times the number of shares outstanding. The book value of equity represents the sum of paid-in capital and retained earnings, where paid-in capital is the amount of capital a firm has historically obtained from stock issuances and retained earnings are the cumulative earnings over the life of the company that have not been paid out as dividends. The book value of a company's equity is also periodically adjusted for "accounting events," such as changes to accounting rules and regulations, write-offs, and extraordinary events. *Id.* at 13.

171. "The average market-based capital structure of the S&P Industrials is a good proxy for the capital structure for competitive firms on a forward-looking economic basis." Vander Weide pf. at 32; tr. 12/19/97 at 59 (Vander Weide). The market-based capital structure recommended by Dr. Vander Weide is 23.77 percent debt and 76.23 percent equity. Vander Weide pf. at 33.

172. Hill reb. pf. at 11.

they make those decisions.[173] Furthermore, a book value capital structure is more prevalent in financial reporting than is market value. As such, investors assessing investment opportunities review book-value capital structures in making their investment decisions.[174] Thus, there is a weighting of market and book values that does, in fact, affect investor expectations of returns, and should therefore be accounted for in imputing a capital structure here. I recommend then that the shares of equity and debt be computed as averages of the market and book values to which the witnesses testified: equity at 63.77 percent (the mid-point between a market value of 79.56 percent and a book value of 47.98 percent) and debt at 36.23 percent (the mid-point between 20.44 percent market, 52.02 percent book).[175] This yields a total weighted average cost of capital of 9.99 percent.

	Share	Cost	Weighted Cost
Common Equity	63.77%	11.50%	7.33%
Long-Term Debt	36.23%	7.34%	2.66%
WACC			9.99%

c. Depreciation

A forward-looking TELRIC study should include depreciation expenses reflecting the economic lives of the incumbent LEC's physical plant.[176] As BAVT notes, the FCC has recognized that a TELRIC study should properly include economic depreciation costs, not

173. Hill pf. at 14.

174. Hill reb. pf. at 11-12.

175. Mr. Hill recommends consideration of both market value and book value capital structures. The market value estimate placed the proportion of common equity at 79.56 percent and the book value proportion of common equity was 47.98 percent. The mid-point between these estimates is 63.77 percent. Exh. DPS IIB-11 (SGH-1), Schedule 2 at 2.

176. Lee pf. at 4. The economic life of an asset is its total revenue producing life. National Association of Regulatory Utility Commissioners, "Public Utility Depreciation Practices," August 1996 at 318 (cited by Lee pf. at 14, n. 19).

depreciation costs based upon regulatory accounting.[177] For telecommunications equipment, an ideal depreciation schedule would account for technology obsolescence, physical life expectations, and competitive impacts.[178]

The starting point for the determination of appropriate depreciation lives to be employed in the determination of TELRIC costs is ¶ 702 of the FCC's LCO. The FCC explicitly imposes on incumbent LECs the burden of demonstrating, again "with specificity," that additional business risks faced in the provision of unbundled network elements justify some modification to existing depreciation rates.[179] An appropriate calculation of TELRICs will include depreciation rates that reflect the true changes in the economic value of assets.[180] Both the Company and AT&T agree that, to comply with the FCC guidelines, depreciation lives should be based upon the expected economic lives of newly installed plant.[181]

BAVT and AT&T have presented materially different recommendations as to the depreciation lives that should be employed in the determination of TELRIC costs. AT&T's expert witness, Richard Lee, recommends use of the FCC's depreciation lives and notes that, for a number of years now, the FCC has been applying a forward-looking methodology in its determination of appropriate depreciation lives for regulated telephone companies.[182] In contrast, the BAVT argues that the economic lives of their assets are significantly shorter than those reflected in the FCC depreciation tables.

Mr. Lee argues that "projection lives" are based on the expected economic lives of newly placed plant, and are distinguishable from "remaining lives" and "average service lives," which reflect historic plant installations.[183] The thrust of Mr. Lee's position is simple. He argues that the FCC has, over time, taken a decidedly forward-looking approach to its determination of depreciation lives. He maintains that FCC staff have critically reviewed the trends and developments in technology and have developed an unbiased, forward-looking methodology for

177. See BAVT Brief at 42; Vanston pf. at 2; LCO, ¶ 686.
178. Vanston pf. at 4.
179. LCO at ¶ 702.
180. 47 USC § 51.505(b)(3), LCO, ¶ 703.
181. Lee pf. at 4; Vanston pf. at 4.
182. Lee pf. at 4.
183. *Id*.

projecting asset lives.[184] In support of his position, Mr. Lee shows that "depreciation accrual" has increased quite substantially in the wake of the FCC's adoption of this new practice in the 1980s.[185] Moreover, today depreciation rates are well above current retirement rates, which suggests an expectation that retirement rates will be much higher in the future.[186]

The FCC reviews its depreciation rates used for rate-making purposes every three years, following meetings among FCC staff, the Company, and state regulators.[187] This process produces the projection lives, or "P-lives," of company plant. The P-life is the number of years a newly placed asset is expected to remain in service. The difference of opinion between Mr. Lee and Dr. Vanston turns on the questions of whether the P-lives that emerge from this "represcription" process reflect the economic lives of newly placed plant. Dr. Vanston argues that, at least historically, they have not.[188]

AT&T argues that the lives used in the Hatfield Model, which are generally consistent with current FCC-prescribed lives for BAVT, are the appropriate lives to use in a forward-looking TELRIC cost study. Thomas Weiss, witness for the DPS, agrees with Mr. Lee's position that the FCC lives prescribed for Vermont are both forward-looking and appropriate to our purposes here.[189] This point is further demonstrated by the relationship between the accrual rate and the retirement rates. In 1996, the accrual rate was 7.2 percent and the retirement rate was 3.7 percent.[190]

Dr. Vanston contends that the regulatory lives prescribed by the FCC are too long for several reasons. First, the P-life established by regulators is designed to compute appropriate depreciation rates for the embedded base of equipment.[191] However, Dr. Lee contradicts Dr. Vanston, at least in part, on this point. P-lives are defined as "the average life expectancy of

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184. *Id.* at 6.

185. From 1980 to 1996, the composite reserve level rose from 18.7 percent in 1980 to a historic high of 47.1 percent in 1996. *Id.* at 9.

186. *Id.*

187. Interim updates are also performed. Lee pf. at 5.

188. Vanston pf. at 12.

189. See Weiss pf. at 14-16; Lee pf. at 5.

190. Lee pf. at 9.

191. Vanston pf. at 6.

new additions to plant," and thus forward-looking.[192] Dr. Vanston counters that plant life is not an adequate basis for determining what is "forward-looking;" it is also necessary, under FCC rules, to determine economic depreciation.[193]

Dr. Vanston next contends that regulators have routinely allowed recovery of depreciation deficiencies in future rate amortizations, a practice that could only be sustained in a regulated monopoly environment.[194] Implicit in this is the suggestion that regulators allow for such deficiencies in establishing the P-life. The evidence, however, is inconclusive on this point.

I am confident that the FCC, through its triennial represcription process, is making diligent, good-faith efforts to develop the best estimates of the economic lives of BAVT's assets. However, I also find that there is good reason to conclude that the economic depreciation of the Company's plant will in fact occur somewhat more quickly than the FCC's linear P-lives currently suggest. The fact that the FCC rates are forward-looking is not enough. As the Company's witness points out, the economic value of an asset may decline more quickly in the early years of its economic life than straight-line depreciation recognizes (a phenomenon that all owners of automobiles sadly learn).[195] I am, however, concerned that the analytic techniques employed by BAVT overstate plant replacement. As AT&T notes, the retirements in various accounts are based upon the application of historic retirement patterns of obsolete technologies. As with mortality analysis, I conclude that such an approach is fraught with uncertainty.[196] Similarly, I am concerned with the projections suggested for broadband deployment and their implications for depreciation and retirement of existing facilities.[197]

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192. Public Utility Depreciation Practices ("Depreciation Practices"), National Association of Regulatory Utility Commissioners, August 1996, at 322; Lee pf. at 13.

193. Vanston reb. pf. at 8.

194. Vanston pf. at 7.

195. "[W]hen technological obsolescence is the major driver for retirements, there is no such thing as a constant service life. Equipment purchased late in the technology generation will have a much shorter life than a piece of equipment purchased earlier. Further, the expected service life of equipment purchased late in the cycle is roughly the same as the average remaining life of existing equipment." Exh. BA-IIB-8. Part B. at 7.

196. Lee pf. at 15.

197. *Id*. at 15-16.

In light of these considerations, I conclude that the appropriate rates for depreciating plant on a forward-looking basis lie in between the rates proposed by Bell Atlantic and the FCC rates advocated by AT&T. In Docket 5702, the Board approved rates that fall in this range, and I recommend that the Board adopt them for use in the TELRIC studies under review here. These rates have the additional advantage of depreciating the same plant for purposes of wholesale and retail rate-making at the same rates.

As a general policy, I believe that the Board should, to the greatest extent possible, set depreciation lives for wholesale rate-making purposes with either those of the FCC or those most recently adopted by the Board for intrastate retail rate-making. I expect that the FCC rates will continue to improve its methods of setting depreciation rates, to capture both the expected economic lives of equipment and their non-linear declines in economic value, which the FCC's current rates fail to do. Also, administrative efficiency will be improved if depreciation rates for the same equipment used in the provision of different services are not reviewed and set separately (*e.g.*, for interstate access rates or intrastate retail rates), at least insofar as the risk characteristics of the various services do not differ substantially.

d. Carrying Charge Factors

Bell Atlantic converted total investment for each network element into a monthly or unit cost for pricing purposes. A standard practice for this, used by the Company here, is to apply carrying charge factors ("CCFs") to the investments. BAVT developed three sets of CCFs: (1) the annual CCF, which enables recovery of initial capital costs over the life of the investment (including a tax-adjusted return on investment) and recovery of the maintenance and other on-going expenses associated with the investment; (2) the directly attributable (or support) cost factor, which recovers costs that are jointly attributable to the provision of UNEs; and (3) the common cost factor, which includes other costs that are associated with the

Company's overall operations, but are attributable directly to no identifiable products or services.[198]

i. The Annual Carrying Charge Factors

BAVT developed a series of factors which, when multiplied by incremental plant investment amounts for individual network elements, produces estimates of the direct annual costs associated with owning and operating the element.[199] These annual carrying charge factors are intended to capture the relationship between the on-going expenses (carrying costs, annual capital additions, and maintenance costs) associated with particular types of investments and the costs of the investments themselves.[200] Expenses incurred for a specific plant account are attributed directly only to those investments, while expenses that are not specific to plant accounts are spread equally across all investments.[201] In this way, asserts the Company, the objective of assigning costs to those who cause them is met to the greatest extent possible.[202] Four CCFs were developed by BAVT: (1) a maintenance factor; (2) a capital cost factor; (3) an ad valorem and personal property tax factor; and (4) a revenue-loading factor.

The Department states that, as a general matter, Bell Atlantic's capital cost factors were developed properly in accordance with stipulated algorithms, but that incorrect data inputs were used in the calculations, yielding improper results.[203] The DPS also contends that the ad valorem and personal property tax factor is incorrect because it takes an embedded, rather than forward-looking, perspective. The Department also argues that the BAVT approach does not properly reflect net investment.[204]

198. Anglin pf. at 5, 48-50. Mathematically, the annual CCF turns a total, up-front cost into a series of periodic payments, adjusted for the time-value of money and other costs, in the same way that a bank converts the total cost of a home into a multi-year mortgage.

199. Weiss pf. at 11.

200. Anglin pf. at 48.

201. *Id.*

202. *Id.*

203. Weiss pf. at 14.

204. *Id.*

A. Maintenance Factors

Each maintenance factor reflects two categories of costs: (1) those stemming from normal day-to-day activities necessary to maintain the plant in good physical condition; and (2) those associated with rearrangements and changes to plant to meet changing needs and to "tie in with existing facilities."[205] The maintenance factor for each type of investment was computed by associating actual booked maintenance expenses with the corresponding capital investment.[206]

The ratio of maintenance expense to investment dollars was developed by comparing cost data for the twelve months ending December 1995 with embedded investment dollars, after adjusting to reflect the present value of those investments.[207] The adjustment was done by multiplying investment by the ratio of current-cost to book-cost ("CC/BC ratio").[208] This adjustment typically reduces the maintenance factor: for most accounts the current cost of investment is larger than its book cost.[209] Department witness Weiss agreed generally with the approach taken by BAVT.[210]

I find that the maintenance factors proposed by the Company are reasonable. They are as follows:

Account Description	**Factor**

205. Anglin pf. at 50.

206. Exh. BA-IIB-1, Attachment E at 27-29.

207. Anglin pf. at 50.

208. Exh. BA-IIB-1, Workpaper E at 28.

209. Tr. 12/8/97 at 32-43 (Anglin); tr. 12/9/97 at 41-42 (Anglin).

210. Anglin, pf. at 50. In its brief, the Department notes that BAVT's support of the 1995 maintenance factor ignores two important facts. First, the 1995 expense data do not reflect most savings from the Company's restructuring (or "process reengineering") effort. In 1995, Bell Atlantic was in the early stages of this reorganization. DPS Reply Brief at 25, referring Dockets 5700/5702, Order of 10/5/94 at 41. Second, the Department notes that the 1995 expense data fail to reflect the savings that Bell Atlantic will accrue as a result of replacing copper feeder cable with the all-fiber-feeder network assumed in the TELRIC study. DPS Reply Brief at 25, referring to Fraine pf. at 11 and tr. 12/10/97 at 142 (Fraine).

I address the process reengineering issue in a later section of this order and, consequently, no adjustment need be made here. As for the implied savings associated with an all-fiber feeder network, there may be some merit to the DPS's position, but the record in this case does not adequately support it (in part because the Department only raised it after the evidentiary hearings had ended). Certainly, a maintenance factor should reflect the expected costs associated with a particular technology. At this time, however, I can only recommend that the Board bear this question in mind, in later investigations.

Buildings	0.0525
Digital Switching Equipment	0.0213
Analog Switching Equipment	0.0806
Digital Circuit Equipment	0.0061
Poles	0.0200
Metallic Aerial Cable	0.0379
Fiber Aerial Cable	0.0046
Metallic U. G. Cable	0.0167
Fiber U.G. Cable	0.0040
Metallic Buried Cable	0.0289
Fiber Buried Cable	0.0035
Aerial Wire	0.0412
Conduit Systems	0.0091

B. Capital Cost Factors

For each plant account, BAVT computed a stream of revenue (per $1000 of investment) needed to depreciate the asset, to earn a forward-looking return on the undepreciated (remaining) value, and to pay associated state and federal income taxes.[211] There was no dispute about the methodology employed by the Company. However, I recommend that the factors be adjusted to reflect the cost of capital recommendations and depreciation lives set out elsewhere in this proposal for decision.

C. The Ad Valorem and Personal Property Tax Factor

The ad valorem and personal property tax factor represents taxes, not otherwise accounted for, that apply to certain types of property. The ad valorem tax factor of 0.0122 was

211. Exh. BA-IIB-1, Attachment E at 3-23.

developed by dividing total ad valorem taxes paid (as booked) by total Company investment.[212] In doing so, BAVT used the 1995 book ratio of ad valorem taxes to total gross investment. The Company maintains that this factor reasonably accounts for taxes that must be paid on property used to provide unbundled elements in a forward-looking network and, therefore, represents costs that should be included in the TELRIC model.[213]

The Department correctly notes, however, that BAVT has merely calculated a flat embedded rate of 1.22 percent on incremental investment. It argues that this approach is inconsistent with Vermont law. Under 32 V.S.A. §8521, Vermont telephone companies pay a property tax equal to 2.37 percent of the net book value of telecommunications property located within the state. This suggests that the amount of the tax in a particular year is a function of the asset's remaining life: the requirement that the tax be based on net investment means that the amount of the tax will decline over time as the net book value of property falls.[214] Mr. Weiss recommends use of the following formula in estimating tax exposure on an asset category-specific basis:

$$\text{Ad Valorem/Personal Property Tax Factor} = 10^{-3} * (13.015 + (0.1380 * \text{asset projection life})).$$

The Company's witness, Mr. Anglin, concurred with this proposal[215] and I recommend that the Board adopt it. The practical effect of this change will be to more accurately assign to each set of UNEs the taxes that they bear.

D. The Revenue-Loading Factor

A revenue-loading factor of 0.0041 is applied to the other components of the annual CCF to reflect the costs that will be incurred by BAVT for regulatory costs and unpaid bills, or "uncollectibles."[216] The Company maintains that, because these expenses will continue to

212. Anglin pf. at 49; exh. BA-IIB-A, Workpaper E, Attachment 2 at 25.
213. BAVT Brief at 52.
214. Weiss pf. at 17.
215. Tr. 12/8/97 at 12-13 (Anglin).
216. Anglin pf. at 50; exh. BA-IIB-1, Workpaper E at 25.

occur in the future, they should be included in the TELRIC costs. BAVT also argues that, as competition takes hold, it will experience an increase in its total uncollectibles, because of the increase in uncollectible wholesale accounts and billing adjustments.[217] No dispute arose over this factor and I recommend that it be applied in establishing UNE rates.

E. The Annual CCF: Summary

Bell Atlantic agrees with the Department that the ad valorem tax factor should be adjusted as advocated by Department witness Weiss, and, as noted above, I adopt that recommendation.[218] As for the other components of the annual CCF, I recommend that the Board accept them, adjusted as appropriate for the weighted average cost of capital and depreciation rates that I have also recommended.

ii. Support Expenses and Common Costs

BAVT's cost study derives separate factors for support expenses[219] and common costs. Support expenses include marketing, sales, service order processing, and customer accounting costs. Any retail costs that are avoided when a service or element is provided at wholesale are not included. These expenses were divided by the network investments set out in the TELRIC study, yielding a cost factor of 0.0587 which was then applied to each investment category in the study.[220]

Common costs are those that cannot be attributed to particular products or services, but are nevertheless necessary to the conduct of business. They include, among others, certain expenses for motor vehicles, executive management, legal activities, planning, and research and development.[221] Because common costs are not assignable, they are recovered from all of the Company's operations (not only from those elements included in the TELRIC study). BAVT therefore divided its total common expenses by year-end total gross investment to derive a

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217. BAVT Brief at 53.

218. Tr. 12/8/97 at 12 (Anglin).

219. BAVT refers to this expense category as "directly attributable" expenses. I have adopted the term "support" expenses for this discussion: it gives a better impression of the kinds of costs at issue.

220. Anglin pf. at 50; Exh. BA-IIB-1, Attachment E at 24.

221. Anglin pf. at 48-50.

common expense allocation factor of 0.89 percent of network incremental investment.[222] The Company used 1995 figures, arguing that "the 1995 level of joint and common costs represents real-world costs incurred by BAVT to provide service in Vermont."[223] They also argue that "process re-engineering has ensured that booked cost is representative of an efficient level of forward-looking joint and common costs."[224]

The LCO and the Board's Phase I Order recognize that, because some costs are common to an incumbent LEC's operations, setting the price of each network element based solely on forward-looking incremental costs directly attributable to the production of the element will not enable an incumbent to recover the total forward-looking costs of operating the wholesale network.[225] The TELRIC methodology requires that prices for interconnection and access to network elements include a reasonable measure of forward-looking common costs. Relevant common costs, however, should not include billing, marketing, and other costs attributable to the provision of retail service.[226] Under the LCO, costs that are common only to a subset of elements or services provided by incumbent LECs are allocated to that subset first.[227]

The Department's witness observes that BAVT's approach to assigning joint and common costs is "not unreasonable;" however, he does regard as unreasonable BAVT's reliance solely on embedded costs in developing the factor.[228] AT&T opposes the proposed joint and common cost allocators for the reason noted by Mr. Weiss, namely that they are based on embedded rather than forward-looking cost data.[229]

The LCO allows for different methods for assigning costs that are common to all elements and services.[230] The Department argues that, while the LCO appears to allow for a

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222. Exh. BA-IIB-1, Workpaper E at 24; Weiss pf. at 19.
223. BAVT Brief at 53.
224. *Id*.
225. LCO, ¶ 694; Phase I Order at 33-48. The Phase I Order does not, however, reach any definitive conclusions about the magnitude of joint and common costs that should be recovered at wholesale.
226. LCO, ¶ 694.
227. *Id*.
228. Weiss pf. at 20.
229. AT&T Brief at 42.
230. LCO, ¶ 694.

fixed allocator methodology that directly attributes these costs as a fixed percentage mark-up over the directly attributable costs, it prefers instead an approach that assigns different shares to different elements, in particular, a relatively small share to certain critical network elements, such as the local loop and collocation, that are most difficult for entrants to replicate.[231] The Department argues that BAVT's flat-assignment approach here is, in effect, a form of Ramsey pricing (wherein significant amounts of a firm's joint and common costs are recovered in the prices of products for which demand is most inelastic, *i.e.*, does not vary greatly with changes in price) since it assigns a disproportionate share of costs to critical bottleneck inputs. The DPS charges that this will undermine the competitive objectives of the Act and, furthermore, was rejected by the FCC in the LCO.[232]

As already noted, the Department also disputes the embedded cost inputs used by BAVT in developing the support and common cost allocators. Specifically, the Department maintains that the appropriate denominator is the total current cost level, or book cost, rather than the depreciated book value from 1995.[233] The BAVT "current cost to book cost" (CC/BC) ratio of 1.410 for its total plant investment in 1995 can be used to convert net book value to current cost. Doing so increases the denominators of the two cost factors, thus reducing the support expense from the proposed 0.0587 to 0.042 and the common cost factor from 0.0089 to 0.0064. BAVT's witness agreed in principle with these adjustments.[234]

In general, I find that the assignment of common costs to all elements and services can be made in a fixed proportion to all services. The allocation of a variable proportion as advocated by the Department, while pro-competitive in one sense, may have an unintended consequence of loading costs onto portions of service that are subject to more facilities-based competition and thus encourage inefficient bypass of the BAVT network. Also, the administrative burdens associated with developing different common cost factors for different UNEs could complicate and delay the establishment of UNE rates in the future — a delay that

231. DPS Brief at 50.
232. *Id.* at 51, citing the LCO at ¶ 696.
233. Weiss pf. at 19.
234. Tr. 12/8/97 at 13 (Anglin); Weiss at 19-20; exh. DPS-IIB-9 (THW-4).

may not be worth the cost. For these reasons, at this time I conclude that the general approach taken by the Company is reasonable.

I also conclude that the adjustments recommended by the Department should be made, because they reflect more reasonable contributions to support and common costs that should be made by UNEs. Based on the evidence presented, I conclude that the support cost factor should be 0.042 and the common cost factor should be 0.0064.

2. The Hatfield Model

The Hatfield Model ("Model" or "HM4.0"),[235] a microcomputer application, was developed (1) to estimate costs of unbundled network elements pursuant to §§ 252(d)(1)(A) and (B) of the Act and (2) to develop an estimate of the costs of basic exchange telephone service that can serve as the basis for allocating universal service supports.[236] Bell Atlantic urges the Board not to rely upon HM 4.0 to set network element prices, arguing that many of the Model's methodologies, engineering assumptions, and data inputs are flawed.[237] The DPS and AT&T acknowledge certain shortcomings in HM 4.0, but nevertheless recommend that the Board adopt it to establish rates for unbundled network elements in Vermont.[238]

In evaluating the Model and the parties' arguments, I consider the following factors: (1) HM4.0's ability to estimate costs on a BAVT service area-wide basis; (2) the degree to which the Model derives reasonable and accurate costs; (3) the ease with which HM4.0 can accommodate changes in assumptions and inputs; (4) HM4.0's ability to model costs based on the current placement of wire centers; and (5) the ease with which inputs and assumptions can be verified. While each of these factors was considered, I cannot be more precise concerning the weights to be given to any of them except to say that I believe that it is reasonable to place

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235. There have been several iterations of the Hatfield Model. BAVT Brief at 54, n. 41. The version reviewed in this docket is HM 4.0. AT&T moved to introduce a later version, HM 5.0, into the record, but I ruled against doing so, since it would have required additional discovery and unacceptably delayed evidentiary hearings. Tr. 12/16/97 at 47.

236. Siwek pf. at 13.

237. BAVT Brief at 62-63.

238. AT&T Brief at 59*ff*. "Defects in Hatfield are remediable." DPS Brief at 63.

more emphasis on HM4.0's design and its ability to change inputs and assumptions rather than on those inputs and assumptions themselves.

a. The Model

In order to estimate the costs that would be incurred by an efficient Vermont firm providing the relevant network functions, HM 4.0 develops a virtual network, based upon certain engineering standards and practices. The Model can ostensibly be adapted to any LEC or geographic area and, with the appropriate state- and company-specific inputs, should be able to develop the costs that a LEC would bear in providing narrowband, voice-grade telephone service.[239]

HM 4.0 has five distinct modules.[240] The first module is entitled "Input Work Files" and employs four categories of input data. Category one contains demographic, geographic, and geological characteristics of "census block groups" used to determine the number of customers requiring telephone service. Category two contains information on distances between central offices, tandems, and signal transfer points and is used to estimate route miles for interoffice transmission facilities. Category three is comprised of ARMIS data on investment, traffic, and expenses.[241] Category four is described as "user-adjustable inputs," which allows modelers to include carrier- or locale-specific parameters in the model.[242]

The Distribution Module determines the length and size of distribution cable, the associated structures, including poles or trenching, and the number of terminals, splices, drops, and network interface devices necessary to provide service to the specified number of customers in each census block group. With this information, the model calculates the necessary investment for each of these elements. The investment figures are then used as inputs in the third module, the Feeder Module.

The Feeder Module configures that component of the network that extends from the wire center to each "service area interface." This module is designed to determine the quality

239. Siwek pf. at 20.
240. The following discussion synthesizes Siwek pf. at 21-24.
241. ARMIS reports are filed at the FCC by LECs.
242. If no specific parameters are entered, these inputs have preset default values.

of various feeder elements, *i.e.*, whether it is best to serve the census block group using feeder transmission facilities of copper wire pairs or fiber optic cable with digital loop carrier systems. This determination depends upon an adjustment to the parameter that specifies the minimum feeder length (*i.e.*, the distance between the CO and the census block group) for which fiber is installed. This module also determines the length and size of cables (and associated components) necessary to reach the serving area interfaces located in each census block group.

The Switching and Interoffice Module computes investments for end office switching, tandem switching, signaling, and interoffice transmission facilities. It determines required line, traffic, and call processing capacity of switches. This determination is based upon (1) line totals by customer type across all census block groups served by the wire center, and (2) traffic and calling volume inputs developed from ARMIS data. Also, by using the traffic data and the interoffice distances as inputs, this module develops figures for the necessary capacity and distances of interoffice transmission facilities. The results developed in this module are then used in the Expense Module.

The Expense Module calculates monthly costs for unbundled network elements. These costs can be displayed by density zone, census block group, or individual wire center. Included in these costs are (1) the capital carrying costs associated with the investments (including depreciation, return on investment, and income taxes) and (2) the annual expenses associated with their operation. Network expenses include maintenance and network operations, while non-network related expenses include customer operations expenses, general support expenses, other taxes and variable overhead expenses.[243]

b. Estimation Methodologies

i. Census Block Groups and Allocation of Distribution Cable

At a general level, BAVT argues that HM4.0 "rests on a series of entirely untested methodologies and highly suspect simplifying assumptions. . . ."[244] The Company insists that HM4.0 erroneously measures outside plant, and that this problem arises from the Model's use

243. Network investments by specific plant category are developed in the other modules, *i.e.*, the Distribution, Feeder, and Switching and Interoffice Modules.

244. BAVT Brief at 66.

of census block groups.[245] Census block groups, BAVT insists, provide poor approximations of local serving areas: "[i]n the less densely populated rural areas that characterize much of Vermont, [census block groups] can cover extremely large regions having no relationship to proper network design."[246]

AT&T takes the view that it is entirely appropriate for HM4.0 to use Vermont-specific census information to identify the number of customers within each census block group requiring telephone service and then to make reasonable assumptions about the distribution of customer locations within those census block groups.[247] AT&T adds that the census block group characteristics used in HM4.0 are user-adjustable, and, by comparison to BAVT's loop study, achieve a "higher level of granularity."[248]

BAVT argues that the most striking example of the weakness in HM4.0's census block group approach can be seen in its calculation of distribution distances and the resulting provision of distribution cable in low-density areas.[249] HM4.0, argues BAVT, first assumes that all "unoccupied" land in a census block group is located at the outside edges, removed from the serving area interface, and requires no cable to cross the land.[250] It then, according to BAVT, assumes that customers are "clustered" in either two or four quadrants within a census block group (with 85 percent of customers on directly-abutting three-acre lots), and provides cable sufficient to reach only customer locations in this close-proximity configuration.[251] This approach, says BAVT, cannot provide sufficient cable to reach all customers in the census block group "unless they are so clustered."[252] BAVT further maintains that rural census block groups customers are likely to be dispersed along roadways and that, moreover, even if customers are clustered in a location, sufficient cable still must be provided to outlying

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245. *Id.* at 66-67.

246. Relying on the testimony of AT&T witness Siwek, BAVT argues that there are 495 census block groups in Vermont, "ranging in size from less than one-third of a square mile to 160 square miles." *Id.* citing tr. 12/17/97, Vol. I at 20 (Siwek).

247. AT&T Brief at 63; tr. 10/31/97 at 21; exh. ATT-IIB-11, Model Description at 25-26.

248. AT&T Brief at 63; tr. 10/31/97 at 25; ex.h ATT-IIB-11, Model Description at 9.

249. BAVT Brief at 67; tr. 12/17/97 at 38-53; exh. BA-IIB-14.

250. BAVT Brief at 67; tr. 12/17/97 at 31.

251. BAVT Brief at 67; tr. 12/17/97 at 32-33.

252. BAVT Brief at 67.

customers.[253] Finally, BAVT contends that AT&T's conclusion that HM4.0 provides sufficient distribution cable in rural areas relies on the "fallacy of using average distances" in the Model to calculate distribution: one "cannot reach the farthest customer with an average cable distance."[254]

In response, AT&T insists that BAVT is incorrect to maintain that HM4.0 understates the amount of cable needed to reach customers because of the Model's customer clustering assumptions.[255] AT&T provides two reasons for this. First, HM4.0's use of the "Town Factor," a built-in presumption that a certain percentage of rural households will be located in clusters, is appropriate.[256] The town factor places those households that are not assumed to be clustered in a town farther away from those population clusters and closer to the edges of the census block group, leaving areas both at the edge and at the center of the census block group that are assumed to be unoccupied.[257] AT&T acknowledges that, while the Vermont Statistical Abstract data suggest a town factor of nearly 93 percent (meaning that 93 percent of rural households are clustered together in "towns"), it used an 85 percent town factor in its modeling, thereby placing more customers closer to the edges of the census block group.[258]

Second, AT&T argues that HM4.0 assumes that not only is there unoccupied space at the edges of the census block groups, but also unoccupied space in the middle of the groups. Therefore, argues AT&T, though BAVT is correct to say that HM4.0 does not model cable lengths to reach outlying customers located at the very border of a census block group, the Model's assumption of unoccupied space in the middle of the census block group has offsetting impacts: the mitigating effects flowing from the conservative town factor and the manner in which HM4.0 models unoccupied space, both at the edges and centers of census block groups,

253. *Id.*; tr. 12/17/97 at 55-56.
254. BAVT Brief at 67.
255. AT&T Reply at 45.
256. *Id.*
257. *Id.*
258. *Id.* at 45-46.

should overcome the concern that HM4.0 "results in the modeling of less than the required amount of distribution cable."[259]

AT&T's responses to the Company's objections to the use of the town factor and HM4.0's modeling of unoccupied space in census block groups seem reasonable; however, there is insufficient evidence to support a conclusion that the approaches are in fact reasonable. On the basis of this record, I cannot conclusively determine that the 85 percent town factor and the Model's assumptions concerning amounts of unused cable at the center of census block groups satisfactorily palliate the coarse use of census block groups as the basis for allocating distribution cable.

c. Engineering Assumptions

i. Cable Lengths

BAVT argues that there are certain, invalid engineering assumptions built into HM4.0's calculations for estimating outside plant. First, BAVT maintains that, in calculating distances (and subsequent lengths) for feeder and distribution cable, HM4.0 fails to account for the topography of the terrain.[260] AT&T witness Madden asserted that "slope" considerations should be of no consequence because routes would follow roads, which have only gradual grades, although he did acknowledge that HM4.0 does not assume road-routing of cable.[261] Furthermore, as BAVT has indicated, all calculations in the Model are based on direct air distances, regardless of terrain, thus calling into question the appropriateness of such an assumption in a model designed to render results for a service area with terrain such as that found in this state.[262]

AT&T argues that BAVT overstates HM4.0's purported failure to account for topographical characteristics in Vermont when calculating the lengths of interoffice cable.[263] According to AT&T, BAVT has ignored a critical back-up provision to the modeling

259. *Id.*

260. BAVT Brief at 68.

261. Tr. 12/18/97 at 26-27.

262. *Id.*; BAVT Brief at 69.

263. AT&T Reply at 46-47. Apart from discussing interoffice cable, AT&T does not address BAVT's inclusion of feeder plant in this argument.

methodology that AT&T insists will ensure that adequate cable length is accounted for: namely, the "1.5 multiplier" that is supposed to account for the likelihood that cable routes will not extend in straight lines across wire centers.[264] Furthermore, insists AT&T, the Model also checks to determine if twice the distance from the wire center to its assigned tandem is less than the distance calculated using the 1.5 multiplier and, if so, estimates the route miles as twice the tandem distance.[265] These two features of HM4.0, according to AT&T, are "conservative component[s] of the model's methodology for calculating interoffice cable that ensure ample cable is modeled."[266]

AT&T convincingly sets out the shortcomings in BAVT's characterization of HM4.0 as a simplistic and two-dimensional model. As AT&T has pointed out, HM4.0 attempts to provide for variations in Vermont's terrain. However, given the available information, I am unable to determine if HM4.0's use of the 1.5 multiplier or the alternative double tandem distance method will result in reasonable estimates of interoffice cable lengths. While these two features of HM4.0 appear to be capable of rendering initial estimates more conservative, I still am left with questions such as "how conservative" or "conservative in relation to what, exactly?" Therefore, I conclude that these particular engineering assumptions in HM4.0 suffer from the same relativity problem discussed above in regard to estimating methodologies, and that they, absent other substantiation, are likely to develop results that cannot be reasonably relied upon in estimating cable lengths in BAVT's network.

ii. Use of Poles

BAVT argues that there are incorrect engineering assumptions built into HM4.0's calculations of the use of poles in certain of the density zones. In the two most dense zones, BAVT argues, HM4.0 allocates either 60 or 85 percent of distribution cable to aerial structure, but also assumes that this aerial distribution is "block cable" or "riser cable", *i.e.*, aerial structure

264. *Id*.
265. *Id.*
266. *Id.*

requiring no poles.[267] According to BAVT, because nearly 15 percent of all lines in Vermont are located in HM4.0's two most dense zones, the Model's assumption regarding poles contributes to an inappropriately low estimate of the cost of distribution plant.[268]

AT&T does not respond directly to Bell Atlantic's criticisms on the HM 4.0's modeling of poles.[269]

BAVT's argument that HM4.0's assumptions regarding poles will result in an inappropriately low estimate of distribution cable is, essentially, uncontested. The Model's approach to pole investment seems quite unrealistic for Vermont's topography. Further refinements will be needed before the Board can rely on this component of the Model.

iii. Buried Cable

Bell Atlantic makes three arguments about underground cable and its associated costs. First, the Company argues that, in the density zones other than the two most dense zones discussed above, AT&T assumes that 70 or 75 percent of distribution cable will be buried, even though the rocky terrain in the BAVT territory results in less than 15 percent of all cable being buried today.[270] Second, the Company asserts that HM4.0 also assumes that two-thirds of all underground structure costs are shared by other utilities, even though, insists BAVT, it would be a violation of the National Electric Code for underground telephone lines and electrical lines to share manholes.[271] Third, BAVT contends that HM4.0 assumes that BAVT will bear only one-quarter to one-third the costs of outside structure in most areas of this state.[272] This, states BA-VT, does not comport with current levels of structure sharing, and represents a level

267. BAVT Brief at 69.
268. *Id.*
269. AT&T Reply Brief at 30.
270. BAVT Brief at 69.
271. *Id.*
272. *Id.* at 70.

of sharing unlikely to be achieved in the foreseeable future because HM4.0, "in effect, assumes that all utilities will build all new structure any time that BAVT is building new structure."[273]

AT&T disputes Bell Atlantic's claims. According to AT&T, BAVT's criticism that sharing percentages exceed current levels of structure sharing and that its buried cable assumptions far exceed the current percentage of buried cable, "reflect the mistaken equation of long run forward-looking costs with embedded or short run costs."[274] AT&T contends that "Bell Atlantic apparently would have the Board assume that there will be no efficiencies gained from competition and that opportunities for structure sharing and cable burying efficiency improvement are nonexistent."[275] Furthermore, asserts AT&T, "both competitive pressures and local regulatory standards will force telephone carriers to engage in a far higher degree of structure sharing than has occurred in the past."[276]

Bell Atlantic will certainly become subject to greater competitive pressures in the near future, but it is not clear to me that such pressures will result in changes to structure sharing practices of the magnitude that AT&T is currently predicting. This reasoning applies equally to AT&T's proposal concerning buried cable. In spite of increased competition, one has to ask whether the current percentage of buried cable, asserted by BAVT to be in the vicinity of fifteen percent, will, in certain density zones, increase to seventy percent. It appears that one of the central factors driving the cost of buried cable is geological conditions, and not simply the degree of competition facing the incumbent. Therefore, while BAVT's current percentages cannot be expected to be exact predictors of practices in the future, by comparison to HM4.0's

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273. *Id*. (emphasis in original). BAVT also contends that HM4.0 contains other "equally questionable techniques" for estimating outside plant, *e.g.*, "it has chosen a methodology for estimating trench costs based on a cost per foot, which does not vary regardless of the number of conduit in the trench. *Id*. citing H.I.P. at 114. According to BAVT, "this technique is not typically used because costs will in fact vary significantly based on the number of conduit runs required in a trench." *Id.* citing exh. BA-IIB-19 at 475-76. A proper methodology, maintains BAVT, varies cost estimates by the number of conduits. BAVT adds that "elsewhere, AT&T uses geographic data to apply multipliers to certain costs, but not to determine the proper mix of structure. Tr. 12/16/96 at 152; BAVT Reply Brief at 42.

274. AT&T Reply Brief at 49.

275. *Id.*

276. *Id*. Furthermore, argues AT&T, BAVT's "identification of sharing restrictions between telephone and electric utilities overstates the level of the restriction. Power and telephone lines can be run side by side underground or share a pole and can share one wall of a manhole; the only restriction is that they must have separate access to the hole." *Id.*

structure sharing assumptions, BAVT's current percentages provide a more reasonable basis upon which to estimate the Company's forward-looking buried cable costs.

iv. Switching

BAVT argues that there are incorrect engineering assumptions built into HM4.0's methodology for estimating switching costs. First, according to BAVT, HM4.0 inappropriately "assumes switch sizes are infinitely variable, so that a switch of any needed line size can be installed to match exactly the line count in a given wire center."[277] This approach, says the Company, "understates costs by ignoring the fact that switches simply are not made this way; there is a minimum size switch that can be purchased, and switch components come in modules of specific sizes, not in infinite variety."[278] Furthermore, argues BAVT, HM4.0 erroneously assumes standard line concentrations for every switch, which incorrectly sizes switches to meet actual demand. According to Bell Atlantic, this approach fails to account for the increased switching costs in areas with higher holding times, requiring lower line concentrations. BAVT maintains that the Model also fails to account for longer "holding" times, which will result from increased Internet use in the future.[279]

AT&T does not address BAVT's arguments concerning the engineering assumptions underpinning the Model's calculations of switching costs.[280]

I conclude, for the reasons expounded by Bell Atlantic, that HM4.0's estimates of switching costs should not be relied upon in the development of UNE rates.

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277. BAVT Brief at 70.

278. *Id.*

279. *Id*. at 71. Additionally, BAVT states that HM4.0 does not account for host-remote situations or for software costs or the costs of providing vertical services to customers. These, it argues, are "assumed to be adequately accounted for in a single switch cost curve — an approach which makes it impossible to verify that the sizing or functionality of a switch have been properly considered and the costs properly measured." *Id*.

280. AT&T argues that HM4.0's switch investment curve produces reasonable estimates of per line costs based on switch size. These arguments will be addressed below in the section discussing inputs to HM4.0.

d. Inputs

Bell Atlantic argues that many of the modeling inputs "selected by AT&T to calculate the investments and expenses for its hypothetical network are indefensible."[281]

i. Pole Costs

BAVT contests AT&T's input for the cost of a pole. AT&T's cost of $417, according to BAVT, reflects an estimated material cost of $201 and an estimated installation cost of $216.[282] BAVT objects to these estimates because back-up documentation demonstrates that the $417 cost was derived by taking a labor estimate from one price quote and combining it with the material cost from another price quote.[283] In addition to material and installation costs, HM4.0's pole costs, according to Bell Atlantic, do not include the additional costs of "anchors, down wires and guys."[284] Nor do they include the cost of delivery to Vermont, states BAVT. When compared with other cost proxies — one, that of $972.70 based upon a "National Construction Estimator, and another, $1,075, an FCC-reported cost, according to BAVT, for an installed pole "in Vermont's type of rocky terrain" — should lead one to the conclusion that HM4.0's estimate is unreasonably low.[285]

AT&T argues that, because HM4.0's poles costs are lower than the highest publicly reported costs, HM4.0 contains an appropriately conservative estimate.[286] As it argued with respect to buried cable costs, AT&T maintains that BAVT's arguments regarding what it (BAVT) insists are unreasonably low pole costs, "are wholly inconsistent with the objectives of a least-cost TELRIC model."[287] In other words, "HM4.0 did not simply adopt the highest reported estimates of pole costs. . . ." nor did it "adopt the lowest reported costs."[288]

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281. BAVT Brief at 73.
282. *Id* at 75.
283. *Id*. citing exh. BA-IIB-20 (under seal); tr. 12/17/97, Vol. II, at 105-107 (under seal).
284. *Id.*
285. *Id*. at 76.
286. AT&T Reply Brief at 48.
287. *Id.*
288. *Id*.

BAVT has adduced evidence that the likely cost of installed poles is considerably higher than the estimate provided by AT&T.[289] While AT&T has shown that it did not adopt the lowest reported estimates, as BAVT has insisted, the AT&T estimates for forward-looking costs do not appear to accommodate the need for appurtenant hardware such as anchors, down wires, and guys, nor do they appear to include costs for delivery to Vermont or the expenses associated with installation in the difficult terrain found in this state. The National Construction Estimator and FCC estimates seem to me to be more reasonable for our purposes here. I conclude therefore that it would not be reasonable to adopt the pole costs proposed by AT&T in HM4.0.

ii. Manhole Costs

Bell Atlantic argues that AT&T's estimates for manhole costs suffer from the same problems as its estimates of pole costs. In particular, asserts BAVT, AT&T erroneously assumes a manhole can be installed in most parts of Vermont for an unreasonably low cost, *i.e.*, $5,140.[290] This, says BAVT, assumes a material cost of $1,865, whereas the National Construction Estimators estimates a material cost of $2,380.[291] Similarly, BAVT finds fault with AT&T's installation cost estimate. The site delivery component of the estimate, $2,340, is, according to BAVT, unsupportable in light of the National Construction Estimator cost of $3,363.[292] Also, according to BAVT, the HM4.0 input value does not account for the "unanticipated costs that develop under field conditions, such as the need for drainage, shoring or slope reinforcement."[293]

AT&T argues that BAVT's criticism of HM4.0's manhole costs is inaccurate and based on a mischaracterization of estimated costs contained in the National Construction Estimator.[294] According to AT&T, BAVT's argument that AT&T's estimates are higher than those of the National Construction Estimator is erroneous because BAVT inappropriately

289. Exh. BA-IIB-19 at 512; exh. BA-IIB-11.
290. BAVT Brief at 76.
291. *Id.*
292. *Id.*; tr. 12/17/97, Vol. II at 82-84; exh. BA-IIB-19 at 476.
293. BAVT Brief at 76.
294. AT&T Reply Brief at 47.

compares "telephone manhole costs estimated in HM4.0 with more expensive electric manhole costs listed in the National Construction Estimator."[295] Finally, AT&T asserts that the "total installed manhole costs assumed in HM4.0 range from $5,1440 to $7,340, depending on density zone," estimates which do not comport with BAVT's characterization.[296]

BAVT has erroneously characterized HM4.0's inputs in this instance and cannot justify a lower estimate for manhole costs than that proposed by AT&T. Therefore, I conclude that it would be reasonable to adopt HM4.0's inputs for manhole costs.

iii. Switching Costs

HM4.0 develops switching costs through its use of a "switching investment curve." HM4.0's switching costs are based on average per-line costs that are derived by comparing per-line costs reported by Bell Operating Companies, GTE, and independent telephone companies to switch sizes given in ARMIS data and, then, by converting these data points into a logarithmic curve that shows an inverse relationship between switch size and per-line cost.[297]

Bell Atlantic maintains that HM4.0's switching curve was built by using limited and inappropriate data points.[298] First, BAVT acknowledges that three of the four points defining the cost curve were obtained by "plotting the average reported per line cost of all switches bought in 1995." However, BAVT asserts that these average costs were plotted against the average size of all installed switches in the embedded networks of sampled companies as of 1994."[299] According to BAVT, "in the likely event that the average switch purchased in 1995 was larger than the average size of all switches installed as of 1994, these first three data points are incorrectly plotted."[300] According to BAVT, each should be "further to the right than the

295. *Id.* AT&T adds that its witness, Mr. Madden, testified that "the section of the National Construction Estimator relied on by Bell Atlantic addresses precast power (meaning power and electric) manholes, which differ in dimension from telephone manholes." *Id.* At 48.

296. *Id.*

297. HM4.0 Model Description at 49.

298. BAVT Brief at 77.

299. *Id.* at 77 and 78.

300. *Id.* at 78, citing Tardiff reb. pf. at n. 43. BAVT further argues that the fourth point on the cost curve "reflects nothing more than an undocumented conversation with a vendor about a hypothetical 80,000 line switch with unknown features and an unspecified concentration ratio." *Id.* AT&T responds that the

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points assumed by HM4.0, reflecting that the average per line cost was for a greater number of lines."[301]

Second, BAVT argues that, because the input values used to estimate switch costs reflect only the reported price for newly installed switches, HM4.0 understates the life-cycle per-line cost of a switch. New installations, contends BAVT, are not the only reasonable way to expand switching capacity. To support this contention, BAVT cites a McGraw-Hill study which states: "Once a switch supplier sells a new system, it has a nearly captive customer; a telco can only grow a switch by buying add-on lines from the manufacturer of that switch. Therefore, add-on lines are priced higher than lines on new systems and represent higher margin sales."[302]

AT&T contends that HM4.0, through its Switch Investment Curve, properly estimates the switch costs of an efficient, forward-looking, network. AT&T first argues that BAVT "does not and cannot contend that the data relied upon by HM4.0 is inaccurate or that there is not an inverse relationship between switch size and per-line cost."[303] Instead, says AT&T, BAVT argues that HM4.0 improperly compares line costs from 1995 to switches installed in 1994. In making this argument, insists AT&T, BAVT misrepresents the model documentation because HM4.0 compares reported 1995 costs to 1995 installation data.[304]

Second, AT&T argues that BAVT's criticism of HM4.0's reliance on the purchase of new switches to the exclusion of higher cost add-ons "reflects Bell Atlantic's refusal to recognize that a proper TELRIC study assumes the construction of a forward looking least cost network, and need not mirror Bell Atlantic's embedded costs, which include the purchase of both new

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300. (...continued)
"additional cost point for large 80,000 line switches was derived from other industry sources." AT&T Reply Brief at 52, n. 202.

301. BAVT Brief at 78. BAVT adds that "any switches of this large size purchased in 1995 are *already* reflected in the average costs reported in the 1995 average cost figures." Furthermore, says BAVT, "assuming that larger switches cost less per line, such purchases are already reducing the average per line cost reflected in AT&T's first two data points." It concludes that, to be consistent, large switch purchases such as this should be removed from the overall average per line costs. Such an adjustment, according to BAVT, would cause the first three data points to move upwards, reflecting still higher per line costs. *Id.*

302. *Id.*, citing exh. BA-IIB-16.

303. AT&T Reply at 52 and 53.

304. *Id.*

and growth lines."[305] HM4.0 properly relies on the lower cost assumption that new switches alone will satisfy growth requirements, argues AT&T, because the TELRIC methodology accounts for the economies of scale present in the construction of network facilities.[306]

I conclude that AT&T has provided a reasonable comparison between the costs of switches bought in 1995 and the average size of installed switches of the same companies during the same year. BAVT mischaracterizes the modeling in this regard. Also, in considering the reasonableness of HM4.0's switch price estimates, I conclude that Model's representation of switches as new installations only, rather than in a way that recognizes that a combination of new installations and future upgrades may be the least-cost approach over the planning horizon, appears to be inconsistent with the TELRIC methodology (that is, the modeling of a forward-looking network, based on the existing network's general configuration. I find that HM4.0 cost inputs are reasonable to the degree that they represent costs for new installations. However, the engineering defect identified in the previous section — namely, the Model's treatment of switch sizes as infinitely variable (and now its neglect of the costs of future upgrades to those new installations) — still plagues it, and I cannot conclude therefore that the Model produces reasonable, forward-looking costs for switching functions in Vermont.

e. Conclusion

For the foregoing reasons, I recommend that the Board not use the Hatfield Model, Version 4.0, to set prices for the unbundled network elements necessary to provide local exchange service in Vermont. I do not, however, believe that later iterations of the Hatfield Model, or any other tool for that matter, should be automatically ruled out for later consideration. See Section IV.A., below, for a fuller discussion of this question.

C. CLEC Access to BAVT's Operations Support Systems

The FCC's LCO requires "an incumbent LEC to provide nondiscriminatory access to their support systems functions of pre-ordering, ordering, provisioning, maintenance and repair,

305. *Id.* at 52.
306. *Id.* at 53.

and billing available to the LEC itself."[307] These systems are broadly referred to as operations support systems ("OSS"). Bell Atlantic has proposed rates and charges to be paid by CLECs, to recover the development and maintenance costs that will give them access to Bell Atlantic's operations support systems.[308] In support of its request, Bell Atlantic presented a cost study describing the development and maintenance costs for its entire northern region.[309]

Bell Atlantic-Vermont is seeking to recover a proportionate share of $107.6 million in one-time OSS development ("onset") costs and a proportionate share of $19.97 million in ongoing maintenance and capital costs associated with implementing access to, and modifications of, its OSS for New York and New England.[310] Bell Atlantic proposes recovery of the approximately $108 million through a combination of monthly recurring charges that differ for resellers and UNE purchasers, and uniform per-transaction charges for all CLECs.[311] The amounts of the proposed charges have been calculated so that, assuming demand has been accurately forecast, it will take five years of monthly recurring charges and seven years of per-transaction charges to recover the total amount of costs identified by BAVT. The maintenance and capital costs, which will be on-going and are estimated to be roughly $20 million per year in the early years, are to be recovered in another per-transaction charge, which has no sunset. BAVT proposes to impose the charge on CLECs and does not propose to impose an analogous charge on itself.[312] Lastly, under the Bell Atlantic proposal, if a CLEC acts as both a reseller

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307. LCO, ¶ 523. For definitions of the various functions, see Kelly pf. at 4.

308. Kelly pf. at 2.

309. Tr. 3/16/98 at 82 (Orosz). The Bell Atlantic-North region ("BA-North") comprises the territories of the former NYNEX companies, *i.e.*, New York and New England.

310. Kelly pf. at 24-25; tr. 3/18/98 at 33 (Minion); tr. 3/16/98 at 82 (Orosz).

311. Orosz pf. at 5.

312. Tr. 3/16/98 at 111 (Orosz); Weiss supp. pf. at 15. Bell Atlantic proposes to recover its alleged investment of $83.9 million in OSS modifications and associated carrying costs over seven years at $17.9 million per year. Weiss supp. pf. at 19**.** BAVT projects 21.5 million transactions during the period, and proposes an $0.84 charge for each. To recover its alleged ongoing maintenance and capital costs, Bell proposes a $0.42 per-transaction charge, without sunset. This charge is composed of a $0.15 per transaction charge associated with alleged ongoing capital costs and a $0.27 per-transaction charge associated with alleged ongoing capital costs. This latter charge has no sunset.

To recover the remainder of the $108 million (approximately $23.7 million), BAVT proposes monthly recurring charges to recover the onset costs it allegedly incurred in developing two different OSS interface systems: one for the UNE-based new entrants, the Carrier Access Team Center ("CATC"), costing $17.868 million; and one for resellers, the Resale Service Center ("RSC"), at $5.828 million. On the

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and a purchaser of UNEs, the CLEC will pay both the monthly charge assigned to resellers and the monthly charge assigned to UNE purchasers, regardless of how many customers the CLEC has.[313] According to the Company, no recovery is sought here for any efforts to improve the basic functions of the underlying OSSs themselves.[314]

1. Positions of the Parties

Bell Atlantic maintains that these expenses are incurred as a direct result of the LCO.[315] They reflect the direct cost of compliance with the requirements to provide CLEC *access* to OSSs. The Company maintains that OSSs constitute UNEs whose recovery is specifically provided for in the LCO.[316] As such, cost recovery should be no different with OSS-UNEs than with any other UNE: the carrier obtaining the element pays for it.

Bell Atlantic initially argued that, in fact, the OSS access costs themselves are not in major dispute.[317] BAVT asserts that its cost study reflects a forward-looking, incremental-cost construct that is consistent with the FCC's definition of TELRIC in formulating its access to OSS.[318] The Company argues that the costs are forward-looking because they calculate

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312. (...continued)
assumption that there will be 80 UNE-based new entrants, BAVT proposes to recover the $17.868 million over five years through a recurring monthly charge of $4,993, paid by each UNE-based new entrant. To recover the $5.828 million of its alleged costs incurred to develop the OSS access for resellers, Bell Atlantic proposes to impose a monthly charge of $2,605 on each reseller. Both charges sunset in five years. The charges would not apply to Bell Atlantic.

313. Weiss supp. pf. at 15.

314. Kelly pf. at 8.

315. The Department agrees with BAVT that OSSs fall within the definition of "network elements" and must be unbundled on request. DPS Brief at 65, citing Act, § 251(c)(3), and LCO, ¶ 516. However, as discussed below, the DPS disagrees that these costs are UNE costs. It argues that cost recovery, to the extent warranted, should be in the context of a general rate proceeding rather than through the UNE charges. DPS Brief at 67.

316. Kelly pf. at 2-3. The FCC concluded that *access* to OSSs is a UNE. LCO, ¶¶ 516, 525.

317. A review of the record and of the briefs offered by the other parties indicates that in fact there still remains considerable dispute over the reasonableness of both the recovery mechanisms and the alleged costs themselves. Weiss supp. pf. at 19; Selwyn pf. at 29-35; Minion reb. pf. at 13-20; DPS Brief; DPS Reply Brief; AT&T Brief at 90; AT&T Reply Brief at 55.

318. Minion pf. at 5.

BAVT's best estimate of the costs to enable CLEC access to OSS functionalities and interfaces and of the ongoing costs to maintain those new or modified systems.[319]

BA-North's efforts were, the Company asserts, limited to developing systems to facilitate access to BA-North's OSS by "*other carriers*".[320] BAVT maintains that what is in major dispute is the method for recovery.[321] Here, Bell Atlantic notes that the issue of "cost causation" is not central to the issue and it need not be decided by the Board, since a portion of the benefit can reasonably be attributed to the existence and availability of interfaces on an "as-needed" basis, thereby justifying recovery through its proposed monthly recurring charge.[322] To the extent the systems are actually used, other portions of the costs are recovered through a monthly per-transaction charge.[323]

Both AT&T and the Department raise a number of concerns with the cost study and the rate design to effect cost recovery. Both AT&T and the Department argue that the Board should reject all of BAVT's OSS-related charges.[324]

AT&T and the Department begin by asserting that the costs that BAVT is claiming are not service element costs, but are largely "general competition onset costs."[325] In support of this point, AT&T argues that Bell Atlantic has not met its burden of proving that the OSS costs it seeks to recover go beyond the ordinary upgrades and modifications to OSSs that are incurred every year.[326] The Department and AT&T go on to argue that each carrier, new and existing, will have its own onset costs.[327] As such, it may be reasonable to have each carrier bear only the burden of its own onset costs. This approach, the DPS contends, is easily

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319. *Id.*
320. BAVT Brief at 85.
321. *Id.* at 84.
322. *Id.*
323. *Id.*
324. AT&T Brief at 92; DPS Brief at 75, 76-77, 79.
325. AT&T Brief at 78; Selwyn pf. at 15-16; Weiss supp. pf. 21.
326. *Id.* at 88; exh. ATT-OSS-3.
327. Ordover pf. at 41; DPS Brief at 69; AT&T Brief at 85.

administered and enhances efficiency by providing an incentive to keep onset costs to the lowest possible level.[328]

AT&T argues that this is not the proper proceeding to consider the recovery of the BAVT costs to provide access to its OSS. Rather, it maintains, Bell Atlantic's entitlement to cost recovery should be taken up in a proceeding that examines the Company's overall revenue requirement.[329] AT&T and the Department argue that the proposed recovery in this docket amounts to "single-issue" rate-making.[330]

AT&T and the Department argue that, with respect to these onset costs, the UNE cost standard is not met for several reasons. First, they assert that the CLECs and resellers are not the cost causers.[331] The cause, they say, is new law and regulation. AT&T asserts that, in addition, BAVT was, and is, the primary beneficiary of the system upgrades.[332] No or few costs, argues AT&T, would be avoided by the absence of any entry by CLECs.[333] Second, AT&T contends that the cost methodology applied does not meet the forward-looking costing methods required, but is decidedly based on embedded costs.[334] Furthermore, AT&T charges that the Company has not modeled a new OSS system that would accommodate competition and utilize the most efficient technology available as required by the FCC in the LCO.[335]

AT&T next argues that the cost study fails to reflect forward-looking opportunities for cost savings or sharing associated with the merger of Bell Atlantic and NYNEX. The merger between Bell Atlantic and NYNEX provides an opportunity to share, consolidate, and

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328. DPS Brief at 70; Ordover pf. at 42-43.

329. Selwyn pf. at 12. The Department supports AT&T's position. DPS Brief at 67.

330. Selwyn pf. at 13; AT&T Brief at 79; DPS Brief at 67.

331. Weiss supp. pf. at 21; Ordover pf. at 38; AT&T Brief at 84.

332. Selwyn pf. at 16; AT&T Brief at 86. The Department agrees with AT&T that the Company has not met its burden to demonstrate that it did not incur these costs for its own benefit. Weiss supp. pf. at 20; exh. AT&T-OSS-7, *White Paper* at 13; DPS Brief at 68.

333. Ordover pf. at 38. AT&T argues that end-users should bear the costs since the Congressional policy mandates that have led to competitive local exchange service (and thus created OSS access costs) were for their benefit. AT&T suggests that, given this view, one method of cost recovery would be to assign them to all competitors according to pro-rata shares of total access lines. AT&T Brief at 86. Alternatively, AT&T argues that all carriers should carry their own onset costs. *Id.*

334. AT&T Brief at 79.

335. *Id*.

integrate their system between the two companies. On a forward-going basis the savings should, it argues, be incorporated.[336]

AT&T asserts that the cost recovery mechanism proposed by Bell Atlantic could force local service competitors in Vermont to bear a disproportionate share, "if not all," of the region-wide OSS costs.[337] AT&T asserts that the status of the cost study and, ultimately, cost recovery in other states actually bears on the potential burden that Vermont ratepayers will face. AT&T asserts this to be a problem for Vermont because costs are not merely *allocated* among the states under the Bell Atlantic proposal, but Bell Atlantic proposes to collect charges from competitors until the full amount has been collected.[338]

AT&T raises other concerns about the study and its methodology. These same concerns, it argues, are shared by the New York Public Service Commission ("NYPSC").[339] AT&T argues that, if the Board decides to allow Bell Atlantic to recover its OSS onset costs from CLECs, the Board should order Bell Atlantic to file a revised TELRIC OSS study by a date certain or forego recovery of any costs.[340] The Department also charges that BAVT has not met its burden of proof, that is, has not established that the costs are known and measurable.[341] The Department's witness notes that the Company's cost information is unsupported.[342] As one example, the DPS notes that the fifteen percent "on-going expense" factor that was applied to a $48 million investment base is unsubstantiated.[343] The Department notes that the NYPSC is requiring further investigation or opportunity to re-

336. *Id.*; tr. 3/17/98 at 222 (Kelly); exh. ATT-OSS-4 at 26; exh DPS-IIB-1 at 11.

337. AT&T Brief at 81.

338. AT&T Brief at 81-82; tr. 3/16/98 at 122 (Orosz).

339. AT&T Brief at 82.

340. *Id.* at 83.

341. DPS Brief at 75.

342. Weiss supp. pf. at 19. The DPS maintains that while BAVT's records show that expenditures were made, those records have not been audited to determine whether the costs reported therein were properly accounted for, or to determine whether the intended results of those expenditures were actually achieved. *Id.*

343. DPS Brief at 76, citing NYPSC RD at 54-55, NYPSC Order at 36; Weiss pf. at 20. The DPS adds that the $48 million investment base, a component of the $108 million total, is unsubstantiated. DPS Brief at 77.

present the costs before any recovery is permitted.[344] It argues that Bell Atlantic-Vermont should "re-apply" for recovery, but should be required to meet the standards as set by the NYPSC.[345] The Department also suggests that a regional effort to resolve these questions might be appropriate, the costs are regional in nature.[346]

AT&T and the Department are also concerned that the charges could act as a barrier to competitive entry and, worse yet, that the charges could increase over time, if the proposed recovery methodology is adopted by the Board.[347] They maintain that any cost recovery mechanism that loads these costs onto new entrants will be a barrier to entry and add to the already significant costs they face in entering the Vermont market.[348]

The Department also supports the competitive neutrality principles set out by AT&T's witness, Dr. Ordover. He urges the Board to assure that, if any of BAVT's onset costs are to be borne by CLECs, the cost recovery mechanism be altogether competitively neutral. For the purposes of cost recovery, he contends, no differentiation should be made:

(1) Between UNE-based CLECs and local service resellers;
(2) Between early entrants and later entrants; or
(3) Between Bell Atlantic and new entrants.[349]

As for any on-going OSS costs, the Department recommends that, if these costs are to be recovered at all, competitive neutrality requires first that all carriers be permitted to explicitly

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344. DPS Brief at 75-76.

345. In line with the recommendations in New York, the Department and AT&T recommend a five-part test to be met by BAVT, before cost recovery is granted:

(1) the claimed costs are real;
(2) the costs are reasonable in amount;
(3) the costs were incurred for the specific purpose of opening the network to competitors rather than to serve Bell's own interests;
(4) the costs are not being recovered through other charges on new entrants or end users; and
(5) potential revenues from the systems are properly offset against the costs to be recovered.

Exh. ATT-IIB-10 (Part LG-1, App.B).

346. Weiss pf. at 21; DPS Brief at 76.

347. AT&T Brief at 84.

348. DPS Brief at 72; tr. 3/16/98 at 149(Orosz).

349. DPS Brief at 79; Ordover pf. at 44.

recover their own corresponding costs, and second, that these costs be spread across the entire industry, including Bell.[350]

As to the precise nature of the fees, AT&T and the Department argue that the costs are generally not transaction-based and, therefore, no transaction charge, or only a small one, should apply.[351] Based on the analysis of Dr. Selwyn, transaction-related capital costs of computer processing is only $0.035 per transaction and only $0.0104 per transaction for data storage.[352]

Finally, AT&T notes that the cost estimates used in BAVT's cost study only reflect budgeted amounts. With the passage of time, actual amounts incurred can and should replace the budgeted figures presented in the cost study.[353]

2. Discussion

There appears to be little disagreement over Bell Atlantic's obligations to provide CLEC access to its operations support systems. As Bell Atlantic and the Department note, OSS access is properly regarded as a UNE and the cost and pricing principles that apply to a UNE should be applied to OSS systems provided by Bell Atlantic to CLECs and resellers.[354] However, the nature and manner by which those principles apply to the services at hand is greatly contested. So too are the resulting prices and the requisite review of costs. Based on the record in this case, I conclude that UNE rates cannot, at this time, be established for OSS-related access in Vermont.[355] I conclude that the current filing provides an inadequate basis

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350. Selwyn reb. pf. at 28-29.

351. AT&T Brief at 87.

352. Selwyn pf. at 29-32.

353. AT&T Brief at 91.

354. "[U]nder a TELRIC methodology, incumbent LECs' prices for interconnection and unbundled network elements shall recover the forward-looking costs directly attributable to the specified element, as well as a reasonable allocation of forward-looking common costs . . . . Directly attributable forward-looking costs include the incremental costs of facilities and operations that are dedicated to the element . . . . [C]ertain shared costs that have conventionally been treated as common costs (or overheads) shall be attributed directly to the individual elements to the greatest extent possible." LCO, ¶ 682.

355. The testimony of Drs. Ordover and Selwyn was persuasive. I do not accept the assertion that competitive providers are the sole causers of these onset costs. The decision to reorganize the structure of the basic local exchange market is, in essence, a societal one, and the costs and benefits of that choice

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for cost recovery, pursuant to the UNE pricing standards of the Board's Phase I Order and the FCC's LCO. Rather, Bell Atlantic should be given opportunity to refile for UNE-based rates, in a manner similar to that required by the New York Public Service Commission.

It is important, however, to distinguish costs that may be recoverable in a UNE rate proceeding from those that are recoverable in a general rate proceeding. I conclude not only that appropriate OSS-related costs should be recovered in UNE rates, but also that they be shared between new entrants and the incumbent operator of the local exchange network. In effect, costs should be imputed to the incumbent, based on a pro-rata share of service (*e.g.*, number of access lines) and collected from CLECs through explicit UNE rates.

Many, if not most, of the issues raised by the Department and AT&T turn on the propriety of recovering onset costs through wholesale UNE-based rates rather than on the broader issue of whether any recovery at all should be permitted in an investigation of the Company's overall rates (and revenue requirement). They note, for example, that the costs in question are historical in nature and likely do not meet the pricing standards established for UNEs. Yet historic or embedded capital costs and on-going expenses may, if just and reasonable, be allowed after a traditional review of rates.

I am not transfixed by the narrow notions of *cost causation* and *forward-looking* that the LCO sets as foundations for establishing wholesale UNE rates. The costs here may arguably be viewed as *caused* by new law and regulation or by competitors and the changes in technology that they have advanced. For reasons of fairness and competitive neutrality, I do not think it is appropriate to impose the costs in question solely on new entrants or incumbents.[356] As a

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355. (...continued)
should redound to all members of the society. This, in practical terms, means that all users of the network, through rates paid to their providers, should cover the legitimate costs of the restructuring, because it benefits them all, whether they take direct advantage of the new market or not. As discussed below, I conclude that this may best be accomplished by imposing charges on both incumbents and new operators, in the expectation that these operators will pass the costs on to end-users. Ordover pf. at 38-49; Selwyn pf. at 15-16; see also the discussion in Section III.E.2., Collocation, at 90, below.

356. By imposing OSS-related fees entirely on new entrants and not on incumbents (or their customers), we would, in essence, be giving incumbents a competitive advantage. As I have already noted, these costs arise in part from a societal decision to create a multi-provider market for local exchange services. As such, it would be inappropriate for only CLECs, particularly those that entered early in the new era, to bear all of the onset costs. This seems all the more objectionable in light of the substantial customer and service base
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policy matter, I conclude that consumers broadly should bear the burden of these costs. Establishing wholesale rate elements, on the one hand, and recognizing certain residual costs in incumbents' general rates, on the other, are two complementary mechanisms that will allow for the most fair and efficient recovery of onset and other OSS-related costs.

As for the question of *forward-looking*, I again do not want to be overly constrained in its application in this instance. Whether the OSS costs under consideration here may be viewed as forward-looking depends in part upon one's perspective in time. However, since these costs were (or will be) incurred as a consequence of explicit directives,[357] it is not necessary to anguish greatly over the issue. I simply conclude that these costs — I am not making a judgment here that the *level* of costs alleged by Bell Atlantic is correct (see below) — should be recovered in a competitively neutral manner from all competitive carriers, including incumbents.

I conclude that the nondiscriminatory access obligations imposed by §§ 251(c)(3) and 251(c)(4) of the Act and by the FCC in its discussion of OSS functions in the LCO, argue strongly in favor of a competitively neutral cost recovery mechanism. Even if the costs alleged here (that is, the precise nature and purpose of the investments) were better understood and found to be justified, I would nevertheless conclude that the BAVT cost recovery proposal does not meet the competitive neutrality standard. As the Department and AT&T argue, it rests on too-narrow a sense of cost causation and, moreover, creates significant barriers to entry.

The DPS and AT&T also assert that the costs in question benefit Bell Atlantic broadly, not just the CLECs and resellers who are given access to the OSS. These allegations go to matters of fact, for the resolution of which the evidentiary record is inadequate.

At this time, I conclude that any investment and expenses that are associated with onset and development costs that enable CLEC and reseller access to the OSS should be addressed in the context of a broader review of BAVT's rates. I also conclude that, as a general matter,

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356. (...continued)
available to the incumbent (across which the costs can be more thinly spread) and in light of the impediment to CLEC entry that the fees will likely be.

357. From Congress and, in particular, the FCC: the LCO was issued on August 8, 1996.

recovery of such costs can be permitted, so long as they satisfy the traditional and long-standing standards for allowable costs.[358] They may in fact already be in rates.[359]

I recommend therefore that the issue of cost recovery be addressed in Docket 6167 or another general rate proceeding. The standards of recovery, along with issues of investment deferral and return on investment, should also be reviewed in such a proceeding. To the extent that certain capital investments are one-time and historical, I conclude that such costs should be recovered over a reasonable amortization period consistent with traditional rate-making principles and practices. As already noted, I also conclude that, as competitive entry occurs, a reasonable (and, as competition increases, perhaps a growing) share of the just and reasonable OSS-related costs should be borne by CLECs in UNE rates. It should go without saying, of course, that no UNE rate for access to OSS should allow for the double recovery of those same costs already provided for in other rates.

To the extent that wholesale charges are established to recover Bell Atlantic's onset and on-going OSS costs, there should be a corresponding reduction in access and retail rates. Such a reduction could be realized in the context of some future general rate proceeding or through appropriate adjustment provisions built into a performance-based regulation plan.

For the foregoing reasons, then, I recommend that the Board adopt the following recommendation with respect to CLEC and reseller access to Bell Atlantic's OSS costs:

1. Recovery by Bell Atlantic of its onset costs should, in the first instance, be addressed in the context of a general rate proceeding. Recovery in overall rates, however, should be restricted to residual costs not already included in UNE rates elsewhere.
2. Bell Atlantic shall refile its OSS cost study or forgo any right to recovery through UNE charges. Refiling shall occur within six months of this Order. The refiled cost study should meet the FCC's standards for UNE cost recovery, as established in the LCO. The cost study should also reflect the standards of cost recovery established by the NYPSC.[360] UNE cost recovery, or any cost recovery contemplated in a general rate review, should also make allowance for any merger or restructuring savings (or costs or other kinds of sharing).

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358. See Docket 5630/5631/5632, Order of 12/30/93 at 47-59, for a discussion of such principles.
359. See AT&T Brief at 92.
360. See footnote 345, above.

3. The OSS UNE charges should generally conform to the pricing principles of the LCO, the Board's Phase I Order, and this Order.[361] Among other things, the applied cost of capital should meet the requirements established herein and in the LCO.[362] Prices should be set in a manner consistent with the underlying character of costs.

Lastly, I recommend that the Board reject any cost recovery mechanism that threatens to impose on Vermont providers or ratepayers more than a reasonable share of the OSS onset costs. Whatever costs are ultimately deemed recoverable and charged to providers will be, to varying degrees, passed through to ratepayers, in the form of higher rates. It is in the greater public interest that every effort be made to reduce those costs as much as possible.

D. Non-Recurring Costs

Non-recurring costs ("NRCs") are those one-time costs associated with the service order process by which (1) CLECs requisition particular UNEs from the incumbent LEC and (2) the incumbent actually provides those UNEs. The costs are primarily labor expenses (capital is typically not required) related to the addition, change, or disconnection of new services, interconnections, or UNEs. Bell Atlantic proposes recovering NRCs through one-time charges imposed upon CLECs at the time UNEs are ordered.[363]

Bell Atlantic developed a computer model ("BA-NRCM") to analyze the one-time costs to BAVT of providing loop and transport facilities, line and trunk side interconnection to the local switch, trunk side interconnection to the tandem switch, and interconnection to the Company's signaling network.[364] Based on assumptions about the amounts of time needed to perform UNE provisioning tasks, the model computes the costs of doing so, given expected labor rates. The costs of the various work functions are then summed to determine the total cost of interconnecting each network element.[365]

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361. Development costs are largely one-time, are not causally related to on-going access to the OSS, and should not be recovered from competitive providers in UNE charges.

362. As the DPS notes in its brief (at 66), there are approximately $17.9 million per year in carrying costs, assuming a 13.18 percent cost of capital. Weiss OSS pf. at 19.

363. Anglin pf. at 42; Recker revised pf. at 9-10.

364. Anglin pf. at 41; Anglin supp. pf. at 2; exh. BA-OSS-2, Attachment 3 (as revised on 1/15/98).

365. Anglin pf. at 41; Anglin supp. pf. at 1; exh. BA-OSS-2, Workpaper XIII.

BAVT used a three-step process for estimating work times. First, the Company conducted work flow analyses to identify the activities and the sequence of their performance necessary to provide each UNE. Next, it interviewed Company personnel to develop work time estimates for each function within each work flow analysis. The interviewees estimated minimum, maximum, and most likely times to complete each task, assuming that other carriers were placing their orders electronically through direct interfaces with the Company's operating systems. Using the three estimates, BAVT calculated a weighted mean for each respondent. These means were then averaged to obtain a single mean for each work function.[366] Lastly, BAVT validated the estimates. It did this by first having a panel of Company personnel, with expertise in the relevant work areas, review and approve — and, if necessary, amend — the estimates. Then, where possible, the Company compared the estimates to actual work times for those activities. These comparisons showed that, for certain functions, the actual work times exceeded the estimated; however, in those instances, BAVT did not increase the estimated work times (on the assumption, presumably, that early inefficiencies in the ordering process, among both CLECs and the Company itself, will be quickly eliminated).[367]

Bell Atlantic collected data on labor rates according to job function. The most recent data available were from 1996, inflated to 1998 dollars at a rate of 2.0 percent/annum.[368] Also, the Company adjusted its estimates to recognize cost savings or increases resulting from, for example, efficiencies gained when more than one UNE is ordered or the costs of additional labor requirements for expedited deliveries.[369] Lastly, the BA-NRCM adjusts prices for non-recurring activities to account for the anticipated costs of disconnecting services and UNEs, when so requested by a CLEC.[370]

AT&T has developed its own non-recurring cost model ("ATT-NRCM"). The model consists of a series of spreadsheets created with a well-known program for microcomputers (Microsoft Excel 7.0). Like the BA-NRCM, AT&T's model estimates labor costs incurred by

366. Exh. BA-OSS-2, Workpaper XII.
367. *Id.*, Workpaper XIV; Anglin pf. at 41-43.
368. Exh. BA-OSS-2, Workpaper X; tr. 3/17/98 at 32-33.
369. Exh. BA-OSS-2, Workpapers I-VIII; Anglin pf. at 45.
370. Exh. BA-OSS-2; Recker pf. at 12, 49-50; Weiss further supp. pf. at 3-4.

an incumbent when a CLEC requests wholesale services, interconnection, or UNEs.[371] Its algorithms are open to review, and its inputs can be varied to test different assumptions about labor costs, physical plant, and so on.[372]

AT&T's modeling differs from Bell Atlantic's in several ways. First, BAVT estimates a 15 percent "fallout" rate in the service ordering process, whereas AT&T assumes only two percent.[373] "Fallout" refers to those orders that, for whatever reason, cannot be handled electronically and will require some kind of human intervention.[374] AT&T bases its fallout estimate on experience in Texas and Minnesota, where OSS systems similar to those being developed by Bell Atlantic are used.[375] Second, AT&T assumes that copper feeder would be used for lengths of less than 9,000 feet and that fiber feeder would be used for greater distances, using the TR-303 integrated digital loop carrier ("IDCL") technology. AT&T argues that this is the most efficient, currently available technology, and is thus "forward-looking."[376] Third, AT&T uses work-time estimates that were developed by specifying the many (approximately 200) individual functions undertaken to process orders and the times required to carry them out.[377] And, lastly, AT&T does not include the future cost of disconnecting UNEs in the original costs of providing them.[378]

The Department compared AT&T's model with that of BAVT and recommends that the Board adopt the AT&T-NRCM and its outputs to develop prices for non-recurring costs in Vermont. The DPS concludes that the AT&T model is "complete in terms of its consideration of the functional activities necessary to complete and document service orders; it is quite logical in organization, a characteristic which lends greatly to its user-friendliness; and it accurately

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371. Exh. ATT-OSS-9, Tab 10.
372. Weiss further supp. pf. at 14.
373. Exh. BA-OSS-2, Workpaper XII; tr. 3/17/98 at 196; Recker pf. at 26-27, 36-38.
374. Recker pf. at 12.
375. Weiss further supp. pf. at 13.
376. Tr. 3/19/98 at 105.
377. Exh. ATT-OSS-9, Tab 9, Att. B.
378. Recker pf. at 12, 49-50.

depicts the functional activities required for information to move through an [incumbent LEC] service ordering system."[379]

I concur with the Department. Overall, the AT&T approach more faithfully adheres to the modeling principles adopted by the Board in Phase I and the FCC in the *LCO*. Principally, the AT&T-NRCM better reflects the reasonable *forward-looking* costs associated with processing wholesale service orders. For instance, BAVT acknowledges that it will shortly be deploying the TR-303 IDLC technology in its network.[380] In addition, significant components of the costs that BAVT asserts are non-recurring arise from activities that are, in most cases, likely to be unnecessary. For example, Bell Atlantic proposes that particular UNEs, such as the loop and switch port combination, be separated and reconnected through a CLEC's collocation cage, a process that will cost $89.17.[381] AT&T asserts that such separation serves no physical or network purpose, and also that it is not required by the Act.[382] Avoiding those activities will eliminate virtually all of the loop and switch port provisioning costs.[383]

The Bell Atlantic approach also fails to estimate work times satisfactorily, largely because the work functions are inaccurately specified and the times needed to perform them are not well estimated. These flaws flow mainly from the fact that BAVT assumes that the work will be undertaken in the context of its historic, rather than the presumed forward-looking, network.[384] The assumed high fallout rate is a consequence of this, as are the assumptions about human intervention in the local exchange network itself (*e.g.*, are network interfaces electronic or is manual rewiring required to reconfigure the network for the leasing

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379. Weiss further supp. pf. at 14.

380. Tr. 3/16/98 (Fraine) at 166-167.

381. Exh. BA-OSS-2, Workpapers I and II; tr. 3/17/98 (Anglin) at 99.

382. Refer to my Order of March 16, 1999.

383. Exh. BA-OSS-2, Workpapers I, II, and 13; tr. 3/17/98 (Anglin) at 100, 125-126; AT&T Brief at 109-110.

384. Recker pf. at 9. AT&T argues persuasively that BAVT cannot be permitted to propose a forward-looking network for recurring cost purposes and then make use of the embedded network when calculating non-recurring costs. Consistency of assumptions and inputs is critical, and in both cases the most efficient, forward-looking network (using currently available technology) should be employed. Selwyn pf. at 43.

of UNEs?).[385] The time estimates are not based on identified work functions, but instead rely upon staff estimates of generalized activities that may or may not be necessary to the provisioning at wholesale of particular UNEs and services.[386] In addition, the polling process by which BAVT gathered time estimates was flawed in ways that render its outputs statistically unreliable, and the relative weights that the Company then assigned the "maximum," "minimum," and "most likely" times estimates, in order to calculate averages, are not given reasonable support.[387]

Lastly, the Company includes the future cost of disconnecting UNEs into the up-front cost of providing them.[388] There is little justification, in either economics or public policy, for this approach to pricing, at the very least because it is rarely known when, or even if, a customer will discontinue service. Moreover, as AT&T points out, it may not always happen, when a customer ceases taking service from a CLEC, that the CLEC will stop leasing the UNEs in question: they may be allocated to serve other customers.[389]

For all these reasons, I recommend that the Board adopt AT&T's non-recurring cost model for determining costs and setting prices for those one-time activities necessary to the provision of UNEs at wholesale. However, a fallout rate of five percent, rather than the two percent recommended by AT&T should be used. The two percent seems ambitious, even in

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385. Exh. BA-OSS-2, Workpaper XII; Recker pf. at 37-38; Weiss further supp. pf. at 9-10; tr. 3/17/98 (Anglin) at 57-58, 81, 136; Selwyn pf. at 5-9; tr. 12/10/97 (Fraine) at 125, 133-134, 147, 235. On one related point, BAVT corrected the Company's position with respect to the treatment of certain orders that fall out of the direct customer access system ("DCAS"). The Company confirms that surcharges for manual service order processing will only be applied when the fall-out occurs because a CLEC failed to make use of DCAS in the first place (that is, did not submit its UNE service order electronically); they will not be applied if the fall-out results from other causes. Tr. 3/17/98 at 57-59.

386. Recker pf. at 28; Weiss further supp. pf. at 6; tr. 3/17/98 (Anglin) at 110-111.

387. Recker pf. at 28; Weiss further supp. pf. at 4-6; tr. 3/17/98 (Anglin) at 110-111, 164-174; tr. 3/18/98 at 163-165 (Weiss); exh. BA-OSS-2, Workpaper XII.

388. Anglin reb. pf. at 2.

389. AT&T Brief at 120. I suppose an analogy to the decommissioning of nuclear generation facilities could be made, but it would be weak indeed. Decommissioning may seem something like disconnection, but it is a sure event, unavoidable and caused directly by the production of electricity by nuclear fission. In any event, the future costs of decommissioning are collected in the retail rates charged for the facilities' output, not in a one-time up-front charge.

the best of times, but now, early in the new competitive process, a slightly higher fallout percentage is more likely to be reflective of actual experience.[390]

E. Other Issues

1. Merger and Process Reengineering Savings

On February 26, 1997, the Board issued an Order in Docket 5900, approving the proposed merger between NYNEX (the holding company of New England Telephone & Telegraph Company) and the Bell Atlantic Corporation. The Board found that there was a very high likelihood that significant cost savings would accrue to the new company as a consequence of the merger. These expected savings will flow from various sources. By the third year after the merger, operating expenses will fall by $600 million per year (the Vermont intrastate jurisdictional share of this will be approximately $4.3 million, or 0.7 percent), capital costs will decrease by at least $250 million per year, and the overall costs of borrowing will also decline.[391] The Company did not promise specific rate reductions in virtue of the merger, but merely acknowledged that those savings could be captured through the rate-making process.[392]

Earlier in this decade, while still owned by NYNEX, the New England Telephone & Telegraph Company ("NET") began a reorganization and workforce reduction program referred to as "process reengineering." It was expected that this multi-year action would reduce NET's annual costs by approximately $400 million.[393]

AT&T and the Department argue that wholesale prices should be adjusted to reflect the savings that the merger and process reengineering will produce in Vermont.[394] AT&T asserts that the failure to reflect these on-going savings in its network and operations costs means that BAVT's cost studies are not *forward-looking*.[395] The DPS agrees, and urges that

390. Weiss further supp. pf. at 9.

391. Exh. DPS-IIB-2; exh. ATT-IIB- (LG-3); Docket 5900, Order of 2/26/97 at 18-19. In addition, revenue increases are expected to be substantial, thereby increasing profitability.

392. Docket 5900, Order of 2/26/97 at 19.

393. Globerson pf. at 17.

394. DPS Brief at 18-19, 67; AT&T Brief at 14-15, 80-81.

395. AT&T Brief at 15.

the Board reduce the final wholesale prices by an additional five to ten percent, to account for the savings.[396]

Bell Atlantic counters that merger and process reengineering savings have and will have no effect upon the costs of its Operations Support Systems (see Section III.C., below), but the Company is silent on the question of whether the expected savings will affect its recurring and non-recurring wholesale costs.[397]

The evidence demonstrates that the Company will derive cost savings from the Bell Atlantic/NYNEX merger, as well as from its process reengineering efforts. Recognizing such savings is appropriate, even mandatory, in the performance of a *forward-looking* cost study. Assuming that Vermont's share of the conservatively estimated $850 million in annual merger savings amounts to less than one percent (.007) of the Bell Atlantic company-wide total, then approximately $5.95 million in reduced costs will accrue to BAVT each year. Process reengineering will yield $400 million in annual savings among Bell Atlantic's former NYNEX companies. Of this, Vermont's share is certainly greater than one percent, but the record is incomplete in this regard. However, by assuming that the annual benefits from BAVT's process reengineering efforts will continue to be at least as great as those expected between 1994 and 1996, which averaged approximately $6.1 million per year,[398] we can calculate a total expected annual savings from the merger and process reengineering of about $11 million. This amounts to roughly 5.9 percent of BAVT's current intrastate revenues.[399]

This simple arithmetic exercise, using conservative inputs (*i.e.*, those favoring BAVT) suggests that the wholesale rates at issue in this docket could be reduced by at least five percent, to capture for customers the efficiencies that BAVT expects to achieve. Therefore, I recommend that, after wholesale prices are calculated in accordance with the directives set out

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396. DPS Brief at 19.

397. BAVT Reply Brief at 49-50.

398. Dockets 5700/5702, Order of 10/5/94, at 44.

399. Docket 6167, *Investigation into Alternative Regulation Plan for New England Telephone & Telgraph Company, d/b/a Bell Atlantic*, exh. BAVT-3, entered into evidence 6/2/99. Adjusted test year intrastate revenues as proposed by BAVT (based on an historic test year ending June 30, 1998) are $185.5 million. The ratio of $11 million to $185.5 million is 5.9 percent.

in this proposal for decision, the Board apply an across-the-board six percent discount to them all, to reflect the expected savings of the merger and process reengineering efforts.[400]

2. Collocation

"Collocation" refers to the ability of CLECs to install interconnection and other physical equipment on the premises of incumbent local exchange carriers. Specifically, the Act imposes upon incumbents:

> The duty to provide, on rates, terms, and conditions that just, reasonable, and nondiscriminatory, for physical collocation of equipment necessary for interconnection or access to unbundled network elements at the premises of the local exchange carrier, except that the carrier may provide for virtual collocation if the local exchange carrier demonstrates to the State commission that physical collocation is not practical for technical reasons or because of space limitations.[401]

Bell Atlantic proposes a set of lease fees and one-time charges to be paid by CLECs when they collocate their facilities in BAVT's buildings, primarily central offices. Such collocation facilities will be necessary, according to Bell Atlantic, whenever a CLEC wishes to purchase an unbundled network element.[402]

AT&T recommends that the Board reject the Company's collocation pricing proposals, and gives three broad reasons for doing so. The first is that there is no basis in law or policy to impose a requirement for CLECs to collocate in order to purchase UNEs.[403] The second is that the costing methodology that BAVT employs to set collocation prices is flawed, and it creates barriers to entry by producing prices that are unreasonably high.[404] And the third is

400. This approach yields a rough justice here. In the future, however, one would expect to see adjustments for these kinds of organizational savings applied to those components of costs directly affected, for example, to maintenance cost factors.

401. Act, § 251(c)(6).

402. BAVT Reply Brief at 64.

403. AT&T Brief at 93.

404. *Id.* at 94, 99-107.

that, by not including any collocation prices in Attachment A to its initial brief, BAVT has deliberately retracted its request for approval of such prices.[405]

I will address each complaint in turn. With respect to the first, I will say again what I and the Board have concluded already several times: that the Board has the authority to require incumbent LECs to provide unbundled network elements on a combined or unseparated basis, thereby obviating the need in certain instances for CLEC collocation facilities, if the Board finds that it is in the public interest to do so. There are two sources for that authority: current Vermont law and, now in light of the US Supreme Court's recent decision in *AT&T Corp.*, the Telecommunications Act of 1996.[406] I have elsewhere directed the Company to file a set of terms, conditions, and prices for making unseparated UNEs (the so-called "UNE-Platform" or "UNE-P") available to CLECs.[407]

This legal conclusion does not, however, lead to the substantive conclusion that BAVT's collocation proposals should be rejected. There will still be occasions when it will be necessary for a CLEC to have equipment on the incumbent's premises, for example, when a CLEC leases only loops and must interconnect them with its own switching facilities. Thus terms, conditions, and prices for collocation must be set.

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405. AT&T Reply Brief at 2-3. In its initial brief, BAVT asks that the Board adopt the rates set out in Attachment A. There are no collocation prices included in the attachment. AT&T asserts that BAVT did this knowingly, since there had been several discussions among counsel about the scope issues to be addressed in the briefs. *Id.* at fn. 4.

406. Order of 10/8/98; *AT&T Corp.* at 736-738; Procedural Order of 3/16/99.

407. And I still await that filing, which was due on May 28, 1999. The filing is intended to serve as the basis for a detailed review of the UNE-P policy and, in the event the Board adopts it, the appropriate prices to be charged for the unseparated elements. On the deadline, however, Bell Atlantic filed an explanation as to why it should not have to make the required submission, which merely re-presented the arguments previously rejected. On June 29, 1999, in Docket 5900, the Board again directed BAVT to file terms, conditions, and prices for unseparated UNEs, but then went further, stating that the revised statement of generally available terms ("SGAT") in which the unseparated UNEs are offered "need only state that CLECs may purchase more than one UNE for a single end-user without also facing a requirement to pay additional charges or a requirement that it physically rejoin UNEs that normally are not severed." Docket 5900, Order of 6/29/99 at 101. That filing was due on July 29, 1999. On July 26th, AT&T filed a motion in this docket urging me to again order BAVT to file the UNE-P proposal, and it referred to the Board's directive in Docket 5900. With this footnote, Bell Atlantic should consider my earlier orders to be renewed: at this time, I will treat the July 29th filing in Docket 5900 as (at least) initial compliance with my Order of March 16th, and I hereby direct Bell Atlantic to file a copy of it in this docket, with copies to all the parties.

AT&T alleges several flaws in Bell Atlantic's costing approach to collocation. First, AT&T argues that BAVT's cost calculations are not consistent with TELRIC principles. Specifically, AT&T objects to BAVT's use of historic contractor costs in Massachusetts as a guide to future such costs in Vermont. AT&T also questions the determination of collocation cage costs on a cage-by-cage basis, which does not capture any efficiencies flowing from the simultaneous construction of many cages in many COs. AT&T next asserts that the Company's cost sampling technique is not statistically reliable and, moreover, the wide range of costs suggests that Bell Atlantic has given its contractors little incentive to be efficient.[408]

AT&T challenges the appropriateness of BAVT's proposed rates to recover "engineering and administration" costs. These are non-recurring costs for BAVT's own labor force, and are incurred when a collocation cage is designed and installed. AT&T asserts that the time estimates are unreliable and the labor rates are improperly calculated. AT&T also objects to the practice of recovering these charges in one-time fees, because they are substantial and thus may discourage competitive entry. AT&T instead recommends that a rate structure be adopted that allows for these costs to be amortized and recovered over a multi-year period.[409]

AT&T argues that Bell Atlantic's annual charges for electrical power to collocation cages are unjustified. AT&T contends that BAVT has not established that there will be incremental power costs associated with collocated equipment or, if any, that they will be substantial. Moreover, asserts AT&T, to the extent that there will be incremental power costs, those costs have already been accounted for in the prices for UNEs and therefore recovery of them in a separate charge would amount to a double-counting and overcollection.[410]

Lastly, AT&T argues that the Company's annual per-square foot charges to cover "building costs" and the cost of a "point of termination frame" are unsupportable. According to AT&T, these charges (akin to "rent") are inconsistent with TELRIC principles — they impose

408. AT&T Brief at 99-101.
409. *Id*. at 101-104.
410. *Id*. at 104-106.

no incremental building costs (in the way of maintenance or increased sizes of CO) — and, in the case of the annual building charge, the costs are already being recovered in UNE rates.[411]

Bell Atlantic responds to AT&T's allegations by first arguing that AT&T has offered no evidence that the use of Massachusetts vendor costs is unreasonable. BAVT then asserts that, because collocation charges are set by tariff, the Company "has every incentive to ensure that vendor costs are as low as possible."[412] In addition, Bell Atlantic argues that its sample of vendor contracts and costs should not be discarded on the grounds that it is insufficient, because it nevertheless represents the best data available.[413]

With respect to engineering and administration costs for collocation cages, Bell Atlantic explains that AT&T's contention that BAVT's use of fully assigned labor rates does not result in a double counting of administrative and support expenses for that labor: "While double-counting may occur if expenses are already accounted for in BAVT's directly attributable cost factors used in its UNE TELRIC study, the administrative and support labor dollars about which AT&T complains were not included in the derivation of the administrative factors used in the UNE TELRIC."[414]

Bell Atlantic argues that its rate design proposal for recovering collocation cage costs (that is, through one-time up-front charges) is reasonable. The Company contends that AT&T's recommendation "places the risk totally on BAVT, without any commensurate upside benefit. Collocation occurs because a competitor desires to collocate. The competitor is the cost causer and it should bear the minimum burden of paying for the costs it imposes on BAVT as those costs are incurred."[415]

BAVT also refutes AT&T's position on electrical power supply. Bell Atlantic asserts that there are incremental power supply costs associated with collocated equipment and that the Company's costing methodology does not double-count those costs.[416]

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411. *Id*. at 106-107.
412. BAVT Reply Brief at 68.
413. *Id*. at 68-69.
414. *Id*. at 69.
415. *Id*. at 70.
416. *Id*. at 70-72.

Lastly, BAVT argues that the building cost charges are appropriate, since they cover expenses that "renters" are reasonably expected to cover. Furthermore, asserts BAVT, although there are incremental building costs included in UNE prices, collocation also imposes incremental building costs, differentiable from the UNE-caused costs, and it is therefore proper to recover them here.[417]

On the basis of this record, I recommend that the Board accept the Company's collocation pricing proposal. AT&T has raised issues that deserve consideration, but the evidence here suggests that BAVT's costs and prices are within the range of reasonableness.[418]

I am concerned, however, about one or two points, and recommend that the Board remain alert to their potential effects as time passes. The first is vendor costs. Labor and materials costs in Massachusetts may or may not resemble those in Vermont: on this record I cannot say. So far, there appear to have been very few requests for collocation in Vermont.[419] It would not be surprising, however, to discover that collocation construction costs are measurably different in Vermont from those in Massachusetts, and, as we gain experience in this state, these prices may need to be adjusted to correct for those differences.[420]

The second is the potential for significant up-front charges to discourage collocation. This, it seems to me, is in part a function of the relationship of the charges to the revenues a competitor expects to generate and thus is simply an "input" into its investment decision calculus. I do not find Bell Atlantic's risk-shedding argument against amortized recovery of the costs to be particularly persuasive since, in a competitive market, it is likely that one failed competitor will be easily replaced by another, or the Company will be able to put the abandoned space to revenue-producing use itself. Again, experience will teach whether an alternative rate-design is needed. Moreover, in light of the US Supreme Court's decision in *AT&T Corp.* and the Board's recent directive in Docket 5900, it appears that the need for CLECs to collocate has been greatly reduced.

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417. *Id.* at 72-73.

418. Exh. BA-IIB-1, Workpapers Part I; Anglin pf. at 39; tr. 3/17/98 at 7-10, 16-18, 142-158, 162-164, 183-186, 197-198.

419. BAVT Reply Brief at 65.

420. Using current construction costs in this instance is consistent with the TELRIC methodology, since they are reasonable predictors of future near-term costs.

Lastly, as first noted in the discussion of OSS costs, I again reject the argument that competitors are, by themselves, causing the collocation costs. The decision to open our public switched network to competitive entry has, in my view, been brought about by the economic consequences of technological advances (the risks of which are borne by businesses), which have themselves precipitated matching legal and regulatory reforms. Collocation is one aspect of those reforms and the manner in which it is priced must necessarily be informed by the objectives that the policy serves. Since it is our society's belief that competitive provision of telecommunications services will yield great benefits to our citizenry, we should be prepared to bear the costs of facilitating that competition in a manner that maximizes those benefits, while still, to the greatest extent possible, satisfying other important rate design principles. In this instance, I recommend approval of Bell Atlantic's approach because it fairly spreads among competitors and incumbents — and therefore among their customers — the real costs of constructing and maintaining space for telecommunications equipment.

3. Geographic Deaveraging

The Act mandates that rates for interconnection and unbundled elements be "based on the cost . . . of providing the interconnection of network elements." In interpreting the Act, the FCC concluded that the rates for interconnection and unbundled elements must be geographically deaveraged, which is to say that prices should reflect the differences in the costs that are caused by differences in topography, population density, and other areal factors.[421] The Department argues that geographic cost differentials in UNE rates will encourage sensible investment decisions. If UNE rates are not deaveraged, contends the DPS, new entrants will be encouraged to build their own facilities in areas where prices significantly exceed costs (such as urban locales), but where it may in fact be more economically efficient to use Bell Atlantic's facilities. Therefore, concludes the DPS, the Board should set the UNE rates for at least three different density zones.[422]

421. LCO, ¶ 764.
422. DPS Brief at 17.

The Department also argues that, because BAVT has not proposed geographically deaveraged rates, the Company has failed to comply with an important condition placed on the approval of its merger with NYNEX, namely, its obligation to establish UNE rates consistent with the LCO.[423] In addition, the DPS argues that the BAVT UNE proposal violates the Act's requirements (at § 252(d)(1)) that rates for interconnection and UNEs be "based on costs."

I agree with both the Department and the FCC that geographic deaveraging will encourage sensible investment and is therefore desirable; however, I do not recommend such deaveraging at this time. Deaveraging will inevitably lead to lower UNE loop rates in urban areas and higher UNE loop rates in rural areas. In the absence of any corresponding universal service support mechanism, such deaveraging very likely will spur entry and competition in urban areas and stifle all but facilities-based competition in rural areas. Unless accompanied by corresponding retail rate increases in the high cost zones, deaveraged wholesale UNE rates will be high in relation to retail rates, thus failing to meet competitive pricing standards.

Ideally, the nature of the deaveraging should be structured to fit neatly with universal service supports. In the absence of a defined mechanism for universal service support, I conclude that it would be inappropriate to deaverage wholesale rates at this time. I urge the Board to delay the implementation of geographic deaveraging until such time as an effective program is in place that will reconcile the sometimes contending public policies of universal service, affordability, and economically efficient pricing.

IV. CONCLUSIONS AND DISPOSITION OF REMAINING ISSUES

For all the reasons set out in Section III, I recommend that the Board adopt the modifications to Bell Atlantic's TELRIC study methods, inputs, and assumptions that are set out in detail above. The Board should require the Company to file new cost studies and a revised SGAT, with a schedule of new wholesale prices that flow from the revised studies. These prices should be made available to any and all telecommunications carriers authorized to provide service in Vermont, and they should remain in effect until changed by order of the Board.

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423. *Id*. at 13-14, citing the LCO, ¶ 764.

A. Compliance and Processes for Future Filings

To comply with the directives in this Order, the Board should direct Bell Atlantic to file within sixty days a revised SGAT for wholesale UNEs and services. Accompanying that filing should be relevant documentation in support of the final prices, including at a minimum revised studies for recurring and non-recurring costs. AT&T's non-recurring cost model was entered into evidence, along with supporting documentation, and electronic copies were provided during discovery. Nevertheless, AT&T should be prepared to provide additional copies of the model, on both paper and electronic media, to any party, within five days of a request. In addition, AT&T should make knowledgeable personnel available (by phone or e-mail) to assist BAVT and other parties in using the model.

An SGAT is not *per se* a tariff, although in certain aspects it resembles one — for example, in the requirement that all eligible providers are entitled to purchase UNEs and services at non-discriminatory prices. It differs, however, in that it is reviewed under the Board's general grant of jurisdiction, 30 V.S.A. § 203, and under § 252(f) of the Act, rather than 30 V.S.A. §§ 218 and 225-227. Another nuance is that it is most likely, at least in this early period of competition, that CLECs will purchase the SGAT's UNEs and services not directly, but under the broader terms of an interconnection agreement. Consequently, the question of whether the SGAT should be tariffed (which involves a variety of other legal issues as well) need not be taken up at this time.

Within six months of this Order, the Company may, if it so chooses, file a revised study for costs related to CLEC access to its operations support systems. That study should include, among other things, a detailed accounting of the costs incurred and expected to be incurred

Our experience in this module of Phase II has caused me to consider whether the process employed was equal to its aspirations. This work has taken nearly two years to complete, frankly too long to have well served any party's — or the public's — interest. The fault is partly human, but mine only, but it is also partly systemic. The many and complex technical and cost issues investigated here might have been more efficiently contended with in a less litigious setting, one in which frank exchanges are not girded by the exigencies of a more formal process, but one that nevertheless can yield final results in a reasonable (but reasonably short) lapse of time. In addition, the process should require periodic reviews (or opportunities

for review) of wholesale prices, while also allowing parties to petition for out-of-period reviews (including requests to add or delete particular UNEs from the SGAT).

Such a process might work along the following lines. At least once every three years, the incumbent local exchange carrier would file with the Board and Department an SGAT for UNEs and related wholesale services.[424] The SGAT would be accompanied by detailed documentation and cost support for the prices it sets out. In accordance with § 252(f)(3) of the Act, the Board would have sixty days to review the SGAT, before allowing it to go into effect, rejecting it, or initiating a more extensive investigation into it. During the sixty-day period, other parties to that proceeding would also review the SGAT and file responses to it, including procedural recommendations.

If the Board concludes that the SGAT deserves fuller examination, it would open a docket. Though a docket, the procedure employed would be more akin to the arbitration process set out in § 252(b) of the Act than to more conventional litigation. The Board would appoint an "arbitrator" (a member of the Board's staff, although an outside expert could be hired) who would have a specified number of days (perhaps 120) to organize a series of workshops, discussions, and presentations on contended issues and then produce a report to the Board. The report would make recommendation with respect to, among other things, UNE prices, cost study methodologies, and other terms of providing wholesale services. Parties would be given the opportunity to comment on the report, and the Board would be required to issue a decision on the report within, say, 60 days of receiving it.

In addition, the process would allow for the filing of prices, terms, and conditions making new UNEs and wholesale services available. These would take the form of additions or amendments to the current SGAT, but would generally not require a full examination of the SGAT. The filing would include relevant supporting documentation, and the new offering would be available 60 days after the filing, barring Board disapproval of it.

This is only one, admittedly bare-boned, approach to reviewing SGATs. The general idea warrants consideration, however, and I recommend that the Board take steps now, beginning with comments from the parties, to develop a new, streamlined procedure for setting

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424. Other certified carriers and interested parties shall be notified of the filing.

"posted" wholesale prices. An informal workshop could be held after, to identify issues, vet alternative approaches, and take comment on any legal issues, such as the question of whether such a procedure need be embodied in a Board rule.

There may be, however, certain aspects of the on-going work for which a compressed time-frame process is not best suited. This docket dealt, in part, with the methodological approaches of not one model, but of several, each for a different component of the network and its interfaces; and this number was in effect doubled by the introduction of a second set of alternative models developed by one of the competitive providers. As states and the FCC continue their work on these issues, and as our understanding of the changing technologies progresses, we can expect cost and pricing models to proliferate and become more refined, more adaptive, and therefore better equipped to algorithmically imagine the future network in Vermont. The modeling approaches of which I am recommending approval today are worthy first steps, and the prices that they yield will assist in opening up the local exchange market here, but the record demonstrates that there is still much room for improvement. Or replacement: neither the Board nor the parties should feel constrained to the current models, if there are better alternatives available. (By rejecting Hatfield 4.0, I am by no means suggesting that later iterations of it, or of any other model, will not be suited to our needs.) However, investigating new modeling techniques probably should not await review of a revised SGAT; it may make sense, at an appropriate time in the coming months, to initiate a deliberative workshop process to address methodological and modeling questions. Here the idea is to encourage a consensus on method, which would greatly reduce the range of contested issues when SGATs, and interconnection agreements for that matter, are arbitrated and reviewed.[425]

The Board should direct the parties to file comments on these points, within ninety days of an final order in this module, and then it should, on the basis of those comments, initiate a process to address and resolve the issues.

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425. The Department argues that the UNE costing and pricing model should also satisfy the FCC's requirements for calculating universal service support. DPS Brief at 58, 62-64. Current efforts of the FCC may eventually produce a model that both it (the FCC) and the states can rely upon for both purposes. That would perhaps be ideal, but I'm not sanguine about its chances, at least in the near term.

B. Phase III

When originally conceived, the scope of this docket included a final phase to examine issues surrounding alternative modes of regulation and universal service funding. These of course remain important questions to be taken up, but I do not believe that it is necessary to do so in this docket. Vermont law allows for alternative approaches to the regulation of telecommunications providers;[426] and, in Docket 6167, the Board is currently considering adopting a type of "price caps" plan for Bell Atlantic. The integration of retail and wholesale pricing policy is certainly something that the Board will need to investigate and, to the extent appropriate, it can do so in Docket 6167 or in another docket. The Board need not hold this docket open to do so.

Nor need it reserve this case for the examination of universal service questions. There is unquestionably a relationship among costs, prices, and universal service support, which is intended to reduce the burden on ratepayers in high-cost areas. Our universal service policies, and the logic underpinning them, have evolved over the decades, and they will continue to evolve as the competitive market for telecommunications service grows. How to reconcile universal service objectives with the other public policies of economic efficiency and fairness in this new environment deserves careful consideration. The studies used to determine the costs of the network for the purposes of UNE pricing can also, if appropriately designed, assist in the identification of high-cost areas (or, more accurately, loops) to serve. As yet, I see no reason to jettison the tentative conclusion reached in the Phase I Order that a promising mechanism for distributing universal service support monies is the "virtual voucher" system.[427] Such a system provides funds to offset some portion of the costs of high-cost loops and, in this sense, the monies go to each customer using a high-cost loop. This way, the customer can choose any provider he or she prefers, while retaining the support funds. The accounting could actually work in a different fashion — for instance, the support could go directly to the provider of the underlying facilities, the price of which (whether wholesale or retail) would be credited fully for the support — but the essential point is that the support funds "follow" the link, wholesale

426. 30 V.S.A. §§ 226a, 226b, and 227a.
427. Phase I Order at 66-67.

prices can be deaveraged, thus facilitating economic efficiency and competitive provision, and retail customers can be insulated in some degree from the high costs over which they have no control. It is a competitively neutral approach, and I encourage the Board to consider it when it takes up universal service issues in earnest.[428]

For all these reasons, I recommend that the Board close this docket now, and address the remaining Phase III issues, as well as those of compliance with the directives set out in this Order, in separate proceedings (rule-makings or dockets) as appropriate.

DATED at Montpelier, Vermont, this 15th day of October, 1999.

s/Frederick W. Weston III
Frederick W. Weston
Hearing Officer

428. One question is whether such an approach is consistent with the Act and applicable state law.

V. BOARD DISCUSSION

When this docket began five years ago, it was difficult to imagine the changes that the telecommunications industry was about to see. Technological advances and accompanying regulatory reforms irrupted more quickly than earlier anticipated, at once driven by and causing an exploding demand for the broad range of telephony services — voice, information processing and transport, wireless, and internet connectivity. And with these changes the economic character of the telecommunications system has also changed (or, rather, has continued to change) and the competitive impulse strengthened. This docket has been dedicated to nourishing that transition in the local exchange system, the last domain of monopolistic service in the public switched network. Today's Order sets terms, conditions, and prices for unbundled access to the local loop, switch, and transport facilities, thus giving competitive providers alternative means to more creatively and efficiently meet consumers' demand for service.

In summary, the Hearing Officer makes four broad recommendations. The first is that the Board should adopt (with modifications) Bell Atlantic's recurring cost models (for outside plant, switching, and trunking). Second, the Board should reject BAVT's non-recurring cost model (for one-time charges associated with a customer's change in local exchange carriers) and, in its place, make use of AT&T's model. Third, the Board should reject BAVT's proposals for recovery of the costs of its operations support systems (OSSs, which enable carriers to process service order requests) and direct the Company to refile in accordance with the Hearing Officer's detailed recommendations. And, lastly, the Board should close this docket and take up any remaining issues in a new investigation.

We adopt in large measure the Hearing Officer's proposal for decision ("PFD"). In so doing, we have reviewed the record and considered the parties' comments on the PFD.[429] A number of issues were raised in the comments; we address them each in turn below.

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429. At the end of September 1999, four parties filed comments on the proposal for decision: BAVT, the DPS, Hyperion, and AT&T.

A. Positions of the Parties

Bell Atlantic asks that we adopt its costing models and wholesale prices as filed. The Company argues that the recommended changes to inputs and methodologies are inappropriate. It asserts that AT&T's non-recurring cost model is "fatally flawed" and should not be adopted. BAVT then argues that, in rejecting its OSS modeling and costs, the Hearing Officer is legally in error. Lastly, the Company asks that the Board, in this Order, clarify that the rates it is setting are not "interim" rates but are rather final rates to remain in effect until such time as the Board changes them.[430]

AT&T generally supports the PFD. It reiterates its argument, however, that BAVT's recurring cost model is "fatally flawed," argues that the PFD's modifications to the BAVT model cannot overcome its weaknesses, and recommends again that the Board adopt the Hatfield Model. If, however, the Board adopts the Hearing Officer's recommendations, AT&T asks that several ambiguities in the PFD be clarified. Lastly, AT&T supports the recommendations concerning OSSs and non-recurring costs.[431]

Hyperion offers no comments on the substantive matters addressed in the PFD, but states that, if the Board decides to close the docket, it should also immediately open any successor docket(s), which should consider, among other things, policies regarding access to poles, conduits, and rights of way.[432]

The DPS generally supports the PFD, but takes exception to several particular recommendations. First, the DPS urges that the Board adopt geographically de-averaged UNE rates. Next, the DPS argues that the proposed adjustment for merger and process re-engineering savings is insufficient and should be 22.3 percent instead of the recommended 6.0 percent. Third, the DPS recommends that the Board should adopt a lesser mark-up for joint and common costs (17.5 percent instead of 27 percent). Fourth, the DPS recommends an adjustment to depreciation rates, consistent with the Board's October 5, 1994, Order in Dockets 5700/5702. The Department also recommends several other minor adjustments, and closes by joining in Hyperion's call for a swiftly-opened follow-on docket.

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430. BAVT Comments at 1.
431. AT&T Comments at 2-14.
432. Hyperion Comments at 1-2.

B. Recurring Costs

We accept the Hearing Officer's recommendations and adopt Bell Atlantic's recurring cost models for setting UNE prices for the local loop, switching, and interoffice transport. The evidence demonstrates that BAVT's model and not Hatfield 4.0 is better suited to calculating the total service long-run incremental costs of these network elements in Vermont. However, several clarifications and minor modifications of the Hearing Officer's conclusions are in order.

First, Bell Atlantic shall use a fill factor of 75 percent for its feeder plant, not the 80 percent given in the PFD, which was apparently a typographical error. The record supports a finding of 75 percent.[433]

Second, the Hearing Officer concludes that the TELRIC methodology requires that costs be calculated on the basis of new investment, which means, in the case of switching, on the basis of new, complete installations rather than of merely switch upgrades.[434] Bell Atlantic argues that this conclusion is inconsistent with the Hearing Officer's findings regarding the Hatfield Model, which he said "is inappropriately biased towards lower prices for switching, since they are based solely on new installation figures, rather than on a reasoned blend of new installations and upgrades."[435] BAVT states that, in light of this conclusion, the Board should allow the Company to calculate switching costs as a weighted average of the costs of both new installations and modular upgrades.[436] In response to the Company's comments (and those of AT&T[437]) on this point, the Hearing Officer reviewed the record and reconsidered his conclusions; as a consequence, he amended slightly his findings on the Hatfield Model's treatment of switching costs (see Section III.B.2.d.iii., above). This did not, however, cause him to change his overall conclusions about the Hatfield Model.

We have reviewed the record on this point and, while we concur generally with the Hearing Officer's conclusions, they should be clarified. The TELRIC methodology calls for the modeling of a forward-looking network (i.e., the most economically efficient technologies

433. Weiss pf. at 28.
434. PFD (as issued 8/26/99) at 27-28.
435. *Id*. at 67.
436. BAVT Comments at 2-3.
437. AT&T Comments at 9.

available) deployed according to the current configuration of wire centers. This means that facilities must be sized to meet the full increment of demand expected over the planning horizon. In Vermont, with its rural character, this will presumably result in the modeled deployment in many locations of appropriately-sized processor units that will be sufficient, over their lives, to meet expected (growing) demand, without any upgrades. However, it also seems possible that, in some instances, the least-cost approach would not be to size a switch, in the first year, to meet the peak demand and total access lines expected in a future, for example, in the fifth or later, year. It may well be that, given the expected nature of future growth, it would be less costly (on a present-value basis) to assume a smaller switch facility in the early years, to upgraded in the later years as demand warrants. We emphasize that, despite the fact that the vendor discounts may be significantly smaller for upgrades than they are for the initial investment, such a deployment strategy may, under certain factual circumstances, nevertheless be most economical. The Hearing Officer was unsure of what discounts were used in the SCIS model, but he also concluded that only new installations should be modeled.

The TELRIC cost of a switch ideally would be modeled on a life-cycle basis, making plausible assumptions about the size and cost of both initial installations and any upgrades that may be necessary over the planning horizon. Under one scenario ("Incremental Acquisition Method"), for example, one would assume the purchase of a new switch that is only slightly larger than currently demanded and assume that it is purchased at a unit price typical of new switch acquisitions. Next, one would add the cost (discounted to present value) of future switch upgrades purchased at the smaller discounts typical of upgrades.

Nevertheless, the record in this case primarily addresses a method other than that "ideal" concept. The method in the record (the "One Purchase Method") assumes an initial switch installation that is of sufficient capacity to meet the carrier's needs over the planning horizon, and that is purchased at a price typical of new purchases. Because of the large initial installation, it is not necessary to consider any upgrades over the planning horizon.

Ideally, the approach that produces the lower life cycle cost should be used. In practice, the choice of an investment strategy to produce that result will depend upon several factors, including the discounts available for initial purchases and for upgrades, the transaction cost of upgrades, and the assumed capital discount rate.

The record shows that under many conditions the One Purchase Method can produce a lower life cycle cost than the Incremental Acquisition Method. We conclude that we should create a presumption that the One Purchase Method should be used in calculating the TELRIC cost of switching. We will, however, permit use of the Incremental Acquisition Method where a party carries the burden of showing that it produces a lower life cycle cost.

Third, Bell Atlantic asserts that the Hearing Officer's conclusion with respect to dedicated interoffice transport — that the application of a fill factor is methodologically inappropriate — is incorrect. BAVT contends that dedicated transport (for example, a DS3 trunk) purchased by a CLEC is in fact only one element in a larger transport system, which has itself been sized and built to serve many customers. "Accordingly," the Company argues, "the fill factor used to design and price the entire facility is also applicable to the fractional part of that facility purchased by the CLEC."[438]

We have reviewed the evidence and arguments, and conclude that the application of a fill factor to dedicated transport is reasonable. That factor, however, should, as the Hearing Officer found, be higher than the 50 percent estimated by the Company.[439] For the reasons given by DPS witness Weiss, we direct BAVT to use a 60 percent fill factor in the calculation of dedicated transport costs.[440]

Fourth, Bell Atlantic disputes the Hearing Officer's conclusion that, with respect to common transport, "minutes of use should be projected for the study period, rather than merely assuming that current usage levels continue into the future."[441] BAVT asserts that, unlike switching costs, interoffice transport investments vary with the level of demand and, therefore, as demand increases investment increases proportionately, which yields a constant per-minute cost. The Company asks that we therefore reject the Hearing Officer's recommendation on this point, saying that "it is inappropriate to increase minutes of use with no corresponding increase

438. BAVT Comments at 3.
439. Exh. BA-IIB-1, Part C, Workpaper 5.4.
440. Weiss pf. at 34-35.
441. PFD at 30.

in investment."[442] We concur with the Company. Therefore, the Hearing Officer's recommended adjustment to BAVT's recurring cost model need not be made.

AT&T asks for several clarifications. The first has to do with calculating loop lengths and the steps that must be taken to integrate the Hearing Officer's several conclusions on this point. AT&T asks that we affirm the Hearing Officer's recommendation that BAVT recalculate these costs using loop lengths at the lower end of the confidence interval, and also that data from the second, expanded and more reliable, loop sample be used for this purpose. In addition, AT&T notes that, in accordance with the Hearing Officer's recommendations, the recalculations should (1) eliminate remote terminals assumed to be only 3,000 feet away from the central office and (2) assume that customers located less than 9,000 feet away from COs will be served by loops that run directly from the COs.[443] We concur, and we direct Bell Atlantic to calculate its loop lengths in this fashion.[444]

C. Operations Support Systems

Bell Atlantic asserts that the Hearing Officer, in recommending that the Company's proposal for recovery of OSS-access costs be rejected, has erred in several ways. The first, BAVT states, is the Hearing Officer's recommendation that development costs to enable CLEC access to the Company's OSSs should be recovered from BAVT's own ratepayers. Second is the Hearing Officer's determination that on-going UNE OSS costs should be split between CLECs and Bell Atlantic.[445] Lastly, the Company states that "not allowing [it] to recover from requesting CLECs the full cost of UNEs would violate the Act and the FCC's TELRIC methodology."[446]

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442. BAVT Comments at 4.

443. AT&T Comments at 5.

444. As the Hearing Officer found, the evidence in this docket does not support a finding that a network architecture that involves pervasive "backhauling" from remote terminals to customers located in close proximity to COs is cost-effective (PFD at 19-20). We note, however, that in accepting the Hearing Officer's findings, we are not concluding that such a network configuration could not be demonstrated to be cost-effective in the future. A comparative analysis of reasonable alternatives, missing from this docket, would inform such a decision.

445. BAVT Comments at 5.

446. *Id*. at 6.

We concur with the Hearing Officer and adopt his recommendation that Bell Atlantic be directed to resubmit its proposal for calculating and recovering legitimate OSS costs. The issues here are complex, however, and some clarification is in order.

The Hearing Officer's essential finding is that Bell Atlantic's OSS filing in this docket "provides an inadequate basis for cost recovery, pursuant to the UNE pricing standards of the Board's Phase I Order and the FCC's LCO."[447] He reaches this conclusion for several reasons that we find compelling. First, the Hearing Officer distinguishes between the one-time "onset" costs incurred to revamp the Company's OSSs to give CLECs and resellers access to those systems and the on-going costs that will be incurred in order to facilitate competitors' access to the OSSs in the future. He finds that it is not appropriate to find that one-time onset costs incurred to revamp the Company's OSSs to give CLECs access to those systems are in fact *caused* by CLECs only; rather, they are the result of a societal decision to reorganize the economic activity we call local exchange service. Consequently, recovering those costs solely in UNE rates charged to CLECs would be inappropriate. Two, he finds that it is not clear that all the costs (both onset and on-going) asserted by BAVT to be related to the provision of OSS-access are in fact so related. The evidence is insufficient in this regard. And, third, he is concerned that some of the costs may already have been or are currently being recovered in general rates.[448]

For these reasons, the Hearing Officer recommends that we reject Bell Atlantic's OSS cost recovery proposal at this time and instruct the Company to refile it within six months, or forego any right to cost recovery altogether.

We agree. The record is inadequate for determining either the level of costs to be recovered or the appropriate mechanisms for doing so. The Company shall file a revised OSS proposal within six months of this Order. Bell Atlantic shall demonstrate why its revised

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447. PFD at 75.

448. *Id.* at 75-77. On this point, the DPS asserts that Bell Atlantic has included some OSS onset costs in its cost of service filed in Docket 6167. The Department argues that, "regardless of the outcome of that docket, those costs should be deemed to be recovered" on the ground that they are non-recurring historic costs. DPS Comments at 35. We decline to reach such a conclusion at this time.

proposal meets the requirements enumerated in Footnote 345, which echo those originally set out by the New York Public Service Commission.[449]

The Hearing Officer offers some thoughts about the principles according to which cost recovery and pricing should be allowed.[450] In general, those guidelines are sensible, but we recognize that any final resolution will be heavily dependent upon the demonstrated facts and, therefore, we leave a decision on the most appropriate methods for recovering OSS-related costs until a later review.

D. Merger and Process Reengineering

Bell Atlantic urges us to disregard the Hearing Officer's recommendation to reduce all UNE prices by six percent to reflect savings from the Bell Atlantic-NYNEX merger and from BAVT's process reengineering efforts. The Company asserts that the recommendation is incorrect in two ways. First, BAVT argues that the proposal double-counts the savings from process reengineering, which, the Company contends have already been reflected in the UNE prices. Second, Bell Atlantic argues that the reduction is "overly broad. It applies a discount supposedly reflecting process reengineering savings to costs areas where the process reengineering will not, and was never expected to, yield savings."[451] The Company does not contest that share of the reduction which is attributable to expected merger savings.

The Department, in contrast, supports the recommendation that UNE prices be adjusted to reflect the merger and process reengineering savings. However, the DPS argues that the discount should be substantially larger, because the cost studies under review here were based on 1995 data. Those data, asserts the DPS, include *costs* for process reengineering ($18.4 million, unseparated) that far exceed the *benefits* ($12.7 million). In addition, the DPS argues that there are significant savings from the Bell Atlantic/NYNEX merger and the impending Bell Atlantic/GTE merger that have yet to be recognized. By the calculations that it makes in

449. We find this particularly sensible, since the OSSs at issue here were developed to serve Bell Atlantic-North (the former NYNEX companies) as a whole. A coordinated, region-wide approach to OSS cost recovery seems most reasonable, therefore.

450. PFD at 75-78.

451. BAVT Comments at 7-8.

its comments, the total reduction to UNE prices should be 22.3 percent, a position which is substantially different from that which it presented in the hearings and in its briefs.[452]

AT&T supports the six percent overall adjustment.[453]

We adopt the Hearing Officer's recommendation and direct the Company to reduce its final UNE prices by an additional six percent (approximately three percent for the merger and three percent for the process reengineering).[454] As for process reengineering, it might be reasonable to accept BAVT's argument that the savings should be applied to individual cost elements (*e.g.*, to wages instead of depreciation and taxes), if such allocations were performed for all affected accounts; however, the record here does not allow us to do so.[455] Moreover, while the mathematics would surely change (numerators and denominators differing), the overall outcome would doubtless vary little: which is to say that, instead of a three percent discount applied generally, larger discounts would need to be applied to specified subsets of costs, and then the prices built up again.[456] In the end, such precision would likely return a result that the Hearing Officer's rough justice more easily renders.

E. Non-Recurring Costs

The Hearing Officer recommends that we reject Bell Atlantic's cost modeling and proposed prices for services that generally occur only once for each new customer account. He

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452. DPS Comments at 16-18.

453. AT&T Comments at 13-14.

454. We note that the Hearing Officer's arithmetic on page 84 is faulty. Using his figures, the total savings from the Bell Atlantic/NYNEX merger and process reengineering is approximately $12 million/year, not the $11 million that he cites. This changes the numerator of the ratio, yielding a reduction of 6.47 percent. In light of the uncertainty inherent in the estimated nature of these numbers, however, we will stick with the 6.0 percent discount recommended.

455. For the same reason, we reject the Department's argument that the discount (total, for both merger and process reengineering savings) should be 22.3 percent: the evidence that the DPS cites is not in the record of this docket. Moreover, we are somewhat baffled by the Department's changed advocacy on this point: its original recommendation was that UNE rates be reduced by between five and ten percent. DPS Brief at 19.

456. The discount we adopt today sets, in a reasonable fashion, that share of the expected savings to be borne by the Company's UNE wholesale business. It may be, in fact, that the savings are not spread equally amongst all of Bell Atlantic's services (which this approach assumes), but the record is insufficient in this regard. In the future, we will be willing to consider alternative allocations of the process reengineering savings (and merger savings as well) among BAVT's retail and wholesale offerings, upon petition of the Company or other interested party.

recommends that, instead, we accept AT&T's Non-Recurring Cost Model which, he concludes, "more faithfully adheres to the modeling principles adopted by the Board in Phase I and the FCC in the *LCO*."[457] The Company asserts a number of flaws in the Hearing Officer's findings and conclusions, which can be briefly summarized as follows:

- The Hearing Officer makes invalid assumptions about technology to be used by BAVT in Vermont. Specifically, BAVT asserts that the TR-303 interface (more commonly known as GR-303) modeled in the AT&T NRCM has limited usefulness in a competitive environment. Also, the AT&T-NRCM assumption that BAVT's OSSs and network elements are electronically linked, thereby eliminating most if not all manual activities, is incorrect.
- The estimates of work times developed by AT&T are not supported by reliable data. Also, there are no work times estimated for certain service order processing functions, which is unrealistic.
- The Hearing Officer incorrectly assesses the "fallout" rate in the service ordering process (*i.e.*, the percentage of orders that cannot be handled electronically, but require human intervention).
- Many of the inputs of the AT&T-NRCM are the model's default values, rather than based on Vermont-specific data.
- As a consequence of these failings, the AT&T-NRCM "produces confiscatorily low cost estimates," leading to prices that may not cover the actual costs incurred.[458]

Lastly, Bell Atlantic contends that the Hearing Officer's findings with respect to UNE combinations are "overly broad and inconsistent with other findings in the PFD." Specifically, the Company argues that the Hearing Officer's conclusion (at page 81) that the availability of unseparated UNEs will eliminate significant loop and switch port provisioning costs is wrong, and it takes this stance for two reasons. The first is that not all CLECs will choose to purchase unseparated UNEs and therefore additional provisioning costs associated with collocation will be incurred. The second is that the requirement that BAVT provide combined or unseparated UNEs to CLECs is still under consideration by the Board.[459]

AT&T supports the recommendation that its NRCM be adopted, but, like BAVT, argues that the Hearing Officer's conclusion about fall-out rates is incorrect. However, where

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457. PFD at 81.
458. BAVT Comments at 9-16.
459. *Id.* at 16-17.

BAVT argues that the Hearing Officer has misunderstood how the fall-out rate is applied in its own model, AT&T asserts that his adjustment to the rate in the AT&T-NRCM is unjustified.[460]

In the main, the parties reiterate the positions they took during the case in chief, which the Hearing Officer has evaluated. Our review of the record and parties' comments persuades us to accept the Hearing Officer's recommendation and use the AT&T-NRCM to establish non-recurring costs and prices at this time. Several comments, however, are warranted.

Bell Atlantic contests the AT&T-NRCM assumption that the TR-303 interface, which is still under development, is an appropriate, forward-looking, technology for Vermont.[461] While this may be a reasonable concern, it is only relevant insofar as it affects the costs that would be incurred to deploy an efficient, least-cost network. AT&T has made a persuasive case that its model more reasonably describes the costs that an efficient firm would incur to provide these particular services than does Bell Atlantic's, and for this reason we adopt it. A specific technology may be more or less suited to a particular application, but it is the effects of such choices *for modeling purposes* that are of interest here: is there a more efficient (cost-effective) technology available and, if so, how would its use affect the costs and prices for the services at issue? We will accept the AT&T technology assumptions at this time, but note that Bell Atlantic remains free in the future to argue that an alternative approach is more reasonable.[462]

Similar reasoning underpins our decision regarding work-time estimates. What amount of labor will an efficient firm need to perform the identified tasks? Bell Atlantic challenges AT&T's estimates and the methods by which they were developed. BAVT also argues that the absence of time estimates for a number of tasks (in effect, an assumption that manual

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460. AT&T Comments at 12-13.

461. BAVT Comments at 9-10.

462. In a letter dated December 12, 1999, AT&T argues that "the representations made by BAVT regarding the so-called TR-303 (a/k/a GR-303) integrated digital loop carrier technology, at pages 9-10 of the BAVT comments, are patently inconsistent with Bell Atlantic's actual network deployment plans," and AT&T points to testimony filed by BAVT in a recent case before the Massachusetts Department of Telecommunications and Energy. AT&T Letter, 12/6/99, at 1. For the reasons given above, we are adopting the Hearing Officer's recommendation on this point; the information in AT&T's letter merely affirms that this decision is sound.

intervention is unnecessary for those tasks) is unrealistic.[463] Again, we are looking forward, and reliance on current experience will likely over-estimate the work-times that Bell Atlantic will see in the future.

Bell Atlantic asserts that the Hearing Officer misapprehends how the 15 percent fallout rate is used in its non-recurring cost study. We need not reach a conclusion on this point, since we are not adopting that model. For the AT&T-NRCM, the Hearing Officer recommends a five percent fallout rate, instead of the two percent assumed by AT&T. AT&T argues against this approach, in part because it is based on a DPS recommendation that is "on the conservative side favorable to Bell," arguing that this is not an appropriate basis for a decision.[464] AT&T notes that five percent is the high end of the range recommended by the DPS, and reasserts that two percent is a more reasonable ratio.[465]

We adopt the Hearing Officer's recommendation of five percent. The parties have differing opinions on the expected service order fallout rate for an efficient firm. The Hearing Officer, recognizing the complexities of information management in a competitive environment, concluded that two percent may be a bit optimistic. We concur with his judgment.

Lastly, with respect to the availability of unseparated UNEs (in particular, loops and switch ports), we note that this issue is currently under review in both Docket 5900 and this one.[466] Bell Atlantic disputes whether our July 2, 1999, Order in Docket 5900 obligates the Company to provide unseparated elements at this time, and it contends that the Hearing Officer's conclusion in this case (that significant collocation costs will be avoided because of the availability of unseparated elements) are "at best, overly broad."[467] The Company argues besides that not all CLECs will wish to purchase unseparated UNEs, and therefore there will be

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463. *Id*. at 10-13.
464. AT&T Comments at 13.
465. *Id*.
466. Docket 5900, Order of 7/2/99 at 98-100; Docket 5713, Orders of 10/8/98, 3/16/99, and 6/4/99.
467. BAVT Comments at 16.

certain non-recurring activities associated with collocation for which the Hearing Officer has failed to recommend prices.[468]

In fact, the Hearing Officer has recommended approval of Bell Atlantic's collocation proposal, which we adopt.[469] Consequently, it is unclear to us what non-recurring collocation costs have been overlooked. We direct the Company, in complying with the directives of this Order, to identify any collocation activities for which costs and prices have not been calculated, to describe their costs, and to propose prices for them. We will at that time consider the appropriateness of their inclusion in the SGAT.

F. Geographic Deaveraging

The Department strongly urges us to reject the Hearing Officer's recommendation that UNE rates remain geographically averaged, as retail rates largely are, until such time as wholesale deaveraging can "be structured to fit neatly with universal service supports."[470] The DPS argues that the concerns expressed by the Hearing Officer about the potential effects of deaveraging on both competition and universal service in the absence of a well-designed support program are "pure speculation."[471] The DPS argues that failure to deaverage would promote economic inefficiency, would be inconsistent with the requirements of the federal Act, and would be at odds with both the Board's conclusions in the Phase I Order and the Hearing Officer's general findings in this proposed decision. The Department asserts that the benefits to consumers from competition facilitated by deaveraged UNE rates would outweigh any negative impacts that the lack of an expanded universal service support mechanism might occasion.[472]

The Hearing Officer's recommendation reveals his ambivalence at pursuing a policy of competitive provision at the possible expense of consumers in the more rural areas of this state. The Department acknowledges the potential conflict, but contends that the risks to rural

468. *Id.* at 17.
469. PFD at 89.
470. PFD at 91.
471. DPS Comments at 9.
472. *Id.* at 8-10.

consumers is small indeed. We share the Hearing Officer's concern, but also conclude that the Department's arguments have merit. Happily, a satisfactory resolution of the dilemma has been made possible by recent events.

Among the many actions that it took when it issued the LCO in August 1996, the FCC established minimum requirements for the geographic deaveraging of interconnection and UNE rates (Section 51.507(f), "deaveraging rule"). The LCO was appealed, and in July of the following year, the US Court of Appeals for Eighth Circuit vacated the deaveraging rule on the ground that the FCC lacked jurisdiction over intrastate rates. However, on January 25, 1999, the US Supreme Court reversed this aspect of the Eighth Circuit's decision, and remanded it to that Court. Two years had now passed and not all states had established deaveraged wholesale rates, and on May 7, 1999, the FCC issued an order further staying compliance with the deaveraging rule until six months after it (the FCC) had released an order in Common Carrier Docket No. 96-45, finalizing the high-cost universal service support system for non-rural LECs, as required by the Act. By linking the stay to the outcome of the universal service proceeding, the FCC was giving the states an opportunity to address the effects of deaveraging on other aspects of local exchange competition.

On November 2, 1999, the FCC did release its universal service order in CC Docket No. 96-45. That order established the principles and rules for federal universal service support for the intrastate costs of non-rural LECs. It also set May 1, 2000, as the deadline for compliance with the deaveraging rule. On December 12, 1999, we opened Docket 6318, specifically for the purpose of complying with the FCC's directive. In light of this, it is not necessary to address deaveraging in this docket at this time; instead, we will take up the question in the new docket, which is well suited to, among other things, considering the very concerns that gave rise to the Hearing Officer's recommendation in this docket.

The revised cost studies and prices that flow from compliance with this Order shall form the basis of the work to be done in Docket 6318.

G. Joint and Common Costs

The Department asserts that the Hearing Officer erred in his recommendations on the allocation factors for joint and common costs.[473] The DPS argues that the mark-ups are excessive and allow the Company to operate less efficiently than it should. The Department recommends that factors resulting in a mark-up of approximately 17.5 percent should be adopted, if the Board also adopts its recommended reduction of 22.3 percent for merger and process reengineering savings; otherwise, the DPS advocates a 15 percent joint and common cost allocator.[474] The Department also recommends that these calculations be performed on BAVT's 1998 cost-of-service data, which would have the effect of further reducing the joint and common cost allocators.[475]

We decline to adopt the recommendations that the Department makes in its comments. First, it asks that we rely on facts not in evidence in this case, which we plainly cannot do. Second, it asks us to, in effect, reject its earlier proposals, with which the Hearing Officer in fact concurred and upon which he based his recommendation. We share the Department's implicit concern — namely, that prices should reflect, and thereby encourage, the highest achievable levels of Company efficiency — and we expect that such gains can be captured through adjustments to prices over time. On this record, however, we must conclude that the Hearing Officer's recommendation is most reasonable.

H. Depreciation

The Department requests that we reject the Hearing Officer's recommendation regarding BAVT's depreciation rates. The DPS argues that reliance on the Docket 5702 rates, which are based on shorter economic lives than are the FCC-prescribed rates, will enable the Company to recover more than its actual investment in plant. Moreover, the DPS contends that many of BAVT's assets are in fact appreciating, not depreciating, and thus lower

473. DPS Comments at 18-19; PFD at 52-53. The factors increase only the "directly attributable" cost components of functionalities and services, and therefore there is not a single, across-the-board percentage for all wholesale offerings.

474. DPS Comments at 19-20.

475. *Id*. at 20-21.

depreciation rates are justified. The DPS also argues that the Board was itself not satisfied with the higher depreciation rates stipulated to (by the DPS and BAVT, then NYNEX) in Docket 5702, that the incentive to modernize the network that was implicit in those rates might no longer be justified, and, now that BAVT's system has been significantly upgraded, lower depreciation rates would more accurately reflect the forward-going economic lives of its assets.[476]

We adopt the Hearing Officer's recommendation on depreciation. His analysis carefully weighs the pros and cons of the various positions, and comes to a reasoned judgment. In particular, we agree that it is reasonable that depreciation rates used at wholesale should match those used for retail rate-making purposes, for the same reasons that the cost of equity used in both exercises should be the same. Until the risks facing the Company at wholesale are demonstrably different than those at retail, thus differentiating its investment strategies in both arenas, there is no persuasive reason to treat these underlying cost drivers differently. Lastly, we note that, in the current investigation into Bell Atlantic's retail rates, Docket 6167, the parties do not call for a change in the Company's depreciation rates; the 5702 rates continued to be relied upon.

I. Cost of Equity

The DPS supports the Hearing Officer's recommendation on the cost of equity to be used for wholesale costing purposes, but asks that we clarify one point. The Hearing Officer recommends that we adopt an 11.5 percent return on equity, which is within the range endorsed by the DPS's witness, Mr. Hill, and also coincides with the rate approved in BAVT's most recent rate case (Docket 5853). The Department points out that 11.5 percent is not, however, the mid-point of that range (10.75 to 11.75), which is 11.25 percent. The DPS argues that diverging from "the usual practice of using the mid-point is not justified," in part because the

476. DPS Comments at 21-24 (referring to the Board's Orders of 10/5/94 at 36-37 and 2/6/95 at 10 in Dockets 5700/5702).

forward-looking capital structure used in this docket differs from that based on embedded costs.[477]

We adopt the Hearing Officer's recommendation on the Company's cost of equity, to be used for setting wholesale UNE and interconnection prices. We expressly and specifically emphasize that we do not have a "usual practice" of setting an equity rate as the mid-point in a recommended range. Instead, we set it to reflect our best estimate of investor expectations. The Hearing Officer's assessment of BAVT's risks at both wholesale and retail is reasonable. Furthermore, while a firm's capital structure can affect its overall risk, in this instance we believe the impact is negligible.

J. Final Prices

Bell Atlantic asks us to state that the prices that we set here are not "interim," as the Hearing Officer recommends, but final, in the sense that they are "Board-established UNE rates under which competitive carriers may obtain access to those elements" and that the rates will remain in effect "until and unless revised in a future proceeding."[478]

We affirm that the rates set in compliance with this Order will be final until changed by future Board order. In this light, all rates that we set are at once *final* and *interim*, since, one, any change to them must be authorized by Board order and, two, any of them can be changed on a forward-looking basis pursuant to future Board orders based on an appropriate record. Consequently, it is unnecessary to adopt the Hearing Officer's recommendation in this Docket that the UNE rates be labeled "interim."

K. Conclusions

Determination of UNE costs and the setting of corresponding prices is a complicated endeavor. We commend the parties for their diligence and hard work. We recognize, however, that this was in many ways a first effort, that the technology of telecommunications and its

477. DPS Comments at 31-33.
478. BAVT Comments at 17.

markets are endlessly recasting themselves, and therefore that the rates that emerge from this docket may have a limited life span. We fully expect — and encourage — the Company, Department, and other interested parties to bring to our attention changes in the industry, new functionalities, innovative modeling techniques, etc., that may warrant a reevaluation of the prices for wholesale UNEs and services. We do not expect, however, that in order to revise the Statement of Generally Available Terms the labor of the past two years need be repeated. The Hearing Officer offered his thoughts on processes that might yield swifter and less litigious resolutions in the future, and recommended that we direct the parties to file comments on these topics within sixty (instead of the proposed ninety) days of a final Order. We so direct them.

VI. ORDER

IT IS HEREBY ORDERED, ADJUDGED, AND DECREED by the Public Service Board of the State of Vermont that:

1. The conclusions and recommendations of the Hearing Officer are adopted, except as modified herein.

2. Bell Atlantic shall modify its studies of recurring costs as set out in Section III.B. It shall file revised studies within sixty (60) days of this Order.

3. Bell Atlantic shall modify its study of non-recurring costs as set out in Section III.D. Specifically, it shall make use of the model developed and proposed by AT&T, with the modifications to its inputs as set out in Section III.D., and it shall file a revised study within sixty (60) days of this Order.

4. Bell Atlantic may file a revised study of its OSS-related costs within six months of this Order. If it does so, that study, and the proposed rate design accompanying it, shall comply with the directives set out in Section III.C. of this Order.

5. Bell Atlantic shall modify its SGAT, based on the outputs of its revised recurring and non-recurring cost studies, within sixty (60) days of this Order. No OSS-related UNE prices shall be included in the SGAT, until such time as the Board approves any such prices.

6. The parties shall file, within sixty (60) days of this Order, comments on the recommendations for future processes set out in Section IV.A.

DATED at Montpelier, Vermont, this 4th day of February, 2000.

s/Michael H. Dworkin	)	
	)	PUBLIC SERVICE
	)	
s/Suzanne D. Rude	)	BOARD
	)	
	)	OF VERMONT
s/David C. Coen	)	

OFFICE OF THE CLERK

FILED: February 4, 2000

ATTEST: s/Susan M. Hudson
Clerk of the Board

NOTICE TO READERS: This decision is subject to revision of technical errors. Readers are requested to notify the Clerk of the Board of any technical errors, in order that any necessary corrections may be made.

Appeal of this decision to the Supreme Court of Vermont must be filed with the Clerk of the Board within thirty days. Appeal will not stay the effect of this Order, absent further Order by this Board or appropriate action by the Supreme Court of Vermont. Motions for reconsideration or stay, if any, must be filed with the Clerk of the Board within ten days of the date of this decision and order.

APPENDIX A. COMMON ABBREVIATIONS

Act	Telecommunications Act of 1996
Atlantic Cellular	Atlantic Cellular Company, L.P.
ATP	Alternative Technology Providers (Atlantic Cellular and Hyperion)
AT&T	AT&T Communications of New England, Inc.
BNF	Basic Network Function
BAVT	Bell Atlantic-Vermont
CCF	Carrying charge factor
CLEC	Competitive local exchange company
CO	Central office or wire center
COT	Central office terminal
CPG	Certificate of Public Good
DAN	Design Access Network
DLC	Digital loop carrier
DPS	Department of Public Service (also "Department")
E-911	Enhanced 911 Board
ECRIS	Engineering Construction Records Interface
FCC	Federal Communications Commission
HM	Hatfield Model
Hyperion	Hyperion Telecommunications of Vermont, Inc.
IDLC	Integrated digital loop carrier
ILEC	Independent local exchange company
ILP	InterLATA (or intraLATA) presubscription (see LPIC)
IXC	Interexchange carrier
LinkCoster	Bell Atlantic's loop costing model
LCO	The FCC's Local Competition Order
LATA	Local Access and Transport Area
LEC	Local exchange company
LPIC	IntraLATA presubscription
LRIC	Long-run incremental cost
MCI	MCI Telecommunications Corporation
MTS	Message Toll Service
NID	Network interface device
NRC	Non-recurring cost
NYNEX	New England Telephone & Telegraph Company (also "NET")
ONA	Open Network Architecture
OSS	Operations support system
RBHC	Regional Bell Holding Company
SAI	Serving area interface
SCIS	Switching Cost Information System
SCP	Signal control point
SGAT	Statement of generally available terms
Sprint	Sprint Communications Company, L.P.

SS7	Signaling System 7
STP	Signal transfer point
TELRIC	Total element long-run incremental cost
TSLRIC	Total service long-run incremental cost
TYP	The DPS's *Ten-Year Telecommunications Plan*
UNE	Unbundled network element
USF	Universal Service Fund