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

In the Matter of	)	
	)	
In the Matter of Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the Communications Act for Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration	)	CC Docket No. 00-218
	)	
In the Matter of Petition of AT&T Communications of Virginia Inc., Pursuant to Section 252(e)(5) of the Communications Act for Preemption of the Jurisdiction of the Virginia Corporation Commission Regarding Interconnection Disputes With Verizon Virginia Inc.	)	CC Docket No. 00-251

MEMORANDUM OPINION AND ORDER

Adopted: August 28, 2003 **Released:** August 29, 2003

By the Chief, Wireline Competition Bureau:

TABLE OF CONTENTS

I. INTRODUCTION 1

II. PROCEDURAL MATTERS 6

A. HISTORY OF THE PROCEEDING 6
B. OUTSTANDING MOTIONS 12
1. Verizon's Motion for Leave to File Corrected Non-Recurring Cost Study and Errata to Testimony 13
2. Verizon's Submission of Additional Record Evidence 15
C. STANDARD OF REVIEW 24
D. TRUE-UP 26

III. OVERARCHING ISSUES 27

A. ECONOMIC THEORY OF TELRIC PRICING 27

B. SELECTION OF A RECURRING COST MODEL 35
1. Introduction 37
2. Positions of the Parties 40
3. Discussion 48
C. COST OF CAPITAL 58
1. Overview 58
2. Theory/Policy Issues 60
3. Implementation Issues 64
D. DEPRECIATION 105
1. Overview 105
2. Background 108
3. Discussion 112
E. ANNUAL COST FACTORS 122
1. Background 122
2. Positions of the Parties 124
3. Discussion 136

IV. LOOPS 161

A. INTRODUCTION 161
B. CHOICE OF COST MODELS FOR LOOPS 164
1. Positions of the Parties 164
2. Discussion 171
C. LOOP COST MODEL IMPLEMENTATION 173
1. Cost Model Algorithms 174
2. Cost Inputs 184
D. LOOP TYPES NOT DIRECTLY MODELED BY THE MSM 332
1. 4-Wire, DS-1, and DS-3 Loop Types 332
2. xDSL, Off Premise Extension, and 4-wire CSS Loops 346
3. 2-wire CSS, 2-wire ISDN BRI, and 4-wire DDS Loop Types 349

V. SWITCHING 357

A. COST MODEL 359
1. Positions of the Parties 359
2. Discussion 367
B. SHARED COST ALLOCATION BETWEEN END-OFFICE AND TANDEM SWITCHING FUNCTIONS 374
1. Positions of the Parties 375
2. Discussion 377
C. COST INPUTS 380
1. Switch Discount 381
2. Switch Demand and Sizing 417
3. Digital Loop Carrier 421
4. Fill Factors 428
5. Trunk Utilization Level 437
6. EF&I Factor 441

7. Right-To-Use Fees 445
8. Busy Hour to Annual MOU Ratio 452
D. RATE STRUCTURE 458
1. Background 458
2. Positions of the Parties 460
3. Discussion 463
E. RECIPROCAL COMPENSATION 484
1. Background 484
2. Discussion 488
F. FEATURES 490
1. Background 490
2. Discussion 492

VI. INTEROFFICE TRANSPORT 494

A. COST MODELS 497
1. Positions of the Parties 497
2. Discussion 503
B. DEDICATED TRANSPORT RATE STRUCTURE – DIGITAL CROSS-CONNECT SYSTEMS AND MULTIPLEXING EQUIPMENT 509
1. Positions of the Parties 509
2. Discussion 510
C. NUMBER OF NODES PER SONET RING AND NUMBER OF PORTS PER NODE 512
1. Positions of the Parties 512
2. Discussion 514
D. EF&I FACTOR 519
1. Positions of the Parties 519
2. Discussion 522

VII. ACCESS TO OSS 527

A. BACKGROUND 527
B. POSITIONS OF THE PARTIES 528
C. DISCUSSION 537

VIII. DUF 547

A. BACKGROUND 547
B. DISCUSSION 550

IX. MISCELLANEOUS UNES 553

A. POSITIONS OF THE PARTIES 553
B. DISCUSSION 554

X. NON-RECURRING CHARGES 555

A. BACKGROUND 555
B. NON-RECURRING COST MODELS 557
1. Positions of the Parties 557

2. Discussion 567
C. IMPLEMENTATION ISSUES 581
1. Costs to be recovered by NRCs 581
2. Manual installation activities 585
3. Manual processing activities 589
4. Disconnection costs 594
5. Unbundling of IDLC Loops 599
6. Migrations (Hot Cuts) 602
XI. BROADBAND ISSUES 605
A. LOOP QUALIFICATION 605
1. Introduction 605
2. Positions of the Parties 608
3. Discussion 615
B. WIDEBAND TESTING 619
1. Introduction 619
2. Positions of the Parties 620
3. Discussion 622
C. LINE-SHARING OSS 623
1. Introduction 623
2. Positions of the Parties 624
3. Discussion 628
D. COOPERATIVE TESTING 629
1. Introduction 629
2. Positions of the Parties 630
3. Discussion 632
E. LOOP CONDITIONING ISSUES 633
1. Introduction 633
2. Positions of the Parties 634
3. Discussion 639
F. NRCS FOR ESTABLISHING LINE SHARING 645
1. Introduction 645
2. Positions of the Parties 646
3. Discussion 648
G. SPLITTER-RELATED CHARGES 649
1. Introduction 649
2. Positions of the Parties 650
3. Discussion 654
H. ISDN ELECTRONICS 656
1. Positions of the Parties 657
2. Discussion 660
XII. RESALE 662
A. TIMING – WHETHER TO SET WHOLESALE DISCOUNT RATES IN THIS PROCEEDING 666
1. Positions of the Parties 666

2. Discussion 668
B. WHOLESALE DISCOUNT STANDARD 671
1. Positions of the Parties 671
2. Discussion 673
C. VERTICAL FEATURES / STAND-ALONE SERVICES 675
1. Positions of the Parties 675
2. Discussion 677
D. AVOIDED COSTS 678
1. Introduction 678
2. Direct Expenses 681
3. Indirect Expenses 688

XIII. RATES AND COMPLIANCE FILING 694

XIV. ORDERING CLAUSES 699

Appendix A: Depreciation – Asset Lives and Salvage Percentages
Appendix B: Plant-Specific Expense Ratios
Appendix C: End-Office Switch Discount Weights
Appendix D: Tandem Switch Discount Weights
Appendix E: UNE Loop Rates
Appendix F: MSM Loop Costs, Component and Total
Appendix G: MSM Loop Input Modifications
Appendix H: List of Exhibits Cited
Appendix I: Frequently Used Acronyms and Abbreviated Terms

I. INTRODUCTION

1. In this order, the Wireline Competition Bureau (the Bureau) resolves disputes regarding the rates that Verizon Virginia, Inc. (Verizon) may charge AT&T Communications of Virginia, Inc. (AT&T) and WorldCom, Inc. (WorldCom) for access to unbundled network elements (UNEs), interconnection, and resale. In two previous orders, the Bureau addressed the terms and conditions of interconnection agreements between the petitioners and Verizon.[1]

[1] *Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the Communications Act for Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration*, CC Docket Nos. 00-218, 00-249, and 00-251, Memorandum Opinion and Order, 17 FCC Rcd 27039 (2002) (*Non-Cost Arbitration Order*); *Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the Communications Act for Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration*, CC Docket Nos. 00-218, 00-249, and 00-251, Memorandum Opinion and Order, 17 FCC Rcd 19654 (2002) (*Non-Cost Arbitration Approval Order*). Although Cox Virginia Telecom, Inc. (Cox) petitioned for arbitration of certain terms and conditions, which the Bureau addressed in the *Non-Cost Arbitration Order* and the *Non-Cost Arbitration Approval Order*, Cox did not seek arbitration of rates. Therefore, as used in this order, the term "petitioners" or "AT&T/WorldCom" refers only to AT&T and WorldCom.

2. Following passage of the Telecommunications Act of 1996 (1996 Act),[2] the Commission adopted various rules to implement the legislatively mandated, market-opening measures that Congress put in place.[3] Under the terms of the 1996 Act, it has been largely the job of the state public utility commissions to interpret and apply those rules through arbitration proceedings.[4] In this proceeding, the Bureau, acting through authority expressly delegated by the Commission, stands in the stead of the Virginia State Corporation Commission (Virginia Commission) for the limited purpose of this arbitration.[5] We expect that this order, combined with the two non-cost orders previously issued, will provide a workable framework to guide the commercial relationships between the interconnecting carriers before us in Virginia.

3. The parties to this consolidated proceeding have presented for decision numerous specific issues pertaining to the rates that Verizon may charge AT&T and WorldCom for access to UNEs, interconnection, and resale. These issues concern the application of the Commission's pricing rules now in effect, including the appropriate cost models to use to implement these rules and the appropriate algorithms, inputs, and other assumptions to use in these cost models. As we discuss more fully below, the parties filed cost models and testimony to support their respective proposed rates, filed rebuttal testimony opposing the cost models filed by the opposing party or parties, and conducted extensive discovery. Subsequently, we conducted extensive hearings at which both the petitioners and Verizon had full opportunity to present evidence and cross-examine opposing witnesses. We base our decisions in this order on the analysis of the record of these hearings, the evidence (including the pre-filed testimony) presented therein, and the subsequent briefing materials filed by the parties. Our application of existing Commission rules is narrowly tailored to the detailed evidence in the record before us, in order to resolve the numerous specific issues presented by the parties regarding their operations in Virginia.

4. Specifically, in this order, we apply the Commission's pricing rules to choose the best cost models presented to us and select the appropriate algorithms, network design assumptions, and inputs for use in the models. Based on these decisions, in this order we set recurring rates for unbundled loops and direct the parties to submit compliance filings consistent with this order for all other recurring and non-recurring charges (NRCs) at issue, and for the

---

[2] *See* Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (1996). We refer to the Communications Act of 1934, as amended by the 1996 Act and other statutes, as the Communications Act, or the Act. *See* 47 U.S.C. §§ 151 *et seq.*

[3] *See, e.g., Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, CC Docket No. 96-98, First Report and Order, 11 FCC Rcd 15499 (1996) (*Local Competition First Report and Order*) (subsequent history omitted).

[4] *See* 47 U.S.C. § 252.

[5] *See* 47 U.S.C. § 155(c)(1); *see also Procedures for Arbitrations Conducted Pursuant to Section 252(e)(5) of the Communications Act of 1934, as amended*, Order, 16 FCC Rcd 6231, 6233, paras. 8-10 (2001) (*Arbitration Procedures Order*) (delegating authority to the Bureau to conduct and decide these arbitration proceedings); *Non-Cost Arbitration Order*, 17 FCC Rcd at 27043-46, paras 3, 6-7.

resale discount.[6] We will issue a subsequent order to address those compliance filings and to establish recurring charges for non-loop UNEs, NRCs, and the resale discount.

5. While we act in this proceeding under authority delegated by the Commission, the arbitration provisions of the 1996 Act require that we decide all issues fairly presented.[7] The parties have asked us to arbitrate cost issues related to Verizon's provision of UNEs,[8] and we resolve those issues here. We note that, after the record in this proceeding closed, the United States Court of Appeals for the District of Columbia Circuit issued the *USTA* decision, which overturned two Commission decisions relevant to Verizon's obligations in these areas.[9] On February 20, 2003, the Commission adopted an order responding to the *USTA* decision.[10] The unbundling and other rule changes called for in that order will become effective thirty days after publication of the order in the Federal Register, which has yet to occur.[11] Thus, our analysis of the issues raised in this proceeding does not reflect any rule changes resulting from the *Triennial Review Order*. However, we do take account of that order's limited clarification of existing rules regarding cost of capital and depreciation.[12] Finally, we note that, on October 8, 2002, the Bureau approved the parties' interconnection agreements, which gave practical effect to their legal rights and obligations.[13] We leave it to the parties to implement, pursuant to the change of law provisions in their interconnection agreements, changes necessitated by the *USTA* decision and the *Triennial Review Order*.[14]

---

6 *See infra section* XIII.

7 *See* 47 U.S.C. § 252(b)(4)(C) (state commission shall resolve each issue in petition and response); *id.* § 252(c) (state commission shall resolve by arbitration any open issue).

8 *See, e.g.,* Verizon Ex. 180 (Errata to Ex. 100, Parts C-9 and C-10), Tab D; AT&T/WorldCom Initial Cost Brief, at Apps. 1-2.

9 *United States Telecom Ass'n v. FCC*, 290 F.3d 415 (D.C. Cir. 2002) (*USTA*), *cert. denied,* 123 S. Ct. 1571 (2003). The effectiveness of the USTA decision was stayed by the court of appeals until February 20, 2003, the date the Commission's *Triennial Review Order* was adopted. *See Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers*, CC Docket Nos. 01-338, 98-147, and 96-98, Report and Order and Order on Remand and Further Notice of Proposed Rulemaking, FCC 03-36 (rel. Aug. 21, 2003) (*Triennial Review Order*)

10 *See Triennial Review Order*.

11 *See* 5 U.S.C. § 553(d).

12 *See Triennial Review Order*, paras. 680-84, 689-91.

13 *See Non-Cost Arbitration Approval Order*, 177 FCC Rcd at 19654.

14 *See id*.

II. PROCEDURAL MATTERS

A. History of the Proceeding

6. In this proceeding, we act in the place of the Virginia Commission. A full discussion of the events leading to preemption of the Virginia Commission and the procedural history preceding the filing of the cost studies and cost testimony on which this order relies can be found in the *Non-Cost Arbitration Order*.[15]

7. *Cost Studies and Pre-Filed Testimony*. On July 2, 2001, AT&T and WorldCom (AT&T/WorldCom) jointly filed recurring and non-recurring cost studies, which generated rates for UNEs, interconnection, and resale.[16] Verizon also filed recurring and non-recurring cost studies at that time. Pursuant to the *Procedural Public Notice*, the cost studies were filed in electronic, as well as paper, formats.[17] On July 31, 2001, AT&T/WorldCom and Verizon filed direct testimony in support of their respective cost studies. On August 27, 2001, AT&T/WorldCom and Verizon filed rebuttal testimony. The parties filed surrebuttal testimony on September 21, 2001. Verizon filed additional surrebuttal testimony on November 16, 2001.

8. Subsequent to filing its original cost studies, Verizon realized that there was a significant error in its switching cost study. On October 22, 2001, Verizon filed a revised switching cost study (dated October 18, 2001), along with revisions to some of its other cost studies, all of which were accompanied by supporting supplemental testimony. As part of this filing, Verizon submitted a revised rate sheet, which included revised proposed rates for switching, loops, and other UNEs. On November 5, 2001, Verizon submitted a further revised version of its switching cost study (dated November 2, 2001) to correct errors in the tandem switching part of its study. Verizon concurrently filed additional supporting supplemental testimony, which included revised rates for tandem switching, loops, some subloops, and common transport. On November 20, 2001, AT&T/WorldCom filed supplemental surrebuttal testimony responding to Verizon's revised cost studies and accompanying testimony. In addition, as a result of concessions made during the hearing, on December 12, 2001, AT&T/WorldCom submitted a revised version of its recurring UNE cost study.

---

[15] *See Non-Cost Arbitration Order*, 17 FCC Rcd at 27042-47, paras. 1-10, 12-13. On March 27, 2001, we issued a letter ruling revising the procedural schedule, including separating cost issues from non-cost issues. *See Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the Communications Act for Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration*, CC Docket Nos. 00-218, 00-249, and 00-251, Letter Ruling (rel. March 27, 2001), *modifying Procedures Established for Arbitration of Interconnection Agreements Between Verizon and AT&T, Cox, and WorldCom*, CC Docket Nos. 00-218, 00-249, and 00-251, Public Notice, 16 FCC Rcd 3957 (2001) (*Procedural Public Notice*).

[16] Because AT&T and WorldCom jointly filed cost studies and jointly filed most of their supporting testimony and post-hearing briefs, we generally refer to them collectively as AT&T/WorldCom. In instances in which either AT&T or WorldCom individually supports a position, that party will be referred to individually.

[17] *See Procedural Public Notice* at 3-4.

9. *Discovery*. The *Procedural Public Notice* established general guidelines governing the discovery process. Pursuant to the schedule set by the Bureau, discovery began on May 31, 2001, and, after various extension requests from the parties, concluded for non-switching cost issues on September 26, 2001. In response to Verizon's revised switching cost studies, we permitted additional discovery on these filings. The parties were permitted to obtain discovery through document requests, interrogatories, oral depositions, and requests for admissions.

10. *Evidentiary Hearing*. The evidentiary hearing for cost issues, at which the parties submitted documentary evidence and, along with Bureau staff, examined witnesses, was held on October 22-25, 29-31, and November 1, 2001 for all cost issues other than switching, and on November 28-29, 2001 for switching costs and other issues affected by the filing of Verizon's revised cost studies. The hearing was transcribed, and a copy of the transcript was filed with the Secretary of the Commission for inclusion in the record.

11. *Post-Hearing Briefs*. The parties filed initial post-hearing briefs on cost issues, exclusive of switching costs, on December 21, 2001. The parties filed briefs on switching cost issues on January 17, 2002. Reply briefs on all cost issues were filed on January 31, 2002.

B. Outstanding Motions

12. As stated in the *Non-Cost Arbitration Order*, we apply several guiding principles in deciding procedural motions.[18] First, we recognize the importance of a full and robust record to decide the unresolved issues presented by the parties. To that end, we generally rule on the side of allowing evidence offered by a party into the record and then according it the appropriate evidentiary weight. Next, we consider whether the parties were afforded a meaningful opportunity to examine and respond to the submission (*e.g.,* revised cost model inputs). Finally, we note that this is a flexible process, and we do not rule in a manner that deters parties from revising their proposals either to reflect agreement reached during the proceeding or to acknowledge and address the other parties' stated concerns.

1. Verizon's Motion for Leave to File Corrected Non-Recurring Cost Study and Errata to Testimony

13. On November 29, 2001, Verizon filed a motion for leave to submit a corrected version of its non-recurring cost study and errata to its non-recurring cost testimony.[19] Specifically, Verizon seeks leave to make three filings. First, it seeks to make minimal corrections to the work times associated with a particular operations unit used in its non-

[18] *Non-Cost Arbitration Order*, 17 FCC Rcd at 27049, para. 19.

[19] *Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the Communications Act for Expedited Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration*, CC Docket Nos. 00-218, 00-249, and 00-251, Motion for Leave to File Corrected Non-Recurring Cost Study and Errata to Testimony (filed Nov. 29, 2001) (Verizon NRCM Motion).

recurring cost study and to revise its proposed NRCs accordingly.[20] Verizon states that it provided the revised non-recurring cost study to petitioners on October 12, 2001.[21] Second, Verizon requests leave to file errata to certain testimony so that the testimony identifies the source of certain work times used in the non-recurring cost study.[22] Third, Verizon seeks to file a revised version of its non-recurring cost model which uses work times for a particular operations group from a year 2000 Anderson Consulting study rather than the 1999 Verizon study used in the original cost study.[23] Verizon states that it is not proposing that this revised study be used in place of its earlier study, but rather that it is filing this study should we prefer to use it.[24]

14. We grant Verizon's motion and admit the corrected testimony and revised non-recurring cost studies. Neither AT&T nor WorldCom responded to the Verizon motion. Admitting these materials into the record is consistent with our goal of ensuring a complete and robust record. Moreover, we note that Verizon provided the corrected information and cost study to AT&T and WorldCom in advance of the hearings on these issues, and they therefore had the opportunity to cross-examine Verizon on, and otherwise respond to, these changes. Finally, grant of the motion does not itself determine the evidentiary weight, if any, that we will afford Verizon's submissions, which we address below when considering the merits of the relevant issues.

2. Verizon's Submission of Additional Record Evidence

a. Positions of the Parties

15. *September 2002 Filing*. On September 13, 2002, Verizon filed additional record evidence, including a declaration of Louis D. Minion.[25] In this filing, Verizon seeks to increase the Gross Revenue Loading Factor used in its annual cost factors (ACFs) to correct what Verizon contends are understated uncollectible revenues from competitive local exchange carriers (LECs) reflected in the original Gross Revenue Loading Factor.[26] Verizon claims that dramatic changes in market conditions necessitate the substitution of actual Verizon 2001 data

---

[20] *Id.* at 1-2, 5.

[21] *Id.* at 2.

[22] *Id.* at 1-2, 5, Attach. A.

[23] *Id.* at 1-5.

[24] *Id.* at 2, 4.

[25] *Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the Communications Act for Expedited Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration*, CC Docket Nos. 00-218, 00-249, and 00-251, Verizon Virginia Inc.'s Submission of Additional Record Evidence (filed Sept. 13, 2002) (Verizon New Evidence Filing).

[26] Verizon New Evidence Filing at 1-2; Verizon New Evidence Filing, Declaration of Louis D. Minion at paras. 2-4, 8-10 (Verizon New Minion Decl.).

for the 1999 surrogate data originally included by Verizon in its cost studies.[27]

16. On September 30, 2002, AT&T filed an opposition to Verizon's submission of additional evidence.[28] AT&T argues that we should reject Verizon's filing for three reasons. First, AT&T states that it would be procedurally inappropriate to admit new evidence well after the record has closed – 316 days after the hearings concluded and 225 days after the reply briefs were filed.[29] According to AT&T, none of the petitioners has had or will have the opportunity to respond to the new evidence proffered by Verizon short of our re-opening the proceeding for additional filings and hearings.[30] Second, AT&T argues that it would be inappropriate for the Bureau to re-open the record solely to address a single cost input.[31] AT&T notes that cost inputs are continually changing, but cost proceedings analyze costs at a particular point in time; otherwise, the proceedings would never end.[32] Finally, AT&T claims that the current high level of uncollectibles is a temporary situation, which therefore does not justify an increase in the costs recoverable in a long-run cost model.[33]

17. *November 2002 and April 2003 Filings*. On November 22, 2002, Verizon filed a motion to permit the parties to supplement the record.[34] In this filing, Verizon claims that there have been significant legal and factual developments since the cost studies were filed and the hearings concluded, and that the Commission would benefit from hearing from the parties on these developments prior to rendering a decision.[35] In particular, Verizon argues that the decision of the United States Supreme Court in *Verizon v. FCC*,[36] the decisions of the United

---

[27] Verizon New Evidence Filing at 1-6; Verizon New Minion Decl. paras. 6-10.

[28] *Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the Communications Act for Expedited Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration*, CC Docket Nos. 00-218, 00-249, and 00-251, Opposition of AT&T Communications of Virginia LLC to Verizon Virginia Inc.'s Submission of Additional Record Evidence (filed Sept. 30, 2002).

[29] *Id*. at 2, 4-6.

[30] *Id.* at 4, 6.

[31] *Id.* at 2-3, 6-14.

[32] *Id.* at 2, 6-8.

[33] *Id.* at 3, 15-18.

[34] *Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the Communications Act for Expedited Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration*, CC Docket Nos. 00-218, 00-249, and 00-251, Verizon Virginia Inc.'s Motion to Permit Parties to Supplement the Record (filed Nov. 22, 2002) (Verizon Motion to Re-open the Record).

[35] *Id.* at 1-2, 7.

[36] 535 U.S. 467 (2002).

States Court of Appeals for the District of Columbia Circuit in *Competitive Telecommunications Ass'n v. FCC*[37] and in *United States Telecom Ass'n v. FCC*,[38] and the section 271 decisions of the Commission warrant additional filings by the parties to advise us of their relevance to this proceeding.[39] Verizon similarly argues that dramatic changes in the telecommunications market warrant additional filings by the parties to explain how these changes have affected key cost issues, most notably the cost of capital and uncollectibles.[40] Verizon claims that, because these legal and factual developments would be sufficient grounds for the Bureau to grant a reconsideration petition, it would be better to consider them prior to rendering a decision.[41] To limit the scope of the supplemental proceeding, Verizon proposed the following procedural schedule: (1) two weeks after the record re-opens, each side could file up to 25 pages of briefs, 75 pages of testimony, and any necessary supporting documentation; (2) two weeks later, each side could file up to 25 pages of rebuttal briefs, 75 pages of rebuttal testimony, and any necessary supporting documentation; and (3) one week later, each side could file reply briefs.[42]

18. AT&T and WorldCom each submitted oppositions to the Verizon motion to re-open the record.[43] They both allege that Verizon failed to present any legitimate reason to re-open the record and that Verizon, instead, seeks to delay the release of this order.[44] AT&T and WorldCom state that none of the court or Commission decisions cited by Verizon changed the law applicable to this proceeding.[45] AT&T also notes that the Bureau is capable of determining the impact, if any, of recent legal decisions.[46] AT&T further argues that new legal decisions fail

---

[37] 309 F.3d 8 (D.C. Cir. 2002).

[38] 290 F.3d 415.

[39] Verizon Motion to Re-open the Record at 1-5.

[40] *Id.* at 5-6.

[41] *Id.* at 2-3 (citing 47 C.F.R. § 1.106(b)(2)(i)).

[42] *Id.* at 8.

[43] *Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the Communications Act for Expedited Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration*, CC Docket Nos. 00-218, 00-249, and 00-251, Opposition of AT&T Communications of Virginia LLC to Motion of Verizon Virginia Inc. to Supplement the Record (filed Dec. 9, 2002) (AT&T Re-open Opposition); *Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the Communications Act for Expedited Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration*, CC Docket Nos. 00-218, 00-249, and 00-251, Opposition of WorldCom, Inc. to Verizon Virginia Inc.'s Motion to Permit Parties to Supplement the Record (filed Dec. 9, 2002) (WorldCom Re-open Opposition).

[44] AT&T Re-open Opposition at 1; WorldCom Re-open Opposition at 1.

[45] AT&T Re-open Opposition at 2, 8-9; WorldCom Re-open Opposition at 2.

[46] AT&T Re-open Opposition at 2. AT&T, nevertheless, devotes the next several pages of its opposition to providing its interpretation of these decisions. *Id*. at 2-5.

to comprise "facts not previously presented" under the Commission's reconsideration standards, even were such standards applicable to delaying agency action, which AT&T states they are not.[47] AT&T and WorldCom similarly claim that the parties introduced sufficient evidence into the record for the Bureau to render its decision without re-opening the record to admit additional evidence.[48] WorldCom, moreover, alleges that Verizon failed to allege any factual information that it could not have introduced during the hearing.[49] In addition, WorldCom notes that, costs will invariably change between the time a record is closed and the regulator sets rates.[50] This lag time, states WorldCom, is inherent in ratemaking and is a feature of the Commission's total element long run incremental cost (TELRIC) pricing methodology that the Supreme Court has noted with approval.[51] Finally, both AT&T and WorldCom claim that if the record were to be re-opened they would need considerably more time than Verizon proposes to determine which issues require additional testimony, and to seek discovery and to cross-examine Verizon's witnesses.[52] Re-opening the proceeding, petitioners therefore allege, would risk never reaching resolution.[53]

19. Verizon responds to these oppositions by claiming that it does not desire delay, but rather seeks to ensure that the rates are not outdated upon adoption.[54] Legal and market conditions have changed since the hearing concluded, and it is not unusual for parties to provide the Commission with information on the impact of these sorts of changes.[55] Further, Verizon claims that imposing short time frames and page limits on any subsequent filings would minimize any delay caused by re-opening the record.[56] Finally, Verizon posits that, because AT&T and WorldCom argue that nothing has changed to warrant re-opening the proceeding, they would not raise new issues and it would, therefore, be a simple matter for AT&T and

---

47 *Id.* at 8; *see* 47 C.F.R. § 1.106(c).

48 AT&T Re-open Opposition at 5-7; WorldCom Re-open Opposition at 3-4.

49 WorldCom Re-open Opposition at 1.

50 *Id.* at 3-4.

51 *Id.* at 4 (citing *Verizon v. FCC*, 535 U.S. at 505-06).

52 AT&T Re-open Opposition at 4-7; WorldCom Re-open Opposition at 5.

53 AT&T Re-open Opposition at 7; WorldCom Re-open Opposition at 5.

54 *Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the Communications Act for Expedited Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration*, CC Docket Nos. 00-218, 00-249, and 00-251, Verizon Virginia Inc.'s Reply to Oppositions of WorldCom Inc. and AT&T Communications of Virginia LLC to Motion of Verizon Virginia Inc. to Supplement the Record at 1 (filed Dec. 16, 2002).

55 *Id.* at 1-2.

56 *Id.* at 1, 3.

WorldCom to file within Verizon's suggested schedule.[57]

20. On April 15, 2003, Verizon, on its own initiative, submitted a proffer of supplemental evidence, which was accompanied by four supplemental submissions of testimony and an additional cost study.[58]

b. Discussion

21. We reject Verizon's submission of additional evidence[59] and deny its motion to re-open the record. As petitioners correctly note, rate cases must end,[60] or rates would never be set. Cost model input data invariably change during the pendency of a ratemaking case. This is not the rare situation where something new and unexpected has occurred; rather, it is the norm. Indeed, the Supreme Court expressly noted that TELRIC rates contain "built-in lags in price adjustments."[61] Verizon itself, moreover, correctly stated elsewhere in this proceeding that cost model inputs necessarily are "snapshots" of the information known at the time a cost model is filed.[62]

22. Although changing circumstances may, at some point, require a cost case to be re-opened, Verizon has failed to demonstrate that such circumstances are present here. First, with regard to court and Commission decisions issued since the record closed, we are fully capable of determining their impact on this proceeding. Second, with regard to alleged factual developments, Verizon failed to show new developments that it was unable to address during the hearings and subsequent briefing. For example, Verizon devoted over 30 pages of its post-hearing briefs and hundreds of pages of written testimony and exhibits to the issue of cost of capital.[63] The record thus contains sufficient information for us to render our decision on this issue without re-opening the record.

---

[57] *Id.* at 4.

[58] *Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the Communications Act for Expedited Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration*, CC Docket Nos. 00-218, 00-249, and 00-251, Verizon Virginia Inc.'s Proffer of Supplemental Evidence (filed April 15, 2003) (Verizon Supplemental Proffer).

[59] Verizon did not file a motion for leave to submit additional evidence when it submitted the Verizon New Evidence Filing and the Verizon Supplemental Proffer. We do not treat these failures as dispositive in this instance, but rather will address Verizon's submissions as if the appropriate motion for leave had been filed.

[60] *See Commonwealth of Virginia, ex rel. State Corp. Comm'n v. Virginia Elec. and Power Co.*, 1988 WL 166804 at *12 (VA. Corp. Com.) (1988) ("Rate cases have to end."); *accord Old Dominion Elec. Coop. v. Virginia Elec. and Power Co.*, 237 Va. 385, 396 (1989).

[61] *Verizon v. FCC*, 535 U.S. at 505.

[62] *See* Verizon NRCM Motion at 4.

[63] *See* Verizon Initial Cost Brief at 42-55; Verizon Reply Cost Brief at 24-44.

23. Finally, we disagree with Verizon that the record could be re-opened without considerably delaying the conclusion of this proceeding. If we were to permit Verizon to submit additional testimony, supporting documentation, and briefs on issues that it asserts require updating, we would similarly need to permit AT&T and WorldCom to identify issues that they believe require updating. Contrary to Verizon's assertion, the mere fact that AT&T and WorldCom oppose re-opening the record does not mean that, if we granted Verizon's motion, they would not seek to file new evidence on distinct sets of issues. Further, the procedures under which we have conducted this arbitration have permitted discovery and cross-examination. It would be improper for us to allow new evidence into the record without providing the parties and staff the opportunity to examine the materials presented through discovery and cross-examination, particularly when this evidence includes testimony by a Verizon witness new to the proceeding[64] and a new cost study.[65]

C. Standard of Review

24. Section 252(c)(2) of the Act requires that arbitrated rates be established in accordance with section 252(d).[66] In setting rates in this arbitration, the Commission's rules require that we utilize "final offer" or "baseball" arbitration.[67] We may depart from final offer arbitration if a final offer submitted by one or more parties fails to comply with the requirements of the Commission's rules, or if we determine that unique circumstances warrant another result because it would better implement the Act.[68] In such situations, the Bureau has discretion to direct the parties to submit new final offers or to adopt a result not submitted by any party that is consistent with section 252 of the Act and the Commission's rules adopted pursuant to that section.[69]

25. Finally, we note briefly that, in addressing the parties' disputes, we attempt to dispose fully of the substantive issues that the parties have presented and to provide adequate direction on how the parties should memorialize our decision in the rate attachments to their interconnection agreements. As discussed above, our decision may take the form of adopting or rejecting a proffered position, or adopting one side's position in modified form. We emphasize,

---

64 *See* Verizon Supplemental Proffer (Garzillo Supplemental).

65 *See* Verizon Supplemental Proffer (Garzillo Supplemental), at 2-16 and attached CD-ROM.

66 *See* 47 U.S.C. § 252(c)(2); 47 C.F.R. § 51.807(c)(2). *See infra* section III(A) for a discussion of the requirements of section 252(d); *see also Non-Cost Arbitration Order*, 17 FCC Rcd at 27053-56, paras. 29-35 (discussing the standard of review in an arbitration generally).

67 *See* 47 C.F.R. § 51.807(b), (d). For purposes of this proceeding, we consider the positions taken by the parties in their briefs and in the last cost study filed to be their final offers.

68 *See* 47 C.F.R. § 51.807(f)(3); *Arbitration Procedures Order*, 16 FCC Rcd at 6232, paras. 4-6.

69 *See Non-Cost Arbitration Order*, 17 FCC Rcd at 27054, para. 30 (citing 47 C.F.R. § 51.807(f)(3); *Arbitration Procedures Order*, 16 FCC Rcd at 6232, para. 5).

however, that we have largely restricted ourselves to addressing the issues that the parties have directly placed at issue through their presentations during the hearings we conducted and through their post-hearing briefs. There may be instances in which we have not specifically spoken to a particular cost input or assumption because no party addressed it in its advocacy, although it may have appeared in the cost studies or opposing workpapers that the parties submitted.[70]

D. True-Up

26. In the *Arbitration Procedures Order*, the Commission required that any arbitration award issued by the Bureau pursuant to delegated authority establishing rates for interconnection, resale, or UNEs must contain a requirement that the arbitrated interconnection agreements contain a true-up provision.[71] This true-up provision will apply in the event that the Commission ultimately modifies any rates that we establish and must ensure that no carrier is disadvantaged by our orders in the event that they are subsequently modified by the Commission on review.[72] Accordingly, in the event that the Commission, on review, establishes rates that differ from those established in this order or in any subsequent Bureau order addressing the parties' compliance filings,[73] any rates established by the Bureau shall be trued-up to the rates ordered by the Commission. Any such true-up shall apply retroactively to the effective date of the Bureau's order adopting rates, which, as we explain below, shall be the effective date of our forthcoming order on the parties' compliance filings. Payment of the net true-up amount owed by the appropriate party to the interconnection agreement shall be made to the other party to the agreement in accordance with the billing practices and other relevant provisions delineated in the agreement. To the extent that there is a disagreement between the parties as to the amount of any such true-up or to the appropriate true-up procedures, such disagreement shall be subject to the dispute resolution provisions of the respective interconnection agreement.

III. OVERARCHING ISSUES

A. Economic Theory of TELRIC Pricing

27. Section 252(d)(1) provides that rates for interconnection and unbundled elements shall be "based on the cost (determined without reference to a rate-of-return or other rate-based proceeding) of providing the interconnection or network element" and "may include a reasonable profit."[74] As the Supreme Court noted, section 252(d)(1) is "radically unlike all previous

---

[70] For example, for UNEs other than loops, switching, transport, operations support systems, and the daily usage file, AT&T/WorldCom simply state that their proposed adjustments to Verizon's rates are contained in their workpapers. AT&T/WorldCom Ex. 12 (Recurring Cost Panel Rebuttal), at 95-96.

[71] *Arbitration Procedures Order*, 16 FCC Rcd at 6233, para. 10.

[72] *Id*.

[73] *See infra* section XIII.

[74] 47 U.S.C. § 252(d)(1).

statutes" and "appears to be an explicit disavowal of the familiar public-utility model of rate regulation . . . in favor of novel ratesetting designed to give aspiring competitors every possible incentive to enter local retail telephone markets, short of confiscating the incumbents' property."[75]

28. In the *Local Competition First Report and Order*, the Commission adopted guidelines to be applied by state commissions when they are called on to arbitrate disputes regarding the prices for interconnection and unbundled network elements pursuant to section 252(d).[76] Specifically, the Commission adopted a forward-looking economic cost methodology, which it called "Total Element Long Run Incremental Cost" or "TELRIC."[77] The Supreme Court affirmed the Commission's TELRIC rules in *Verizon v. FCC*,[78] and it is those rules that we must apply in this arbitration proceeding.

29. The TELRIC of an element is the sum of three components – operating expenses, depreciation expense, and cost of capital:[79]

- *Operating expenses* are the annual costs associated with operating a particular asset. As we explain in section III(E) below, we generally will calculate operating expenses by multiplying the *network investment* associated with a particular element by *ACFs*. We derive network investment through the use of cost models, which we describe in section III(B) below.

- *Depreciation* is the mechanism by which the network investment in an asset is recovered over the life of the asset. In describing the TELRIC methodology, the Commission stated that regulators should use "economic depreciation" that "reflects the true changes in economic value of an asset" in calculating depreciation expense.[80] We discuss depreciation in section III(D) below.

- *Cost of capital, i.e.*, the cost of obtaining debt and equity financing, reflects the amount investors would demand to compensate for the risks of investing in the enterprise. In the *Local Competition First Report and Order*, the Commission stated

---

75 *Verizon v. FCC*, 535 U.S. at 489.

76 *See generally Local Competition First Report and Order*, 11 FCC Rcd at 15812-83, paras. 618-766; 47 C.F.R. §§ 51.501 – 51.511. The Commission also concluded that rates for reciprocal compensation under section 252(d)(2) should be based on the same principles. *Local Competition First Report and Order*, 11 FCC Rcd at 16023, para. 1054.

77 *Id.* at 15844, para. 672.

78 535 U.S. at 467.

79 *See Local Competition First Report and Order*, 11 FCC Rcd at 15856, para. 703.

80 *Id*.

that regulators should adjust the cost of capital to reflect the risks faced by the incumbent as competition is introduced into its local market.[81] We discuss cost of capital in section III(C) below.

30. Based on the Commission's finding that prices in a competitive market will tend toward long-run incremental cost,[82] the TELRIC methodology is designed to derive prices for particular elements in the incumbent LEC's network that "replicate[], to the extent possible" what the incumbent LEC would be able to charge in a competitive market.[83] Specifically, TELRIC equates the current market value of the existing network of an incumbent telecommunications provider with the cost the incumbent would incur today if it built a local network that could provide all the services its current network provides to meet reasonably foreseeable demand using the least-cost, most-efficient technology currently available.[84] The Commission's decision to equate the current value of existing equipment with the forward-looking cost of currently available equipment "rests on the rational economic assumption that, as new more efficient equipment becomes available, the value of older, less efficient equipment will be affected."[85]

31. In the *Triennial Review Order*, the Commission clarified the existing rules with respect to two key components of TELRIC – cost of capital and depreciation.[86] The Commission made clear that, in establishing a TELRIC-based cost of capital, state commissions must reflect the risk of participating in a market with facilities-based competition.[87] With respect to depreciation, the Commission declined to mandate a particular set of asset lives. The Commission did, however, clarify that it was appropriate for state commissions to employ accelerated depreciation in order to reflect accurately the anticipated decline in value of assets in a competitive market.[88]

---

81 *Id.*

82 *See id*. at 15845, para. 675.

83 *Id*. at 15846, para. 679.

84 *See id.* at 15848-49, para. 685. The Commission added one constraint on the design of the network: the new network must take as given the existing wire center locations. *Id.* at 15848-49, para. 685.

85 Reply Brief for Petitioners United States and Federal Communications Commission at 8, *Verizon Communications, Inc. v. FCC*, 535 U.S. 467 (2002) (Nos. 00-511, 00-555, 00-587, 00-590, 00-602) (FCC Reply Brief). As the Supreme Court noted, "what the incumbents call the 'hypothetical' element is simply the element valued in terms of a piece of equipment an incumbent may not own." *Verizon v. FCC*, 535 U.S. at 501.

86 *Triennial Review Order*, paras. 680-83, 689-90.

87 *Id.* at para. 680.

88 *Id.* at para. 690.

32. In applying the UNE pricing rules, we are mindful of the Supreme Court's finding that TELRIC does not require an assumption of a perfectly competitive or perfectly efficient market.[89] Accordingly, in calculating rates under TELRIC, we do not need to assume that one or more hypothetical ubiquitous facilities-based competitors exist today. Rather, consistent with the approach adopted in 1996, TELRIC requires us to assume that, in the long run,[90] the existence of widespread facilities-based competition (and the corresponding erosion of the incumbent LEC's market power) will constrain the pricing of UNEs. Similarly, we interpret the requirement to use the "most efficient technology currently available" to mean that the incumbent LEC and its competitors will deploy current technology over a period of time and, in the long run, this technology will be deployed ubiquitously. The assumption that competition will drive incumbent LECs to deploy new technology is fully consistent with the empirical evidence cited by Verizon witness Shelanski.[91]

33. We decline to consider Verizon's proposal that the appropriate network assumptions reflect only technology deployment that is planned over the next three to five year period.[92] The *Local Competition First Report and Order* states that UNE rates shall reflect "long run" costs, meaning "a period long enough that all costs are treated as variable and avoidable."[93] To our knowledge the Commission's rules and orders do not otherwise address whether the period proposed by Verizon meets this standard, and Verizon has not demonstrated in the context of this proceeding that its proposal complies with the Commission's current requirements. Verizon's proposal therefore is beyond the scope of this proceeding.

34. We agree with Verizon that it is rational for a company to continue to use capital equipment that is no longer state-of-the-art. The TELRIC rules, however, recognize that the value of such equipment in a competitive market will be no higher than the market value of newer, more efficient equipment that performs the same functions.[94] In other words, even if

---

89 *See Verizon v. FCC*, 535 U.S. at 504.

90 *See Local Competition First Report and Order*, 11 FCC Rcd at 15845, 15851, paras. 677, 692. The long run approach "ensures that rates recover not only the operating costs that vary in the short run, but also fixed investment costs that, while not variable in the short term, are necessary inputs directly attributable to providing the element." *Id*. at 15851, para. 692.

91 Verizon Ex. 101 (Shelanski Direct), at 17. Specifically, Dr. Shelanski's testimony cites an article he published in 2000 which concluded that there is a "positive correlation between competition and adoption of new technology." Howard A. Shelanski, *Competition and Deployment of New Technology in U.S. Telecommunications*, 2000 U. CHI. LEGAL F. 85 (2000); *id*. at 115 ("When deployment times and market structures are matched, faster deployment times correlate with more competitive markets. . . . [A]verage deployment times speed up as markets become more competitive.").

92 *See, e.g.,* Verizon Ex. 101, at 16-29.

93 *See Local Competition First Report and Order*, 11 FCC Rcd at 15851, para. 692; *see also* 47 C.F.R. §51.505(b).

94 FCC Reply Brief at 8-9.

there are valid reasons for Verizon not to deploy particular equipment, the prices Verizon could charge for network elements in a competitive market still would be affected by the deployment of more efficient equipment unless there are reasons why no carrier would deploy the particular equipment.

B. Selection of a Recurring Cost Model

35. In order to establish the recurring rates that Verizon may charge petitioners, we resolve two critical categories of issues. First, as states usually have done in these arbitrations, we determine the appropriate cost model(s) to use to generate rates. Second, we determine the appropriate inputs and assumptions (*e.g.*, network design assumptions, investment inputs) to be used in the cost model(s). We address generally the modeling issue here; we will address it in greater detail, together with the input issues, in the sections specific to individual UNEs.[95]

36. Both AT&T/WorldCom and Verizon submitted recurring cost models. We analyze the parties' proposed cost models for access to UNEs and interconnection[96] and apply the baseball arbitration rules discussed above[97] in order to choose between the parties' competing cost model proposals. So long as the cost model sponsored by one side for a particular UNE or method of interconnection comports with the requirements discussed herein, we are required to consider that model a valid option for generating rates. If both sides propose competing models, and if both models generally comport with our basic requirements, then we will adopt the model that more fully complies with the Commission's costing rules and principles. Thus, although none of the proposed cost models may represent the perfect model, we will use the model presented that best complies with Commission rules and precedent.

1. Introduction

37. We establish rates in this arbitration through the use of economic cost models.[98] In the *Local Competition First Report and Order* and the rules promulgated thereby, the Commission provided general guidance regarding the type of economic cost model(s) necessary to generate rates for access to UNEs and interconnection. Most important, a cost model must be consistent with the TELRIC methodology.[99] This methodology requires that rates be determined

---

95 *See infra* sections IV (loops), V (switching), VI (transport), VII (access to OSS), and VIII (DUF).

96 Because the legal standard for establishing the wholesale discount for resold incumbent LEC services is governed by a separate, independent standard, we analyze this issue separately, *infra*, in section XII**.** *Compare* 47 U.S.C. § 252(d)(3) *with* 47 U.S.C. § 252(d)(1), (2).

97 *See supra* section II(C).

98 *See Local Competition First Report and Order*, 11 FCC Rcd at 15850-56, at paras. 690-703; 47 C.F.R. § 51.505(e).

99 47 C.F.R. § 51.505(e); *see also* 47 C.F.R. §§ 51.501 *et. seq*.

based on the forward-looking economic costs of the UNE or method of interconnection,[100] assuming a network design that uses the least-cost, most efficient technology currently available, but also assuming the existing wire center locations of the incumbent LEC.[101] Specifically, the rates for each UNE must equal the forward-looking long-run costs of the total quantity of the UNE (based on current and reasonably projected future demand) that are directly attributable to, or reasonably identifiable as incremental to, the element, plus a reasonable allocation of forward-looking common costs.[102] Embedded costs (including those in the incumbent LEC's book of accounts), retail costs, opportunity costs, and revenues used to subsidize other services may not be considered when determining the forward-looking economic cost of a UNE.[103] As discussed above,[104] by basing UNE costs on forward-looking economic costs, the Commission sought to replicate the prices that would exist in a competitive market.[105] The Commission thus adopted a pricing methodology that would send appropriate signals for competitive entry and investment.[106]

38. Subsequently, in the universal service proceeding, the Commission provided additional guidance regarding the proper criteria for forward-looking cost methodologies. In particular, the Commission delineated ten criteria that should be used in making forward-looking economic cost determinations.[107] Some of these criteria offer specific guidance on developing forward-looking cost models. Notably, a cost model "must include the capability to examine and modify the critical assumptions and engineering principles."[108] Underlying data must be verifiable, network design assumptions must be reasonable, and model outputs must be plausible.[109] All data, formulas, and other aspects of the models must be made available to other

[100] Unless otherwise indicated in this order, the Commission rules and orders that delineate pricing standards apply equally to establishing rates both for access to UNEs and for methods of interconnection. To simplify the drafting, however, we will generally refer only to UNEs in the text of this order.

[101] 47 C.F.R. § 51.505(b).

[102] 47 C.F.R. §§ 51.505(a)-(c).

[103] 47 C.F.R. § 51.505(d). Some historic cost information may, however, be probative of forward-looking costs and may be considered for that purpose.

[104] *See supra* section III(A).

[105] *See Local Competition First Report and Order*, 11 FCC Rcd at 15846-15847, para. 679.

[106] *See Local Competition First Report and Order*, 11 FCC Rcd at 15844, 15848-89, paras. 672, 685; Brief for Petitioners United States and Federal Communications Commission at 11, *Verizon Communications, Inc. v. FCC*, 535 U.S. 467 (2002) (Nos. 00-511, 00-555, 00-587, 00-590, 00-602) (FCC Brief); *see also Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, First Report and Order, 12 FCC Rcd 8776, 8899, para. 224 (1997) (*Universal Service First Report and Order*), as corrected by *Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, FCC 97-157, Errata (rel. June 4, 1997) (subsequent history omitted).

[107] *Universal Service First Report and Order*, 12 FCC Rcd at 8912-16, para. 250.

[108] *Id.* at 8915, para. 250(9).

[109] *Id.* at 8915, para. 250(8).

parties for their evaluation.[110] In other words, a cost model must be transparent and verifiable.

39. The Commission applied these various criteria to develop a cost model – the Synthesis Model (SM) – for use in determining universal service support.[111] This is the only instance in which the Commission has directly applied forward-looking costing principles to create a cost model. In the *Platform Order*, the Commission adopted network architecture, including outside plant, switching, and interoffice network assumptions, for use in a forward-looking cost model.[112] In so doing, the Commission noted that loop costs were more important than switching costs for universal service purposes,[113] and it therefore devoted considerably more analysis to determining outside plant architecture than central office and interoffice plant architectures.[114] Subsequently, in the *Inputs Order*, the Commission made key determinations regarding the particular inputs to the model.[115]

2. Positions of the Parties

40. Verizon proposes rates for each of the UNEs that it offered petitioners as of the date it submitted its cost studies.[116] These UNEs include loops (of varying capacities), subloops, the network interface device (NID), digital subscriber line technology (commonly referred to as xDSL) loop qualification, enhanced extended link testing, line sharing options, transport (common, dedicated, and dark fiber), entrance facilities, switching, signaling, call-related databases, customized routing, daily usage files (DUF), service messaging systems, and operations support systems (OSS).[117]

41. Verizon submitted myriad cost studies to generate rates for these UNEs.[118] For

---

[110] *Id*.

[111] *See Federal-State Joint Board on Universal Service*, CC Docket Nos. 96-45 and 97-160, Fifth Report and Order, 13 FCC Rcd 21323 (1998) (*Platform Order*); *Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, Tenth Report and Order, 14 FCC Rcd 20156 (1999) (*Inputs Order*), *aff'd Qwest Corp. v. FCC*, 258 F.3d 1191 (10th Cir. 2001).

[112] *See generally Platform Order*, 13 FCC Rcd 21323.

[113] *Id.* at 21354-55, para. 75.

[114] *Compare id.* at 21335-53, paras. 26-70 (discussion of loop model platform), *with id*. at 21353-57, paras. 71-80 (discussion of switching and interoffice platform).

[115] *See generally Inputs Order*, 14 FCC Rcd at 20156. The model adopted by the Commission is called the "Synthesis Model" because, in developing the platform and inputs to determine forward-looking loop costs, the Commission melded the best aspects of the different cost models presented to it. *See id.* at 20162-63, para. 8.

[116] *See* Verizon Ex. 100 (Cost Study), Summary of Costs.

[117] *See id*.; Verizon Ex. 107 (Recurring Cost Panel), at 15.

[118] *See* Verizon Ex. 100P (Cost Study), Vols. I-VIII, XI-XII, XV-XVI (confidential version).

loops (excluding DS-3 loops), switching, and signaling, Verizon submitted computer cost models. For loops Verizon submitted a cost study that includes its Loop Cost Analysis Model (LCAM), for switching Verizon submitted a cost study that includes Telcordia™ Technologies, Inc.'s (Telcordia) Switching Cost Information System (SCIS) model, and for signaling Verizon submitted Telcordia's Common Channel Signaling Cost Information System model.[119] For other UNEs, including transport, Verizon submitted individual spread sheet-based studies.[120] Some of the spread sheet studies submitted by Verizon also rely, in part, on the LCAM or SCIS computer models. For example, the subloop cost studies (excluding DS-3 subloop feeder) rely in part on the LCAM.[121] We describe the Verizon cost studies for individual UNEs in more detail in the sections of this order that address those UNEs.

42. Verizon claims that it applied TELRIC principles in the network configuration and investment inputs used in its cost studies.[122] In particular, Verizon explains that it designed its studies generally to determine UNE costs based on the costs that Verizon anticipates it will incur at the end of its three-year study period based on the technology mix that it actually deploys in new growth areas today.[123] In so doing, Verizon used as its starting point its existing network configuration in Virginia.[124] Verizon then adjusts its technology assumptions for this network to represent the mix of technologies that Verizon deploys today in new growth areas.[125] In applying forward-looking adjustments to its existing network based on current engineering and deployment guidelines, Verizon maintains that, even on an efficient, forward-looking basis, Verizon will continue to be constrained by its existing network and investments.[126]

43. In developing its cost studies, Verizon first identified its material investments on a per available unit basis.[127] For its switching study only, it determined investments based on the percentage of expenditures on entirely new (or replacement) switches and on growth and upgrade switch equipment, and the vendor discount associated therewith.[128] In its various cost studies, Verizon applied utilization (*i.e.*, fill) factors to the material investments to determine

---

[119] *Id.*, Vols. I-III, V-VI, XI, XV (confidential version); Verizon Ex. 107, at 31.

[120] *See, e.g.,* Verizon Ex. 100P, Vol. VI, Part C-9, Vol. VII, Part D-2 (confidential version).

[121] *See id*., Vols. IV, Part B-8, Section 1.3.

[122] *See, e.g.*, Verizon Ex. 107, at 16; Verizon Initial Cost Brief at 2-3, 10-19; Verizon Reply Cost Brief at 1-11.

[123] *See* Verizon Initial Cost Brief at 2, 12; *see also* Verizon Ex. 107, at 17, 23-30.

[124] *See* Verizon Ex. 107, at 29-30.

[125] *See id*. at 16; Verizon Initial Cost Brief at 12.

[126] *See* Verizon Ex. 101, at 6-7; Verizon Initial Cost Brief at 2-3, 10-11, 20-21; Verizon Reply Cost Brief at 2-4.

[127] Verizon Ex. 107, at 17.

[128] *Id.* at 187-194; Verizon Ex. 122 (Recurring Cost Panel Surrebuttal), at 166-173.

those investments on a per unit in service basis.[129] Verizon then applied investment loading factors to these costs to account for engineering and installation costs, thereby determining the total installed investments.[130] Verizon calculated the forward-looking costs by applying ACFs to these total investments.[131]

44. AT&T/WorldCom challenge Verizon's cost studies, claiming that they fail to comply with TELRIC principles.[132] They claim that the Verizon cost studies inappropriately "take as a given Verizon's existing network in all its particulars,"[133] rather than assuming only the existing Verizon wire center locations.[134] Thus, AT&T/WorldCom argue that the Verizon studies are not designed to comply with TELRIC principles, but rather to recover Verizon's embedded costs.[135] In addition, AT&T/WorldCom contend that Verizon's studies, particularly the LCAM and the SCIS computer models, are neither transparent nor verifiable. In particular, they allege that inputs often are not documented and crucial algorithms are not subject to change by the model user.[136]

45. AT&T/WorldCom submitted their own recurring cost model to generate rates for the 2-wire loop, common transport, switching, and signaling network elements.[137] Specifically, AT&T/WorldCom filed a modified version of the SM, which the Commission developed through a series of orders in the universal service proceeding.[138] AT&T/WorldCom term their cost model the Modified Synthesis Model (MSM). In most respects, including in particular the model's central design algorithms, the MSM remains the same model as that adopted by the Commission in the universal service proceeding.[139] For example, just as the original SM begins designing outside plant by assuming the existing incumbent LEC wire center locations and by using road surrogate data to locate customers, so does the MSM. Both models then use

---

[129] Verizon Ex. 107, at 34.

[130] *Id.* at 17.

[131] *Id.*

[132] *See, e.g.*, AT&T/WorldCom Initial Cost Brief at 13-21.

[133] *Id.* at 13.

[134] *Id.*

[135] *Id.* at 13-14.

[136] *See id.* at 46-48.

[137] *See* AT&T/WorldCom Ex. 1 (Pitkin Direct), at 1-2; AT&T/WorldCom Ex. 23 (Cost Study); AT&T/WorldCom Initial Cost Brief at 26-36.

[138] AT&T/WorldCom Initial Cost Brief at 26-36. *See, e.g.*, *Universal Service First Report and Order*, 12 FCC Rcd at 8776; *Platform Order*, 13 FCC Rcd at 21323; *Inputs Order*, 14 FCC Rcd at 20156.

[139] *See* AT&T/WorldCom Initial Cost Brief at 26-36.

algorithms to determine efficient outside plant routes to connect the customer locations to the wire center locations.[140] Although the MSM is substantially the same in construct as the underlying SM, AT&T/WorldCom made certain platform and cost input changes to the loop module, designed, they assert, to improve the model.[141] The switching and transport module of the MSM, and the calculations contained therein, remain the same as in the SM.[142]

46. Unlike the Verizon studies, however, the MSM generates rates for only a subset of the UNEs at issue in this proceeding. AT&T/WorldCom did not submit additional cost models to generate rates for the remaining universe of UNEs that Verizon makes available. Instead, they propose applying out-of-model calculations to the 2-wire loop costs determined by the MSM to generate rates for the 4-wire, DS-1, and DS-3 loop types.[143] For all other UNEs, AT&T/WorldCom propose corrections to Verizon's cost studies to restate the Verizon proposed rates.[144]

47. Verizon opposes the use of the MSM for generating UNE rates.[145] First, Verizon claims that AT&T/WorldCom's theory of "repeated, instantaneous, and complete network replacement" is neither economically correct nor required by TELRIC.[146] Verizon argues that AT&T/WorldCom's assumption of the existence of carriers capable of instantaneous and ubiquitous deployment of new technology and network design results in a model network that no carrier – neither Verizon nor any competitor – would ever deploy.[147] It claims that forward-looking costs should be based on efficiencies that are actually attainable, rather than unattainable, hypothetical costs.[148] Second, Verizon argues that the Commission has stated previously that any version of the universal service SM is inappropriate to use for determining UNE costs.[149] Third, Verizon challenges key aspects of the MSM as unverifiable.[150] Finally,

---

[140] *See infra* section IV(B).

[141] These changes include correcting implementation errors, updating vintage data, changing the common support calculations, and incorporating certain input changes. *See* AT&T/WorldCom Initial Cost Brief at 32-36. These changes are discussed, *infra*, in sections III(E)(2)(b), IV(B).

[142] *See* Verizon Switching Cost Brief at 26 (citing Tr. at 5193-94).

[143] *See* AT&T/WorldCom Ex. 1, at 1-23; AT&T/WorldCom Initial Cost Brief at 36, 167.

[144] *See* AT&T/WorldCom Ex. 12, at 1-171.

[145] *See, e.g.*, Verizon Initial Cost Brief at 133-50.

[146] *Id.* at 19-23; *see also* Verizon Reply Cost Brief at 1-3, 10-11.

[147] *See, e.g.*, Verizon Initial Cost Brief at 19-23; Verizon Reply Cost Brief at 12.

[148] *See* Verizon Initial Cost Brief at 2-3, 10-11, 20-21; Verizon Reply Cost Brief at 2-4.

[149] *See* Verizon Ex. 108 (Tardiff Rebuttal), at 7-8, 13-14; Verizon Ex. 109 (Murphy Rebuttal), at 47; Verizon Initial Cost Brief at 137-42.

[150] *See* Verizon Ex. 109, at 118; Verizon Initial Cost Brief at 148-49.

Verizon claims that it is inappropriate to use the MSM because the MSM does not model all of the UNEs that Verizon provides.[151]

3. Discussion

48. Commission precedent provides a number of criteria to guide our choice of cost models. First, any cost model we use should be consistent with TELRIC pricing principles (*i.e.*, it should be designed to calculate the cost of a network that uses the most efficient technology available, taking as a given the existing incumbent LEC wire centers).[152] Second, the model should be transparent.[153] That is, the logic and algorithms of the cost study should be revealed, understandable, capable of being adjusted by the parties and regulators, and not contain "black boxes." For example, if a cost model were presented in an electronic spreadsheet format, but all the formulas were concealed so that the regulator and other parties could not ascertain the underlying assumptions, the model would not be transparent. Third, any assumptions contained in the model should be verifiable.[154] Any data used to estimate costs should either be derived from public sources, or capable of verification and audit without undue cost or delay. Both sides claim that the models they have submitted in this proceeding satisfy these three criteria.

49. We find that the MSM better meets these three criteria for loops and that the Verizon cost studies better meet these criteria for switching, signaling, and transport. At the outset, we note that we do not find any of the cost models before us fundamentally inconsistent with forward-looking pricing principles. Rather, as we explain in this section and in the sections pertaining to each individual UNE, we adopt the cost model for a particular UNE that is more: (1) consistent with the Commission's TELRIC rules; (2) transparent and adjustable; and (3) verifiable.[155]

50. As a threshold matter, we note that the underlying SM was designed and approved by the Commission, in part, specifically because it met these three criteria.[156] The modifications made by AT&T/WorldCom do not affect the model's compliance with these criteria. First, the MSM is consistent with TELRIC principles because it attempts to model the most efficient technology available, while assuming the location of existing Verizon wire center locations. Second, the MSM is generally transparent. The SM has been available publicly for

---

[151] *See* Verizon Initial Cost Brief at 137-38.

[152] *See* 47 C.F.R. §§ 51.501-51.511; *Local Competition First Report and Order*, 11 FCC Rcd at 15844-56, paras. 672-703.

[153] *See Universal Service First Report and Order*, 12 FCC Rcd at 8912-16, para. 250.

[154] *See id*.

[155] *See infra* sections IV(B), V(A), and VI(A).

[156] *See Platform Order*, 13 FCC Rcd at 21325, 21327-31, 21342-43, 21345-46, 21349-50, paras. 4, 9-12, 15, 44-46, 53-54, 66; *Inputs Order*, 14 FCC Rcd at 20168-69, 20171, paras. 21-25, 29.

years for use in the universal service context, and the underlying algorithms and formulas have all been subject to review by many parties. Most of the algorithms and formulas that the MSM uses are identical to those in the SM. The modifications to the loop module of the MSM that AT&T/WorldCom propose in this proceeding were made available for examination by Verizon and Commission staff. Third, the assumptions in the MSM are verifiable. AT&T/WorldCom generally rely on public data for model inputs and, where no public data were available, they rely on data previously examined by the Commission following a period of public comment. For example, the line count data that AT&T/WorldCom propose to use in the loop module of the MSM are based on Verizon's Automated Reporting Management Information System (ARMIS) data, while the customer location data (for which there is no publicly available source of updated data) are the same data used by the Commission in the SM.

51. Verizon's criticisms of the MSM as an inappropriate TELRIC model fail to undermine a finding that the MSM satisfies these core model criteria. Verizon essentially claims that no version of the SM is capable of being used to generate UNE rates.[157] Verizon's allegation that the Commission has stated that the SM should not be used to generate UNE rates[158] goes too far. In the universal service *Inputs Order*, the Commission cautioned parties against using the nationwide input values, which the Commission adopted for universal service cost comparison purposes, in developing UNE rates.[159] The Commission, however, did not state that the model platform would be inappropriate for use in setting UNE rates.[160] To the extent there are disputes over the appropriate inputs to use in the MSM, we address those issues individually in the loop section of this order.[161]

52. With respect to loops, Verizon's cost study does not meet the model criteria as well as the MSM loop module does. In contrast to the MSM, the Verizon recurring loop cost study is not an economic cost model; it is an engineering cost study based on the Verizon network that exists, or existed in the past, in Virginia, presented in electronic database or spread sheet formats. For example, Verizon uses a survey from 1993 to 1995 to estimate an average loop length for specific distribution areas (DAs) or groups of DAs.[162] For other cost study assumptions, such as structure sharing, fill factors, and plant routes, Verizon also uses figures based solely on its actual experiences and network design.[163] Because of Verizon's extensive use of historical network design and data, its loop cost studies are not as consistent as the MSM loop

[157] *See* Verizon Initial Cost Brief at 139-40.

[158] *See id*.

[159] *See Inputs Order*, 14 FCC Rcd at 20172, para. 32

[160] *See infra* section IV(B)(2).

[161] *See infra* section IV(C).

[162] *See infra* section IV(B)1.

[163] *See infra id.*

module with the Commission's TELRIC rules, which require "use of the most efficient telecommunications technology currently available and the lowest cost network configurations," limited only by existing wire center locations.[164]

53. There are, moreover, serious issues of transparency and verifiability with the Verizon study, and in particular with the LCAM module. For example, it is not always possible for a third party to adjust the inputs or formulas (*e.g.*, line count data cannot be adjusted in Verizon's loop model).[165] Nor did Verizon provide the underlying source material for all of its inputs. For instance, Verizon has not submitted the loop studies that form the basis for its estimates of the average loop length per wire center, nor has it presented any detailed statistical summary of these loop studies.[166]

54. For similar reasons, we select the Verizon switching cost study, including the SCIS model, to determine switching costs instead of the MSM. The Verizon switching study better satisfies the Commission's TELRIC rules, in part, because it relies on more recent data than does the MSM.[167] AT&T/WorldCom rely on the SM switch cost inputs that were derived from 1989-1996 switching data.[168] Verizon, in contrast, uses switching data from 1996-2000, the most recent data then available.[169]

55. The Verizon switching cost study is also more transparent, adjustable, and verifiable than is the MSM switching module.[170] The most important switching cost inputs are the switch discounts – both the percentage of new versus growth switch equipment and the size of the vendor discounts applicable to each type of switch.[171] As we explain *infra* in the switching section, we find that neither side proposes appropriate new versus growth switch equipment assumptions.[172] We therefore determine independently the appropriate percentages of new and growth switch equipment. Only the SCIS model, and not the MSM, permits the user to modify the growth versus new switch percentages and associated vendor discounts. Further, the specific vendor discount figure used in the MSM is not identified. Thus, for these and other reasons we explain below, we find the Verizon switching cost study preferable to the AT&T/WorldCom

---

164 47 C.F.R. § 51.505(b)(1).

165 *See* AT&T/WorldCom Ex. 12, at 19.

166 *See id.* at 15-16.

167 *See infra* section V(A)(2).

168 *See Inputs Order*, 14 FCC Rcd at 20282, para. 299; Verizon Switching Cost Brief at 7.

169 Verizon Switching Cost Brief at 6.

170 *See id.* at 3 (citing Tr. at 5129).

171 *See infra* section V(A)(1).

172 *See infra* section V(C)(1)(b).

switching cost study.[173]

56. We also adopt the Verizon unbundled transport studies.[174] AT&T/WorldCom submit the MSM only for common transport, not dedicated transport.[175] Verizon, in contrast, submits cost studies for both.[176] AT&T/WorldCom, moreover, support the use of the Verizon dedicated transport study.[177] Both sides assume the use of the same forward-looking technology in their respective common transport studies, and both studies are transparent and permit the user to adjust the inputs.[178] With both studies satisfying the key criteria, we prefer the Verizon cost study because it calculates costs for common and dedicated transport using a consistent network design and consistent cost inputs.[179]

57. Finally, although Verizon is correct that AT&T/WorldCom propose to utilize the MSM to generate rates for only a limited set of UNEs,[180] AT&T/WorldCom generally propose restating the rates generated by the Verizon cost models for other UNEs.[181] Therefore, to the extent that only Verizon submitted a cost study for a particular UNE, we will rely on that study.[182]

C. Cost of Capital

1. Overview

58. In the *Local Competition First Report and Order*, the Commission stated that the objective of a TELRIC pricing methodology is to set prices equal to those a firm would charge in

---

[173] *See infra* section V(A)(2). Because signaling is usually purchased only when a competitive LEC also purchases switching, we adopt the Verizon signaling cost study. *See id*.

[174] *See infra* section VI(A).

[175] Tr. at 5551, 5559-62, 5599; AT&T/WorldCom Initial Cost Brief at 188-89; *see also* AT&T/WorldCom Ex. 7 (Turner Direct) at 3; Verizon Initial Cost Brief at 173.

[176] Verizon Ex. 100P, Parts C-9 (common transport) and D-2 (dedicated transport) (confidential version); Verizon Ex. 107, at 212-221.

[177] AT&T/WorldCom Initial Cost Brief at 180, 188-89; *see also* Tr. at 5559-63, 5599.

[178] *See infra* section VI(A).

[179] *See infra* section VI(A)(2).

[180] *See* Verizon Initial Cost Brief at 137-78.

[181] *See* AT&T/WorldCom Ex. 12, at 95-96.

[182] *See infra* section IX.

a competitive market.[183] It decided that TELRIC includes a normal profit equal to the cost of capital.[184] The Commission stated that the "currently authorized rate of return at the federal or state level is a reasonable starting point," and that incumbent LECs "bear the burden of demonstrating with specificity that the business risks they face providing unbundled network elements and interconnection services would justify a different risk-adjusted cost of capital."[185] The Commission went on to say that "[s]tates may adjust the cost of capital if a party demonstrates to a state commission that either a higher or lower cost of capital is warranted."[186] The Supreme Court upheld the Commission's treatment of cost of capital in its decision affirming the Commission's TELRIC rules.[187]

59. In the *Triennial Review Order*, the Commission clarified two aspects of the proper calculation of a cost of capital in a TELRIC proceeding. First, the Commission stated that a TELRIC-based cost of capital should be based on the same set of assumptions regarding technology and competition that are used to calculate network investment.[188] That is, TELRIC pricing is intended to replicate the rates in a market with facilities-based competition, and therefore the cost of capital should reflect the risk of losing customers to other facilities-based carriers.[189] Second, the Commission clarified that a TELRIC-based cost of capital should reflect any unique risks (above and beyond competitive risks) associated with new services that may be provided over certain types of facilities.[190] The Commission suggested that one mechanism for reflecting such risk would be the use of UNE-specific costs of capital.[191]

2. Theory/Policy Issues

60. The overall cost of capital is the minimum rate of return required to attract capital to an investment.[192] It is the rate of return investors expect to receive from alternative

---

[183] *See Local Competition First Report and Order*, 11 FCC Rcd at 15846, para. 679 ("Adopting a pricing methodology based on forward-looking economic costs best replicates, to the extent possible, the conditions of a competitive market.").

[184] *Id*. at 15854, paras. 699-700.

[185] *Id*. at 15856, para. 702.

[186] *Id.*

[187] *See Verizon v. FCC*, 535 U.S. at 517-22.

[188] *See Triennial Review Order*, paras. 680-82.

[189] *Id*., para. 680.

[190] *Id*., para. 683.

[191] *Id*.

[192] *See* A. LAWRENCE KOLBE, ET AL., THE COST OF CAPITAL, ESTIMATING THE RATE OF RETURN FOR PUBLIC UTILITIES 13 (1986).

investments that have the same risk. The central conceptual issue identified by the parties to this proceeding is what assumptions to make with respect to competition in assessing the risk Verizon faces.

61. Verizon argues that the Commission must make the same assumptions in calculating cost of capital that it makes in calculating network investment.[193] It states that TELRIC assumes more competition than exists today, and it is therefore inappropriate to assume that Verizon will remain the dominant company in the local market.[194] Verizon also argues that the cost of capital should reflect the increased risk of stranded investment associated with the fact that a competitive LEC can use UNEs on a short-term basis before migrating a customer to the competitive LEC's own facilities.[195]

62. AT&T/WorldCom state that the Commission should look at the existing level of competition in calculating cost of capital.[196] They argue that the Commission is not required to use the same assumptions about competition that it uses to calculate network investment because the *Local Competition First Report and Order* requires a cost of capital based on the actual risks faced by an incumbent LEC, not the risks it would face under TELRIC assumptions.[197] This approach assumes that Verizon will remain the dominant carrier in the market for the foreseeable future.[198] AT&T/WorldCom's economist stated on cross-examination, however, that the assumptions underlying the calculation of cost of capital should be consistent with the assumptions used to calculate network investment.[199]

63. After the record in this case closed, the Commission issued the *Triennial Review Order*. In that order, the Commission addressed the issue disputed here. Specifically, the Commission clarified that a TELRIC-based cost of capital should reflect the same competitive assumptions that are used to determine network investment.[200] Based on this clarification, we agree with Verizon that the cost of capital used in this proceeding must reflect the risks of a market in which Verizon faces facilities-based competition, and that AT&T/WorldCom's

---

193 Verizon Ex. 104 (Vander Weide Direct), at 8.

194 *Id.* at 8.

195 *Id.* at 10; *see also* Verizon Ex. 111 (Hausman Rebuttal), at 15-17. Although Dr. Hausman suggests that a mark-up of Verizon's costs is needed to compensate for the failure of the TELRIC methodology to consider sunk costs, the prices proposed by Verizon in this proceeding do not reflect this mark-up, and we will consider only the specific cost of capital proposal made by Dr. Vander Weide.

196 AT&T/WorldCom Ex. 10 (Hirshleifer Rebuttal), at 6-7.

197 *Id*. at 4-7.

198 *Id.* at 7, 19-21.

199 Tr. at 3201.

200 *See Triennial Review Order*, paras. 680-82.

assumption that Verizon is, and will remain, the dominant local telephone company cannot form the basis of our cost of capital decisions.

3. Implementation Issues

64. Verizon proposes an overall cost of capital of 12.95 percent[201] and AT&T/WorldCom propose an overall cost of capital of 9.54 percent.[202] In both cases, the overall or weighted average cost of capital (WACC) has three components: (1) cost of debt, (2) cost of equity, and (3) capital structure (*i.e.*, the proportions of debt and equity that the company uses to finance its assets and operations). Although there are only minor differences in the proposed capital structures and costs of debt, there are significant differences in the parties' proposed costs of equity because the parties used different models and different proxy groups. In this order, we will select between the parties' proposals for each of the relevant components, and then calculate a cost of capital based on these selections. Because Verizon's proposed cost of capital of 12.95 percent is closer to the figure we calculate based on these selections, we will use a 12.95 percent cost of capital to calculate UNE rates in this proceeding.[203]

a. Cost of Debt

65. Verizon estimates a 7.55 percent cost of debt using an average yield to maturity analysis of Moody's A-rated industrial bonds for March 2001.[204] Verizon claims that this estimate is conservative because it does not include flotation costs that must be paid to issue debt securities.[205]

66. AT&T/WorldCom state that the best estimate of the cost of debt is the weighted

---

[201] Verizon Ex. 104, at 3.

[202] AT&T/WorldCom Ex. 5 (Hirshleifer Direct), at 4.

[203] We note that our decision here is based on the record before us and that applying the same methodology to current data could produce different results. To cite just one example, we note that there has been a significant decline in interest rates since this proceeding started. For example, the 20-year Treasury security yield fell from 5.65 percent in January 2001 to 4.34 percent in June 2003, before rising to 4.92 percent in July 2003. *See* Federal Reserve Statistical Releases, *Selected Interest Rates (H.15) (Government Securities, Federal, Constant Maturity, 20-Year, Monthly)* (visited Aug. 14, 2003) <http.federalreserve.gov/releases/h15/data/m/tcm20y.txt>. The rate on shorter term instruments has fallen even more. For example, the three-month yield during the same period fell from 5.29 in January 2001 to .92 percent in July 2003. *See* Federal Reserve Statistical Releases, *Selected Interest Rates (H.15) (Government Securities, Federal, Constant Maturity, Three-Month, Monthly)* (visited Aug. 14, 2003) <http.federalreserve.gov/releases/h15/data/m/tcm3m.txt>. The rate for AAA corporate bonds also dropped during this same period, from 7.15 percent in January 2001 to 4.97 percent in June 2003, before rising to 5.49 percent in July 2003. *See* Federal Reserve Statistical Releases, *Selected Interest Rates (H.15) (Moody's, Private, AAA Rating, Monthly)* (visited Aug. 14, 2003) <http.federalreserve.gov/releases/h15/data/m/aaa.txt>.

[204] Verizon Ex. 104, at 45.

[205] *Id.*

average cost over all of the subject company's outstanding issues, including the debt of the holding company and any subsidiaries.[206] AT&T/WorldCom estimate a 7.86 percent cost of debt using a yield to maturity analysis of Bell Atlantic and GTE bonds, as listed in Standard & Poor's (S&P) bond guide.[207]

67. We adopt the cost of debt proposed by AT&T/WorldCom. As noted above, the cost of capital calculation is intended to reflect the cost of capital of a telecommunications carrier that operates in a market with facilities-based competition. In this case, Verizon's proposed 7.55 percent is based on a group of companies that generally operate in competitive markets, while AT&T/WorldCom's proposed 7.86 percent is based on an analysis of Bell Atlantic and GTE bonds. We conclude, however, that AT&T/WorldCom's proposal to use the cost of debt for Bell Atlantic and GTE is the better of the two proposals because it at least reflects the cost of companies in the relevant industry.[208] In contrast, Verizon has not demonstrated that the debt costs faced by S&P companies generally are at all related to the costs telecommunications carriers would face in a market with facilities-based competition. Nor are there alternative data in the record that support Verizon's proposal, as we find below with respect to the beta used in calculating the cost of equity.[209]

b. Cost of Equity

(i) CAPM or DCF Model

68. Verizon's cost of equity estimate is based on a constant growth version of the discounted cash flow (DCF) model.[210] The constant growth DCF model holds that a company's cost of equity capital equals the sum of the stock's expected dividend yield and the stock's dividend growth rate, which is assumed to be constant. Verizon estimates the cost of equity capital using this model for a subset of S&P 500 Industrial Firms.[211] Verizon asserts that the S&P Industrials are an appropriate proxy group because they are "a well-known sample of publicly traded competitive companies whose risk, on average, approximates the risk the incumbent LECs actually face in providing telecommunications services in a competitive market."[212]

---

206 AT&T/WorldCom Ex. 5, at 9.

207 *Id*.

208 As noted below, the incumbent LEC holding companies operate in a mix of fully competitive businesses (*e.g*., wireless) and businesses where competition is just emerging (*e.g*., local telephony). *See infra* para 93.

209 *See infra* paras 91-92.

210 *See* Verizon Ex. 104, at 46.

211 *Id.*

212 *Id*.

69. AT&T/WorldCom estimate the cost of equity capital by averaging estimates derived from the Capital Asset Pricing Model (CAPM) and a three-stage DCF model.[213] The CAPM holds that a company's cost of equity capital equals the expected risk-free rate, plus the product of the expected beta for the common stock and a risk premium reflecting the difference between the expected market rate of return and the expected risk-free rate of return.[214] Beta measures the degree to which a company's stock varies relative to the market as a whole.[215] It represents the systematic or non-diversifiable risk of the stock.[216] AT&T/WorldCom use the CAPM to obtain cost of equity capital estimates for a proxy group of five companies: Verizon, BellSouth, SBC, ALLTEL, and CenturyTel.[217]

70. AT&T/WorldCom apply the three-stage DCF model to Verizon, BellSouth, SBC, and ALLTEL at the holding company-level.[218] They assume that dividends will: (1) increase in the five-year first stage at an annual rate that varies between approximately 11-15 percent, depending on the company; (2) decrease linearly annually in the 15-year second stage until hitting their estimate for the long-term growth rate of the economy; and (3) increase forever in the third stage at the long-term growth rate of the economy.[219]

71. We conclude that the CAPM is the better mechanism for estimating the cost of equity in this proceeding. The CAPM requires three estimates: (1) risk-free rate; (2) risk premium; and (3) beta. Unlike the various DCF models, the CAPM does not rely on assumptions concerning dividend growth rates, and therefore cost of capital estimates derived from the CAPM are no better or worse for companies that are growing rapidly than for those growing slowly.[220]

72. Verizon's only criticism of the CAPM is that the spread between the yield on long-term Treasury bonds and A-rated Industrial and utility bonds has increased since 1998 due to the Treasury's decision at that time to reduce the supply of long-term Treasury bonds, and this has caused CAPM cost of equity results to decline even though telecommunication debt costs

---

213 AT&T/WorldCom Ex. 5, at 10-11.

214 *See id.* at 21.

215 *See id.* at 21-22. *See infra* section III(C)(3)(b)(iv) for a detailed discussion of beta.

216 *See* AT&T/WorldCom Ex. 5, at 21-22.

217 *Id*., Attach. JH-9.

218 *Id.* at 15-19. AT&T/WorldCom did not include CenturyTel in their DCF analysis because it has a small dividend yield and therefore the cost of equity produced with the DCF model is not meaningful. *Id*. at 19 n. 18.

219 *Id.* at 15-16.

220 Modern finance textbooks routinely present the CAPM as an accepted method of estimating the cost of equity capital. *See, e.g.*, RICHARD BREALY AND STEWART MEYERS, PRINCIPLES OF CORPORATE FINANCE 164-73 (2d Ed. 1984).

have remained constant.[221] Efficient capital market theory, however, would hold that bond yields on a given day reflect (at least) all publicly available information and that current yields are the best estimate of future yields.[222] Given the passage of time, bond yields during the period of this proceeding should no longer be anomalously low due to the Treasury's announcement; any lingering effect of the announcement is not an anomaly and is reflected in the CAPM analysis. In addition, as discussed below, we consider both short-term and long-term bonds in developing our cost of equity estimate, which provides a degree of comfort that both estimates are reasonably accurate if they have roughly the same magnitude. We also use the arithmetic average market risk premium calculated over the longest period for which reliable data are available, thereby minimizing the impact of any short-term fluctuation from long-term trend.

73. In contrast to the benefits of using a CAPM analysis, we have identified a number of concerns with each of the DCF analyses presented. For example, the constant growth DCF model advocated by Verizon assumes that dividends will grow at the same rate forever.[223] Typically, regulators have used this type of model to prescribe a cost of capital for utilities.[224] Some utility growth rates years ago may have been relatively stable and roughly the same magnitude as the long-term growth rate of the economy. If the growth rate used in the model is substantially inconsistent with this assumption, however, the finance literature concludes without exception that the model is unlikely to produce an accurate cost of equity capital estimate.[225] Verizon's use of the constant growth DCF model to estimate the cost of equity capital for its S&P proxy group stretches the reasonable limits of its use. AT&T/WorldCom derive an estimate of the long-term economy-wide growth rate of approximately six percent, which is unchallenged by Verizon.[226] For most of its S&P proxy group of firms, Verizon assumes constant growth rates that are higher than AT&T/WorldCom's long-term economy-wide growth estimate. The market value weighted average of the constant growth rates Verizon assumes for its S&P proxy group of firms is approximately 13 percent,[227] a figure that is more than twice AT&T/WorldCom's long-

---

[221] *See* Verizon Ex. 112 (Vander Weide Rebuttal), at 59-60.

[222] *See* EDWIN J. ELTON AND MARTIN J. GRUBER, MODERN PORTFOLIO THEORY AND INVESTMENT ANALYSIS 361-405 (3d ed. 1987)

[223] Verizon Ex. 104, at 13-14.

[224] The constant growth DCF model has been widely accepted by regulators for many years. In fact, the Commission derived its current 11.25 percent rate of return prescription using this model. *See Represcribing the Authorized Rate of Return for Interstate Services of Local Exchange Carriers*, CC Docket No. 89-624, Order, 5 FCC Rcd 7507, 7528, para. 178 (1990) ("We have found that RHCs [Regional Holding Companies] are still an appropriate surrogate for LEC interstate access service and that 'classic' DCF estimates for the RHCs should be given the greatest weight in our decision.").

[225] *See* ROGER A. MORIN, REGULATORY FINANCE, UTILITIES' COST OF CAPITAL 111, 123, 143, 156, 231-38 (1994); HAIM LEVY AND MARSHALL SARNAT, CAPITAL INVESTMENT AND FINANCIAL DECISIONS 510-13 (3d ed. 1986).

[226] AT&T/WorldCom Ex. 5, at 17.

[227] Verizon Ex. 104, Attach. A.

term economy-wide growth rate estimate. As AT&T/WorldCom demonstrate, however, no company can grow forever at a greater rate than the economy as a whole,[228] and therefore we conclude that Verizon's assumption is not reasonable.

74. In addition, the results of Verizon's cost of equity capital analysis are inconsistent with its argument regarding the appropriate proxy group. Verizon argues that the S&P Industrial companies are an appropriate proxy group because they operate in fully competitive markets, as opposed to the incumbent LEC parent companies, which, according to Verizon, presently operate in less risky markets than the Commission's TELRIC rules assume.[229] Yet Verizon derives a 14.75 percent cost of equity capital for its S&P 500 proxy companies, and a 15.52 percent cost of equity capital for the four incumbent LEC parent companies in the S&P proxy group, ALLTEL, BellSouth, SBC, and Verizon.[230] As Verizon acknowledges, however, common sense holds that the cost of capital should be high for companies that face high risk and low for companies that face low risk.[231] Consequently, either Verizon is incorrect that the incumbent LEC parent companies face less risk than the S&P Industrial companies, or there is some flaw in its DCF model. Because Verizon's statements regarding the relative risks of incumbent LECs and S&P Industrial companies are consistent with other information in the record (*e.g.*, information on the betas for the various companies),[232] it appears that Verizon's DCF model does not accurately capture the risks faced by different types of companies.

75. AT&T/WorldCom's DCF model has similar flaws. For example, they offer no explanation or evidence supporting the magnitude or the pattern of the growth rate assumptions beyond the fifth year.[233] There are an unlimited number of different growth rate estimates that could be used in such a DCF model. Different growth rate estimates, even among those that might be considered reasonable, could produce significantly different cost of equity capital estimates. The cost of equity capital estimate derived from a three-stage DCF model is only as accurate as the assumptions on which the model relies. There is no basis on which to find that AT&T/WorldCom's three-stage DCF model produces a reasonable cost of equity capital estimate, given the lack of support for their dividend growth rate assumptions.

76. Moreover, like the Verizon DCF model, the AT&T/WorldCom DCF model produces results that are inconsistent with expectations regarding the risks of different types of companies. Verizon states that the AT&T/WorldCom DCF model produces lower cost of equity

---

228 AT&T/WorldCom Ex. 10, at 13.

229 Verizon Ex. 104, at 40-41, 46.

230 *Id.* at 47.

231 Verizon Ex. 118 (Vander Weide Surrebuttal), at 40-41.

232 *See* Verizon Ex. 192 (Verizon response to record request no. 12 (requested Oct. 25, 2001)).

233 AT&T/WorldCom Ex. 5, at 16-17.

estimates for high-risk companies than it does for low-risk companies.[234] Specifically, Verizon notes that the AT&T/WorldCom DCF model produces a lower rate for the S&P 500 companies than for LECs, and that the estimates for both of these groups are lower than the cost of equity estimates for electric and gas utilities.[235] Verizon states that there is no rational explanation for these results other than flaws in the DCF model.[236] We agree with Verizon that these results are indicative of flaws in the AT&T/WorldCom DCF model. Based on these factors, we select the CAPM and consider its terms in the following paragraphs.

(ii) Risk-Free Rate of Return

77. The risk-free rate, the first term in the CAPM, is the rate of return an investor could obtain if it faced no risk. AT&T/WorldCom developed two separate CAPM cost of equity capital estimates using as the risk free rate: (1) the expected 30-day Treasury bill rate; and (2) the 20-year Treasury bond rate.[237] The expected 30-day Treasury rate that AT&T/WorldCom use is 4.93 percent,[238] and the 20-year Treasury bond rate that they use is 6.26 percent.[239] Verizon re-stated AT&T/WorldCom's CAPM study using different estimates for beta and the risk premium, but it used AT&T/WorldCom's 20-year Treasury bond estimate for the risk-free rate in that re-statement.[240]

78. The parties have identified some concerns with both the 30-day Treasury bill rate and the 20-year Treasury bond rate. The 30-day Treasury bill rate has almost no default risk and little interest rate risk. It therefore is the closest proxy for a risk-free rate. The 30-day Treasury bill may fluctuate widely, however, resulting in fluctuating and unreliable cost of equity capital estimates. Moreover, the maturity period of the 30-day Treasury bill does not match the long-term horizons of equity investors. Finally, the 30-day Treasury bill will not reflect factors (*e.g.*, inflation) in the same way that a long-term security such as a common stock will.

79. The use of a long-term bond rate as the risk-free rate avoids the problems associated with the use of the 30-day Treasury bill. Long-term Treasury bonds are almost risk free for investors that have long-term investment horizons. They are less volatile than 30-day Treasury bills, reflect long-term inflation expectations, and have an investment horizon that matches more closely those of common stock investors than that of the 30-day Treasury bill.

---

234 Verizon Ex. 118, at 40-41.

235 *Id.* at 41.

236 *Id.* at 43-47.

237 AT&T/WorldCom Ex. 5, at 26.

238 *Id.* at 33.

239 *Id.*

240 Verizon Ex. 112, at 60.

The only alleged problem with the 20-year Treasury bond was previously identified by Verizon, *i.e.*, that the rate is not representative of the true risk-free rate due to the Treasury's 1998 decision to reduce the supply of long-term bonds.[241] As noted above, we rejected Verizon's argument on this point.[242]

80. Although we conclude that either a short-term or long-term rate could be used, we will adopt AT&T/WorldCom's proposal and estimate the cost of equity capital twice – once using the 4.93 percent expected 30-day Treasury bill rate and once using the 6.26 percent 20-year Treasury bond rate – and then average the results.

(iii) Market Risk Premium

81. The market risk premium component of the CAPM reflects the difference between the expected rate of return for the market as a whole and the expected risk-free rate of return. AT&T/WorldCom use two sources of information to estimate the market risk premium. First, they rely on the difference between Merrill Lynch's expected return on the market and the expected yields on the one-month and the 20-year Treasury securities.[243] Second, AT&T/WorldCom rely on both arithmetic and geometric average historical differences between realized stock market and Treasury security returns over several different time periods.[244] Using these data sources, AT&T/WorldCom derive a market risk premium of 7.5 percentage points for the one-month Treasury bill and 5.5 percentage points for the 20-year Treasury bond.[245]

82. Verizon uses the Ibbotson Associates arithmetic average risk premium for stocks over long-term government bonds for the period 1926-1999, 8.10 percent, to restate AT&T/WorldCom's CAPM study.[246] Verizon argues that AT&T/WorldCom's use of geometric average differences, rather than arithmetic averages, is not defensible, nor is the use of a time period that includes periods prior to 1926.[247]

83. We adopt Verizon's recommended approach of using data from Ibbotson Associates, but we will use two risk premiums, one for the 30-day Treasury bill and one for the 20-year Treasury bond. For the reasons explained above, the market risk premium should be based on the average excess of the market rate of return over the risk-free rate over the longest

---

241 *Id.* at 59-60.

242 *See supra* para. 72.

243 AT&T/WorldCom Ex. 5, at 27-29.

244 *Id.* at 29-32, Attach. JH-8.

245 *Id.* at 32.

246 Verizon Ex. 112, at 60.

247 *Id.* at 52-56.

period for which reliable data are available. Ibbotson Associates publishes risk premiums that are widely used. Verizon uses the Ibbotson Associates arithmetic average risk premium for stocks over long-term government bonds for the period 1926-1999, 8.10 percent, to re-state AT&T/WorldCom's CAPM study.[248] AT&T/WorldCom uses Ibbotson Associates' arithmetic average risk premium for stocks over 30-day Treasury bill returns for the period 1926-1999, 9.45 percent, in one of their CAPM specifications.[249] We also note that AT&T has relied on the Ibbotson Associates historical risk premium for government securities, either in whole or in part, in the CAPM analyses it has undertaken to estimate the cost of capital for evaluating real-world business projects.[250]

84. In addition to the Ibbotson Associates data, AT&T/WorldCom's market risk premium calculation relies in part on Merrill Lynch's expected rate of return to estimate the risk premium, but they do not explain or document how Merrill Lynch derives this number. Accordingly, we give this estimate no weight in developing the correct risk premium to use in a CAPM analysis. AT&T/WorldCom also rely in part on the geometric average historical risk premium to develop the risk premium they use in their CAPM analysis. As Verizon notes, most cost of capital experts agree that the arithmetic historical average, not the geometric historical average risk premium, should be used in the CAPM analysis.[251] In statistical terms, the arithmetic average, not the geometric average, is the unbiased measure of the expected value of repeated observations of a random variable. Use of the geometric average produces a smaller risk premium and a lower cost of capital compared to use of the arithmetic average.

85. AT&T/WorldCom also rely in part on historical data from as far back as 1802.[252] As Verizon notes, however, many cost of capital experts agree that it is appropriate to use the longest period for which reliable return data are available to calculate the risk premium in a CAPM analysis, but that reliable data on stock market returns were not available until approximately 1926.[253] The historical risk premium approach assumes that average realized return is a proxy for expected return. Realized returns may vary substantially from anticipated returns over short periods, but the two coincide over very long periods, such as from 1926-present.[254] Giving weight to shorter periods than 1926-present produces a smaller risk premium

---

[248] *Id.* at 60.

[249] AT&T/WorldCom Ex. 5, Attach. JH-8.

[250] Letter from Mark A. Keffer, AT&T Chief Regulatory Counsel, Atlantic Region, to Magalie R. Salas, Secretary, FCC, CC Docket Nos. 00-218, 00-251, at response no. 6 (requested Oct. 24, 2001) (filed Dec. 12, 2001) (Keffer Dec. 12 Letter).

[251] Verizon Ex. 112, at 54-58.

[252] AT&T/WorldCom Ex. 5, Attach. JH-8

[253] Verizon Ex. 112, at 57-58.

[254] *See* MORIN, *supra* note 225, at 313-14.

and a lower cost of capital compared to use of the longer period.

86. Based on our decision to use two risk-free rates of return, it follows that we must use two market risk premiums. Specifically, we will use the 9.45 percent risk premium together with the 4.93 percent expected 30-day Treasury bill rate, and the 8.10 percent risk premium together with the 6.26 percent 20-year Treasury bond. Using the beta selected below, we will calculate two costs of equity, which we will average to obtain a final result.

(iv) Beta

87. Beta measures the degree to which a company's stock price varies relative to the market as a whole, *i.e*. it represents the systematic or non-diversifiable risk of the stock.[255] A company has a beta equal to 1.0 if its stock price changes over time to the same degree as stock market prices change in the aggregate. A company that has a beta equal to 1.0 has the same risk as the market. A company has a beta greater than 1.0 if its stock price changes over time to a greater degree than stock market prices change in the aggregate, *i.e*., if it has greater risk than the market. A company has a beta less than 1.0 if its stock price changes over time to a lesser degree than stock market prices change in the aggregate, *i.e*., if it has less risk than the market. Selection of a beta is the most difficult aspect of the cost of capital calculation because there is no real-world company that provides UNEs in the type of competitive market assumed under the Commission's TELRIC rules, and therefore no real-world company's beta precisely reflects the risk of participating in such a market.

88. Verizon proposes calculating the cost of equity capital using an S&P 500 proxy group of companies, to reflect the competitive assumptions implicit in the Commission's TELRIC rules.[256] Although Verizon does not advocate using the CAPM, it did restate AT&T's CAPM analysis using Value Line betas for 365 S&P 500 companies.[257] The market value weighted average Value Line beta for these companies is 1.05, while the simple average beta is 1.00.[258] Verizon also placed Value Line betas into the record for BellSouth (.85), SBC (.85), ALLTEL (.75), and CenturyTel (.95).[259] The market value weighted average beta for these companies is .85, and the simple average also is .85.[260] Verizon also placed into the record the

---

[255] *See* AT&T/WorldCom Ex. 5, at 21-22.

[256] Verizon Ex. 104, at 46-47.

[257] Verizon Ex. 112, at 60. Value Line is an investment advisory service that provides information on betas for public companies.

[258] *See id.* at 60.

[259] *See* Verizon Ex. 192.

[260] *See* Verizon Ex. 112, at 51.

Value Line beta for AT&T, .95.[261]

89. AT&T/WorldCom propose calculating the cost of equity capital using a proxy group of large incumbent LEC holding companies, to reflect the competitive risks an incumbent LEC faces today.[262] They use BARRA betas for BellSouth (.65), Verizon (.68), SBC (.83), ALLTEL (.74), and CenturyTel (.84).[263] The market value weighted average BARRA beta for these companies is .73, while the simple average is .75.[264] These are "levered" betas, which means they have been adjusted to reflect the capital structure used in AT&T/WorldCom's analysis.[265]

90. Although we do not agree with the rationale underlying Verizon's proposal, we conclude that it is reasonable to use Verizon's proposed beta of 1.0 to develop the cost of capital in this proceeding. The businesses of most of Verizon's S&P 500 proxy group of companies have no obvious similarity to the provision of local exchange services, and Verizon did not describe any. Consequently, there is no basis on which to conclude that this proxy group best represents the risks that Verizon would face if it faced facilities-based competition. Nevertheless, the overall beta of 1.0 for the S&P 500 companies for which Verizon placed betas into the record does produce a useful benchmark for the risk faced on average by established companies in competitive markets. Absent evidence of any unique risks associated with the telecommunications industry, or a particular segment of the industry, we would be uncomfortable prescribing a cost of equity capital for UNEs that is based on a beta significantly higher or lower than the average beta for companies that face competition.

91. Moreover, based on the information in the record regarding the betas of interexchange carriers (IXCs), a beta of 1.0 appears to represent a reasonable estimate of the risk faced by a company such as Verizon in a market with facilities-based competition. The long-distance companies for which we have betas (AT&T and (pre-bankruptcy) WorldCom) build, own, operate, and maintain long distance networks.[266] The assets they use, activities they perform, and functions they provide are comparable, but not identical, to incumbent LEC assets, activities, and functions. Moreover, they operate these assets in an environment that clearly is competitive, with a number of ubiquitous facilities-based competitors. Although there are obvious differences between the local exchange market and the interexchange market, the betas

---

[261] *See* Verizon Ex. 192.

[262] AT&T/WorldCom Ex. 5, at 40. Indeed, AT&T/WorldCom argue that the current risk of an incumbent LEC holding company overstates the risk associated with providing UNEs. *Id*. at 40-43.

[263] *Id*., Attach. JH-5. Like Value Line, BARRA is an advisory service that provides information on betas for public companies.

[264] *Id*.

[265] *See id.* at 25.

[266] *See* Verizon Ex. 192; Keffer Dec. 12 Letter, at response no. 6 (beta for WorldCom and MCI is 1.03).

of the IXCs are a relevant proxy group for us to consider in attempting to quantify risk in a TELRIC proceeding.

92. We draw further support for the use of a beta of 1.0 from the evidence regarding the betas used by AT&T in making internal investment decisions. AT&T has used the CAPM to derive the cost of equity capital for evaluating long distance, wireless, and cable TV projects.[267] For these purposes, it used a beta equal to 1.03, based on the weighted average of the betas for WorldCom and MCI developed from a variety of sources.[268]

93. We find AT&T/WorldCom's proposal to use a beta based solely on a proxy group of incumbent LECs unpersuasive in light of some of the important factors not reflected in the incumbent LECs' betas. Their betas may be thought of as a weighted average of the betas for each line of business in which they operate. Although the incumbent LECs' current betas do reflect some risk associated with their participation in competitive markets, such as wireless, those betas likely understate the risk of selling UNEs in a competitive market because the incumbent LECs continue to operate as regulated monopolies or near-monopolies in many of their markets. For example, approximately 58 percent of Verizon's year 2000 consolidated revenues are attributable to operating telephone company regulated services.[269] In contrast, the assumption required under the Commission's TELRIC rules, *i.e.*, that the incumbent LEC faces or potentially faces a ubiquitous competitor that uses only the most efficient technology and network configuration, does not reflect the current local exchange market. The TELRIC cost of capital would have to reflect the risk of participating in such a market.[270]

94. Similarly, the current betas for the incumbent LECs may not reflect the risk that an incumbent LEC will not be able to recover the initial capital outlay for an asset if any anticipated decreases in asset prices over time are not factored into the depreciation allowance. As the Commission found in the *Triennial Review Order*, if equipment prices are declining, an incumbent LEC needs to recover more of its investment in an asset during the early years of the asset's life and less in the later years in order to compete effectively with a subsequent entrant that pays less for the same asset.[271] Even if there is no new entry, but the cost of an asset is continuously decreasing, an incumbent LEC would not recover the initial capital outlay for the asset if regulators at each rate proceeding establish successively lower UNE prices based on the

---

[267] Keffer Dec. 12 Letter, at response no. 3.

[268] *Id.*, at response no. 6. The 1.03 beta is a "re-levered" beta, *i.e.*, one that is adjusted to reflect the capital structure that AT&T used in its analysis, 10 percent debt and 90 percent equity, as opposed to the capital structure of WorldCom and MCI. AT&T included a 1 percentage point premium in its cost of capital estimate to "provide a margin of safety." *Id.*, at response no. 3. That is, using a beta of 1.03 in CAPM produced a WACC of 14.31 percent, but AT&T used a cost of capital of 15.31 percent in analyzing investment opportunities.

[269] *See* Verizon Ex. 186 (Verizon response to record request no. 6 (requested Oct. 24, 2001)).

[270] *Triennial Review Order*, paras. 680-82.

[271] *Id*., para. 690.

application of straight line depreciation to lower asset prices.[272]

95. Beyond the general problems inherent in using incumbent LEC betas to calculate a TELRIC cost of capital, we have additional problems with the specific betas proposed by AT&T/WorldCom. AT&T/WorldCom use beta and risk premium estimates in their CAPM analysis developed by BARRA, a consulting firm.[273] BARRA is not nearly as well known or widely circulated as Value Line, and it is unlikely to have nearly as much influence on the expectations of investors.[274] Value Line perhaps is the largest and most widely circulated investment advisory service, and it exerts influence on a large number of institutions and individual investors and on the expectations of these investors.[275] In making its own capital budgeting decisions, it is noteworthy that AT&T relies in part on Value Line betas, but not at all on BARRA betas.[276] Accordingly, we will not rely on the BARRA betas proposed by AT&T/WorldCom in this case.

(v) Flotation Costs

96. Flotation costs are the costs associated with issuing securities, including underwriters' commissions, legal fees, and printing expenses. Verizon states that these costs, which often are deducted from the proceeds of an offering, typically represent three to five percent of the amount of the proceeds.[277] In addition, Verizon states that there is a decline in stock price associated with the sale of new securities that has been estimated at two to three percent.[278] Verizon believes a five percent flotation cost allowance is a conservative estimate to

---

[272] Verizon also argues that a significant portion of local exchange network investment is sunk and irreversible, and that entrants that buy unbundled networks on a month-to-month basis bear none of the risk associated with these investments while the incumbent LEC bears all of it. Verizon Ex. 111, at 9. As a result, according to Verizon, there is a "real options" effect as the competitive LEC receives a risk-free ride on the incumbent LEC's network. *Id*. AT&T/WorldCom disagree completely. AT&T/WorldCom Ex. 20 (Murray Surrebuttal), at 4-33. Given our decision to adopt Verizon's proposed cost of capital, we need not resolve this dispute.

[273] *See* AT&T/WorldCom Ex. 5, at 23-25.

[274] *See* MORIN, *supra* note 225, at 65.

[275] In addition, the BARRA betas are derived by estimating a multiple regression equation specifying that beta is a function of many different independent variables. More typically, beta is measured based on simple regression analysis of changes in a company's stock market price and changes in a broad stock market average price over time. Value Line is among those financial companies that use the simple regression analysis. It also adjusts its betas to account for their long-term tendency to converge to 1, a routine practice among investment services that publish betas. *Id.* at 65, 67-68. Numerous studies have found that betas do regress over time to 1.00. *Id.* at 67-68. This is a compelling reason for using betas that are so adjusted.

[276] Keffer Dec. 12 Letter, at response no. 6.

[277] Verizon Ex. 112, at 47.

[278] *Id.*

include in a DCF model.[279]

97. AT&T/WorldCom did not include a separate flotation cost allowance. AT&T/WorldCom contend that these costs already are anticipated by the market and that including an allowance would provide a double recovery.[280] They also argue that Verizon has in fact issued very little stock in recent years, and is not expected to do so in the foreseeable future, and that, therefore, there is no need to compensate Verizon for flotation costs.[281]

98. Given our conclusion below that the record in this proceeding supports Verizon's proposed cost of capital, we need not resolve the question of whether to include, and how to quantify, flotation costs.

(vi) Cost of Equity Capital Estimate

99. In the CAPM, the overall cost of equity capital equals the expected risk-free rate, plus the product of the expected beta for the common stock and a risk premium reflecting the difference between the expected market rate of return and the expected risk-free rate of return.[282] Based on the analysis above, we will calculate two different cost of equity figures and use the average of the two in developing an overall cost of capital. First, using the 30-day Treasury bill, the cost of equity equals 4.93 + 9.45 (1.0), or 14.38. Second, using the 20-year Treasury bond, the cost of equity equals 6.26 + 8.10 (1.0), or 14.36. We will use the average of the two, 14.37, in developing the overall cost of capital.[283]

c. Capital Structure

100. Verizon recommends a capital structure of 25 percent debt and 75 percent equity, based on a proxy group of S&P Industrials and telephone holding companies over a five-year period.[284] Verizon argues that AT&T/WorldCom's use of a capital structure based on book value is not forward-looking and not consistent with TELRIC.[285]

101. AT&T/WorldCom recommend a capital structure of 34.5 percent debt and 65.5

---

[279] *Id.* at 48.

[280] AT&T/WorldCom Ex. 17 (Hirshleifer Surrebuttal), at 37.

[281] *Id.* at 38.

[282] *See* AT&T/WorldCom Ex. 5, at 21.

[283] As discussed in the next section, it will be necessary to use an implied cost of equity of 14.22 percent in running the cost models in this case.

[284] Verizon Ex. 104, at 44-45.

[285] Verizon Ex. 112, at 27-28.

percent equity by using a mid-point WACC estimate.[286] The WACC formula was applied using book and market average weights.[287] AT&T/WorldCom argue that a company with low operational risk can afford the risk associated with more debt in its capital structure, and that Verizon's assumption of less debt is inappropriate given the low risk associated with wholesale provision of network elements.[288]

102. We will use Verizon's proposal as the starting point in determining the appropriate capital structure in this case. In calculating TELRIC prices, the theoretically correct capital structure is based on market values of debt and equity, not book values. In section 252(d)(1) of the Act, Congress specifically prohibited the use of traditional rate-base, rate-of-return ratemaking.[289] The Commission has interpreted this section to require prices based on forward-looking costs, because forward-looking costs best replicate the costs a carrier would face in a market with facilities-based competition.[290] Under the Commission's TELRIC rules, we calculate the investment necessary to build a network using the most efficient technology currently available.[291] The TELRIC rules provide for the recovery of the investment in that efficient network through the use of economic depreciation and they provide for a return on that investment through a risk-adjusted cost of capital.[292] The book value of Verizon's existing network is irrelevant for these purposes. Investors would not earn the return that they require if a cost of capital that is based on book value is applied to the economic value of their assets, given that rational investors value these assets at market value. Thus, the use of a capital structure based on market values, rather than book values, represents a departure from traditional ratemaking, but one that is entirely appropriate under the Act.[293]

103. Verizon proposes use of a 75 percent equity/25 percent debt capital structure, based on 1996-2000 data showing that this ratio was no less than 86 percent for the S&P Industrials and 78 percent for telecommunications companies.[294] AT&T/WorldCom estimate

---

[286] AT&T/WorldCom Ex. 5, at 39.

[287] *Id.* at 36-37.

[288] *Id.* at 37.

[289] 47 U.S.C. § 252(d)(1).

[290] *See Local Competition First Report and Order*, 11 FCC Rcd at 15846, para. 679.

[291] 47 C.F.R. § 51.505(b)(1); *Local Competition First Report and Order*, 11 FCC Rcd at 15848-49, para. 685.

[292] 47 C.F.R. § 51.505(b)(2), (3); *Local Competition First Report and Order*, 11 FCC Rcd at 15856, paras. 702-03.

[293] We note that AT&T/WorldCom do not argue that a capital structure based on market value is incorrect as a matter of theory. Rather, they argue that in this case it does not reflect the relevant risk of providing UNEs. *See* AT&T/WorldCom Ex. 5, at 36-37. As we explained above, we think Verizon's assessment of the relevant risk is more consistent with the requirements of TELRIC than is AT&T/WorldCom's.

[294] Verizon Ex. 104, at 44-45.

that this ratio for incumbent LECs, based on book value weights, is 49 percent/51 percent. They determine that this ratio is 80 percent/20 percent based on market value.[295] For the reasons described above, we give no weight to the portion of AT&T/WorldCom's proposal that is based on incumbent LECs' book value capital structure. Based on the data on which the parties estimated their market value-based capital structures, a range of 78-80 percent equity and 20-22 percent debt could be justified. Therefore, as between the two proposals presented in this case, Verizon's 75 percent equity/25 percent debt is the better choice. Using this ratio, however, would create a mismatch with the data we use to calculate the cost of equity because those data assume an 80 percent/20 percent equity/debt ratio.[296] To be consistent, it is necessary for us to depart slightly from baseball arbitration and use an 80 percent/20 percent equity/debt ratio.

d. Overall Cost of Capital

104. In our analysis above, we have selected a 7.86 percent cost of debt, a 14.37 percent cost of equity capital, and a capital structure that is 20 percent debt and 80 percent equity to estimate the cost of capital for UNEs. The WACC under these assumptions is 13.068 percent. Accordingly, as between the two proposals presented in this case, using baseball arbitration we adopt the 12.95 percent overall cost of capital proposed by Verizon to develop UNE rates.[297]

D. Depreciation

1. Overview

105. Depreciation is the mechanism by which the investment in an asset is recovered over the life of the asset. The *Local Competition First Report and Order* contains a limited discussion of depreciation. Specifically, the Commission stated that properly designed depreciation schedules should take into account expected declines in the value of goods.[298] The Commission's rules simply require the use of "economic depreciation."[299] In upholding the TELRIC rules, the Supreme Court found that existing regulatory depreciation rates were an appropriate starting point that could be "adjusted upward if the incumbents demonstrate the need."[300]

106. There are two components of depreciation – the useful life of the asset, and the

---

[295] AT&T/WorldCom Ex. 5, at 36.

[296] *See supra* paras. 88-89.

[297] To achieve a 12.95 percent overall cost of capital, an implied cost of equity of 14.22 percent should be used in lieu of the 14.37 percent identified above when running the MSM and the Verizon cost models.

[298] *See Local Competition First Report and Order*, 11 FCC Rcd at 15849, para. 686.

[299] 47 C.F.R. § 51.505(b)(3).

[300] *Verizon v. FCC*, 535 U.S. at 519.

rate at which the asset is depreciated over the useful life. In a recent decision addressing the issue of asset lives, the Commission noted that more than twenty states have used FCC regulatory lives in calculating TELRIC-based UNE prices.[301] In the same decision, the Commission expressed some concerns about the use of asset lives used in financial reporting, although it did permit incumbent LECs to seek waivers that would allow them to use financial book lives.[302] That decision did not, however, specifically consider whether FCC regulatory lives or financial book lives are more appropriate for use in a TELRIC calculation. In the *Universal Service* proceeding, the Commission used FCC regulatory lives in running the SM.[303] In its section 271 decisions, the Commission has found both FCC regulatory lives and financial book lives to be consistent with TELRIC principles.[304] Similarly, in the *Triennial Review Order*, the Commission declined to mandate one set of asset lives or the other.[305]

107. As to the timing of recovery over the life of an asset, the *Triennial Review Order* clarifies that, under the Commission's "economic depreciation" requirement, a carrier may accelerate recovery of the initial capital outlay for an asset over its life to reflect any anticipated decline in its value.[306] For example, an approach that accelerates cost recovery based on an index showing that equipment prices are declining over time may be consistent with the requirement to use economic depreciation.[307] Recovering more of the initial capital outlay for the asset in the early years would enable a carrier to recover less in later years, thereby allowing it to compete with carriers that have purchased new, lower-priced equipment in those later years.

---

[301] *See 1998 Biennial Review – Review of Depreciation Requirements for Incumbent Local Exchange Carriers*, CC Docket No. 98-137, Report and Order, 15 FCC Rcd 242, 257, para. 33 (1999) (*Biennial Review Depreciation Order*).

[302] *See id.* at 262-63, para. 48 ("We believe that giving incumbent LECs the right to select, for regulatory purposes, any depreciation rate allowed by GAAP [Generally Accepted Accounting Principles] is inappropriate as long as incumbent LECs reserve the right to make claims for regulatory relief based on the increased depreciation that would result from granting them that flexibility."); *id*. at 252-53, para. 25 (establishing waiver requirements).

[303] *See Inputs Order*, 14 FCC Rcd at 20344, para. 426.

[304] *See, e.g., Application by Verizon New England Inc., Bell Atlantic Communications Inc. (d/b/a Verizon Long Distance), NYNEX Long Distance Company* (*d/b/a Verizon Enterprise Solutions*), *Verizon Global Networks Inc., and Verizon Select Services Inc., for Authorization To Provide In-Region, InterLATA Services in Rhode Island*, CC Docket No. 01-324, Memorandum Opinion and Order, 17 FCC Rcd 3300, 3317, para. 30 (2002) (FCC lives) (*Rhode Island 271 Order*); *Joint Application by SBC Communications Inc., Southwestern Bell Tel. Co., and Southwestern Bell Communications Services, Inc., d/b/a Southwestern Bell Long Distance for Provision of In-Region, InterLATA Services in Kansas and Oklahoma*, CC Docket No. 00-217, Memorandum Opinion and Order, 16 FCC Rcd 6237, 6274, paras. 76 (2001) (financial lives) (*Kansas/Oklahoma 271 Order*), *aff'd in part*, *remanded in part sub nom. Sprint Communications Co. v. FCC*, 274 F.3d 549 (D.C. Cir. 2001).

[305] *Triennial Review Order*, para. 688.

[306] *Id*., para. 690.

[307] *Id*.

2. Background

108. Verizon advocates the use of financial reporting lives based on Generally Accepted Accounting Principles (GAAP).[308] It states that GAAP lives are appropriate for use in a TELRIC model because they are reassessed annually to reflect the true economic life of the assets.[309] Verizon argues that GAAP lives are reasonable because they are comparable to those used by competitive companies, such as IXCs and cable operators,[310] and they are longer than the lives suggested in a study prepared by Technology Futures, Inc. (TFI).[311] Verizon also argues that the use of FCC regulatory lives is not appropriate in the context of UNE pricing because the FCC regulatory lives were determined before the 1996 Act and could not possibly reflect the competitive and technological environment assumed under TELRIC.[312] Verizon argues that competition reduces the life of an incumbent LEC's assets and increases the risk that assets will become obsolete before the full investment is recovered.[313]

109. Verizon asserts that the MSM proposed by AT&T/WorldCom fails to take account of the change in price of capital goods, which is an important element of economic depreciation.[314] For example, Verizon identifies central office switches and fiber optic carrier systems as types of equipment that have experienced declining prices in recent years.[315] According to Verizon, failure to reflect declining prices in the depreciation calculation will result in an understatement of depreciation expense, and TELRIC rates that are too low.[316] Similarly, Verizon states that the periodic revaluation of assets required by TELRIC means that carriers must recover more of their investment in the early years of an asset's life in anticipation of possible price reductions in the next rate proceeding.[317] Although Verizon witness Dr. Hausman suggests that this problem can be addressed by including a mark-up in the MSM to account for

---

[308] Verizon Ex. 105 (Lacey Direct), at 3; Verizon Initial Cost Brief at 35.

[309] Verizon Ex. 105, at 4-7; Verizon Initial Cost Brief at 35.

[310] Verizon Ex. 106 (Sovereign Direct), at 12-15; Verizon Initial Cost Brief at 42.

[311] Verizon Ex. 106, at 15-16. Verizon does not rely on this study as the basis for its proposed asset lives. Rather, it refers to the study only in an attempt to demonstrate the reasonableness of its own proposal. Verizon Reply Cost Brief at 22.

[312] Verizon Ex. 114 (Sovereign Rebuttal), at 4; Verizon Initial Cost Brief at 37-39.

[313] Verizon Ex. 106, at 5-7; Verizon Initial Cost Brief at 38-39.

[314] Verizon Ex. 111, at 12-14.

[315] *Id.* at 14-15.

[316] *Id.* at 14.

[317] *Id.* at 16; Tr. at 3173.

economic depreciation of capital goods,[318] Verizon itself does not use such a mark-up in running its cost models or the MSM, nor does it use an accelerated depreciation mechanism that would more accurately reflect the effect of declining equipment prices.

110. In response, AT&T/WorldCom argue that the proposal advanced by Dr. Hausman here is conceptually the same as the proposal he made on behalf of the United States Telephone Association in 1996, which was rejected by the Commission in the *Local Competition First Report and Order*.[319] According to AT&T/WorldCom, its model uses forward-looking asset lives that reflect the technology and competition risks faced by Verizon, and there is no need for any additional mark-up to protect Verizon against the risk of under-recovery.[320]

111. AT&T/WorldCom explain that the regulatory lives reflected in the MSM were forward-looking at the time the Commission adopted them, and the continued growth in incumbent LEC depreciation reserves suggests that those lives are more than adequate to reflect the impact of competition and technology in the current environment.[321] AT&T/WorldCom argue that the intensity of competition does not change the useful life of the asset,[322] and that the ability to provide wholesale service through UNEs actually extends the life of an asset that otherwise might be stranded as a result of facilities-based competition.[323] AT&T/WorldCom state that lives based on GAAP are inappropriate because GAAP is based on the principle of conservatism, which requires accountants to err on the side of using shorter lives (thereby increasing costs) in order to protect investors.[324]

3. Discussion

112. Based on the record before us, we agree with AT&T/WorldCom that FCC regulatory lives should be used for purposes of calculating UNE prices. We adopt one modification to AT&T/WorldCom's proposal, however. Specifically, we will use asset lives at the low end of the "safe harbor" range prescribed by the Commission in 1994 and 1995, and

---

[318] Verizon Ex. 111, at 14-15. Hausman also suggests a mark-up is needed to account for the effect of risk and uncertainty on sunk and irreversible investments. *Id*. at 15-17.

[319] AT&T/WorldCom Ex. 20 at 18-19 (citing *Local Competition First Report and Order*, 11 FCC Rcd at 15849, para. 686).

[320] *Id*. at 26-27.

[321] AT&T/WorldCom Ex. 3 (Lee Direct), at 6-8 (explaining how the shift to forward-looking projection lives has resulted in increased depreciation reserves); AT&T/WorldCom Initial Cost Brief at 95-96.

[322] AT&T/WorldCom Initial Cost Brief at 105.

[323] AT&T/WorldCom Ex. 9 (Lee Rebuttal), at 14-15; Tr. at 3362-62.

[324] AT&T/WorldCom Ex. 9, at 4-6; AT&T/WorldCom Initial Cost Brief at 97-101.

modified in 1999,[325] rather than the lives prescribed by the Commission for Verizon in Virginia in 1994. The safe harbor lives represent the Commission's most recent assessment of the forward-looking asset lives for each of the accounts. As explained below, we choose the low end of the safe harbor to be consistent with the competition and technology assumptions required under the Commission's TELRIC rules.

113. We find that AT&T/WorldCom's proposal to use the asset lives prescribed by the Commission for Verizon in 1994 is not the best approach. In certain cases, the asset lives proposed by AT&T/WorldCom are too long to be consistent with the forward-looking principles upon which TELRIC is based. For example, they propose a 17-year life for digital switching equipment. Given that the Commission has allowed incumbent LECs to use a life as short as 12 years under the safe harbor, and as short as 10 years based on specific evidence presented by a carrier,[326] a 17-year life is inconsistent with forward-looking principles. Instead, Verizon should use the 12-year life that is the low end of the FCC safe harbor range.[327]

114. Our determination to use FCC regulatory lives applies only where there is a dispute between the parties as to the appropriate asset life. In cases where the parties agree (*e.g.*, a 30-year life for poles), there is no dispute for us to resolve. Similarly, we will adopt Verizon's proposal with respect to salvage percentages because it was not challenged by AT&T/WorldCom.[328] We note that there is no safe harbor range for buildings. Consequently, we will use the economic life of 46.93 years that the Commission used in the *Inputs Order*.[329] A complete list of the asset lives and salvage percentages to be used in establishing rates in this proceeding is found in Appendix A to this order.

115. We reject Verizon's argument that FCC regulatory lives are not sufficiently forward-looking. The Commission has used forward-looking asset lives for some time in its regulation of incumbent LEC depreciation practices, and the asset lives that we adopt here are the most recent ones prescribed by the Commission. While Verizon asserts generally that technological advances and increased competition justify the use of shorter lives, it provides no

---

[325] *See Simplification of the Depreciation Prescription Process*, CC Docket No. 92-296, Second Report and Order, 9 FCC Rcd 3206 (1994); *Simplification of the Depreciation Prescription Process*, CC Docket No. 92-296, Third Report and Order, 10 FCC Rcd 8442 (1995). The Commission modified the range for digital switching in 1999. *See Biennial Review Depreciation Order*, 15 FCC Rcd at 247-48, para. 13.

[326] *See Prescription of Revised Percentages of Depreciation Pursuant to the Communications Act of 1934, As Amended, for GTE North, Inc./GTE South, Inc.*, FCC 99-369, Memorandum Opinion and Order, 15 FCC Rcd 1755 (1999); Verizon Ex. 114, at 9. Although the Commission allowed GTE to use a 10-year life for digital switches, we explain below that Verizon has not provided specific evidence in this proceeding that would justify the use of asset lives outside the safe harbor range.

[327] *See Biennial Review Depreciation Order*, 15 FCC Rcd at 247-48, para. 13.

[328] AT&T/WorldCom Ex. 9, at 2.

[329] *See Inputs Order*, 14 FCC Rcd at 20391, App. A, Part 3 (Capital Costs).

specific evidence to support its position. For example, Verizon provides no studies or other documents explaining the anticipated technological advances that might cause it to retire plant more quickly than anticipated when the safe harbor was established (or modified in the case of digital switching), nor has it effectively rebutted AT&T/WorldCom's argument that new technology can extend the life of assets, as DSL technology has done with copper facilities.[330] Similarly, Verizon provides no evidence to demonstrate how increased competition has affected retirement rates since the asset lives we use were established, or how it might affect future retirement rates.

116. We find that Verizon has not demonstrated that financial book lives are a more appropriate measure of the actual economic life of an asset. Verizon did not document or explain in significant detail the methodologies, studies, or data that it, or its auditor, relied on in developing asset lives, nor did it demonstrate that these lives are in fact compliant with GAAP. As compared to our thorough understanding of the process by which the safe harbor lives were developed, Verizon has given us no real basis on which to conclude that the asset lives it proposes reflect the anticipated economic life of assets in a competitive market.

117. For similar reasons, we find that Verizon's comparison of its proposed lives to the financial book lives used by IXCs and cable operators is unconvincing. Even if we were to accept that the economic life of a LEC's assets is the same as the economic life of the assets of an IXC or a cable operator, we have no information on how those lives were developed and no basis upon which to find that they reflect the best estimate of the anticipated economic life of the assets.

118. Verizon's argument that the TFI study validates its proposal is also unconvincing.[331] As AT&T/WorldCom explain, the TFI study assumes that new technology will result in massive waves of retirements (*e.g.*, replacement of copper cable by fiber-to-the-home facilities). Although TELRIC assumes that the value of an incumbent LEC's network is constrained by the widespread deployment of the most efficient technology currently available, that does not mean it is appropriate to assume massive retirements of copper facilities. Our finding here is entirely consistent with the Commission's most recent analyses of the TFI study.[332] AT&T/WorldCom convincingly demonstrate that past TFI studies have been extremely aggressive in their projections, and that actual incumbent LEC retirements have proceeded at a

[330] AT&T/WorldCom Ex. 9, at 14-15.

[331] Verizon Ex. 106, at 15-16.

[332] *See Biennial Review Depreciation Order*, 15 FCC Rcd at 249, para. 16 ("There is no evidence that the large wave of replacements forecast by TFI, which should result in increased retirements, has begun or is about to begin."); *Inputs Order*, 14 FCC Rcd at 20346, para. 428 ("[C]ommenters assert that technological advances and competition will have the effect of displacing current technologies, but offer no specific evidence that this displacement will occur at greater rates than the forward-looking Commission-authorized depreciation lives take into account.").

much slower pace.[333]

119. We agree with Verizon that, if equipment costs are falling, the effect of using straight-line depreciation in lieu of accelerated depreciation is an under-recovery of depreciation expense in the early years of an asset's life and an over-recovery in the later years.[334] Although the Commission's decision in the *Triennial Review Order* specifically authorizes state commissions to adopt an accelerated depreciation mechanism,[335] in this case neither of the parties to the arbitration proposed a measure of depreciation that uses accelerated depreciation to reflect the changing prices of capital goods over time.[336] Although Verizon witness Dr. Hausman suggests that a mark-up of Verizon's costs might cure this problem,[337] this was not part of Verizon's pricing proposal and Verizon did not provide sufficient information upon which we can assess the validity of the suggested mark-up.

120. Similarly, Verizon has not demonstrated that the use of shorter asset lives is an appropriate substitute for using accelerated depreciation to reflect the effect of declining equipment prices. The fact that switch prices are declining, as Verizon asserts, does not necessarily mean that the projected life of a switch will be shorter than it would be in a market with stable or rising switch prices. Rather, the only conclusion we can draw from the declining prices is that a carrier should be able to recover more of its investment in an asset in the early part of the useful life of the asset.

121. Based on the record before us, we are not able to determine whether, and how much, certain types of equipment prices would be expected to decline going forward, [338] and

---

[333] *See* AT&T/WorldCom Ex. 9, at 8-11, Attach. 2.

[334] If, on the other hand, equipment prices are expected to increase going forward, economic depreciation expenses would be lower in the early years of the assets' lives and greater in the later years. A carrier in a competitive market could recover less of the initial capital outlay for such assets in the early years because they would compete in later years against entrants that have purchased new, higher priced assets in those years. The effect of using straight-line depreciation in lieu of *decelerated* depreciation is an over-recovery in the early years of an asset's life and an under-recovery in the later years.

[335] *Triennial Review Order*, para. 690.

[336] The MSM includes an option to use accelerated depreciation, rather than straight-line depreciation, and AT&T/WorldCom used this option in running the MSM. Because the MSM levelizes the amount of capital recovery (*i.e.*, the sum of depreciation and return on investment) so that it is the same each year, the effect of using the accelerated depreciation option is to reduce UNE rates. This difference in UNE prices appears to be a result of the tax consequences of the two different depreciation options. Consequently, because the levelization function in the MSM offsets the increased recovery that would be expected in the early years of the asset, running the MSM with the accelerated depreciation option is not the same as using accelerated depreciation to reflect the effect of declining equipment prices.

[337] Verizon Ex. 111, at 14-15.

[338] Similarly, we are not able to project whether, and how much, some equipment prices might be expected to rise going forward.

therefore we are not able to reflect economic depreciation in the rates we prescribe for Verizon. We do, however, consider the risk of under-recovery caused by the lack of economic depreciation in developing the cost of capital, and therefore our inability to establish economic depreciation rates does not mean the rates established in this proceeding are not compensatory.

E. Annual Cost Factors

1. Background

122. The cost models presented by the parties convert investments into annual operating costs through the use of expense factors, or ACFs. It is through the application of the ACFs to the amount of installed investment that we determine the annual costs (*i.e.*, expenses) of owning and operating the facilities and equipment needed to provide a particular network element.[339]

123. The Commission addressed two types of expenses in the *Inputs Order*: plant-specific expenses and common support services expenses. Plant-specific expenses are the costs related to maintenance of specific kinds of telecommunications plant.[340] In the *Inputs Order*, the Commission decided to calculate input values for plant-specific operations expenses as a percentage of investment, on an account-by-account basis.[341] Common support services expenses include the cost of corporate operations (*e.g.*, legal and human resources), customer service (*e.g.*, marketing and billing), and plant non-specific expenses (*e.g.*, engineering and power).[342] The Commission determined that common support services expenses should be calculated on a per line basis, rather than as a percentage of investment.[343] For both types of expenses, the Commission determined that inputs should be based on nationwide averages, rather than the specific expenses of any individual carrier.[344]

2. Positions of the Parties

a. Verizon

124. Verizon's cost study presents a total of eight proposed ACFs: (1) Depreciation, Return, Interest and Income Taxes; (2) Other Taxes; (3) Network; (4) Wholesale Marketing; (5)

---

[339] Cost of capital and depreciation are discussed in sections III(C) and III(D). The ACFs used in the cost models also include the cost of capital and depreciation expense. In this section of the order we focus on operating expenses.

[340] *Inputs Order*, 14 FCC Rcd at 20301, para. 341.

[341] *Id*. at 20304, para. 346.

[342] *Id*. at 20318-19, para. 377.

[343] *Id*. at 20321, para. 382.

[344] *Id.* at 20305, 20321, paras. 348, 382.

Other Support; (6) Right-to-Use; (7) Common Overhead; and (8) Gross Revenue Loading.[345] The first six ACFs are expressed as expense-to-investment ratios.[346] Multiplying these ACFs by the TELRIC investment produced by the model will produce an estimate of TELRIC expenses. The Common Overhead ACF, which accounts for the expenses of general administrative activities, such as executive and legal, is expressed as an expense-to-expense ratio and operates as a mark-up of the expenses calculated by the other ACFs.[347] The Gross Revenue Loading ACF, which accounts for the cost of uncollectibles and regulatory assessments, is expressed as an expense-to-gross revenue ratio.[348]

125. Verizon uses expense and investment figures for 1999 as the starting point in calculating ACFs. It uses Virginia-specific data for some ACFs and Verizon-East data for others. Verizon argues that it is inappropriate to use nationwide expense ratios for the purpose of establishing UNE rates. It states that the objective of a UNE cost study is to identify the costs the incumbent LEC would incur, which is markedly different than the objective in the Commission's universal service proceedings, where nationwide ratios were used.[349] In addition, Verizon argues that ratios based on nationwide data fail to reflect legitimate state-specific cost differences.[350]

126. Verizon then makes two adjustments to the numerator of certain ratios (Network, Wholesale Marketing, Other Support, and Common Overhead) in order to convert 1999 expenses to forward-looking expenses. First, Verizon applies productivity and inflation factors to the 1999 expense figures.[351] This adjustment takes place within each of Verizon's cost models, rather than in the development of the ratios themselves.[352] The second forward-looking adjustment Verizon makes to its expenses is to reduce the projected cost of repairing copper facilities by five percent to reflect the improved performance of new copper facilities as compared to existing copper facilities.[353]

127. In addition to adjusting the expense number in the numerator to reflect forward-

---

[345] Verizon Ex. 107, at 48-49. We address Verizon's right-to-use expenses in the discussion of switching costs in section V(C)(7).

[346] Verizon Ex. 107, at 49.

[347] *Id.*

[348] *Id.*

[349] Verizon Ex. 108, at 57.

[350] Verizon Initial Cost Brief at 169 n.185.

[351] Verizon Ex. 107, at 62.

[352] Verizon Ex. 122, at 22-23, n.19.

[353] Verizon Ex. 107, at 62-63.

looking expenses, Verizon applies a forward-looking-to-current (FLC) conversion factor to the investment number in the denominator of those same ACFs.[354] The premise underlying Verizon's adjustment of the numerator and denominator to forward-looking numbers is that a ratio based on 1999 numbers may understate Verizon's forward-looking expenses because expenses will not automatically fall in proportion to declines in the amount of investment. Verizon argues, for example, that the transition from one loop technology to another technology that requires a lower investment may not necessarily reduce maintenance expense in proportion to the reduction in investment, and it likely will not reduce administrative expenses (*e.g.*, legal expense) at all.[355] Verizon states that the most appropriate figure to use as the denominator is the TELRIC investment calculated as a result of this proceeding.[356] Since that number is not yet available, Verizon relies on data supplied in the New York Commission's recent UNE docket as the basis for proposing a FLC factor of 80 percent that is applied to embedded 1999 investment.[357]

128. AT&T/WorldCom argue that the adjustments made by Verizon are insufficient to reflect the increased productivity that should be achieved in a forward-looking network. Specifically, AT&T/WorldCom state that Verizon's proposed inflation factor is higher than its proposed productivity factor, which results in forward-looking expenses that are higher than current expenses.[358] AT&T/WorldCom note that Verizon agreed to significantly higher productivity adjustments in the 2002 New York UNE case.[359]

129. AT&T/WorldCom criticize Verizon's FLC factor as a "thinly-veiled attempt to recoup the operating costs of its embedded, inefficient network."[360] AT&T/WorldCom argue that the costs of a forward-looking network should be significantly less than those of Verizon's

---

354 *Id.* at 70-71.

355 *Id.* at 71.

356 *Id.* at 74 ("The most accurate calculation of the FLC ratio would require Verizon to compare the total plant investments in the TELRIC filing with the total plant investments in Verizon's accounting records.").

357 *Id.* at 75 ("This data suggests that a ratio of TELRIC investment to current investment of between 75 percent and 80 percent is a reasonable approximation going forward. Verizon conservatively used an 80 percent ratio in its cost studies.").

358 Tr. at 3803 (Verizon witness Minion acknowledges that forward-looking expenses in 2003 are higher than in 2001 in Verizon's cost study).

359 Tr. at 3804 (Verizon proposed a productivity factor of 2 percent above inflation for network-related expenses and 10 percent above inflation for non-network-related expenses); *Proceeding on Motion of the Commission to Examine New York Telephone Company's Rates for Unbundled Network Elements*, Case No. 98-C-1357, Order on Unbundled Network Element Rates at 53 (New York Commission Jan. 28, 2002) (*New York Commission Pricing Decision*).

360 AT&T/WorldCom Ex. 12, at 81.

existing network.[361] They argue that Verizon has not really adjusted the expense number in the numerator of its ACFs to reflect forward-looking costs, and therefore it is unnecessary to adjust the investment number in the denominator by using the FLC factor. In lieu of Verizon's FLC factor, AT&T/WorldCom propose application of a current-cost-to-book-cost (CC/BC) ratio as a means to convert Verizon's embedded investment to 1999 levels before calculating the expense ratios.[362]

130. AT&T/WorldCom also state that Verizon's proposed five percent adjustment for copper cable repair expense substantially understates the cost savings that can be anticipated with the new facilities reflected in the cost models. They state that a more reasonable, but still conservative, estimate of the savings associated with new metallic facilities is 30 percent for both repair expenses and expenses associated with rearrangement of plant.[363] AT&T/WorldCom base this conclusion on documents provided by Verizon that purportedly show expense reductions in excess of 90 percent when older portions of plant are rehabilitated.[364]

131. Verizon disagrees that the documents in question show that a 90 percent expense reduction is possible, and argues that there is no basis for the 30 percent expense reduction advocated by AT&T/WorldCom.[365] Verizon also argues that no reduction at all should be made for rearrangement expenses, as most of those expenses would not be affected by a switch to new copper facilities, and a higher utilization factor would have to be used to justify elimination of the rest.[366]

b. AT&T/WorldCom

132. AT&T/WorldCom use the MSM to calculate ACFs. For plant-specific expenses, AT&T/WorldCom retain the expense ratios used by the Commission in the SM.[367] These ratios are based on an average of 1997 and 1998 expenses and investment using nationwide data, rather than Verizon-specific data.[368] AT&T/WorldCom rely on the Commission's finding in the universal service proceedings that nationwide values are better predictors of forward-looking cost,[369] and they argue that many expenses will not vary among states or regions.[370]

---

361 *Id.* at 81-84.

362 *Id.* at 85-86.

363 *Id.* at 89-92.

364 *Id.* at 91.

365 Verizon Ex. 107, at 34-39.

366 *Id.* at 37-38; Tr. at 3899-90.

367 AT&T/WorldCom Ex. 14 (Pitkin Surrebuttal), at 70; AT&T/WorldCom Initial Cost Brief at 106.

368 *Inputs Order*, 14 FCC Rcd at 20305, para. 347-48.

369 *Id.* at 20309, para. 356.

AT&T/WorldCom also argue that the use of nationwide data generally avoids the need to verify the reasonableness of a company's data.[371]

133. AT&T/WorldCom recommend a different approach for common support expenses.[372] Common support services expenses include the cost of corporate operations (*e.g.*, legal and human resources), customer service (*e.g.*, marketing and billing), and plant non-specific expenses (*e.g.*, engineering and power).[373] In the universal service context, the Commission determined that common support services expenses should be calculated on a per line basis, rather than as a percentage of investment.[374] Specifically, the Commission ran a regression analysis using nationwide data for 1996, 1997, and 1998, to derive a per line amount for each type of common support expense.

134. AT&T/WorldCom propose replacing the per line common support expenses used in the SM with an eight percent factor that is multiplied by Verizon's actual 2000 expenses.[375] The eight percent factor is derived from 2000 data and, according to AT&T/WorldCom, is consistent with the downward trend in overhead expenses among the BOCs. AT&T/WorldCom state that use of 2000 data is generous and actually overstates overhead expense because these data reflect one-time merger-related expenses.[376] As an alternative approach to calculating common support expenses, AT&T/WorldCom recommend replacing the 1998 nationwide expense and investment data used by the Commission in the *Inputs Order* with actual Verizon data for 2000, and then using an out-of-model worksheet to allocate costs to particular UNEs, rather than allocate them on a per line basis as the SM does.[377]

135. Verizon opposes AT&T/WorldCom's proposal. Most significantly, Verizon argues that the application of expense ratios based on current investment and current expenses to "steeply-discounted, forward-looking" investment erroneously assumes that decreases in investment lead to automatic, proportionate decreases in expenses.[378] While Verizon acknowledges generally that expenses should fall as a result of the deployment of forward-looking technology, it argues that these decreases are based on changes in productivity, rather

(Continued from previous page)

370 AT&T/WorldCom Initial Cost Brief at 111.

371 *Id.* at 112.

372 AT&T/WorldCom Ex. 1, at 12-13.

373 *Inputs Order*, 14 FCC Rcd at 20318-19, para. 377.

374 *Id.* at 20321, para. 382.

375 AT&T/WorldCom Ex. 1, at 12-13.

376 *Id*. at 15.

377 *Id*. at 11.

378 Verizon Initial Cost Brief at 169.

than changes in the investment required for particular types of equipment.[379] As discussed above, Verizon also argues that the use of nationwide data, rather than carrier-specific data, is inappropriate in a UNE pricing proceeding.

3. Discussion

a. Plant-Specific Expenses

136. We agree with Verizon that ratios based on Verizon-specific data for 1999 are the most appropriate starting point for developing ACFs in this proceeding.[380] The purpose of this proceeding is to set UNE prices based on the forward-looking cost to Verizon of providing those UNEs. Although it is appropriate in the universal service context to use nationwide figures, it is preferable to use Verizon-specific inputs when calculating UNE rates for Verizon because it is reasonable to expect that the relationship between investment and expenses may be different for Verizon than it is for other incumbent LECs.

137. Although we agree with Verizon with respect to the starting point for developing ACFs, we do not agree with the "forward-looking" adjustments it makes. Both sides agree that the use of forward-looking technology should reduce expenses because of increased efficiencies. However, there are significant differences between the parties in how they attempt to capture these efficiencies in their calculation of expenses. By applying expense ratios based on 1997 and 1998 data to TELRIC investment (at least for plant-specific expenses), AT&T/WorldCom assume that the relationship between investment and expenses will remain constant as the amount of investment falls.[381] Verizon, on the other hand, assumes that the level of expenses will change based only on underlying changes in productivity and inflation.

138. In theory, Verizon is correct that forward-looking expenses can be calculated by applying a productivity factor to current expenses. In this case, however, Verizon's position that productivity in a competitive environment will be no more than inflation (*i.e.*, that costs will not decline due to productivity gains) is not supported by the evidence on the record. As Verizon's witness acknowledged, its proposed productivity factor reflects only labor productivity, and not total factor productivity (TFP).[382] Moreover, the only evidence Verizon offered in support of its

---

[379] Verizon Ex. 122, at 23-27.

[380] Ideally, we would use the average of two or three years as the Commission did in the *Inputs Order*. In this case, however, the record provides no evidence on whether years other than 1999 are representative of Verizon's experience.

[381] As noted above, AT&T/WorldCom propose a different approach for common support expenses.

[382] Tr. at 3880. TFP measurement is a methodology commonly used to measure productivity and productivity growth in the economy as a whole. Productivity is measured as the ratio of an index of the outputs of a firm (or industry, or nation) to an index of its inputs. Productivity growth is measured by changes in this ratio over time. *See, e.g., Price Cap Performance Review for Local Exchange Carriers*, CC Docket No. 94-1, Further Notice of Proposed Rulemaking, 14 FCC Rcd 19717, 19720-21, para. 11 (1999).

productivity factor was a single page summarizing the factors for each year, with no supporting documentation. We do not find this conclusory evidence convincing. Furthermore, we note that in other state proceedings Verizon has recognized significantly higher levels of productivity than it has proposed here.[383]

139. For similar reasons, we reject the FLC factor advocated by Verizon. The purpose of the ACFs is to calculate forward-looking expenses by multiplying an expense-to-investment ratio by forward-looking investment. Although Verizon purports to do this, in fact it estimates forward-looking expenses based on past expenses, adjusted for productivity and inflation as described above. Then, with the FLC factor, Verizon develops its ACFs, which it then uses to "calculate" the same forward-looking expense figure with which it started. As AT&T/WorldCom note correctly, the approach taken by Verizon is circular because it starts with forward-looking expenses, which is supposed to be the end result of the ACF calculation.

140. Because Verizon's FLC adjustment does not produce a meaningful estimate of forward-looking expenses, and therefore is inconsistent with the Commission's TELRIC pricing rules,[384] we will depart slightly from baseball arbitration and use an alternative adjustment to the 1999 embedded investment figures. Specifically, rather than multiply Verizon's 1999 investment figures by the FLC factor, we believe the better approach is to multiply these figures by a CC/BC ratio, as AT&T/WorldCom propose.[385] As the Commission explained in the *Inputs Order*, the CC/BC ratio is necessary to convert the embedded investment figures to current investment figures.[386] The CC/BC ratio is greater than 1.0 for accounts where costs have increased over time, and less than 1.0 for accounts where costs have declined over time.[387] Because the record does not include CC/BC ratios for Verizon for 1999, we will use the 1998 CC/BC ratios adopted by the Commission in the *Inputs Order*.[388] These ratios represent the

---

383 Tr. at 3804; *New York Commission Pricing Decision* at 53.

384 47 C.F.R. § 51.505(d)(1).

385 We direct Verizon to follow a similar approach (*i.e.*, replacing the FLC factor with a CC/BC factor) in recalculating its right-to-use factor. *See infra* section V(C)(7).

386 *Inputs Order*, 14 FCC Rcd at 20302-03, 20317, paras. 342, 374.

387 In contrast, Verizon's FLC factor is the same for all accounts. Because the FLC factor is multiplied by embedded investment figures that do not reflect price changes over time, the resulting ratio may not accurately reflect the expense ratio that would be anticipated in a forward-looking environment. For example, the ratio of Verizon's 1999 expenses to 1999 embedded investment for poles is .151. The 1998 CC/BC factor adopted by the Commission in the *Inputs Order* is 2.398, which reflects the fact that the cost of installing poles has increased over time. Inputs Order, 14 FCC Rcd at 20420, App. D at D-4. Adjusting the pole investment to reflect this trend, the ratio of 1999 expenses to 1999 current investment is .064. In contrast, applying Verizon's proposed FLC to the 1999 embedded investment figure produces an expense ratio of .191, which significantly overstates the costs associated with poles.

388 *Inputs Order*, 14 FCC Rcd at 20420, App. D at D-4.

results from five incumbent LECs, two of which were Bell Atlantic and GTE.[389] Accordingly, in the absence of record evidence of Verizon's actual CC/BC ratios, these ratios should serve as an adequate estimate.

141. For all these reasons, we reject Verizon's forward-looking adjustments and calculate plant-specific expenses by applying, to TELRIC investment, expense ratios based on 1999 expenses and 1999 investment, adjusted by CC/BC ratios.[390] The use of TELRIC investment, which assumes the most efficient technology, ensures that the cost calculated through an ACF based on current expenses and investment is forward-looking and that it reflects anticipated productivity gains. Although Verizon may be correct that expenses do not change in exact proportion to changes in the value of assets, the Commission has used current expense ratios in the past,[391] and we think it is reasonable to follow a similar approach in the calculation of UNE prices. Because we apply the expense ratios to forward-looking investment, additional adjustments generally should be unnecessary unless we can anticipate with some certainty that the underlying relationship between investment and expenses will change in the future, *i.e*., that the relationship between expenses and investment in 1999 is not representative of what would be expected on a forward-looking basis.[392] We discuss in section III(E)(3)(c) below certain adjustments that have been proposed by the parties.

b. Common Support Expenses

142. The parties take very different approaches to the calculation of some components of common support expenses. We provide below a brief discussion of each of the relevant components. In some cases, neither party proposes an approach that can be implemented both in the MSM and in Verizon's switching and transport models. In these cases, for reasons we explain below, we will retain the treatment of the expense in the MSM and direct Verizon to modify how the expense is reflected in its models.

143. *Common Overhead*. The parties take a relatively similar approach to calculating common overhead expense. Specifically, both sides propose applying a mark-up factor to direct expenses of approximately eight percent.[393] This mark-up is intended to recover the costs of the

---

[389] *Id.* at 20305, para. 347.

[390] Appendix B shows the plant-specific ratios based on these calculations. Because these ratios do not incorporate Verizon's forward-looking adjustments to the investment figure in the denominator, Verizon should back out from its models the corresponding forward-looking adjustment to the expense figure in the numerator, *i.e*., the productivity and inflation factors it applies within the models.

[391] *Inputs Order*, 14 FCC Rcd at 20304, para. 346.

[392] Although Verizon proposed a 5 percent adjustment to copper maintenance and repair expense, and AT&T/WorldCom advocated a 30 percent adjustment, those adjustments were to Verizon's proposed ACFs. Because we are not using Verizon's proposed ratios, we do not think either proposed adjustment is necessary.

[393] Verizon Ex. 107, at 66-69; AT&T/WorldCom Ex. 1, at 12-13.

Executive and Planning accounts and the General and Administration accounts.[394] Because the proposals on this issue are so similar, we will retain the treatment of common overhead in each of the models.

144. *Wholesale Marketing Expense*. AT&T/WorldCom propose that expenses associated with advertising should not be considered in calculating the ACFs. AT&T/WorldCom assert that all of these expenses are retail-related and not appropriately recovered in UNE rates. In support of their position, AT&T/WorldCom argue that the Commission excluded over 95 percent of these costs in developing inputs to be used in calculating universal service support.[395] Verizon states that AT&T/WorldCom improperly exclude all marketing costs from the MSM. Verizon argues that many of these costs are related to wholesale marketing functions it performs, such as product forecasting, product management, and regulatory implementation.[396] Verizon also argues that even advertising expenses need not be totally excluded because wholesale advertising likely would occur in a competitive marketplace.[397] Verizon suggests that a more detailed analysis of the marketing account is needed to determine which expenses, if any, should be excluded.

145. We agree with AT&T/WorldCom that advertising and marketing expenses should be removed. As the Commission found in the *Inputs Order*, retail-related expenses, which these are, should not be included in the calculation of ACFs.[398] Although it is possible that Verizon will engage in wholesale advertising and other wholesale marketing in the future, Verizon has not explained adequately the basis for the significant costs it proposes to include in the ACFs. Verizon's assumption that forward-looking wholesale advertising expense will be the same as current retail advertising expense is not supported by any objective evidence in the record. Accordingly, the exclusion of these costs from the MSM should be retained, and the Wholesale Marketing factor should be zeroed out in Verizon's models.

146. *Network Operations Expense*. Verizon proposes to recover the costs in this set of accounts by applying a loading factor to its Network factor, rather than through an independent expense factor.[399] AT&T/WorldCom propose to calculate network operations expense based on Verizon's actual 2000 data, adjusted forward to 2002, and allocated to individual UNEs through an out-of-model calculation.[400] Because of the vastly different approaches taken by the parties, it

---

394 Verizon Ex. 107, at 66; AT&T/WorldCom Ex. 23, at 7.

395 Tr. at 3910. The Commission initially proposed including 4.4 percent of marketing costs, but revised this to 5.82 percent. *Inputs Order*, 14 FCC Rcd at 20334, para. 407.

396 Verizon Ex. 109, at 69-70.

397 Verizon Ex. 107, at 41-46.

398 *Inputs Order*, 14 FCC Rcd at 20331, para. 401; *see also* 47 C.F.R. § 51.505(d)(2).

399 Verizon Ex. 107, at 58.

400 AT&T/WorldCom Ex. 1, at 13-16.

is difficult even to compare the two proposals, let alone identify a single approach that can be used both in the MSM and in Verizon's models. The parties agree, however, on the approximate amount of costs to be recovered.[401] Accordingly, we will retain AT&T/WorldCom's treatment of Network Operations expense in the MSM. Because we have established specific expense factors to be used for plant-specific expenses, Verizon's proposal to recover those costs through loading factors is not feasible. Instead, we direct Verizon to increase the Common Overhead factor in its models to recover the amount that would have been recovered through the loading factors.

147. *Customer Service Expense*. Verizon proposes to recover Customer Service expense through its Wholesale Marketing factor.[402] AT&T/WorldCom use the per line figure for customer service expense used by the SM in the universal service context, and allocate it across UNEs through an out-of-model calculation.[403] Verizon argues that the $1.69 per line per month customer service expense used in the MSM is based on old data and is not accurate.[404] In response, AT&T/WorldCom state that Verizon itself excludes much of this expense in its model, and that the amount of expense included in the two models is similar.[405] As with other components of the common support expenses, it is difficult to compare the two proposals and to develop a single approach that will work in all the models. Accordingly, we will retain the treatment of customer service expense in the MSM. As with Network Operations expense, we direct Verizon to increase its Common Overhead factor so that it recovers an amount equal to the amount of customer service expense that would have been recovered in its Wholesale Marketing factor.

148. *Uncollectibles*. In establishing UNE prices, it is appropriate to increase the amount of cost to be recovered by a factor that reflects the fact that some portion of charges will not be paid by Verizon's competitive LEC customers. In the universal service context, the SM grosses up common support expenses to reflect an amount for uncollectibles.[406] AT&T/WorldCom do not state that they have changed the treatment of uncollectibles in converting the SM to the MSM, and Verizon does not challenge the treatment of uncollectibles

[401] Verizon Ex. 108, at 62-63 (AT&T/WorldCom identify $110 million in network operations expense, as compared to Verizon's identification of $106 million).

[402] Verizon Ex. 107, at 63-64.

[403] AT&T/WorldCom Ex. 1, at 16.

[404] Verizon Ex. 109, at 75.

[405] Specifically, AT&T/WorldCom witness Pitkin states that the MSM includes over $11 million in customer service expense. AT&T/WorldCom Ex. 14, at 70.

[406] *Inputs Order*, 14 FCC Rcd at 20321, para. 382, n.855. The SM assumes an uncollectible rate of 5.26 percent of common support expenses ($7.32 per month common support expense x 12 months x 1.0526 = 92.463 annual common support expense.).

in the MSM.[407]

149. Verizon proposes a separate Gross Revenue Loading factor to account for uncollectibles, as well as regulatory assessments. It proposes an uncollectible rate of .56 percent of revenues, which was the rate it experienced in 1999 for IXC customers.[408] This ratio is expressed as a ratio of expenses to gross revenue and is applied as a mark-up to total cost.[409]

150. As with other aspects of common support expenses, it is difficult to compare the two proposals and to develop a factor that can be used in the various models we use to develop rates. Accordingly, we will retain the treatment of uncollectibles contained in each of the proposed models. That is, the models we use in developing UNE rates (the MSM and Verizon's switching and transport models) will be run without any changes to the manner in which those models account for uncollectibles.

c. Proposed Adjustments

151. *General Support Expense*. As explained in the *Inputs Order* in the universal service context, the SM reduced general support facilities (GSF) expense by 32 percent to reflect costs associated with special access and toll, which are not supported by the universal service support mechanism.[410] Verizon states that AT&T/WorldCom have inappropriately retained this exclusion.[411] In response, AT&T/WorldCom state that GSF expense associated with serving wholesale customers should be significantly lower than GSF expense for retail services (*e.g.*, fewer customer service representatives require less building space).[412] AT&T/WorldCom state that they were generous in not excluding more than the 32 percent that the SM excludes. We agree with Verizon that the reduction in GSF expense is inappropriate. The exclusion in the SM was based on the fact that certain services are not supported by the universal service support mechanism. AT&T/WorldCom did not demonstrate that the 32 percent reduction correlates to any anticipated reduction in GSF expenses beyond the reduction that results from multiplying the expense ratio by TELRIC investment.

---

[407] AT&T/WorldCom Ex. 23, at Vol. 1 at 6-10.

[408] Verizon Ex. 107, at 70, 356-57. Verizon submitted late-filed testimony proposing to increase the Gross Revenue Loading Factor included in its original cost studies. In its November 2002 filing, Verizon argues that the Commission should use the 8.34 percent rate that Verizon experienced with competitive LECs in 2001. According to Verizon, its experience to date in 2002 indicates that the 2001 rate is the start of a continuing trend toward much higher rates of uncollectibles. Verizon submitted an even higher figure in its April 2003 proffer. As discussed in section II(B)(2) above, we will not consider Verizon's late-filed testimony on this issue.

[409] Verizon Ex. 107, at 49-50.

[410] *Inputs Order*, 14 FCC Rcd at 20425, App. D at D-9; AT&T/WorldCom Ex. 14, at 71.

[411] Verizon Ex. 108, at 58-60; Verizon Ex. 109, at 111-13.

[412] AT&T/WorldCom Initial Cost Brief at 110.

152. *Merger Savings*. AT&T/WorldCom argue that Verizon's proposed ACFs are flawed because Verizon fails to include a specific adjustment to reflect the anticipated future savings associated with the Bell Atlantic/NYNEX and Bell Atlantic/GTE mergers.[413] AT&T/WorldCom propose that the increased productivity that Verizon hopes to gain through these mergers should be reflected in the forward-looking costs developed in this case. Specifically, AT&T/WorldCom propose a reduction in the common overhead factor proposed by Verizon.[414] Verizon responds that the amount of actual merger savings is subject to significant uncertainty and the projections made by the company at the time of the merger reflect many parts of the company other than local telephony, such as wireless and long distance.[415] Verizon also suggests that future increases in productivity due to the merger are reflected in its productivity factor.[416]

153. We agree with Verizon that an adjustment for proposed efficiencies realized through the mergers is unnecessary. As discussed above, multiplying expense ratios based on 1999 data by TELRIC investment will ensure that Verizon does not recover more than the forward-looking cost of providing UNEs. To warrant a further downward adjustment, we would need to quantify efficiencies solely attributable to the mergers, above and beyond the efficiencies attributable to the TELRIC assumption that Verizon will use the most efficient technology available. When the Commission reviewed each merger, it was not convinced that there would be substantial merger-specific cost savings.[417] The Commission's finding in both merger decisions that there would be only limited merger-specific cost savings supports our decision to reject AT&T/WorldCom's proposed adjustment.

154. *Y2K Expenses*. AT&T/WorldCom argue that a specific adjustment is needed to back out expenses incurred by Verizon in making its computer systems "Y2K" compliant. AT&T/WorldCom assert that these one-time expenses, which are included in the 1999 figures used by Verizon, will not be incurred on a forward-looking basis and should not be recovered through UNE rates.[418] Verizon argues that the proposed exclusion for Y2K expenses is unwarranted. According to Verizon, Y2K expenses are simply part of its annual Information

---

413 AT&T/WorldCom Ex. 12, at 87.

414 *Id.* at 88.

415 Verizon Ex. 107, at 47.

416 *Id.* at 48-49.

417 *In re Application of GTE Corp. and Bell Atlantic Corp. for Consent to Transfer Control of Domestic and International Sections 214 and 310 Authorizations and Application to Transfer Control of a Submarine Cable Landing License*, CC Docket No. 98-184, Memorandum Opinion and Order, 15 FCC Rcd 14032, 14141-42, paras. 241-42 (2000); *In re Applications of NYNEX Corp. and Bell Atlantic Corp. for Consent to Transfer Control of NYNEX Corporation and its Subsidiaries*, File No. NSD-L-96-10, Memorandum Opinion and Order, 12 FCC Rcd 19985, 20066-68, paras. 169-73 (1997).

418 AT&T/WorldCom Ex. 12, at 92.

Systems budget, and the dollars spent on Y2K would have been spent on other projects but for the Y2K problem.[419] Verizon states that the company did not increase its 1999 Information Systems budget to deal with Y2K, and its expenses for the following year were actually higher than in 1999.[420] We agree with Verizon that Y2K compliance expenditures should be included in calculating the ACFs. Although Y2K was a one-time event, Verizon has credibly demonstrated that the amount of spending for Information Systems in 1999 was not unduly inflated due to Y2K.

155. *Non-Recurring Expenses*. Verizon asserts that it has removed all non-recurring expenses from the numerator in its Network ACF because it proposes to recover these costs through NRCs.[421] Because Verizon's accounting system does not actually identify costs as recurring or non-recurring, it has used the amount of non-recurring revenue (retail and wholesale) as a proxy for non-recurring expenses.[422] AT&T/WorldCom argue that this adjustment should not be made because these costs are not appropriately recovered through NRCs.[423]

156. In section X(C)(1), we explain that costs associated with initiating service to competitive LECs generally should be recovered in recurring charges (through the application of ACFs), rather than through NRCs. The costs at issue are labor costs associated with the activities necessary to provide UNEs to a competitive LEC. In many cases, these activities will produce benefits for any carrier using the facility in the future, and not just the initial competitive LEC for which the work is performed (*e.g.*, cross-connects made to complete a connection are likely to remain in place even if the end-user customer no longer takes service from the competitive LEC). Costs of non-recurring activities that benefit only the competitive LEC, or are not reflected in Verizon's ACF calculation (*e.g.*, certain types of loop conditioning), should be recovered through NRCs.

157. Allowing even this limited set of NRCs creates a potential for double recovery without an adjustment to the ACFs. However, AT&T/WorldCom propose no such adjustment and based on the record before us we have no basis on which to develop one. Although Verizon proposes an adjustment based on its retail NRCs, it is unclear whether retail NRCs actually recover all the costs associated with retail non-recurring activities,[424] and there is no evidence as to how Verizon's retail NRC revenues relate to the limited set of expenses we allow it to recover

[419] Verizon Ex. 107, at 39-40.

[420] *Id.*

[421] *Id.* at 60.

[422] Verizon Ex. 107, at 60-61; Tr. at 4770.

[423] AT&T/WorldCom Ex. 12, at 93-94. AT&T/WorldCom do, however, advocate removal of all retail-related expenses. AT&T/WorldCom Ex. 1, at 15-16.

[424] Tr. at 4781.

through NRCs in this proceeding. Accordingly, we agree with AT&T/WorldCom that no adjustment should be made for non-recurring expenses in any of the ACFs.

158. *OSS-Related Expenses*. Verizon has removed costs associated with providing competitive LECs with access to its OSS from the calculation of the Other Support ACF. Verizon argues that these costs are more appropriately recovered through its proposed Access to OSS network element.[425] AT&T/WorldCom argue that the expenses associated with providing access to OSS should not be recovered through a separate UNE charge, but instead should be recovered through the application of ACFs. Accordingly, AT&T/WorldCom state that the expenses removed by Verizon should be included in the ACF calculations.[426]

159. Because we allow Verizon to recover OSS costs through a separate UNE charge,[427] those costs should not be included in the calculation of the ACFs. Verizon should retain its proposed adjustment to the Other Support factor when running its models to develop switching and transport rates. Although ideally a comparable adjustment should be made in the MSM, the differences in the parties' proposals makes it difficult to determine how such an adjustment should be made. Accordingly, we will not make a corresponding adjustment in the MSM.

160. *LNP Expenses*. According to Verizon, AT&T/WorldCom inappropriately exclude expenses associated with Local Number Portability (LNP).[428] Verizon states that these costs will be incurred in a forward-looking environment. AT&T/WorldCom did not offer a specific response to Verizon on this point, but Verizon is correct that the MSM submitted by AT&T/WorldCom does not include any LNP expense. We conclude that AT&T/WorldCom's decision to exclude LNP expense in calculating ACFs was appropriate. The Commission has established a mechanism for recovery of LNP costs from end-users, and it has established a presumption that LNP costs should not be considered in setting UNE prices.[429] Verizon may be correct that there are some LNP costs that may be appropriate to include in calculating ACFs (*i.e.*, costs incurred after the five-year period for the end-user charge has lapsed), but Verizon has made no attempt to demonstrate the amount of any LNP cost that satisfies this criterion. Accordingly, LNP costs should not be included in the calculation of expense ratios.

---

425 Verizon Ex. 107, at 66.

426 AT&T/WorldCom Ex. 12, at 94; Tr. at 3958.

427 *See infra* section VII(C).

428 Verizon Ex. 109, at 75.

429 *Telephone Number Portability*, CC Docket No. 95-116, Third Report and Order, 13 FCC Rcd 11701, 11778, para. 146 (1998) ("[W]e presume that state commissions will not include the costs of number portability when pricing unbundled network elements.").

IV. LOOPS

A. Introduction

161. A loop refers to the transmission facility, including all of its features, functions, and capabilities, used to carry traffic between the distribution frame (or its equivalent) in an incumbent LEC central office and the demarcation point at an end-user customer premises. Because loop investments represent a considerably higher proportion of investment in the local plant than any other UNE,[430] establishing appropriate forward-looking unbundled loop rates is, perhaps, the single most important issue in this arbitration.

162. UNEs must be provided at rates established in accordance with the TELRIC methodology.[431] Although the Commission provided guidance regarding the overall TELRIC pricing principles in the *Local Competition First Report and Order*,[432] the Commission's rules provide only general guidance on the proper manner for an incumbent LEC to recover its loop costs. The rules state that total recurring loop costs are those costs directly attributable to the loop, plus a reasonable allocation of the forward-looking common costs,[433] and they require that an incumbent LEC recover its loop costs through flat-rated charges.[434]

163. The Commission's universal service orders provide further guidance on how to determine forward-looking loop costs.[435] Consistent with the *Local Competition First Report and Order*, the *Platform Order* states that a forward-looking cost model should model loops in a manner that, from an economic perspective, minimizes cost and maximizes efficiency and, from an engineering perspective, ensures that the modeled network supports the quality of services to be provided over the network.[436] Both the *Platform Order* and the *Inputs Order* provide

---

[430] *Platform Order*, 13 FCC Rcd at 21335, para. 27 n.63 (stating that both the HAI and the BCPM cost models submitted in the universal service proceeding calculated the loop plant to represent over 70 percent of total network investment); *Local Competition First Report and Order*, 11 FCC Rcd at 15690, para. 378 n.818 (finding loop plant to constitute 48 percent of network plant of Class A carriers) (cited in *Verizon v. FCC*, 535 U.S. at 520).

[431] 47 C.F.R. § 51.501 (pricing rules apply to UNEs).

[432] *Local Competition First Report and Order*, 11 FCC Rcd at 15812-929, paras. 618-862. We discuss separately the TELRIC methodology and the relationship between the submitted cost studies and this methodology. *See supra* section III(A).

[433] 47 C.F.R. § 51.505(c); *Local Competition First Report and Order*, 11 FCC Rcd 15846-56, at paras. 679-703. We address common costs and NRCs elsewhere in this order. *See supra* section III(E) and *infra* section X.

[434] 47 C.F.R. §§ 51.507(b), 51.509(a); *Local Competition First Report and Order*, 11 FCC Rcd at 15874, para. 744.

[435] *See Universal Service First Report and Order*, 12 FCC Rcd at 8898-17, paras. 223-51; *Platform Order*, 13 FCC Rcd at 21333-53, paras. 21-70; *Inputs Order*, 14 FCC Rcd at 20164-279, paras. 12-285.

[436] *Platform Order*, 13 FCC Rcd at 21335, para. 26.

considerable, detailed guidance on the network design and inputs appropriate for a forward-looking cost study. To the extent that such guidance applies to specific model design, network design, or cost input issues, we discuss these orders in the following sections.

B. Choice of Cost Models for Loops

1. Positions of the Parties

164. Verizon proposes using the LCAM to generate rates for unbundled loops.[437] Specifically, Verizon proposes using this model to develop rates for the following loop types: two-wire analog loops, four-wire analog loops, off-premises extension loops, integrated services digital network (ISDN) BRI (*i.e.*, two-wire digital) loops, four-wire digital (*i.e.*, 56 and 64 kbps) loops, two-wire customer-specified signaling loops, four-wire customer-specified signaling loops, DS1/ISDN PRI loops, DS3 loops, xDSL-compatible loops, subloops, and dark fiber loops.[438]

165. To calculate its loop costs, Verizon attempts to identify for each loop component the material investment costs that it would incur to deploy a forward-looking network.[439] The LCAM utilizes three separate modules to identify these costs.[440] First is the Plant Characteristics Module. In this module, Verizon uses an internal company survey conducted from 1993 through 1995 to determine for each wire center the average distribution and feeder lengths, the typical cable sizes, and the plant mix (*i.e.*, aerial, buried, underground).[441] For cable costs, Verizon relies on the data in its Vintage Retirement Unit Cost (VRUC) system on installed cable costs from 1997 through 1999.[442] The second module is the Electronics Module. It determines the investment costs for digital loop carrier (DLC) systems.[443] The third module, the Loop Study Module, imports the results of the other two modules and then calculates loop investments by wire center.[444]

166. Verizon takes as the appropriate starting point for determining loop costs its

---

[437] Verizon Ex. 107, at 31; *see also* Verizon Ex. 100P (Cost Study), Vols. I-III, XVI, Tab 7 (confidential version).

[438] Verizon Ex. 107, at 80-82; *see also* Verizon Initial Cost Brief at 79 n.76.

[439] Verizon Ex. 107, at 17, 32-33; Tr. at 4104; Verizon Initial Cost Brief at 80.

[440] Verizon Ex. 100P, Vol. I, Tab B-1 at 1-5 and Vol. XVI, Tab 7 at 11-16 (confidential version).

[441] *Id.*, Vol. I, Tab A-1 at 1, Tab B-1.2 at 1-3, and Vol. XVI, Tab 7 at 11-14 (confidential version); *see also* AT&T/WorldCom Ex. 12, at 12-14; AT&T/WorldCom Ex. 11 (Murray Rebuttal), at 28-29.

[442] Verizon Ex. 100P, Vol. I, Tab A-1 at 1 (confidential version); Verizon Ex. 107, at 117-18.

[443] Verizon Ex. 100P, Vol. I, Tab A-4 at 1, Tab B-1.2 at 1, 3, and Vol. XVI, Tab 7 at 14 (confidential version).

[444] *Id*., Vol. I, Tab A-4 at 1, Tab B-1.2 at 1, 4, and Vol. XVI, Tab 7 at 14-15 (confidential version).

existing outside plant network,[445] and then makes forward-looking adjustments to conform to TELRIC principles.[446] In making these forward-looking adjustments, Verizon anticipates the technology mix that it expects to deploy in its outside plant at the end of its three-year study period. The LCAM thus models the loop plant that Verizon would deploy at the end of the three-year study period, assuming that this technology would be fully implemented throughout its network.[447]

167. AT&T/WorldCom offer two sets of critiques of the Verizon LCAM. First, AT&T/WorldCom claim that the LCAM violates basic TELRIC principles.[448] Specifically, AT&T/WorldCom criticize Verizon for failing to model a reconstructed network and, instead, making some forward-looking adjustments to its embedded network based on the network that Verizon plans to deploy at the end of its three-year study period.[449]

168. Second, AT&T/WorldCom propose to modify key inputs and assumptions used in the LCAM to enable it to produce forward-looking rates.[450] Although they claim that restating Verizon's cost studies based on these changes would generate more forward-looking rates than Verizon's studies as filed, AT&T/WorldCom nevertheless contend that it is impossible to quantify all of the adjustments necessary to correct the TELRIC flaws in Verizon's cost studies.[451] Thus, for the 2-wire, 4-wire, DS-1, and DS-3 loop types, AT&T/WorldCom propose adjusting the LCAM only in the event that we do not adopt their affirmative proposal, which we now describe.[452]

169. AT&T/WorldCom propose using a modified version of the Commission's

---

[445] *See, e.g.*, Verizon Ex. 101, at 2, 6-7, 9-12, 20-22; Verizon Ex. 102 (Gordon Direct), at 10-16. One Verizon economist testified that "data based on current network investment and operating practices provide the most appropriate (and in many cases, the only sound) bases for the analysis." Verizon Ex. 102, at 15.

[446] *See, e.g.*, Verizon Ex.101, at 2, 5-6, 9-12, 20-22; Verizon Ex. 102, at 5, 10-16, 19-21, 33. Specifically, Verizon's chief economic witness stated that Verizon's recurring cost study "should try to measure the costs that Verizon VA, acting efficiently, will incur going forward to provide relevant network functions" and that the Verizon study "incorporates engineering guidelines that begin with the existing network and then call for deployment of the most efficient mix of technologies going forward." Verizon Ex. 101, at 20, 21.

[447] *See, e.g.*, Verizon Ex. 101, at 21-24; Verizon Ex. 102, at 5-7, 10-16, 19-21, 33.

[448] AT&T/WorldCom Ex. 11, at 6-24, 38.

[449] *Id.* at 6-8, 12-19, 38.

[450] AT&T/WorldCom Ex. 12, at 4-5, 11, 16, 18-20, 31, 36-45, 52, 54, 56, 62, 64-65, 70, 73, 75-79, 81 (proposed loop model changes); *see also* AT&T/WorldCom Ex. 11, at 19-33, 35-38 (proposed loop model changes).

[451] AT&T/WorldCom Ex. 12, at 5, 16, 19, 31.

[452] *Id.* at 16.

universal service SM, which they call the MSM, to generate 2-wire analog loop rates.[453] They then propose applying out-of-model calculations to the statewide average 2-wire loop costs produced by the MSM to generate rates for 4-wire loops and for DS-1 and DS-3 (high capacity) loops.[454] In constructing the MSM, AT&T/WorldCom begin with the SM developed by the Commission in the universal service proceedings and adjust several of its inputs and algorithms.[455] We analyze these changes individually, below.[456]

170. Verizon challenges the use of any form of the SM, including the MSM, to generate loop rates.[457] It claims that the SM was not designed to estimate company- and state-specific forward-looking UNE costs, and, even as modified by AT&T/WorldCom, it is incapable of estimating the forward-looking costs that Verizon will incur.[458] In addition, Verizon criticizes many of the specific inputs used in the MSM, some that were adopted by the Commission for use in the SM and others that are newly proposed by AT&T/WorldCom for use in the MSM.[459] As noted, we address these specific input issues below.[460]

2. Discussion

171. We find that the MSM is the better cost model to use to determine the costs, and thus to generate rates, for the basic 2-wire analog loop.[461] Specifically, the MSM more fully complies with the TELRIC methodology than does the LCAM. As we noted in the cost model section of this order, we disagree with Verizon's threshold argument that the Commission has precluded use of the SM to establish UNE rates.[462] Although the Commission cautioned against relying on the nationwide inputs adopted in the *Inputs Order*,[463] the Commission never found that the underlying model platform is inappropriate for use in determining UNE costs. Rather, the Commission developed the SM platform in an express effort to model a forward-looking

---

[453] AT&T/WorldCom Ex. 23, Vol. 1 at 1-10; AT&T/WorldCom Ex. 1, at 1, Ex. D at 1-8, Attach. at 1-6; *see also* Verizon Ex. 109, at 19.

[454] AT&T/WorldCom Ex. 23, Vol. 1 at 10-12; AT&T/WorldCom Ex. 1, at 23-26, Ex. D at 1-8, Attach. 1-6.

[455] AT&T/WorldCom Ex. 23, Vol. 1 at 1-10; AT&T/WorldCom Ex. 1, at 1, 8-23; *see also supra* section III(B)(2).

[456] *See infra* sections IV(C).

[457] Verizon Ex. 108, at 7-21.

[458] *Id.* at 7-8, 13-14; Verizon Ex. 109, at 4-7.

[459] Verizon Ex. 109, at 3-124.

[460] *See infra* section IV(C).

[461] We address other loop types *infra* in section IV(D).

[462] *See supra* section III(B)(2).

[463] *See Inputs Order*, 14 FCC Rcd at 20172, para. 32.

network that reflects use of the most efficient, lowest cost network configuration, assuming existing wire center locations, that an efficient carrier would deploy.[464] The MSM is based on the same underlying forward-looking network design as the SM.[465] In contrast, the LCAM takes as its starting point Verizon's existing outside plant network, not just its existing wire center locations, and thus does not begin with the most efficient network design or technology.[466] Indeed, the network on which Verizon bases its costs is at least a decade old.[467] Verizon attempts to overcome this fact by making forward-looking adjustments to its current network.[468] We find that it is more consistent with the Commission's rules to adopt a cost model that begins with forward-looking technology and the lowest cost network configuration, rather than a model that applies forward-looking adjustments to embedded network design and technology assumptions.[469]

172. Further, the MSM is more transparent and verifiable than is the LCAM. The MSM incorporates the SM's algorithms and many of its cost inputs that were subject to extensive comment and analysis in the universal service proceeding, as well as to intense scrutiny by Verizon in this arbitration. The workings of the model are thus known well to the parties, as are the sources of the cost inputs. In contrast, Verizon did not make available the underlying sources of much of the data and formulas in its loop cost study. Verizon provides only the results of its loop plant survey and did not provide the studies underlying the survey results, either in their entirety or through a detailed or statistical summary, in this proceeding. Thus, the data contained therein are unavailable for review. Similarly, although Verizon uses weighted averages for certain inputs, such as average loop distance per ultimate allocation area (UAA), Verizon fails to explain how it arrived at its weights.[470] Further, the Verizon survey uses only one line per UAA, without explaining why or how this line is typical.[471] Moreover, although the Verizon study itself is available for review, its inherent complexity makes it substantially more difficult to undertake any meaningful sensitivity analyses. For example, the study documentation fails to explain the integration of the study's modules (*e.g.*, VCost, VRUC

---

464 *See Platform Order*, 13 FCC Rcd at 21345-46, paras. 54, 66; *Inputs Order*, 14 FCC Rcd at 20171, 20188, paras. 29, 66.

465 AT&T/WorldCom Ex. 1, at 1-2; AT&T/WorldCom Initial Cost Brief at 30.

466 *See* 47 C.F.R. § 51.503(b)(1).

467 Verizon Ex. 122, at 60; Verizon Initial Cost Brief at 82. For example, the surveys used to determine plant characteristics were completed by Verizon personnel beginning in 1993, and therefore reflect the characteristics of outside plant placed in earlier years. *See* Verizon Ex. 122, at 60; Verizon Initial Cost Brief at 82.

468 Verizon Ex. 107, at 16, 94-99; Verizon Ex. 122, at 62-63; Verizon Initial Cost Brief at 82.

469 *See* 47 C.F.R. § 51.505(b)(1).

470 *See, e.g.*, Verizon Ex. 100P, Vol. 1, Part B-1, sections 4.5, 4.6 (confidential version); Verizon Ex. 107, Attach. B at 28-31; Verizon Initial Cost Brief at 80.

471 Tr. at 4431-36.

database, LCAM) sufficiently for us to have confidence that changes made in one module flow into another properly. It is also not possible for the user to modify certain key VRUC data, such as line counts.[472] Accordingly, we will use the MSM to establish the rates for the basic 2-wire loop.

C. Loop Cost Model Implementation

173. Having decided to use the MSM to establish rates for the basic 2-wire loop, we turn to the myriad issues that the parties raise regarding the specific inputs and assumptions to use in the model. Both parties recognize that the rates derived from their respective models depend greatly on the inputs.[473] Thus, although we find that the MSM more closely complies with the Commission's TELRIC rules than does the LCAM, the selection of inputs and assumptions for use in the cost model is of major importance.

1. Cost Model Algorithms

174. In presenting the MSM, AT&T/WorldCom apply several changes to the algorithms used in the SM. These changes consist of programming logic changes to the cost model. Cost input figures are not directly affected by these changes. Specifically, AT&T/WorldCom modify: (1) the node selection criteria (*i.e.*, replace the modified PRIM algorithm with the unmodified PRIM algorithm); (2) the drop terminal dispersion locations; (3) the drop terminal orientation; (4) the customer lot size/configuration; (5) the residual line allocation; and (6) the possibility for microgrids to overlap.[474]

a. Network Design Algorithm (*i.e.*, PRIM Algorithm)

(i) Positions of the Parties

175. To optimize outside plant routing, AT&T/WorldCom propose using a network design algorithm, which they call the unmodified PRIM algorithm, instead of the algorithm used in the SM, which is termed the modified PRIM algorithm.[475] According to AT&T/WorldCom, the unmodified PRIM applies a distance methodology as opposed to the average cost methodology reflected in the modified PRIM algorithm.[476] They contend that the use of a distance algorithm

---

[472] *See* AT&T/WorldCom Ex. 12, at 19; *see also* AT&T/WorldCom Initial Cost Brief at 46.

[473] *See* Tr. at 4391-93.

[474] AT&T/WorldCom Ex. 23, Vol. 1 at 3-4; AT&T/WorldCom Ex. 1, at 9, Ex. D at 1-8, Attach. 1-6; *see also* Verizon Initial Cost Brief at 147.

[475] AT&T/WorldCom Ex. 23, Vol. 1 at 4; AT&T/WorldCom Ex. 1, Ex. D at 6-7. The PRIM algorithm is named after its inventor Robert C. Prim. Robert C. Prim, *Shortest Connection Networks and Some Generalizations*, BELL SYSTEM TECHNICAL JOURNAL 36 at 1389-1401 (1957).

[476] AT&T/WorldCom Ex. 1, Ex. D at 6-7.

avoids the error of connecting less dense, but more distant serving area interfaces/feeder distribution interfaces (SAIs/FDIs) to the central office before connecting closer, less distant interfaces. In so doing, the unmodified PRIM allegedly avoids building duplicative plant that would be modeled if the modified PRIM algorithm were used.[477]

176. Verizon opposes the use of the unmodified PRIM algorithm, claiming that the Commission rejected it during the development of the SM and that it results in understated loop costs.[478] To show this understatement, Verizon compares the distribution distances resulting from the MSM to the results that would be generated by a minimum spanning tree (MST) algorithm, which calculates distance using airline miles.[479] Verizon applies a conversion factor to account for the fact that outside plant typically cannot be deployed in straight lines due to, for example, geographic obstacles and rights-of-way constraints.[480] Verizon claims that, in some DAs, the distribution distances resulting from the MSM are less than those generated by the MST.[481] Verizon therefore argues that use of the unmodified PRIM algorithm in the MSM fails to account for all of the outside plant necessary to connect customers to central offices.[482]

(ii) Discussion

177. We find it appropriate to use the unmodified PRIM algorithm in this arbitration context to optimize outside plant routing. The PRIM algorithm is an optimizing algorithm intended to design an efficient, low-cost outside plant network configuration. In either form, modified or unmodified, it will design a network sufficient to connect central offices to customer locations.[483] Although the Commission chose in the *Platform Order* to use the modified PRIM algorithm rather than the unmodified PRIM algorithm,[484] the only explanations provided are statements in the

---

[477] *Id.*, Ex. D at 7.

[478] Verizon Initial Cost Brief at 146-47; Verizon Reply Cost Brief at 135 n.128.

[479] Verizon Ex. 108, at 43-45.

[480] *Id.* at 44.

[481] *Id.* at 45. Specifically, Verizon contends that on average the MSM distribution distance is 1.2 times the MST distances and that, in ten percent of the clusters, the MSM distribution distance is less than the MST distance. *Id*.

[482] *Id.* at 45; Verizon Initial Cost Brief at 147.

[483] *See* C.A. Bush, *et al.*, *Computer Modeling of the Local Telephone Network*, at 12 (Oct. 1999) (citing R.C. Prim, *Shortest Connection Networks and Some Generalizations*, BELL SYSTEM TECHNICAL JOURNAL, 36, 1289-1401 (1957) (describing an efficient algorithm for computing minimum distance networks) and J.C. Gower & G.J.S. Ross, *Minimum Spanning Trees and Single Linkage Cluster Analysis*, APPLIED STATISTICS, 18, 54-64 (1969) (containing a computed coded version of the Prim algorithm and some extensions)), submitted as AT&T/WorldCom Ex. 23, Vol. 1, Attach. B. An earlier version of this documentation was available when the *Platform Order* was adopted. *See Platform Order*, 13 FCC Rcd at 21336, para. 29 n.65.

[484] *See Platform Order*, 13 FCC Rcd at 21374, App. A. para. 33.

model's documentation that reflect an expectation that the modified PRIM algorithm would be more efficient than the unmodified PRIM algorithm because "the modified [PRIM] algorithm leads to lower feeder cost estimates than the unmodified [PRIM] algorithm."[485]

178. Here, AT&T/WorldCom claim otherwise, arguing that the unmodified PRIM algorithm does a superior job of designing a lower-cost outside plant network configuration. AT&T/WorldCom have every incentive to propose an optimizing algorithm that best achieves its purpose of minimizing costs. If AT&T/WorldCom are wrong, and the modified PRIM algorithm better optimizes network design to minimize costs, then our selection of the unmodified algorithm would lead to an overstatement of costs. Consequently, we find it appropriate to use an objective optimizing algorithm proposed by the party with the greatest incentive to minimize costs.

179. Verizon's argument that the unmodified PRIM algorithm fails to account for all of the outside plant because it does not reflect how Verizon will actually add new SAIs/FDIs[486] misunderstands the point of an optimization algorithm. The purpose of the algorithm, whether modified or unmodified PRIM, is to design an outside plant (both feeder and distribution) network that connects customers to central offices in the most efficient manner. If full connectivity with appropriately sized cabling occurs, then either version of the algorithm functions correctly. As an abstract matter, on an individual wire center basis, the unmodified PRIM algorithm may generate either higher or lower costs than the modified PRIM algorithm, depending on the specific characteristics of the wire center. That neither version of the PRIM algorithm reflects how Verizon actually deploys its outside plant at present is relevant neither to the specific choice of PRIM algorithm, nor to general TELRIC modeling.

180. Verizon's comparison to MST distance calculations is similarly inapposite. As AT&T/WorldCom correctly state, either form of the PRIM algorithm applies a Steiner algorithm (that is, assumes junction points), rather than using an MST design.[487] By using junction points, which connect multiple SAIs/FDIs to each other and connect drop terminal nodes to SAIs/FDIs, instead of connecting each customer location directly to the next location, the Steiner algorithm adds considerable efficiency to the modeled network compared to one using an MST methodology.[488] Thus, the MST calculations may overstate costs. In addition, the PRIM algorithms use rectilinear distances rather than airline miles to map outside plant routes, which likely overestimates rather than underestimates route distances, and thereby overestimates outside plant costs.[489] Further, Verizon's comparison of its MST calculations to the MSM mismatches distance assumptions. The MSM

---

485 AT&T/WorldCom Ex. 23, Vol. 1, Attach. B at 13.

486 Verizon Initial Cost Brief at 147.

487 AT&T/WorldCom Ex. 1, Attach. B at 12-13 n.19; AT&T/WorldCom Ex. 14, at 36.

488 AT&T/WorldCom Ex. 1, Attach. B at 12-13 n.19; AT&T/WorldCom Ex. 14, at 36-37.

489 *See* AT&T/WorldCom Ex. 14, at 36-39.

assumes the use of a 0.9 road factor (which AT&T/WorldCom propose, but we reject[490]), but Verizon uses a 1.0 road factor in performing its MST calculations. Verizon thus fails to offer a meaningful apples-to-apples comparison, and instead compares a network that assumes a ten percent reduction in outside plant distances, and therefore costs, against a network that includes no such assumption.[491]

b. Other Algorithm or Coding Changes

(i) Positions of the Parties

181. In addition to using the unmodified PRIM algorithm, AT&T/WorldCom modify the following algorithm or coding items: (1) the drop terminal dispersion locations, (2) the drop terminal orientation, (3) the customer lot size/configuration, (4) the residual line allocation, and (5) the possibility for microgrids to overlap.[492] According to AT&T/WorldCom, these changes are necessary to correct implementation errors in the SM.[493] For example, AT&T/WorldCom correct coding in the SM that erroneously locates some drop terminal placements outside of the microgrid to which they are assigned.[494] Although Verizon suggests that these algorithm and coding changes are inappropriate,[495] it offers no specific critique of any of the individual changes

[490] As we explain *infra* in section IV(C)(2)(c)(ii), a road factor is a method of adjusting estimates of route distances to reflect that the use of road surrogate data to plot customer locations may not reflect the actual dispersion of customers on roads and the associated cable and structure costs. A road factor of less than 1.0 would be used if dispersion and cable and structure counts are overstated, and a factor of greater than 1.0 would be used if they are understated.

[491] In addition to the treatment of the road factor, the comparison of MST distance to MSM distribution distance is inappropriate because of the way that customer lines are treated as inputs to the MSM. In wire centers with a low telephone penetration rate and few residential locations having secondary lines, a fractional line count, which could be significantly less than one, is assigned to each residential location in the data set. When the MSM is run, the sum of the fractional lines is converted to an integer number of lines, which the model then plots in the appropriate microgrids. The number of residential locations may therefore be lower than the number of residential locations in the underlying data. The model only configures plant to this lower number of locations. In contrast, the MST computed by Verizon measures the distance required to reach each of the fractional customer locations, thereby including distances for attaching some residential customers who do not, according to the input data, have residential telephone service. For example, assuming the model input data reflect ten customer locations in a cluster and a fifty percent telephone penetration rate, the MSM converts the ten fractional (*i.e.*, one-half) lines into five lines and then plots these five locations and designs plant to run to these locations. The MST, on the other hand, would design plant to run to each of the ten locations.

[492] AT&T/WorldCom Ex. 23, Vol. 1 at 3-4; AT&T/WorldCom Ex. 1, at 9, Ex. D at 1-6, 8, Attach. 1-6; *see also* Verizon Initial Cost Brief at 147.

[493] AT&T/WorldCom Ex. 23, Vol. 1 at 3-5, Attach. C at 108; AT&T/WorldCom Ex. 1, at 9-10, Ex. D at 1-6, 8.

[494] AT&T/WorldCom Ex. 1, Ex. D at 1-2.

[495] Verizon Initial Cost Brief at 146.

made by AT&T/WorldCom.[496] Instead, Verizon argues that the Commission has not adopted most of these changes in recently released versions of the SM.[497]

(ii) Discussion

182. We find that the changes made by AT&T/WorldCom to the algorithms and computer code used in the SM are appropriate for modeling a state-specific forward-looking network and are well documented.[498] AT&T/WorldCom's decision to sponsor a model based on the Commission's SM does not mean that AT&T/WorldCom are precluded from proposing changes to that model. Indeed, in adopting the model for universal service purposes, the Commission suggested that it expected improvements to the model platform would be made on an ongoing basis.[499] In the instant case, AT&T/WorldCom contend that model algorithm and coding changes are necessary to correct certain minor flaws in the SM.[500] For example, making changes to ensure that drop terminal placements are located within the microgrid to which they are assigned improves the accuracy of the model in designing the outside plant configuration.[501] Indeed, the Bureau (on authority delegated by the Commission) has already adopted this specific algorithm coding change in more recently released versions of the SM.[502]

183. Verizon, moreover, offers no specific critique of the changes that AT&T/WorldCom make.[503] Verizon's claims in its brief that the Commission either: (1) previously rejected AT&T/WorldCom's proposals (a claim Verizon does not substantiate)[504] or (2) has yet to

---

496 *See* AT&T/WorldCom Ex. 14, at 52; Verizon Initial Cost Brief at 147.

497 Verizon Initial Cost Brief at 147.

498 *See* AT&T/WorldCom Ex. 23, Vol. I at 3-5, Attach. C at 108; AT&T/WorldCom Ex. 1, at 9, Ex. D at 1-6, 8, Attach. 1-6.

499 *Platform Order*, 13 FCC Rcd at 21329, para. 13 ("[W]e expect that . . . on an ongoing basis, we will find opportunities to make technical improvements [to the model platform]. In such cases, we delegate to the Common Carrier Bureau the authority to make changes or direct that changes be made as necessary and appropriate to ensure that the platform of the federal mechanism operates as described in this Order.").

500 AT&T/WorldCom Ex. 1, at 9-10.

501 *Id.*, Attach. D at 1-2.

502 *See Common Carrier Bureau Seeks Comment on Translation of Cost Model to Delphi Computer Language and Announces Posting of Updated Cost Model*, CC Docket No. 96-45, Public Notice, 16 FCC Rcd 12630 (CCB 2001); *Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, Order, 18 FCC Rcd 41 (WCB 2003); Verizon Ex. 146 (AT&T/WorldCom Response to VZ-VA 9-22); Verizon Initial Cost Brief at 147 n.151 and accompanying text; AT&T/WorldCom Ex. 1, at 9.

503 *See* AT&T/WorldCom Ex. 14, at 52.

504 Verizon Initial Cost Brief at 146.

incorporate them into its current beta version of the SM,[505] fail to provide us with any justification to reject the algorithm changes. Indeed, in its reply brief, the only algorithmic or coding change that Verizon identifies as having previously been rejected by the Commission is the PRIM algorithm, discussed above.[506] In contrast to Verizon's lack of specificity in its criticisms, AT&T/WorldCom provide reasonable explanations to support each of their algorithm changes.[507] Accordingly, we accept the AT&T/WorldCom algorithm and coding changes made to the loop module of the MSM.

2. Cost Inputs

a. Updating Cost Input Data

(i) Positions of the Parties

184. In sponsoring the MSM, AT&T/WorldCom propose to update certain data that the Commission adopted in the universal service *Inputs Order*.[508] AT&T/WorldCom use updated data to bring the model forward to reflect, to the extent possible, outside plant costs as of year-end 2002, the middle of their three year-study period.[509] Specifically, AT&T/WorldCom update the line counts, the road distance factor, the feeder structure costs, the DLC input costs, the ARMIS data that underlie the plant mix calculations, and ARMIS financial data that are used in the MSM to calculate outside plant costs.[510]

185. Verizon objects to what it characterizes as selective updating of input data by AT&T/WorldCom.[511] These objections fall into two categories. First, Verizon objects generally to AT&T/WorldCom updating only selected inputs,[512] each of which results in lower costs.[513] For instance, the AT&T/WorldCom proposals to use updated (and higher) line counts (*i.e.*, demand data) and updated ARMIS data that underlie plant mix calculations (which has the effect of reducing the percentage of expensive underground plant deployed) result in the MSM

---

[505] Verizon Ex. 108, at 32-33.

[506] Verizon Reply Cost Brief at 135 n.128; *see also supra* section IV(C)(1)(a); AT&T/WorldCom Ex. 14, at 52.

[507] AT&T/WorldCom Ex. 23, Vol. 1 at 3-4; AT&T/WorldCom Ex. 1, at 9, Ex. C at 1-4, 6, 8, Ex. D at 1-6, 8, Attach. 1-6.

[508] AT&T/WorldCom Ex. 1, at 11-13.

[509] *See id*. at 11; AT&T/WorldCom Ex. 23, Vol. 1 at 5-6, Attach. C; AT&T/WorldCom Initial Cost Brief at 33.

[510] AT&T/WorldCom Ex. 1, at 11-13, 18-19; AT&T/WorldCom Ex. 23, Vol. 1 at 8-10, Attach. G; AT&T/WorldCom Initial Cost Brief at 34-36.

[511] Verizon Ex. 109, at 79-83.

[512] *Id.* at 83.

[513] *See* Verizon Ex. 109, at 79-81, 83; Verizon Ex. 108, at 26-33; Verizon Reply Cost Brief at 134-37.

generating loop costs significantly below those generated by the original SM.[514] Verizon estimates that AT&T/WorldCom's proposal to update line counts (the merits of which are addressed below[515]) reduces loop costs by $2.81 per loop per month.[516]

186. Second, Verizon objects to AT&T/WorldCom's proposal to update the line count data without also updating the customer location data.[517] Verizon argues that AT&T/WorldCom's use of projected 2002 line counts with 1997 customer location data causes a significant understatement of loop costs. As a result of this data mismatch, the MSM treats all line growth between 1997 and 2002 as additional (second) lines, producing unattainable economies of scale.[518]

187. Verizon does not propose updating input data to the MSM, except to the extent that Verizon proposes to use data from its cost study in the MSM. For example, in its re-run of the MSM, Verizon proposes to use the fill factors that it uses in the LCAM.[519] For inputs that AT&T/WorldCom do not update, Verizon does not propose specific updates either.

188. AT&T/WorldCom respond to Verizon's contention that it is inappropriate to update select inputs by noting that the Bureau has modified certain input data in the SM to determine universal service support. Specifically, the Bureau has updated line count data without also updating customer location data.[520]

(ii) Discussion

(a) Updating Input Data Generally

189. We find that AT&T/WorldCom may update certain input data without concurrently updating all input data. We reach this conclusion for several reasons. First, adoption of AT&T/WorldCom's proposed updates allows for the use of state-specific data in place of nationwide inputs. When the Commission adopted nationwide inputs in the universal service proceeding, it expressly cautioned that the use of state-specific data may be more

---

514 *See infra* sections IV(C)(2)(a)(ii), IV(C)(2)(b), IV(C)(2)(h).

515 *See infra* sections IV(C)(2)(a)(ii)(b), IV(C)(2)(b).

516 Verizon Ex. 108, at 28.

517 Verizon Ex. 109, at 79-81, 83, 113-17; Verizon Ex. 108, at 29-31; Tr. at 4401-02; Verizon Initial Cost Brief at 154-55.

518 Verizon Ex. 109, at 83, 116-17; Verizon Ex. 108, at 29-31; Tr. at 4401-02; Verizon Initial Cost Brief at 154-55.

519 *See* Verizon Ex. 204 (MSM Re-run); *see also infra* section IV(C)(2)(g).

520 AT&T/WorldCom Initial Cost Brief at 122-23 (citing *Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, Order and Order on Reconsideration, 16 RCC Rcd 22418 (CCB 2001) (*2002 Line Count Order*)); *see* also AT&T/WorldCom Ex. 14, at 60-62.

appropriate for use in determining UNE rates.[521] The purpose of this proceeding is to set UNE prices based on the forward-looking cost of providing those UNEs, thus Virginia-specific data are better suited to this purpose.

190. Second, both Verizon and AT&T/WorldCom propose cost inputs that reflect data of different vintages for different inputs, and both sides update only select inputs in their filings in the arbitration. Indeed, in its cost study, Verizon proposes using updated year 2000 line count data with customer location data from 1993-1995.[522] Similarly, in adopting loop cost inputs for use in the SM, the Commission used data of mixed vintages, including, for example, line count data from 1998, customer locations based on 1997 data applied to 1990 census block data, and DLC investment data from 1995-1998.

191. Third, almost all of the MSM inputs are based on publicly available data. Thus, either side could propose updated inputs without significant difficulty. Verizon had ample opportunity to submit updated data, based either on publicly available data or on its own proprietary data, but it did not do so.[523] Finally, to the extent that complementary data sets reflect different vintages, we analyze the particular data issue below.

(b) Line Count Data

192. We find, based on the options presented by the parties, that it is appropriate to use updated line count data, despite the lack of updated customer location data. Ideally, of course, AT&T/WorldCom would have provided both updated line count data and updated customer location data. Alternatively, Verizon could have submitted updated customer location data. Where, as here, two inputs are used in a single cost equation, we prefer to use recent data of uniform vintage. Neither side, however, submitted such data. Consequently, we must select one of the following options: (1) updated line count data (estimated year-end 2002 vintage) coupled with older customer location data (mid-1997 vintage data applied to 1990 census block data), or (2) older data for both cost inputs (1998 line count data and 1997/1990 customer location data). Between these two options, we adopt the former as more likely to produce forward-looking outside plant costs in Virginia.

193. The Bureau has resolved this exact issue – whether to update line count data without also updating customer location data – in this same manner twice in the context of calculating universal service support. Specifically, in determining support levels for 2001 and 2002, the Bureau issued two separate orders, each of which required the use of updated line

[521] *Inputs Order*, 14 FCC Rcd at 20172, para. 32 ("it may not be appropriate to use nationwide values for other purposes, such as determining prices for unbundled network elements").

[522] Verizon Ex. 122, at 60; AT&T/WorldCom Ex. 15 (Baranowski Surrebuttal), at 5-6.

[523] AT&T/WorldCom in fact restated many of the inputs that Verizon proposed for its cost models. *See, e.g.*, AT&T/WorldCom Ex. 12, at 19-79, 94-95.

count data even though customer location data were not similarly updated.[524] In these orders, the Bureau concluded that line count data must be updated to reflect cost changes.[525] Static line counts would fail to reflect economies of scale properly, thus violating one of the Commission's forward-looking cost methodology requirements identified in the *Universal Service First Report and Order*.[526]

194. The Bureau also found that the concern that a mismatch between customer location data and line count data would understate costs was exaggerated.[527] The costs for additional lines added at existing locations are accounted for through the line count increase. For example, both the SM and the MSM model larger, more expensive cable sizes to accommodate larger line counts within a cluster. In the line count update orders, the Bureau noted that 72 percent and 65 percent, respectively, of the increase in residential lines nationwide were due to the installation of additional lines at existing locations.[528] The use of road surrogate data to determine customer locations, moreover, means that missing locations lying anywhere on the road network used to create surrogate locations would be reflected in the outside plant structure costs computed by the model. Structure costs would thus be underestimated only to the extent that new locations are along new roads.[529] Further, we note that, although updated line count data are readily available (and reported to the Commission quarterly by the National Exchange Carrier Association (NECA)), updated customer location data are not. This remains the case even after the release of year 2000 Census data because such data do not currently exist in a format that the Commission could use to update customer location data.

195. Finally, we note that Verizon updates line count data but not customer location data in proposing its cost studies. Verizon uses 2000 line count data along with customer

---

[524] *2002 Line Count Order*, 16 FCC Rcd at 22418, 22420-22, paras. 1, 6-12; *Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, Order, 15 FCC Rcd 23960, 23964-66, paras. 1, 8-13 (CCB 2000) (*2001 Line Count Order*).

[525] *2002 Line Count Order*, 16 FCC Rcd at 22420-21, para. 7; *2001 Line Count Order*, 15 FCC Rcd at 23964, para. 9.

[526] *2002 Line Count Order*, 16 FCC Rcd at 22420-21, para. 7 (citing *Universal Service First Report and Order*, 12 FCC Rcd at 8915, para. 250(6) ("The cost study or model must estimate the cost of providing service for all businesses and households within a geographic region. This includes the provision of multi-line business services, special access, private lines, and multiple residential lines. Such inclusion of multi-line business services and multiple residential lines will permit the cost study or model to reflect the economies of scale associated with the provision of these services."); *2001 Line Count Order*, 15 FCC Rcd at 23964, para. 9 (citing same).

[527] *2002 Line Count Order*, 16 FCC Rcd at 22421-22, paras. 10-12; *2001 Line Count Order*, 15 FCC Rcd at 23965-66, paras. 12-13.

[528] *2002 Line Count Order*, 16 FCC Rcd at 22421-22, para. 11 n.26; *2001 Line Count Order*, 15 FCC Rcd at 22965, para. 12.

[529] *2002 Line Count Order*, 16 FCC Rcd at 22421-22, para. 11; *2001 Line Count Order*, 15 FCC Rcd at 23965-66, para. 13.

location data from 1993-1995.[530] Thus, Verizon appears to concede implicitly that it is not necessarily inappropriate to use a cost model that uses updated line count data, but not updated customer location data.

b. Loop Count Demand Data

196. Having determined that it is appropriate to consider updated line count data, we must now address the manner in which AT&T/WorldCom propose to determine this input data.

(i) Method for Updating to 2002

(a) Positions of the Parties

197. AT&T/WorldCom propose using an estimated year-end 2002 line count to calculate loop costs. AT&T/WorldCom start with the actual line count for Verizon for the year 2000, as reported by NECA, and then project a growth rate for 2001 and 2002. In so doing, they estimate what the line count would be in the middle of their three-year study period.[531] To project line count growth from year 2000 to 2002, AT&T/WorldCom analyze annual NECA line counts for Verizon from 1994 through 2000 to determine the annual line growth rate for each year. They then apply the average growth rate between 1994 and 2000 to the actual year 2000 line count to calculate an estimate for the 2002 line count.[532]

198. Verizon claims that AT&T/WorldCom's methodology for estimating 2002 line counts is flawed. Specifically, Verizon contends that AT&T/WorldCom ignore both more recent trends in line growth that show that growth is slowing, and factors used by incumbent LECs to develop demand forecasts.[533] Verizon states that the projected growth rates used by AT&T/WorldCom exceed the actual growth realized in 2000 and suggests that, if line counts are to be updated, the growth rates that Verizon experienced in 2000 represent more reasonable alternatives.[534]

(b) Discussion

199. We agree with Verizon that the better way of projecting a 2002 line count is to use

---

[530] Verizon Ex. 122, at 60; AT&T/WorldCom Ex. 15, at 5-6.

[531] AT&T/WorldCom Ex. 1, at 11; AT&T/WorldCom Ex. 23, Vol. 1 at 5, Attach. D. In their post-hearing brief, AT&T/WorldCom mischaracterize their line count projections to be to mid-2002, instead of to year-end 2002. *See* AT&T/WorldCom Initial Cost Brief at 121-22.

[532] AT&T/WorldCom Ex. 23, Vol. 1 at 5, Attach. D.

[533] Verizon Ex. 109, at 113-18 (identifying factors such as local economic conditions, requests for building permits, community demographics, and "the life-cycle phase of services").

[534] *Id.* at 113-14.

the actual year 2000 growth rate instead of the 1994 to 2000 average growth rate proposed by AT&T/WorldCom. Although it may be appropriate as a statistical matter to analyze several years' worth of line growth data to determine a trend and then apply this trend to the most recent year's data, as applied here this approach raises several concerns. First, we question the inclusion by AT&T/WorldCom of line count data for two years before the enactment of the 1996 Act. The 1996 Act spurred the development of facilities-based competition, which affects Verizon's line growth, and AT&T/WorldCom did not account for this affect. Second, AT&T/WorldCom calculate an arithmetic average of the years 1994-2000, without attempting to weight growth in individual years in response to changing circumstances. We question whether it is appropriate to weight equally line growth data from the boom years immediately following the 1996 Act and from the year 2000. Indeed, as Verizon notes, line growth slowed considerably in 1999 and 2000 compared to earlier years,[535] and AT&T/WorldCom offer no evidence that the more recent trend would not continue through 2002. We find that the most recent data (*i.e.*, 2000) provide a better basis to predict line growth for the following two years (*i.e.*, 2001 and 2002). Accordingly, we adopt the Verizon proposal and generate projected year-end 2002 line counts by applying the year 2000 line growth rate to the year 2000 line count.[536]

(ii) Using DS-0 Equivalents to Account for DS-1s and DS-3s

(a) Introduction

200. Both the SM and the MSM use as inputs estimates of the number of DS-0 equivalent lines representing residential lines, switched business lines, and special access lines (the latter of which represent primarily DS-1 and DS-3 non-switched business lines).[537] The number of special access lines used by both models is based on the number of high capacity lines (*i.e.*, DS-1 and DS-3 lines) reported by incumbent LECs, in this case Verizon, to the Commission (as part of the ARMIS reporting) on a DS-0 equivalent basis.[538] To determine the number of DS-0 equivalent high capacity lines, the incumbent LECs calculate DS-0 equivalents on a per channel basis. Thus, each DS-1 is counted as 24 DS-0 equivalent channels, and each DS-3 is counted as 672 DS-0 equivalent channels.[539]

---

[535] *See id.* at 114.

[536] To determine projected 2002 line counts by wire center, we (1) began with AT&T/WorldCom's proposed 2002 line counts by wire center; (2) reduced these amounts by the growth rates that AT&T/WorldCom applied for 2001 and 2002 to arrive at line counts for year-end 2000; and (3) applied the year 2000 growth rates that we adopt herein to the year 2000 line counts for years 2001 and 2002. We also verified that the year 2000 line counts, in aggregate, are the same as those that Verizon reported in its ARMIS filings.

[537] *See* AT&T/WorldCom Ex. 23, Vol. 1, Attach. D.

[538] *Inputs Order*, 14 FCC Rcd at 20202, para. 100.

[539] *See* ARMIS instructions, available on the Commission's web site at http://www.fcc.gov/wcb/armis/instructions/2002/definitions08.htm#T1Agen (visited Mar. 28, 2003).

201. Based on the line count inputs, including the high capacity DS-0 equivalent counts, the SM and the MSM construct the facilities needed to provide each kind of service. As an end result, the models compute a total cost for each wire center. Using the convention that all high capacity lines are counted in terms of their DS-0 equivalents, the models then calculate the average cost per line by dividing total cost by the number of DS-0 equivalent lines (equal to the sum of residential, switched business, and special access lines) resulting in a rate for a DS-0 equivalent line (*i.e.*, the basic two-wire loop).

202. The SM uses two additional inputs to determine the kind of facilities to build. It assumes that a fixed percentage (equal to 12.75 percent) of switched business lines are carried on either DS-1 or DS-3 facilities and that a different fixed percentage (equal to 91.75 percent) of special access lines are carried on either DS-1 or DS-3 facilities.[540] For all lines carried on DS-1 or DS-3 facilities, there is no change in the amount of fiber feeder capacity used, but the number of twisted copper pairs in both the feeder and distribution portions of the network is assumed to be equal to the number of DS-0 equivalent lines divided by 12 (because 2 pairs can carry 1.5 Mbps or up to 24 DS-0 circuits).[541]

(b) Positions of the Parties

203. As stated, the MSM incorporates high capacity lines through DS-0 equivalent line counts, which assume a 24:1 DS-0 to DS-1 ratio and a 672:1 DS-0 to DS-3 ratio. To determine the costs of DS-1 and DS-3 loops, AT&T/WorldCom propose using cost factors of 4.3:1 and 41.3:1 for DS-1 loops and DS-3 loops, respectively.[542] AT&T/WorldCom implicitly recognize that the use of DS-0 equivalent line counts based on channel capacity in combination with the SM's assumptions regarding the percentage of special access facilities may be inconsistent with the DS-1 and DS-3 cost factors they propose, and that this inconsistency could result in understating loop costs by spreading too few costs over too many DS-0 equivalent loops.[543]

204. To correct for any understatement of total costs, AT&T/WorldCom modify the default inputs of the SM by setting the percentages of switched business lines and special access lines carried on either DS-1 or DS-3 facilities to zero.[544] That is, when the MSM calculations are performed, the model never deploys any DS-1 or DS-3 facilities using the 12:1 line ratio. Instead, the model is instructed to configure the outside plant network such that all lines are

---

[540] *See Inputs Order*, 14 FCC Rcd at 20202, para. 100.

[541] *See id*.

[542] As explained, *infra* section IV(D)(1)(c), we adopt the AT&T/WorldCom proposal.

[543] *See* AT&T/WorldCom Ex. 1, at 18, 20-21; AT&T/WorldCom Ex. 14, at 43-46; AT&T/WorldCom Ex. 23, Vol. 1 at 11-12.

[544] AT&T/WorldCom Ex. 1, at 11.

carried on two-wire analog circuits.[545] Thus, although the total number of DS-0 equivalent lines remains overstated, the total network costs are also overstated because the MSM deploys more copper pairs than are actually required.[546]

205. Verizon claims that using DS-0 equivalents to account for high capacity special access lines overstates the number of loops assumed in the network, thereby understating loop costs. Holding costs constant, as the number of loops increases, the cost per loop decreases. Verizon advocates the use of physical per line data, rather than DS-0 equivalents.[547] By not using physical per line data, Verizon contends that AT&T/WorldCom fail to allocate costs properly to DS-0 loops and assume unattainable network efficiencies and economies of scale.[548] If physical per line data are not used for high capacity special access lines, then Verizon alternatively proposes that special access DS-0 equivalents be removed from the MSM computations entirely.[549] All switched business lines should also be assumed to use DS-0 facilities. By making these changes to the MSM, the model would determine costs that reflect achievable economies of scale.[550]

206. To the extent that we accept use of DS-0 equivalents as representative of high capacity special access outside plant lines and costs, Verizon also criticizes AT&T/WorldCom's method of calculating the DS-0 equivalents. Specifically, Verizon claims that AT&T/WorldCom inflate the line counts by misinterpreting Verizon's year 2000 ARMIS data, and understate costs by failing to include investments necessary for DS-1 and DS-3 multiplexing equipment.[551]

207. AT&T/WorldCom admit that they initially misinterpreted the Verizon ARMIS data. They subsequently reduced the number of special access DS-0 equivalents by 700,000 to correct this error.[552] AT&T/WorldCom contend that Verizon's claim that using DS-0 equivalents rather than physical pairs understates costs is actually a matter of cost allocation. Use of DS-0 equivalents allocates more costs to high capacity lines relative to DS-0s than would the use of actual physical per line data. Thus, the use of DS-0 equivalents increases the costs associated with DS-1 and DS-3

---

[545] *Id.* at 18; AT&T/WorldCom Ex. 23, Vol. 1 at 11-12.

[546] *See* AT&T/WorldCom Ex. 1, at 18, 25.

[547] *See* Verizon Ex. 109P (Murphy Rebuttal), at 35-37 (confidential version); Tr. at 4517-25.

[548] Verizon Ex. 109P, at 30-38 (confidential version); Verizon Ex. 108, at 29 n.20; Tr. 4395-96, 4487-92, 4517-25; Verizon Initial Cost Brief at 143-45.

[549] *See* Verizon Ex. 109, at 31; Verizon Ex. 162 (Tardiff Supplemental Rebuttal), at 3-6; Verizon Ex. 204; Tr. 4395-96, 4487-92, 4517-25.

[550] *See* Verizon Ex. 109P, at 29-38, 113-17 (confidential version); Verizon Ex. 204; Tr. 4395-96, 4487-92, 4517-25; Verizon Initial Cost Brief at 143-46.

[551] Verizon Ex. 109, at 37.

[552] AT&T/WorldCom Ex. 14, at 72; AT&T/WorldCom Initial Cost Brief at 122.

loops, which offsets any reduction in DS-0 loop costs. Total loop costs, however, are not affected.[553] Finally, AT&T/WorldCom claim that, by accounting for line cards and other costs that are necessary to deploy the number of DS-0 equivalent lines calculated, the model captures sufficient costs to account for DS-1 and DS-3 multiplexing investments.[554]

(c) Discussion

208. We find that counting high capacity (*i.e.*, DS-1 and DS-3) lines on a per channel DS-0 equivalent basis (*i.e.*, 24 DS-0s per DS-1 and 672 DS-0s per DS-3), when combined with the AT&T/WorldCom proposal to determine the cost of DS-1 and DS-3 loops based on different cost ratios (*i.e.*, 4.3:1 DS-1 to DS-0 and 41.3:1 DS-3 to DS-0), creates total cost and cost allocation problems that all but ensure that total outside plant costs are not recovered. Specifically, basing the costs for DS-1 and DS-3 loops in the DS-0 loop cost calculations on one DS-0 equivalency ratio, while basing the cost recovery mechanism for DS-1 and DS-3 loops on a different, lower DS-0 equivalency ratio, results in under-recovery of total outside plant costs.

209. AT&T/WorldCom's proposed solution fails to resolve the total cost and cost allocation problems. AT&T/WorldCom propose to offset overstating line counts, which result from the 24:1 and 672:1 DS-0 equivalent calculations for DS-1 and DS-3 loop facilities, respectively, by overstating the number of facilities on which DS-0 special access (and switched business) lines are carried. Specifically, AT&T/WorldCom propose to assume that DS-0 outside plant will be built to carry all special access (and switched business) lines, thereby overstating the outside plant costs for these lines.[555] They do not, however, offer evidence that the overstatement of costs offsets the overstatement of the DS-0 equivalent line count. Rather, this "two-wrongs-make-a-right" approach does not resolve the total cost problem (except, perhaps, by happenstance).[556]

210. Verizon proposes to address the total cost problem, as well as its allegation that the use of DS-0 equivalents to account for special access lines creates unachievable economies

---

553 *See* AT&T/WorldCom Ex. 14, at 44-47; AT&T/WorldCom Initial Cost Brief at 125.

554 *See* AT&T/WorldCom Ex. 14, at 48-49.

555 AT&T/WorldCom Ex. 1, at 18; AT&T/WorldCom Ex. 23, Vol. 1 at 11-12.

556 We note that, had we accepted the AT&T/WorldCom approach to use DS-0 equivalent line counts for high capacity special access lines, two specific Verizon criticisms would fail to withstand scrutiny. First, AT&T/WorldCom correct their original faulty application of the number of special access lines in Verizon's year 2000 ARMIS data by lowering the number they use in their best and final offer from 2.8 million to 2.1 million. Keffer Dec. 12 Letter, Install A; AT&T/WorldCom Ex. 14, at 72-73. Second, as AT&T/WorldCom state, Verizon misinterprets the DS-0 equivalent calculations that AT&T/WorldCom perform by failing to recognize that AT&T/WorldCom include DLC costs associated with all DS-0 equivalent lines, which captures sufficient costs to account for DS-1 and DS-3 multiplexing investments. *See* AT&T/WorldCom Ex. 14, at 48-49.

of scale,[557] by zeroing out the DS-0 equivalent special access line counts and associated costs in the MSM.[558] We find that this approach, although not ideal, offers a solution consistent with the Commission's arbitration rules.[559] Therefore, we adopt the Verizon proposed solution.

211. In order to implement this proposal, the number of special access lines in each wire center is set equal to zero, with switched business and residential line counts remaining unchanged. In addition, we set the percentages of switched lines carried on DS-1 or DS-3 facilities equal to zero, as both Verizon and AT&T/WorldCom propose (albeit for different reasons).[560] Using the resulting cost estimate to determine the number of and rates for DS-0 lines, rates for DS-1 and DS-3 lines may then be determined using the now independent AT&T/WorldCom proposed DS-1 to DS-0 and DS-3 to DS-0 cost ratios (*i.e.*, 4.3:1 and 41.3:1, respectively). DS-1 and DS-3 loop rates may be based on these (or any other appropriate) cost ratios because the rates for these loops would no longer rely on DS-0 costs that already include high capacity loop costs. That is, using this convention to determine DS-0 loop costs resolves total cost issues between the DS-0 loop costs and the DS-1 and DS-3 loop costs by making the DS-0 loop cost determination independent of the DS-1 and DS-3 loop cost determination.

212. We adopt the Verizon proposed modification as a valid application of TELRIC principles. We acknowledge, however, that the rates computed according to this proposal represent an upper bound on the rates of the basic two-wire analog loop. Because two-wire loops and higher capacity loops share network facilities, the correct economic approach to pricing would be to assign to DS-0 loops their directly attributable incremental costs plus a share of the joint facilities costs of providing DS-0 loops and high capacity loops. The Verizon approach assigns to the DS-0 loops the full stand-alone cost of providing DS-0 loops, which is equal to the directly attributable incremental costs of DS-0 loops plus all of the joint facilities costs of all outside plant. By assigning all of the outside plant joint facilities costs to the DS-0 loop type, the basic 2-wire loop rates are within (but at one end of) the reasonable TELRIC range.

213. The Commission has repeatedly stated in its section 271 orders that the application of TELRIC principles can result in UNE rates that fall within a range of

---

[557] Regarding Verizon's proposal to use physical per line data instead of DS-0 equivalent data, we note that no such data have been introduced into the record.

[558] Verizon Ex. 204.

[559] *See supra* section II(C) (discussing the baseball arbitration rules). An ideal solution might involve running the MSM multiple times in order to compute the incremental costs of both DS-0 lines and high capacity lines, as well as the total cost of providing all lines together in the network. Some "reasonable" allocation of the common costs, based on DS-0 equivalent lines or actual facilities could then be imposed. Because we have no record on how to effectuate such reasonable allocations of common costs among different loop types, we have no basis to implement such a solution in this proceeding.

[560] *See* Verizon Ex. 204.

reasonableness; that is, TELRIC does not mandate a specific rate, but rather is a methodology under which rates may result within a reasonable range.[561] Here, we are faced with two proposals for accounting for special access lines and their associated costs. AT&T/WorldCom's proposal would result only by chance in loop rates that fall within the range of reasonableness. Verizon's proposal, in contrast, falls within the reasonable TELRIC range. Accordingly, pursuant to the baseball arbitration rules,[562] we adopt Verizon's proposal because it is the only valid one before us.

(iii) Inclusion of All Wire Centers

(a) Positions of the Parties

214. Verizon criticizes the validity of the MSM because it excludes two Virginia wire centers – Centreville (CLLI code CNVIVACT) and McLean/Lewinsville (CLLI code MCLNVALV).[563] Verizon characterizes this flaw as an example of the inherent failure of the MSM to model UNEs properly.[564] Verizon makes no specific proposal to adjust the MSM to include these wire centers.

215. AT&T/WorldCom acknowledge that the MSM as originally submitted erroneously excluded these two wire centers.[565] During the course of the arbitration, AT&T/WorldCom corrected this problem, including both of these wire centers in their best and final offer submission.[566]

(b) Discussion

216. We find this issue to be moot. AT&T/WorldCom recognize that they failed to include two Verizon wire centers in their original cost model submission. They then corrected this error in their best and final offer submission. Inasmuch as AT&T/WorldCom respond fully to Verizon's criticism, no disagreement remains for us to resolve.

---

[561] *See, e.g.*, *Application by Bell Atlantic New York for Authorization Under Section 271 of the Communications Act to Provide In-Region, InterLATA Service in the State of New York*, CC Docket No. 99-295, Memorandum Opinion and Order, 15 FCC Rcd 3953, 4084, para. 244 (1999) (*New York 271 Order*), *aff'd sub. nom. AT&T Corp. v. FCC*, 220 F.3d 607 (D.C. Cir. 2000).

[562] *See supra* section II(C).

[563] Verizon Ex. 163 (Murphy Supplemental Rebuttal), at 20-23; Verizon Initial Cost Brief at 146 n.149.

[564] Verizon Ex. 163, at 23.

[565] Tr. at 4429-30.

[566] *See* Keffer Dec. 12 Letter, Install A.

c. Customer Location Data

(i) Verifiability of Data

(a) Positions of the Parties

217. To model outside plant costs, a cost model must identify the locations of the end-user customers that are connected to the local network. AT&T/WorldCom use the same customer location data that the Commission used in the SM.[567] Verizon alleges that, because the customer location data utilized by the MSM is based on proprietary third-party (*i.e.*, Taylor Nelson Sofres (TNS)) information, the accuracy and reliability of the data cannot be tested.[568]

(b) Discussion

218. We reject Verizon's assertion and find instead that the AT&T/WorldCom customer location data are sufficiently verifiable for use in a TELRIC model. Although we generally prefer to rely on public rather than proprietary data, in the instant case, all parties had sufficient ability to review and comment on the proprietary-based data. In the *Inputs Order*, the Commission endorsed the use of the PNR (predecessor to TNS) road surrogate algorithm and the PNR methodology for estimating customer location data.[569] Verizon (through its predecessor entities Bell Atlantic and GTE) was able to and did comment on the use of PNR's algorithm and methodology to calculate customer location data.[570] The Commission responded to, and rejected, Verizon's claims there.[571] In particular, the Commission found that "interested parties have been given a reasonable opportunity to review and understand the National Access Line Model process [proposed by PNR] for developing customer counts."[572] Verizon, moreover, fails to propose any alternative source of customer location data for use in the MSM. Accordingly, the customer location data accepted by the Commission in the *Inputs Order* remain the best available source of customer location data, and we find it appropriate for use in the MSM.

---

[567] AT&T/WorldCom Ex. 14, at 61.

[568] Verizon Ex. 109, at 118; Verizon Initial Cost Brief at 164.

[569] *Inputs Order*, 14 FCC Rcd at 20176-87, paras. 40-62.

[570] *Federal-State Joint Board on Universal Service*, CC Docket Nos. 96-45, 97-160, Bell Atlantic Inputs Further Notice Comments at 13-15 (filed July 23, 1999), GTE Inputs Further Notice Comments at 37-39 (filed July 23, 1999).

[571] *Inputs Order*, 14 FCC Rcd at 20178-80, 20182-86, paras. 45-47, 54-61 (rejecting Bell Atlantic and GTE criticisms of the PNR algorithm as unverifiable).

[572] *Id.* at 20185-86, para. 60.

(ii) Road Factor

(a) Introduction

219. The MSM, like the SM, uses road surrogate data to estimate customer locations because the more accurate customer geocoded data were not available.[573] In using road surrogate data, the model plots customer locations in each cluster at equal distances apart on the roads modeled. This may not reflect the actual dispersion of customers on roads.

220. A road factor could be used to adjust for any inaccuracies caused by the use of surrogate data. The factor would be less than 1.0 if dispersion and cable and structure counts were overstated and greater than 1.0 if they were understated. In the *Inputs Order*, the Commission rejected using a nationwide road factor of less than 1.0 because parties to the universal service proceeding failed to submit reliable data to verify that the use of road surrogate data overstated customer dispersion.[574]

(b) Positions of the Parties

221. AT&T/WorldCom propose a road factor of 0.9 to compensate for the overstated dispersion and cable and structure counts that result from the use of road layout based surrogate customer location data, as opposed to more accurate geocoded customer location data. AT&T/WorldCom support this change from the 1.0 road factor used in the SM by claiming that: (1) a newer BellSouth Telecommunications, Inc. (BellSouth) cost model based on actual geocoded data generates considerably fewer distribution route miles than does the SM, and (2) a comparison by the Kansas Corporation Commission of actual customer locations to surrogate customer locations showed that the route distances generated by the surrogate locations were fifteen percent too high.[575]

222. Verizon opposes the use of a road factor of less than 1.0. It argues that the Kansas study cited by AT&T/WorldCom is inapplicable because a road factor must be calculated on a state-specific basis.[576] AT&T/WorldCom fail to do so or even to provide any evidence of similarities between customer location data for wire centers in Kansas and in Virginia.[577] Had a study been performed that analyzed ARMIS sheath distances in Virginia, Verizon claims that it would have shown that the road factor should have been greater than 1.0.[578] Verizon, however, does not propose

---

[573] *See id.* at 20172-87, paras. 33-62.

[574] *Id.* at 20194-95, paras. 80-82.

[575] AT&T/WorldCom Ex. 1, at 21-22; AT&T/WorldCom Ex. 14, at 59; AT&T/WorldCom Initial Cost Brief at 126-27; AT&T/WorldCom Reply Cost Brief at 49-50.

[576] Verizon Initial Cost Brief at 167; *see also* Verizon Ex. 109, at 103.

[577] *See* Verizon Ex. 109, at 102-03; Verizon Initial Cost Brief at 167-68.

[578] Verizon Ex. 109, at 102-03.

using a higher number, preferring instead to retain the 1.0 road factor. Similarly, Verizon contends that the BellSouth model cited by AT&T/WorldCom is an inappropriate basis on which to establish a Virginia road factor because it does not reflect conditions in Virginia.[579] Finally, Verizon notes that, in the *Inputs Order*, the Commission rejected AT&T/WorldCom's claim that a road factor was necessary to adjust for overstated dispersion and inflated amounts of cable and structure.[580]

223. AT&T/WorldCom criticize Verizon's contention that ARMIS sheath distance data should be used to determine the road factor, claiming that such data are not forward-looking because they are based on embedded plant and ignore the structure sharing that would occur between feeder and distribution plant in a reconstructed network.[581]

(c) Discussion

224. We adopt Verizon's proposal to use a road factor of 1.0. In the universal service proceedings, AT&T/WorldCom proposed, and the Commission rejected, the use of a road factor less than 1.0 due to allegedly overstated dispersion and inflated cable and structure amounts.[582] Although the Commission recognized then that the issues raised by AT&T/WorldCom might justify the application of a road factor less than 1.0, it declined to apply such a factor unless it was supported by specific evidence.[583] AT&T/WorldCom fail to provide any Virginia-specific evidence here. For example, although the Kansas decision cited by AT&T/WorldCom relies on a wire-center-by-wire-center analysis,[584] AT&T/WorldCom present no similar analysis for Virginia. Nor do they provide any evidence showing that wire centers in Virginia have characteristics similar to those in Kansas.[585] The BellSouth study cited by AT&T/WorldCom is similarly unavailing. AT&T/WorldCom did not submit the BellSouth study into evidence, thus it has not been reviewed in this proceeding. Although the Kansas Commission decision and the BellSouth cost study may support the reasonableness of Virginia-specific studies (had any been submitted), standing alone they provide insufficient support for AT&T/WorldCom's proposal.

225. Although Verizon suggests that an appropriate road factor would be greater than

---

[579] Verizon Initial Cost Brief at 167; *see also* Verizon Ex. 109, at 102-03.

[580] Verizon Ex. 109, at 101-04; Verizon Initial Cost Brief at 167-68.

[581] AT&T/WorldCom Ex. 14, at 57-59; AT&T/WorldCom Ex. 18P (Riolo Surrebuttal), at 19-20 (confidential version); AT&T/WorldCom Initial Cost Brief at 127.

[582] *Inputs Order*, 14 FCC Rcd at 20178-79, 20195, paras. 45-46, 82.

[583] *Id.* at 20179, para. 46.

[584] *An Investigation into the Kansas Universal Service Fund (KUSF) Mechanism for the Purpose of Modifying the KUSF and Establishing a Cost-Based Fund*, Docket No. 99-FIMT-326-GIT, Order 16: Determining the Kansas-Specific Inputs to the FCC Cost Proxy Model to Establish a Cost-Based Kansas Universal Service Fund at paras. 32-33, 38 (Kansas Commission 1999) (*Kansas Commission USF Order*).

[585] *See* Verizon Ex. 109, at 102-03; Verizon Initial Cost Brief at 167.

1.0,[586] it neither proposes such a factor nor provides any evidence to support a higher figure. Rather, Verizon proposes use of the 1.0 factor adopted by the Commission in the *Inputs Order*.[587]

226. We therefore reject AT&T/WorldCom's proposed road factor of 0.9 in favor of the 1.0 factor proposed by Verizon and adopted by the Commission in the *Inputs Order*.

(iii) Vacant Residential and Business Units

(a) Positions of the Parties

227. Verizon claims that customer locations are undercounted by the MSM because the model fails to account for vacant residential and business units. Such units should be included because they represent planned growth, and any LEC (incumbent or competitive) building a network would build to all housing units, not just the ones then occupied.[588] Although Verizon provides some census figures pertaining to the percentage of housing units that were unoccupied in 2000,[589] it does not propose any specific adjustment to the MSM.

228. AT&T/WorldCom contend that the MSM does not undercount customer locations by failing to account for vacant residential and business units.[590] Rather, the Commission explicitly chose to use data based on households rather than housing units in calculating the number of customer locations in the original SM.[591]

(b) Discussion

229. We agree with AT&T/WorldCom that it is appropriate to base customer locations in the MSM on the number of households rather than on the number of housing units. The Commission expressly addressed this issue in the *Inputs Order* and chose to base customer location data on the number of households rather than on the number of housing units in order to achieve consistency in its calculations by avoiding the use of mismatched data.[592] Specifically, the Commission found that vacant units must either be included in both the line count data and the customer location data or in neither. Because line count data, in turn, uses household rather than housing unit data, the Commission found that household data must also be used to determine

---

586 Verizon Ex. 109, at 103.

587 *See* Verizon Initial Cost Brief at 167-68.

588 Verizon Ex. 109, at 23; Verizon Initial Cost Brief at 164-65.

589 *See* Verizon Ex. 109, at 23.

590 *See* AT&T/WorldCom Ex. 14, at 42-43; AT&T/WorldCom Initial Cost Brief at 145-46 n.135.

591 AT&T/WorldCom Initial Cost Brief at 145-46 n.135 (citing *Inputs Order*, 14 FCC Rcd at 20183-84, paras. 56-57).

592 *Inputs Order*, 14 FCC Rcd at 20183-84, paras. 56-57.

customer locations.[593] To use housing units (including vacant units) to determine customer locations would result in inflated line costs due to a data mismatch. Indeed, the Commission specifically found that "adopting housing units as the standard would inflate the cost per line by using the highest possible numerator (all occupied and unoccupied housing units) and dividing by the lowest possible denominator (the number of customers with telephones)."[594] Maintaining consistency in this calculation remains as important here as it was in the universal service proceeding.[595] Thus, because households rather than housing units are used to determine loop counts, households should also be used to determine customer locations.[596] We therefore reject Verizon's proposal to include vacant units in the customer location data only.

d. Cable Drop Length

(i) Positions of the Parties

230. Verizon claims that the drop length used in the MSM is too low and improperly calculated.[597] Specifically, it claims that the MSM uses an inappropriately short drop length of approximately 24 or 27 feet,[598] much shorter than the national average drop length of 73 feet.[599] Verizon largely attributes this error to AT&T/WorldCom's calculation of drop length using the number of drops, rather than the number of lines.[600] Verizon also asserts that the small drop length derives from AT&T/WorldCom's use of an improper road factor and an excessive loop count.[601]

---

[593] *Id*.

[594] *Id.* at 20184, para. 57.

[595] The issue of maintaining consistency between data points here is noticeably different from the data mismatch issue we address between line count data and customer location data. *See supra* section IV(C)(2)(a)(ii)(b). Here, the AT&T/WorldCom proposal properly matches both data type (*e.g.*, household v. housing unit) and vintage (*i.e.*, year). Verizon proposes, in concept, that we should mismatch the type of data. In addressing the line count and customer location data issue, we resolved issues of data vintage, not data type. We also found that the possible mismatch is overstated because many new customers will be located at existing customer locations or along modeled plant routes. *See id*. The Bureau, moreover, twice endorsed this approach to line count and customer location data, whereas the Commission expressly determined that no mismatch should exist in the type of data addressed here. *Compare 2002 Line Count Order*, 16 FCC Rcd at 22418, 22420-22, paras. 1, 7-12 *and 2001 Line Count Order*, 15 FCC Rcd 23960, 23964-66, paras. 1, 9-13, *with Inputs Order*, 14 FCC Rcd at 20184-85, para 57.

[596] We also note that Verizon does not offer any explanation as to why any undercount in vacant units is not accounted for through the application of fill factors. *See infra* section IV(C)(2)(g).

[597] Verizon Ex. 109, at 104-07; Verizon Reply Cost Brief at 158.

[598] *Compare* Verizon Ex. 109, at 105 (23.8 feet), *with* Verizon Reply Cost Brief at 157-58 (27.3 feet).

[599] Verizon Ex. 109, at 105 (citation omitted); Verizon Reply Cost Brief at 158.

[600] Verizon Reply Cost Brief at 158.

[601] Verizon Ex. 109, at 104-07; Verizon Reply Cost Brief at 158.

231. AT&T/WorldCom assert that Verizon's criticisms are misplaced. Cable drop lengths should be calculated based on the number of drops, not the number of lines. When properly calculated, the drop length is 77.4 feet, not the 24 or 27 feet that Verizon alleges and longer than the 73 feet that Verizon claims would be appropriate.[602]

(ii) Discussion

232. We agree with AT&T/WorldCom. Drop lengths represent the cable length between the customer location and the drop (*e.g.*, pole, pedestal). Drop lengths should be calculated based on the number of drops, as AT&T/WorldCom propose, not the number of lines.[603] AT&T/WorldCom, moreover, demonstrate that the drop length they use in the MSM is actually longer than the drop length that Verizon proposes as a reasonable alternative.[604]

e. Distribution Length and Engineering Standards for Sizing Distribution Areas

(i) Positions of the Parties

233. Once customer locations have been identified, they must be grouped by the cost model in an efficient and technologically reasonable manner.[605] Two possible ways to group customer locations are use of a clustering algorithm or a grid-based approach.[606] A clustering algorithm uses a multifaceted approach, including the use of internal optimization algorithms, to group locations in proximity to one another into clusters in a manner designed to minimize costs while maintaining a specified level of service quality.[607] Accordingly, in the *Platform Order*, the Commission found the use of a clustering algorithm "consistent with actual, efficient network design."[608] A grid-based approach, as the term suggests, involves grouping customer locations by placing a uniform grid over the area being modeled and grouping together locations that fall within a grid.[609] In comparing these two approaches, the Commission found that, although the grid-based approach is simpler to implement, the use of the clustering algorithm was superior because it identifies "natural groupings of customers . . . does not impose arbitrary serving area boundaries" as

---

602 AT&T/WorldCom Ex. 14, at 39-40; AT&T/WorldCom Initial Cost Brief at 184.

603 We address issues raised by Verizon pertaining to the road factor and to the loop count *supra* in sections IV(C)(2)(d)(ii) and IV(C)(2)(b), respectively.

604 *See* AT&T/WorldCom Ex. 14, at 39-40; AT&T/WorldCom Initial Cost Brief at 184.

605 *Platform Order*, 13 FCC Rcd at 21341, para. 42; AT&T/WorldCom Ex. 23, Vol. 1, Attach. B at 4-5.

606 *See Platform Order*, 13 FCC Rcd at 21341-42, para. 43.

607 *Id.* at 21341-45, paras. 43-53; AT&T/WorldCom Ex. 23, Vol. 1, Attach. B at 4-16.

608 *Platform Order*, 13 FCC Rcd at 21342, para. 44.

609 *Id.* at 21342-43, para. 46.

does a grid-based approach, and takes into account engineering constraints such as distance limitations between customer locations and DLC systems.[610]

234. AT&T/WorldCom use the same clustering algorithm in the MSM that the Commission adopted in the SM.[611] In applying this algorithm, the MSM assumes a relatively small number of relatively large clusters, thereby lowering fixed costs while increasing variable (*i.e.*, cable and structure) costs.[612] AT&T/WorldCom also claim that the appropriate copper/fiber break point in the clustering algorithm should be 18,000 feet.[613]

235. Verizon claims that the MSM improperly builds too few DAs with excessively long distribution lengths,[614] and that it fails to follow Carrier Serving Area (CSA) rules, which specify a copper/fiber break point of 12,000 feet.[615] Verizon also contends that the MSM improperly assumes that the number of clusters should be kept small as opposed to minimizing the distribution length per cluster.[616] Finally, Verizon asserts that the MSM routinely models clusters that violate the deployment guideline (different from the CSA rules) that DAs should have between 200 and 600 lines.[617] Verizon claims that, as a result of these errors, the MSM models approximately half of the DAs that actually exist in Verizon's network in Virginia.[618]

236. In response to these criticisms, AT&T/WorldCom claim that Verizon's LCAM model suffers the same infirmities that Verizon identifies in the MSM. Specifically, AT&T/WorldCom allege that the LCAM includes almost 2,500 fewer DAs than does Verizon's actual network in Virginia and that more than twenty percent of the DAs included in the LCAM contain more than 600 working lines.[619] The 200-600 working lines assumption for sizing DAs, moreover, represents a flexible engineering guideline, not a mandatory outside plant design rule.[620]

---

610 *Id.* at 21342-43, 21345, paras. 45-46, 53.

611 *See* AT&T/WorldCom Ex. 1, at 1, 6-8; AT&T/WorldCom Ex. 23, Vol. 1, Attach. B at 4-16.

612 AT&T/WorldCom Ex. 23, Vol. 1, Attach. B at 5-7.

613 AT&T/WorldCom Ex. 18 (Riolo Surrebuttal), at 2-5; AT&T/WorldCom Initial Cost Brief at 127-30; AT&T/WorldCom Reply Cost Brief at 50.

614 Verizon Ex. 109, at 20-22, 24-25, 27-28; Verizon Initial Cost Brief at 166; Verizon Reply Cost Brief at 143-44.

615 Verizon Ex. 109, at 19-22, Attach. 2; Verizon Initial Cost Brief at 166; Verizon Reply Cost Brief at 142-43.

616 Verizon Ex. 109, at 24; Verizon Reply Cost Brief at 143-44.

617 Verizon Ex. 109, at 20-22; Verizon Reply Cost Brief at 143-44.

618 Verizon Ex. 109, at 20-22; Verizon Reply Cost Brief at 143-44.

619 AT&T/WorldCom Ex. 15, at 3-4.

620 AT&T/WorldCom Ex. 18, at 6.

(ii) Discussion

237. We agree with AT&T/WorldCom and find that the MSM does not improperly size DAs.[621] AT&T/WorldCom persuasively demonstrate that DAs need not always contain between 200 and 600 working lines. Rather, these are general deployment goals.[622] Verizon claims that the Commission limited use of the clustering algorithm of the SM to rural areas and that there is no evidence that the algorithm produces overall efficient results.[623] Moreover, Verizon claims that AT&T/WorldCom misstate the Commission's findings in the *Platform Order*. The SM's documentation, however, notes that the clustering algorithm, which produces a smaller number of larger clusters, will perform better in rural areas than a clustering algorithm focused on generating a larger number of smaller clusters, but that "it is not clear, *a priori*, what number of clusters will embody an optimal trade-off between these fixed and variable costs."[624] The Commission applied optimization routines to its clustering algorithm to reduce the total distance between the customer locations and their clusters' centers by ten to thirty percent, typically.[625] Thus, the Commission found that the SM's clustering algorithm, which is used by the MSM, "provides the least-cost, most-efficient method of grouping customers into serving areas."[626] Accordingly, we find appropriate the use of this clustering algorithm in the MSM.

f. Engineering Standards for Copper Loop Lengths

(i) Positions of the Parties

238. AT&T/WorldCom assign a maximum copper/fiber breakpoint of 18,000 feet in the MSM.[627] They claim that this is consistent with modern CSA outside plant design guidelines and that the Commission endorsed the use of an 18,000 foot break point in the *Platform Order*.[628]

239. Verizon claims that the proper break point should be 12,000 feet and that this

---

[621] We discuss the copper/fiber break point issue *infra* in section IV(C)(2)(f). Because we agree with Verizon on that issue, our finding on that issue will affect the average distributions length by reconfiguring in the MSM any loops that originally were determined to have distribution lengths of between 12,000 and 18,000 feet.

[622] AT&T/WorldCom Ex. 15, at 3-4.

[623] Verizon Reply Cost Brief at 144 n. 139.

[624] AT&T/WorldCom Ex. 23, Vol. 1, Attach. B at 5 (emphasis in original).

[625] *Id.*, Vol. 1, Attach. B at 6.

[626] *Platform Order*, 13 FCC Rcd at 21345, para. 53.

[627] AT&T/WorldCom Ex. 18, at 2-5; AT&T/WorldCom Initial Cost Brief at 127-30; AT&T/WorldCom Reply Cost Brief at 50.

[628] AT&T/WorldCom Ex. 14, at 33 (citing *Platform Order*, 13 FCC Rcd at 21352-53, para. 70); AT&T/WorldCom Ex. 18, at 3 (citing same).

limitation is required generally under the CSA guidelines. In particular, the 12,000 foot limit is necessary for a network to provide advanced services and network elements that were not at issue in the universal service proceedings. By using 18,000 feet in the *Platform Order*, Verizon alleges that the Commission departed from CSA guidelines.[629]

240. AT&T/WorldCom respond that the choice of an 18,000 foot or a 12,000 foot break point in the MSM is largely meaningless because fewer than one percent of loops modeled in the MSM have a break point of between 12,000 and 18,000 feet.[630]

(ii) Discussion

241. We agree with Verizon and find that the appropriate copper/fiber break point for use in the MSM is 12,000 feet. CSA guidelines expressly call for a copper/fiber break point at 12,000 feet, not 18,000 feet.[631] The CSA guidelines, although flexible enough to permit some exceptions, are nonetheless the most recent guidelines for building outside plant and, therefore, represent the most appropriate design guidelines to be used in a TELRIC model. Although AT&T/WorldCom note that the Commission used an 18,000 foot break point in the SM,[632] this is not dispositive here. Rather, Verizon is correct that the Commission made that decision in the context of modeling a network designed to provide a basic level of voice service to be supported.[633] Specifically, the Commission found that a design standard that included transmission standards applicable for voice, data, video, sensor control, and other uses exceeded the service quality standards for universal service. The Commission further found that it was not in the public interest to burden the universal service support mechanisms with the costs necessary to support a network capable of delivering very advanced services. Because such a limited network was being modeled, the Commission found an 18,000 feet break point appropriate.[634]

242. This is a different case. Unlike in the universal service context, the functionality of an unbundled loop is not limited to voice-grade service.[635] Thus, the universe of UNE loops included in the loop cost model is broader than the loops in the network modeled only for universal service purposes. When including this broader universe of loops, we conclude that the loop cost model should design outside plant that adheres to CSA guidelines. We therefore apply a

---

629 Verizon Ex. 109, at 19-22, Attach. 2; Verizon Initial Cost Brief at 166; Verizon Reply Cost Brief at 142-43.

630 AT&T/WorldCom Ex. 14, at 32.

631 AT&T Ex. 122 (Telcordia Notes on the Network, Section 12), § 12.1.4.

632 *See* AT&T/WorldCom Ex. 14, at 33 (citing *Platform Order*, 13 FCC Rcd at 21352-53, para. 70); AT&T/WorldCom Ex. 18, at 3 (citing same).

633 Verizon Ex. 109, at 19, 21; Verizon Reply Cost Brief at 142-43.

634 *Platform Order*, 13 FCC Rcd at 21352-53, para. 70.

635 47 C.F.R. § 51.319(a)(1).

copper/fiber break point of 12,000 feet in the MSM.

g. Fill Factors

(i) Purpose and Use in Cost Models

243. Fill factors represent the percentage of total usable capacity of a part of outside plant (*e.g.*, distribution cable, copper feeder cable) that is expected to be used to meet a measure of demand.[636] Fill factors are used in designing outside plant to ensure that the plant can accommodate existing demand, growth, churn, and administrative functions (such as testing and repair), but also to avoid building excess capacity.[637] In developing a cost model, fill factors that are too low model an outside plant network with excess capacity above that of an efficient firm, thereby leading to inappropriately high UNE loop rates. Conversely, if fill factors are too high, the outside plant designed would be insufficient to support predicted growth and service outages, and the resulting UNE loop rates would be correspondingly too low.[638] In its section 271 orders, the Commission has accepted a wide range of fill factors as consistent with TELRIC principles.[639] Here, consistent with baseball arbitration rules,[640] we adopt the fill factors proposed by one side that are most consistent with Commission rules and precedent.

(a) Positions of the Parties

244. AT&T/WorldCom and Verizon employ different types of fill factors in their respective cost models. AT&T/WorldCom use target fill factors in the MSM, which are designed to approximate the excess capacity a firm would deploy to account for growth, churn, and administrative services over a reasonably foreseeable period of time. Thus, AT&T/WorldCom's proposed fill factors, which vary in the MSM for different parts of outside plant (*e.g.*, distribution, copper feeder, fiber feeder) and for density zones, are intended to ensure that the network models not only the capacity needed to provide service to current customers, but sufficient capacity to provide

---

636 Fill factors are sometimes referred to as utilization factors or utilization rates. *See* Verizon Ex. 109, at 84.

637 *See Inputs Order*, 14 FCC Rcd at 20237-38, para. 186.

638 *Id.*

639 *See, e.g., Joint Application by BellSouth Corporation, BellSouth Telecommunications, Inc., and BellSouth Long Distance for Provision of In-Region, InterLATA Services in Georgia and Louisiana*, CC Docket No. 02-35, Memorandum Opinion and Order, 17 FCC Rcd 9018, 6053, 9054-55, paras. 66, 70 (2002) (allowed use of 69.5 percent for copper feeder, 74 percent for fiber feeder, and 48 percent for distribution as not clear TELRIC error) (*Georgia/Louisiana 271 Order*); *Kansas/Oklahoma 271 Order*, 16 FCC Rcd at 6275-76, para. 80 (30 percent distribution fill factor violates TELRIC as too low); *Application of Verizon New England Inc., Bell Atlantic Communications, Inc. (d/b/a Verizon Long Distance), NYNEX Long Distance Company (d/b/a Verizon Enterprise Solutions) and Verizon Global Networks Inc., for Authorization to Provide In-Region, InterLATA Services in Massachusetts*, CC Docket 01-9, Memorandum Opinion and Order, 16 FCC Rcd 8988, 9007-08, paras. 39-40 (2001) (*Massachusetts 271 Order*) (40 percent distribution fill factor may be too low).

640 *See supra* section II(C).

for growth, churn, and administrative functions as well.[641] In so doing, AT&T/WorldCom rely on current demand, as opposed to ultimate demand (*i.e.*, the total anticipated future demand).[642] Thus, the fill factors drive the engineering used to model the network capacity.

245. This is the same approach to fill factors that the Commission adopted in the *Inputs Order*, and, for the factors adopted in the *Inputs Order* – distribution, copper feeder, and fiber feeder – AT&T/WorldCom propose using the same fill factors.[643] For remote terminal (RT) plug-in equipment and RT common electronics, AT&T/WorldCom propose using the same fill factors that the Commission adopted for copper feeder in the *Inputs Order*.[644]

246. Verizon does not use target fill factors in its loop cost study. Rather, it uses a capacity modeling approach based on realized (or actual) fill factors.[645] Verizon's engineering guidelines specify that the network should be built to support a certain level of capacity (generally, two lines per customer location). Verizon then applies a fill factor on top of this amount for cost study purposes. In so doing, Verizon applies its fill factor to ultimate demand – total demand for which the network is built – rather than to current demand. In other words, Verizon does not use fill factors to size facilities or otherwise plan the network. Instead, it applies fill factors to the network it will build in order to ensure that "the rates spread the forward-looking costs across only those units of capacity that will be available to produce revenue."[646] Verizon claims that it is being conservative in advocating use of its actual experienced fill factors, in both its cost study and the MSM, because the average fill factor in the competitive environment assumed under TELRIC would be less than its current actual fill due to increased fluctuations in demand and customer churn.[647]

(b) Discussion

247. As we explain in more detail below in the analyses of the individual fill factors, we adopt the fill factors proposed by AT&T/WorldCom. Their proposals comport with the Commission's treatment of fill factors in the *Inputs Order*, in both concept and level.[648] In that order, the Commission expressly adopted use of current demand, rather than ultimate demand, in applying fill factors. Moreover, the Commission rejected GTE's claims, raised again by Verizon

---

641 *See* AT&T/WorldCom Initial Cost Brief at 145; *see also* Verizon Ex. 109, at 84.

642 *See Inputs Order*, 14 FCC Rcd at 20239, para. 188 (discussing ultimate demand).

643 *See* AT&T/WorldCom Initial Cost Brief at 151, 157, 160.

644 *See* AT&T/WorldCom Initial Cost Brief at 162-63.

645 Verizon Ex. 107P, at 34-40, 100-16 (confidential version); Verizon Initial Cost Brief at 103-05.

646 *See* Verizon Initial Cost Brief at 103.

647 *See id.* at 105.

648 *See Inputs Order*, 14 FCC Rcd at 20237-38, 20243-44, paras. 186, 200-01.

here, that current demand would not take into account growth. To the contrary, the Commission found that current demand accounts for growth.[649]

248. In addition, because AT&T/WorldCom and Verizon use distinct types of fill factors in their respective models (target fill versus realized fill), the factors used in one model may not be directly substituted into the other model. This is one of the few matters on which AT&T/WorldCom and Verizon agree.[650] Indeed, one Verizon witness, agreeing with an AT&T/WorldCom witness, stated that "there is not a really direct way to know the comparison between our [Verizon's] fill factor and theirs [AT&T/WorldCom's]. . . . It's really a totally different use of the utilization [*i.e.*, fill] factor."[651]

249. Further, in its brief, Verizon defends the use of actual fill factors on the ground that the average fill factor in the competitive environment assumed under the Commission's TELRIC rules would be less than its current actual fill due to increased fluctuations in demand and customer churn.[652] Although there may be some merit to Verizon's argument that competition will lead to greater fluctuations in demand, it also may be the case that companies in a competitive market would develop more efficient mechanisms to respond to these fluctuations (*e.g.*, more creative marketing and pricing strategies, more flexible network architectures). Because Verizon has presented no evidence on this point, we have no basis for finding that there is a negative correlation between competition and outside plant utilization rates.[653]

(ii) Distribution Fill Factor

(a) Positions of the Parties

250. In the MSM, AT&T/WorldCom use target fill factors for distribution cable of between 50 and 75 percent, with an effective fill averaged across density zones of 52.5 percent.[654] These target fills are the same fill factors that the Commission adopted in the *Inputs Order*.[655] To determine the effective fill factor using current demand (as AT&T/WorldCom project it), AT&T/WorldCom perform a test using mid-2001 data for total demand. Specifically, they compute an effective fill factor by comparing the number of cable pairs actually deployed by the model with

---

649 *Id.* at 20243-44, para. 201 ("Significantly, we note that, contrary to GTE's inference, current demand as we define it includes an amount of excess capacity to accommodate short-term growth.").

650 Tr. at 4494-96.

651 *Id.*

652 *See* Verizon Initial Cost Brief at 105.

653 The effect of increases in risk due to demand fluctuations and churn may be reflected in the cost of capital. *See supra* section III(C).

654 AT&T/WorldCom Ex. 14, at 13-14; AT&T/WorldCom Initial Cost Brief at 151.

655 *Inputs Order*, 14 FCC Rcd at 20369, App. A.

the demand number in the model.[656]

251. Verizon claims that AT&T/WorldCom's proposed fill factors would not enable a carrier to operate efficiently and meet minimum service quality standards.[657] Rather, normal network planning requires building two lines to each customer premises to serve ultimate demand.[658] Verizon asserts that although the Commission previously supported use of current, rather than ultimate, demand, this was in the universal service context.[659] By building only to current demand, Verizon contends that AT&T/WorldCom fail to account for demand fluctuations, churn, and administrative functions. Building to ultimate demand also avoids the future costs of inefficient piecemeal deployment.[660] Further, Verizon notes that AT&T/WorldCom's use of 2001 demand data to determine the effective fill factor is inconsistent with other aspects of the MSM that use mid-2002 demand data.[661]

252. Although Verizon criticizes modeling based on current demand rather than ultimate demand, AT&T/WorldCom note that Verizon does not propose an alternative figure (other than that Verizon uses in its own study) for use in the MSM.[662] Nor does Verizon provide any substantiation for its claim that a network built using AT&T/WorldCom's distribution fill factors would have insufficient capacity to function properly. AT&T/WorldCom claim, however, that their proposed fill factors are consistent with GTE engineering guidelines.[663] Verizon further failed to recognize that current demand includes capacity for short term growth, churn, and administrative functions.[664]

253. Finally, AT&T/WorldCom assert that Verizon's claim of a data mismatch between their effective fill factor calculations and their line count data is misplaced. To calculate fill factors, the same point in time must be used for both total available lines and total current lines. AT&T/WorldCom use mid-2001 data for both data points in their effective fill factor test calculation. Using 2002 data for only the numerator (*i.e.*, usable capacity) would improperly inflate

---

656 *See* AT&T/WorldCom Ex. 14, at 14 n.16.

657 Verizon Ex. 109, at 22, 84-85; Verizon Initial Cost Brief at 160.

658 Verizon Ex. 109, at 85.

659 *Id.* at 84.

660 *Id.* at 22, 84-86.

661 Verizon Initial Cost Brief at 161; *see also* Verizon Ex. 108, at 31.

662 AT&T/WorldCom Initial Cost Brief at 151.

663 AT&T/WorldCom Initial Cost Brief Proprietary at 153 (confidential version) (citing AT&T Ex. 117P (GTE Network Planning: Planning Analysis Report, Infrastructure Provisioning Guidelines, PAR-074, Revision 1 (March 1997)), at H1-H3 (confidential version)).

664 AT&T/WorldCom Ex. 1, at 13-14; *see also* AT&T/WorldCom Initial Cost Brief at 151-152; AT&T/WorldCom Reply Cost Brief at 66-67.

the calculated effective fill factor, contrary to Verizon's proposal of low fill factors, and would create a data mismatch within the fill factor calculation itself.[665]

(b) Discussion

254. We agree with AT&T/WorldCom and will use their proposed loop distribution fill factors. In the *Inputs Order*, the Commission expressly rejected using ultimate demand, as Verizon proposed then and proposes again now, in favor of using current demand to calculate fill factors.[666] There, the Commission found forecasting ultimate demand too speculative.[667] Here, Verizon fails to respond to this concern and provide a method of reliably forecasting ultimate demand, particularly in light of rapidly changing technological developments. Just as the Commission found it inappropriate to include in universal service support the costs of building outside plant designed to meet uncertain ten- or twenty-year demand projections, it is inappropriate for AT&T/WorldCom to bear the cost today of building plant for uncertain ultimate demand.[668] Verizon, moreover, continues to misinterpret current demand. As AT&T/WorldCom explain, the Commission previously found that current demand, *by definition*, includes capacity for growth.[669] Further, Verizon's assertion that AT&T/WorldCom's proposed fill factors are too high is belied by the information in GTE's engineering guidelines.[670]

255. Verizon also incorrectly criticizes AT&T/WorldCom's use of 2001 data instead of 2002 data for total demand in their test determination of the effective fill factor. AT&T/WorldCom propose using 2001 data for both total usable capacity and total demand, thereby ensuring consistency between the numerator and the denominator in calculating the distribution fill factor. Verizon's suggestion would artificially inflate the fill factor, as AT&T/WorldCom point out, and we think it unlikely that Verizon supports a higher fill factor. Consistency is crucial to the calculation of the fill factor, and Verizon provides no good reason to depart from the use of inputs of uniform vintage.[671]

256. Further, even if Verizon's criticisms were valid, Verizon failed to propose a viable

---

665 AT&T/WorldCom Ex. 14, at 13-14; *see also* AT&T/WorldCom Reply Cost Brief at 66 n.45.

666 *Inputs Order*, 14 FCC Rcd at 20243-44, paras. 199-202.

667 *Id.* at 20243-44, paras. 200-01.

668 *See id.* at 20243, para. 199; AT&T/WorldCom Ex. 20, at 38-41; AT&T/WorldCom Reply Cost Brief at 67.

669 *Inputs Order*, 14 FCC Rcd at 20237-38, 20243-44, paras. 186, 201.

670 *See* AT&T Ex. 117P, at H1-H3 (confidential version).

671 *See* AT&T/WorldCom Ex. 14, at 14 n.15; AT&T/WorldCom Reply Cost Brief at 66 n.45; *see also supra* section IV(C)(2)(c)(iii) (discussing model consistency issues).

alternative distribution fill factor for use in the MSM.[672] Indeed, as Verizon's witness concedes, the fill factors that Verizon uses in its cost study cannot be directly substituted into the MSM.[673] The Verizon testimony and briefs, moreover, do not include any other proposal for the distribution fill factors that Verizon would use in the MSM.

(iii) Copper Feeder Fill Factor

(a) Positions of the Parties

257. AT&T/WorldCom propose copper feeder target fill factors in the range of 70 percent to 82.5 percent, with lower effective fills after breakage is taken into account.[674] These target fill factors are the same as those adopted by the Commission in the universal service proceeding.[675]

258. Verizon claims that AT&T/WorldCom's copper fill factors are unreasonably high. In particular, Verizon contends that they fail to account for the fifteen percent capacity necessary for administrative services and for three percent capacity necessary to accommodate annual growth.[676]

259. AT&T/WorldCom respond that their fill factor proposal properly reflects current demand, and that it would need little or no adjustment even if Verizon were correct that the copper feeder fill factor must accommodate fifteen percent spare capacity for administrative purposes and three percent annual growth.[677] That is, fill factors in the 70 to 82.5 percent range can already accommodate these amounts of spare capacity. AT&T/WorldCom also assert that their proposed fill factors are consistent with the information contained in GTE engineering guidelines.[678]

(b) Discussion

260. We agree with AT&T/WorldCom and will use their proposed copper feeder fill factors. The copper feeder fill factors that AT&T/WorldCom propose comport with those adopted

---

672 *See* Tr. at 4494-96 (the fill factor used in the Verizon model cannot be imported into the MSM); AT&T/WorldCom Initial Cost Brief at 145-46.

673 *See* Tr. at 4494-96; *see also Massachusetts 271 Order*, 16 FCC Rcd at 9007, para. 39 (questioning the use of a low distribution fill factor without a state-specific explanation).

674 Breakage refers to the fact that cable pairs come in discrete sized bundles. In order to provide capacity on a given route, it is necessary to choose a bundle of size greater than or equal to the current demand. For example, if bundles exist in sizes of 6 and 12, but not in intermediate sizes, then a 12-cable bundle must be used to provide capacity for 8 cable pairs.

675 *See Inputs Order*, 14 FCC Rcd at 20246-47, para. 207.

676 Verizon Ex. 109, at 87; Verizon Reply Cost Brief at 153.

677 AT&T/WorldCom Initial Cost Brief at 157.

678 AT&T/WorldCom Initial Cost Brief at 157-58 (citing AT&T Ex. 117P, at E1-E3 (confidential version)).

by the Commission in the universal service proceedings and with those in the GTE planning guidelines.[679] In the *Inputs Order,* the Commission found that the copper feeder fill factor it adopted, proposed by AT&T/WorldCom here, reflected the industry practice of sizing feeder cable to meet current demand, which included cable sufficient for growth.[680] Moreover, AT&T/WorldCom's copper fill factor, which can be as low as 70 percent, also appears to be low enough to accommodate the fifteen percent administrative spare and additional spare for growth that Verizon alleges is necessary. Finally, Verizon again fails to recognize that the target fill factors proposed by AT&T/WorldCom and based on current demand properly account for growth, as the Commission found in the *Inputs Order*.[681] Thus, Verizon's criticisms are misplaced.

(iv) Fiber Feeder / Fiber Strand Fill Factor

(a) Positions of the Parties

261. AT&T/WorldCom propose a fill factor for fiber feeder (*i.e.*, fiber strand) of 100 percent.[682] The Commission adopted this fill factor in the universal service proceeding.[683] Fiber feeder plant, AT&T/WorldCom explain, inherently includes spare capacity, and growth can be accommodated by upgrading the electronics on the ends of the fiber.[684]

262. Verizon claims that a 100 percent fill factor improperly ignores the fact that fiber normally is installed in 12-ribbon strands, and that all strands in a ribbon are not necessarily used when installed.[685] It also claims that spare ribbons must be maintained for repair and maintenance purposes, and, therefore, a 100 percent fill factor is inappropriate.[686]

263. AT&T/WorldCom respond that the target fill factors are input into the MSM prior to considering the effect of breakage. After the fill factor is input, the MSM then calculates the effects of breakage.[687] Thus, the effective fill factor is less than 100 percent.

---

679 *Inputs Order*, 14 FCC Rcd at 20246-47, para. 207; AT&T Ex. 117P, at E1-E3 (confidential version).

680 *Inputs Order*, 14 FCC Rcd at 20240, 20243-44, 20246-47, paras. 190-91, 199-201, 207.

681 *See id.* at 20237-38, 20243-44, paras. 186, 200-01.

682 AT&T/WorldCom Initial Cost Brief at 160; AT&T/WorldCom Reply Cost Brief at 70.

683 *Inputs Order*, 14 FCC Rcd at 20247, para. 208; AT&T/WorldCom Initial Cost Brief at 160.

684 AT&T/WorldCom Initial Cost Brief at 160; AT&T/WorldCom Reply Cost Brief at 70.

685 Verizon Ex. 109, at 86-87; Verizon Reply Cost Brief at 153.

686 Tr. at 5606; Verizon Reply Cost Brief at 153.

687 AT&T/WorldCom Initial Cost Brief at 160.

(b) Discussion

264. We agree with AT&T/WorldCom and will use their proposed fiber feeder fill factor. Consistent with AT&T/WorldCom's position, in the *Inputs Order* the Commission determined that the ability to upgrade the electronics on the ends of the fiber sufficiently accounts for growth, churn and administrative functions.[688] The Commission thus adopted a 100 percent fiber feeder fill factor.[689] Further, fiber feeder cable is normally installed with 100 percent redundancy. That is, for every fiber strand installed, a separate strand is installed to account for any breakage that occurs. Thus, breakage is accounted for in a 100 percent fill factor.[690] Verizon's criticism that the MSM fails to account for the fact that fiber feeder is installed in 12-ribbon strands is misplaced. Our review of the MSM confirms that the values it uses assume that the installation of fiber cable occurs in groups of twelve or more fiber strands.

(v) RT Plug-In and RT Common Electronics Fill Factors

(a) Positions of the Parties

265. For RT plug-in cards and RT common electronics, AT&T/WorldCom propose using the same 70 percent to 82.5 percent fill factors that they use for copper feeder plant.[691]

266. Verizon argues that these fill factors are inappropriately high because they fail to account properly for growth and administrative services.[692]

(b) Discussion

267. We will use the fill factors for RT plug-in cards and RT common electronics that AT&T/WorldCom include in the MSM. As stated previously, Verizon's argument that AT&T/WorldCom fail to account for growth is incorrect.[693] Further, these fill factors are lower than the analogous switch port fill factors that we adopt herein,[694] suggesting that factors even higher than those proposed by AT&T/WorldCom may be appropriate. Finally, we note that, in its cost study, Verizon proposes the same fill factor for copper feeder and for RT common electronics, and it

---

688 *Inputs Order*, 14 FCC Rcd at 20247, para. 208.

689 *Id.*

690 *Id.* at 20240-41, 20247, paras. 192, 208.

691 AT&T/WorldCom Ex. 14, at 54; AT&T/WorldCom Initial Cost Brief at 162-63; AT&T/WorldCom Reply Cost Brief at 70-71.

692 *See* Verizon Initial Cost Brief at 161; Verizon Reply Cost Brief at 152-54; *see also* Verizon Ex. 109, at 87-90.

693 *See supra* sections IV(C)(2)(g)(i)(b), IV(C)(2)(g)(ii)(b).

694 *See infra* section V(C)(4)(b).

proposes a higher factor for RT plug-in cards than it proposes for copper feeder.[695]

h. Plant Mix

(i) Introduction

268. Plant mix refers to the relative proportion of different types of plant – aerial, buried, and underground – in a given area.[696] Aerial plant refers to telephone poles and their associated hardware, including anchors and guy wires.[697] Buried plant refers to plant placed underground in trenches without the use of conduits.[698] Underground plant refers to plant trenched underground and placed inside supporting and protective conduits.[699] For feeder plant, underground plant includes manholes and pullboxes.[700] Determining the appropriate forward-looking plant mix for different areas with different terrains and climate conditions is important because the structure, cable, installation, and maintenance costs vary based on the plant types modeled.[701]

(ii) Positions of the Parties

269. AT&T/WorldCom propose using plant mix inputs in the MSM that differ from those that the Commission used in the SM.[702] Specifically, they propose relying on Verizon's ARMIS data for Virginia from 1991 through 2000 to determine the ratio between aerial and buried cable.[703] Because the ARMIS data are not divided into density zones, AT&T/WorldCom manipulate the data to determine the appropriate mix of aerial to buried plant for each of the MSM's nine density zones. In the two densest zones (*i.e.*, zones eight and nine), AT&T/WorldCom determine that most plant would be aerial plant, with a considerable percentage consisting of intra-building cable.[704]

---

695 *See* Verizon Ex. 107P, at 100 (confidential version).

696 *Federal-State Joint Board on Universal Service*, CC Docket Nos. 96-45, 97-160, Further Notice of Proposed Rulemaking, 12 FCC Rcd 12514, 18540, para. 56 (1997) (*USF 1997 Further Notice*); *Federal-State Joint Board on Universal Service*, 1999 WL 343066, CC Docket Nos. 96-45, 97-160, FCC 99-304, paras. 103-04 (rel. May 28, 1999) (*Inputs Further Notice*).

697 *See, e.g.*, *Inputs Further Notice*, para. 104.

698 *See, e.g., id.*

699 *See, e.g., id.*

700 *See, e.g., id.*

701 *USF 1997 Further Notice*, 12 FCC Rcd at 18540, para. 56.

702 AT&T/WorldCom Ex. 1, at 19; AT&T/WorldCom Ex. 6 (Riolo Direct), at 39-43; AT&T/WorldCom Ex. 23, Vol. 1 at 8; AT&T/WorldCom Initial Cost Brief at 171-72.

703 AT&T/WorldCom Ex. 6, at 39-43; Tr. at 4563-65; AT&T/WorldCom Initial Cost Brief at 171-72.

704 AT&T/WorldCom Ex. 6, at 39-42; Tr. at 4563-65.

AT&T/WorldCom then rely on one of their witnesses' experiences to determine the percentage of underground plant: they assume the use of almost no underground cable (one percent) in the six least dense zones (*i.e.*, zones one through six), and minimal underground cable in the three highest density zones (ten percent for the densest zone, *i.e.*, zone nine, and five percent for the zones seven and eight).[705]

270. Verizon criticizes the plant mix assumptions that AT&T/WorldCom propose as inappropriately speculative, unsupported, and inconsistent with real-world building constraints, such as municipal and zoning laws (including rights-of-way requirements), and weather and geography concerns specific to localities within Virginia.[706] Although a forward-looking cost model will reflect cost minimization strategies, Verizon contends that these existing, real-world considerations would constrain even the most efficient competitor, and therefore may not be ignored.[707] Verizon claims that its proposal takes all of these, and other, local specific factors into account in determining whether to build aerial, buried, or underground plant, but that the AT&T/WorldCom proposal does not.[708] Verizon also alleges that AT&T/WorldCom fail to explain how they use the ARMIS data to generate different inputs for different density zones.[709] Finally, Verizon claims that AT&T/WorldCom improperly assume a high amount of intra-building riser cable even though the Commission previously rejected such an assumption.[710] Accordingly, Verizon proposes that the Commission defer to Verizon's actual experiences.

271. Verizon proposes using data from engineering surveys of its employees, conducted between 1993 and 1995, to generate the plant mix for distribution and feeder plant.[711] Verizon claims that these data are based on the plant mix that Verizon, as an efficient company, actually experienced. Specifically, Verizon asserts that its plant mix is efficient and provides the best estimate of the mix that any current or future carrier would deploy to service demand in Virginia, given Verizon's existing wire center locations, state geography, and municipal and zoning laws (including rights of way requirements).[712]

272. AT&T/WorldCom criticize Verizon's plant mix proposal as inappropriately based on

---

[705] AT&T/WorldCom Ex. 6, at 39-42; AT&T/WorldCom Initial Cost Brief at 171; AT&T/WorldCom Reply Cost Brief at 73.

[706] Verizon Ex. 109, at 107-10; Verizon Initial Cost Brief at 158-60; Verizon Reply Cost Brief at 151.

[707] Verizon Ex. 109, at 109-10; Verizon Initial Cost Brief at 158-59.

[708] Verizon Initial Cost Brief at 158-60.

[709] Verizon Reply Cost Brief at 151 n.147.

[710] Verizon Ex. 109, at 108-09.

[711] Verizon Ex. 122, at 60-71; Verizon Reply Cost Brief at 68-71; *see* Verizon Ex. 100P, Vol. 1, Part B-1, section 4.8 (confidential version); *see also* Verizon Initial Cost Brief at 82-86.

[712] Verizon Initial Cost Brief at 83.

embedded (and unadjusted) data from the 1993-1995 time period.[713] They state that Verizon makes no attempt to update its survey results or independently validate them against more recent data or against Verizon's projections for new projects.[714] AT&T/WorldCom also contend that the surveys themselves are so fundamentally flawed as to be useless, even assuming *arguendo* that they otherwise could serve as an appropriate basis for forward-looking inputs.[715] Notably, Verizon submits only the survey results, but not the underlying survey data.[716] AT&T/WorldCom further criticize the Verizon plant mix inputs because, they claim, these inputs are the same across all density zones.[717]

(iii) Discussion

273. We adopt, pursuant to the baseball arbitration rules,[718] Verizon's proposed percentages of underground distribution and feeder plant and AT&T/WorldCom's proposed relationship between aerial and buried plant for the remaining outside plant.[719] The AT&T/WorldCom proposal for underground plant lacks support, whereas the Verizon proposal relies on empirical data that appear to take into account Virginia specific conditions. For aerial and buried plant, however, we find AT&T/WorldCom's proposal is better substantiated and more consistent with forward-looking costing principles than Verizon's proposal. Specifically, AT&T/WorldCom rely on data through the year 2000, rather than only on 1993-1995 data. These data, moreover, implicitly account for Virginia specific conditions, are more transparent and verifiable than the Verizon survey data summaries, and result in varied plant mixes across density zones.

274. *Underground Plant.*[720] We adopt Verizon's proposals for the percentage of underground distribution and feeder plant. We agree with Verizon that AT&T/WorldCom's proposal is too speculative and unsupported. In particular, the AT&T/WorldCom proposal for the percentage of underground plant is based solely on the undocumented experiences of one of

---

[713] AT&T/WorldCom Initial Cost Brief at 168-73; AT&T/WorldCom Reply Cost Brief at 72-76.

[714] AT&T/WorldCom Reply Cost Brief at 73-76.

[715] AT&T/WorldCom Ex. 12, at 12-15; AT&T/WorldCom Initial Cost Brief at 49-51.

[716] *See supra* section IV(B)(2).

[717] *See* Tr. at 4418-19; AT&T/WorldCom Initial Cost Brief at 171.

[718] *See supra* section II(C).

[719] Although most of the testimony and briefing on this issue addresses the plant mix for distribution plant, we apply the same analysis for both distribution and feeder plant. That is, where we adopt Verizon's proposal for underground plant, we also adopt both its proposed distribution and feeder underground plant mix inputs. Similarly, we adopt the aerial and buried ratios that AT&T/WorldCom propose for both distribution and feeder plant.

[720] *See supra* para. 268 (describing underground plant).

AT&T/WorldCom's witnesses.[721] In the *Inputs Order*, the Commission generally declined to rely on unsubstantiated witness opinion to support a party's cost proposal,[722] and we similarly decline to do so here. AT&T/WorldCom, moreover, fail to provide any specific showing that their general underground plant mix estimates account for specific local Virginia conditions.[723]

275. Verizon's proposals for the percentages of underground plant, in contrast, rely on empirical, Virginia-specific data.[724] This is particularly important because, as the Commission noted in the *Inputs Order*, plant mix is more heavily influenced by state and local considerations than are most other inputs.[725] Although we have concerns about relying on stale data, we find that the Verizon data, compiled from actual worker responses, probably reflect deployment decisions responsive to local Virginia concerns, and, in any event, are more substantiated than the AT&T/WorldCom underground proposal, which relies on the unsupported opinion of an individual witness.[726]

276. *Aerial and Buried Plant*.[727] For the remaining (*i.e.*, non-underground) outside plant, we establish plant mix percentages by relying on the ratio of aerial to buried plant proposed by AT&T/WorldCom. AT&T/WorldCom base their ratio of aerial to buried plant on Verizon ARMIS data through the year 2000,[728] considerably more recent data than 1993-1995 vintage data that Verizon proposes to use.[729] The use of ten years of ARMIS data also demonstrates that the relative proportions of aerial and buried outside plant are consistent over time.[730] Further, in contrast to their

---

[721] *See* AT&T/WorldCom Ex. 6, at 39.

[722] *See Inputs Order*, 14 FCC Rcd at 20229-30, paras. 165 (declining to adopt unsupported expert opinion for LEC engineering adjustment), 223 (declining to adopt unsupported expert opinion for structure costs buying power adjustment).

[723] *See Inputs Order*, 14 FCC Rcd at 20199, para. 93.

[724] *See* Verizon Ex. 122, at 60-71; Verizon Reply Cost Brief at 68-71.

[725] *Inputs Order*, 14 FCC Rcd at 20199, para. 93 ("varying plant mix by state, study area, or region of the country may more accurately reflect variations in forward-looking costs").

[726] We note that, although (as we discuss below) we are concerned about the Verizon survey's lack of transparency or verifiability, these concerns apply at least as much to unsupported AT&T/WorldCom witness statements.

[727] *See supra* para. 268 (describing aerial and buried plant types).

[728] AT&T/WorldCom Ex. 6, at 39-42.

[729] We note, moreover, that, although Verizon claims its experiences reflect those of an efficient carrier, Verizon was not subject to local price cap regulation until 1994, the middle of its survey period. *See* Verizon Initial Cost Brief at 14.

[730] For example, the relationship between aerial and buried distribution plant ranged from 38.6 percent to 61.4 percent, aerial to buried in 1991, to 34.9 percent to 65.1 percent in 2000. Similarly, the relationship between aerial and buried fiber feeder plant ranged from 31.1 percent to 23.6 percent, aerial to buried in 1991, to 36.3 percent to (continued….)

underground plant proposal, AT&T/WorldCom use Virginia ARMIS data, thus accounting for many Virginia specific local conditions.[731] The ARMIS data used by AT&T/WorldCom are also more transparent and verifiable than the Verizon data because the ARMIS data are publicly available, whereas the data underlying the 1993-1995 Verizon survey results were not introduced into the record. Thus, although Verizon's survey respondents may have accounted for then existing local conditions, we are unable to verify precisely how they did so or whether such conditions might have changed in recent years. For instance, municipal ordinances may have changed in the intervening decade since the surveys were first conducted.[732] Finally, we find that Verizon is mistaken in its assertion that the MSM should not include riser cable.[733] The MSM treats each location in a high-rise building as a separate customer location, thereby accounting for plant to each customer location.

i. Structure Sharing

(i) Sharing Between Verizon and Other Companies

(a) Positions of the Parties

277. AT&T/WorldCom propose changing the SM default values for structure sharing between Verizon and other companies to account for additional amounts of sharing that, they contend, an efficient competitor would experience compared to the sharing that Verizon actually achieved in deploying its embedded network.[734] By proposing higher levels of intercompany structure sharing, AT&T/WorldCom lower the costs attributable to Verizon, thereby decreasing loop costs. AT&T/WorldCom base their structure sharing proposal primarily on the experiences of one of their witnesses.[735]

278. Verizon challenges the intercompany structure sharing inputs that AT&T/WorldCom propose as overly speculative, unsupported, and based on arguments previously rejected by the Commission in the universal service proceedings.[736] Specifically, Verizon claims that AT&T/WorldCom present essentially the same arguments that the Commission previously rejected

(Continued from previous page)
24.1 percent in 2000. (The feeder plant percentages do not add up to 100 percent because data were included for underground feeder plant.) AT&T/WorldCom Ex. 6, at 39-42.

[731] *See Inputs Order*, 14 FCC Rcd at 20199, para. 93.

[732] We note, however, that the data are likely to have taken into account at least some local conditions that existed in the mid-1990s or earlier.

[733] *See* Verizon Ex. 109, at 108-09.

[734] AT&T/WorldCom Ex. 1, at 22; AT&T/WorldCom Ex. 23, Vol. 1 at 9; AT&T/WorldCom Ex. 18, at 15-18; Tr. at 4384-86; AT&T/WorldCom Initial Cost Brief at 174-78; AT&T/WorldCom Reply Cost Brief at 76-80.

[735] *See* AT&T/WorldCom Ex. 18, at 15-18.

[736] Verizon Ex. 109, at 94-101; Verizon Initial Cost Brief at 155-58; Verizon Reply Cost Brief at 148-50.

in the *Inputs Order*.[737] Verizon also contends that AT&T/WorldCom's proposal ignores the fact that other companies have no incentive to share Verizon's structure costs because they can simply come in later and lease capacity in the right-of-way (*e.g.*, conduit) at cheaper rates.[738] Finally, Verizon opposes reverting to the inputs used in the SM because they do not reflect state-specific data.[739]

279. Verizon proposes using its existing structure sharing values, developed from actual plant deployment data between 1997 and 1999.[740] Verizon claims that it already takes advantage of any structure sharing opportunities that present themselves, but that these have been very few. Verizon further argues that there is no reason to believe that structure sharing opportunities will improve in the future.[741]

280. AT&T/WorldCom argue that Verizon's structure sharing proposal is improperly based on its embedded network and fails to account for any sharing of trenches in either buried or underground plant. They further claim that, if Verizon's network is to be used at all, Verizon's actual experiences in new developments could serve as a starting point.[742]

281. Verizon responds that the structure sharing opportunities it has experienced are more probative than the structure sharing opportunities that exist in new developments. Verizon's experiences in new developments overstate the sharing opportunities that would exist if Verizon were reconstructing its entire network, which would include both existing developments and new developments.[743]

(b) Discussion

282. During the hearing, a Verizon witness conceded the reasonableness of AT&T/WorldCom's buried structure sharing proposal, and an AT&T/WorldCom witness conceded the reasonableness of Verizon's aerial structure sharing proposal.[744] We agree with the parties that

---

[737] Verizon Initial Cost Brief at 157 (citing *Inputs Order*, 14 FCC Rcd at 20260, para. 241). We note that the paragraph of the *Inputs Order* cited by Verizon does not support Verizon's assertion in its brief.

[738] *Id.* at 101-02 (citing Tr. at 4387).

[739] Verizon Ex. 109, at 101.

[740] Verizon Ex. 107, at 117, 216-217; Verizon Ex. 122, at 146-47; Verizon Initial Cost Brief at 95-97, 100-03; Verizon Reply Cost Brief at 66-68.

[741] Verizon Ex. 122, at 145-47; Tr. at 4380-81; Verizon Reply Cost Brief at 66-67.

[742] Tr. at 3217-18.

[743] *Id.* at 3223-25; Verizon Initial Cost Brief at 102-103; Verizon Reply Cost Brief at 66-68.

[744] Tr. at 4386 (Gansert: "First of all, with respect to buried, I have no argument."); *Id.* at 4378 (Baranowski: "The Verizon cost study included sharing of poles which we do not modify in our restatement of Verizon's costs."); *see also* AT&T/WorldCom Ex. 12, at 76.

(continued….)

these proposals are reasonable. Thus, for buried plant, we use the intercompany structure sharing percentages that AT&T/WorldCom propose, and for aerial plant, we use the intercompany structure sharing percentages that Verizon proposes.

283. For underground plant, we adopt AT&T/WorldCom's structure sharing proposal for MSM density zones one and four through nine, and Verizon's structure sharing proposal for zones two and three. We reach this conclusion by comparing each side's proposals to the objective, reasonable structure sharing percentages that the Commission adopted on a nationwide basis in the *Inputs Order*.[745] We then apply the baseball arbitration rules[746] and choose the proposal that is closer to the Commission's national figure for the particular density zone. We do so because, as we explain in more detail below, neither side provided sufficient substantiation to justify their underground structure sharing proposals.

284. We find that neither side presents sufficient support for its underground structure sharing proposal to enable us to adopt it solely on its own merit. Rather, both of the proposals before us are the sort of unsupported opinion upon which the Commission refused to rely in the *Inputs Order*.[747] Specifically, AT&T/WorldCom's underground sharing inputs are based solely on the unsubstantiated opinions of their witnesses, and AT&T/WorldCom fail to provide documentation to support these opinions. Just as the Commission concluded that unsupported opinions were insufficient bases to support a Commission determination on structure sharing in the universal service proceedings,[748] so too we decline to rely solely on AT&T/WorldCom's unsubstantiated opinions here.

285. Verizon's proposal is similarly unsupported. Verizon claims that its underground sharing inputs are based on its actual and recent experiences. Actual recent experiences may be particularly probative for this input because Verizon, operating as a price cap carrier in Virginia during the years reflected in its sharing data (1997-1999), retained incentives to share structure costs with other entities. Further, in determining forward-looking structure sharing opportunities between companies, we agree with Verizon that our examination should not be restricted to new growth

(Continued from previous page)

To the extent that the Verizon aerial plant structure sharing proposal contained in its re-run of the MSM differs slightly from the aerial sharing inputs used in the Verizon LCAM, we use the proposal contained in the Verizon MSM re-run. *Compare* Verizon Ex. 204, *with* Verizon Ex. 100P, Vol. 1, Part B, sections 2.1 and 8.1 (confidential version). We find the Verizon proposal in its MSM re-run superior because it reflects higher levels of structure sharing in denser zones, whereas the Verizon inputs in the LCAM are the same across all density zones. *Compare* Verizon Ex. 204, *with* Verizon Ex. 100P, Vol. 1, Part B, sections 2.1 and 8.1 (confidential version). Indeed, both the Commission and Verizon have recognized that there are fewer sharing opportunities in less dense areas than in denser areas. *Inputs Order*, 14 FCC Rcd at 20260-63, paras. 243, 248; Verizon Ex. 109, at 97.

[745] *See Inputs Order*, 14 FCC Rcd 20260-61, para. 243.

[746] *See supra* section II(C).

[747] *See Inputs Order*, 14 FCC Rcd at 20261, para. 244.

[748] *See id.*

areas. New growth developments, by definition, would have significantly higher sharing opportunities than would exist in reconstructing the entire network.

286. Verizon's restatement of the underground sharing percentages in the MSM, however, does not appear to incorporate sharing percentages taken from its recent data. Instead, Verizon uses the input of 97 percent sharing (*i.e.*, only three percent of underground costs are shared with other entities, with Verizon solely responsible for 97 percent of underground structure costs) in its re-run of the MSM. This figure is every bit as undocumented as the AT&T/WorldCom proposal. The only support for this figure is a Verizon witness statement, during the hearing, that the appropriate underground sharing percentage is 97 percent.[749] This witness then defers to a different Verizon witness to explain the source of this figure,[750] an explanation that never came. This figure, moreover, is inconsistent with the treatment of underground sharing in the LCAM, which appears to assume no sharing. Finally, despite the Commission's prior finding, and Verizon's recognition, that sharing varies by density zone,[751] Verizon proposes 97 percent sharing in all density zones.[752]

287. We therefore are left to choose between opposing positions – AT&T/WorldCom's claim that an efficient carrier will always share underground costs and Verizon's claim that, in actuality, it is almost never able to find companies willing to share its costs of deploying underground plant – either of which may be reasonable and both of which are unsupported by actual documentation. The Commission adopted forward-looking sharing percentages in the *Inputs Order*. Those values are the only independent evidence of forward-looking structure sharing values available to us to evaluate the parties' underground structure sharing proposals.[753] Accordingly, consistent with the baseball arbitration rules,[754] we use the SM default values as an independent basis to choose between the parties' proposals. Specifically, for each of the MSM's nine density zones, we adopt the proposed underground plant structure sharing percentage that is closer to the default percentage.

288. The following table summarizes the proposals before us and identifies the inputs we adopt:

---

[749] Tr. at 4382.

[750] *Id.* at 4383.

[751] *Inputs Order*, 14 FCC Rcd at 20260-63, paras. 243, 248; *see also* Verizon Ex. 109, at 97; Verizon Ex. 204 (Verizon aerial plant sharing proposal for the MSM varies by density zone).

[752] Verizon Ex. 204.

[753] We note that in the *Inputs Order* the Commission used its predictive judgment to adopt structure sharing percentages. *Inputs Order*, 14 FCC Rcd at 20262, paras. 245, 247.

[754] *See supra* section II(C).

SM/MSM density zone	Underground Structure Sharing Percentage			
	SM	MSM	Verizon MSM re-run	Decision
1	100	100	97	100
2	100	50	97	97
3	85	50	97	97
4-6	65	50	97	50
7-9	55	50	97	50

(ii) Structure Sharing Between Feeder and Distribution Plant

(a) Positions of the Parties

289. AT&T/WorldCom propose reducing the SM default inputs for structure costs for feeder plant by 40 percent to reflect 40 percent structure sharing between feeder plant and distribution plant.[755] This proposal is based on an order of the Kansas Corporation Commission, the cost model filed by BellSouth in state cost proceedings in Florida and Louisiana, and on the experiences of AT&T/WorldCom witnesses.[756] The Kansas order and the new BellSouth model support sharing between feeder and distribution plant at levels substantially in excess of those in the SM. In particular, AT&T/WorldCom claim that the Kansas Commission, in determining outside plant costs in a state universal service proceeding, found that over 40 percent of feeder routes share structure with distribution cable.[757] AT&T/WorldCom also claim that the BellSouth cost studies show considerable structure sharing between feeder and distribution, with 74 percent of feeder routes being shared with distribution facilities.[758] Finally, AT&T/WorldCom's witnesses explain that considerable sharing between feeder and distribution structure would occur in efficient outside plant design.[759]

290. Verizon challenges AT&T/WorldCom's proposed reduction in feeder structure costs. Verizon claims the AT&T/WorldCom proposal is unsupported by any Virginia specific data and is inconsistent with the MSM's own plant mix assumption in high density areas of 70 percent

[755] AT&T/WorldCom Ex. 1, at 22; AT&T/WorldCom Ex. 6, at 10-12; Tr. at 4538-4539; AT&T/WorldCom Initial Cost Brief at 180-81.

[756] AT&T/WorldCom Ex. 1, at 22; AT&T/WorldCom Ex. 6, at 10-12; *see also supra* section IV(C)(2)(c)(ii).

[757] AT&T/WorldCom Ex. 6, at 10-12; AT&T/WorldCom Initial Cost Brief at 179 (citing *Kansas Commission USF Order*, paras. 52, 54).

[758] AT&T/WorldCom Ex. 6, at 11-12; AT&T/WorldCom Initial Cost Brief at 179.

[759] AT&T/WorldCom Ex. 6, at 11-12; AT&T/WorldCom Ex. 18, at 17-18; AT&T/WorldCom Initial Cost Brief at 179; *see also* AT&T/WorldCom Ex. 1, at 22.

underground cable for feeder plant and only ten percent for distribution plant.[760]

(b) Discussion

291. We find that AT&T/WorldCom's proposal to reduce feeder plant structure costs by 40 percent to account for structure sharing between feeder and distribution plant is appropriate in an efficient, forward-looking cost model and supported by the record. Verizon's affirmative cost study, the LCAM, undermines its challenge to AT&T/WorldCom's feeder/distribution structure sharing proposal. Specifically, Verizon admits that the LCAM applies an approximately 20 percent reduction to both distribution and feeder structure costs to account for structure sharing between feeder and distribution.[761] Because distribution plant costs significantly exceed feeder plant costs, Verizon's application of sharing cost savings equally to distribution and feeder plant would lead to lower costs than does AT&T/WorldCom's application of the entire sharing factor to feeder plant.[762] The AT&T/WorldCom sharing inputs, moreover, are supported by additional independent sources – the *Kansas USF Order* and BellSouth's cost models filed in Florida and Louisiana. Notably, the *Kansas USF Order* found that, for each of the fourteen wire centers examined, "at least 40 percent of the feeder routes also included distribution cable [and, in] some wire centers, the percentage was much higher."[763] Further, Verizon does not challenge the feeder/distribution figures that AT&T/WorldCom contend are contained in the *Kansas USF Order* and in the BellSouth cost models. Although we do not find the *Kansas USF Order* or the Bellsouth cost studies dispositive of the appropriate feeder/distribution structure sharing for Verizon, they support the reasonableness of the AT&T/WorldCom proposal.

j. Pole / Aerial Plant Investment

(i) Positions of the Parties

292. AT&T/WorldCom propose using in the MSM the aerial structure (*e.g.*, poles, anchors, guy wires) investment costs adopted by the Commission in the *Inputs Order*.[764] The

---

760 Verizon Ex. 109, at 98-100; Verizon Reply Cost Brief at 150.

761 Tr. at 4536-38.

762 *See id.* at 4538-40. Verizon's argument that AT&T/WorldCom's proposed 40 percent reduction in feeder structure is inconsistent with the MSM's plant mix assumptions for all plant types in all density zones proves too much, particularly in light of Verizon's concession that considerable structure sharing between feeder and distribution plant will occur. Just as the 20 percent reduction in feeder and distribution structure in the LCAM is an aggregate figure, so too is the 40 percent feeder reduction proposed by AT&T/WorldCom. As such, it represents an average amount of savings across all plant types in all density zones. Although a more nuanced approach analyzing the amount of sharing in each density zone for each plant type might be superior to AT&T/WorldCom's proposal, neither side presented such a proposal. That the perfect approach is not before us does not compel us to reject AT&T/WorldCom's reasonable proposal.

763 *Kansas Commission USF Order*, para. 52.

764 AT&T/WorldCom Ex. 12, at 42; AT&T/WorldCom Initial Cost Brief at 183.

Commission based those costs on an independent study conducted by David Gabel and Scott Kennedy for the National Regulatory Research Institute (NRRI).[765] This study analyzed publicly available contract data obtained from the Rural Utilities Service (RUS) of the United States Department of Agriculture. The study then applied regression analyses to these contract data to determine average pole investment values, adjusted to 1997 dollars.[766]

293. In the *Inputs Order*, the Commission used the pole investment values from the Gabel Study as the starting point for determining aerial structure costs. The Commission then added to this amount the costs of anchors and guy wires (broken down by density zone) from the Gabel Study, which were not included in the RUS contracts, but rather were based on the comments of experts. The Commission applied a ten percent engineering loading factor to account for the fact that the RUS contracts did not include LEC engineering, and applied a thirty percent water factor where the water table was less than three feet. These costs were then applied to the pole spacing assumptions used by the model, which vary by density zone.[767]

294. The following chart identifies the 27 different aerial structure investment inputs (per pole) that the Commission used in the SM and that AT&T/WorldCom propose using in the MSM:[768]

[765] David Gabel and Scott Kennedy, *Estimating the Cost of Switching and Cables Based on Publicly Available Data* (The National Regulatory Research Institute 1998) (Gabel Study). NRRI functions as the research organization of the National Association of Regulatory Commissioners (NARUC). *See* http://www.nrri.ohio-state.edu/about/ (visited Dec. 18, 2002).

[766] Gabel Study, at 1-3, 8, 33-34, 50-55.

[767] *See Inputs Order*, 14 FCC Rcd at 20204-37, 20250-53, paras. 104-85, 218-25.

[768] Although both AT&T/WorldCom and Verizon state in testimony that the average per pole investment in the SM and the MSM is $417, we do not believe that this is correct in the context of loops. The $417 figure is the average pole investment cost in the transport module. Neither the SM nor the MSM produces a weighted average of the 27 different pole investment figures used by the model.

Aerial Structure Costs (per pole)[769]						
	Water Table > 3 feet			Water Table < 3 feet		
Density	Normal	SoftRock	HardRock	Normal	SoftRock	HardRock
1	$ 377.99	$ 450.67	$ 523.36	$ 491.38	$ 585.88	$ 680.37
2	$ 377.99	$ 450.67	$ 523.36	$ 491.38	$ 585.88	$ 680.37
3	$ 396.67	$ 469.35	$ 542.04	$ 515.67	$ 610.16	$ 704.65
4	$ 396.67	$ 469.35	$ 542.04	$ 515.67	$ 610.16	$ 704.65
5	$ 396.67	$ 469.35	$ 542.04	$ 515.67	$ 610.16	$ 704.65
6	$ 396.67	$ 469.35	$ 542.04	$ 515.67	$ 610.16	$ 704.65
7	$ 396.67	$ 469.35	$ 542.04	$ 515.67	$ 610.16	$ 704.65
8	$ 408.23	$ 480.91	$ 553.60	$ 530.69	$ 625.19	$ 719.68
9	$ 408.23	$ 480.91	$ 553.60	$ 530.69	$ 625.19	$ 719.68

295. Verizon claims that the AT&T/WorldCom aerial structure investment inputs are unsupported. It also contends that the MSM understates aerial investment costs and attempts to demonstrate this by comparing pole costs used in the MSM to the pole costs that Verizon would incur to replace all of its existing poles. Specifically, Verizon proposes determining the per pole costs by starting with its book cost (total plant in service or TPIS) of poles in Virginia from its year 2000 ARMIS data and spreading this amount over the total number of poles in Verizon's network in Virginia, again based on ARMIS data.[770] This generates a book cost per pole of $299. Verizon then multiplies this figure by the current-to-book ratio of 2.39 used in the *Inputs Order* to arrive at a cost per pole of $713.[771] Verizon proposes applying this figure to the total number of poles in Verizon's actual network. This results in total pole investments of $203 million, an amount that is 217 percent higher than the total pole investment amount used in the MSM.[772]

296. AT&T/WorldCom defend their proposal, claiming that, in a forward-looking environment, efficiencies from sequential installation and mobilization and demobilization would be captured in pole installation investments. AT&T/WorldCom also contend that the higher costs of replacing single poles at a time should not be included, as they are in Verizon's proposal, because

[769] The actual aerial structure investment inputs used by the models are per foot costs, not per pole costs. To facilitate understanding of aerial costs, however, we have derived per pole costs by applying the pole spacing assumption used by the model to the aerial investment data.

[770] Verizon Ex. 108, at 35-36, 41-42.

[771] *Id.* at 41-42.

[772] *Id.*; Verizon Initial Cost Brief at 162. We note that the $713 cost per pole in Verizon's rebuttal testimony compares to a per pole cost of $1007 that Verizon uses in the LCAM, which is based on data from 1996-2000. *Compare* Verizon Ex. 108, at 41-42, *with* Verizon Ex. 100, Vol. I, Part B, section 2.1.

these costs fail to account for economies of scale.[773]

(ii) Discussion

297. We will use the aerial structure investment inputs that AT&T/WorldCom propose and that the Commission developed in the *Inputs Order*.

298. Both proposals are reasonable.[774] AT&T/WorldCom's proposal relies on structure investments: (1) that the Commission expressly endorsed in the *Inputs Order*, and (2) that were based on an independent analysis of publicly available contract data.[775] Verizon's proposal is based on its ARMIS data,[776] which we rely on in other parts of this order,[777] and on a cost-to-book ratio used by the Commission in the *Inputs Order*.[778] Because Verizon's proposal is based on ARMIS data, it reflects Virginia-specific data, whereas the AT&T/WorldCom proposal uses nationwide data. Both proposals rely on data that is somewhat embedded in nature. AT&T/WorldCom rely on RUS contract data from the mid-1990s, adjusted to 1997 dollars.[779] Verizon relies on ARMIS data that include pole investments going back many years.

299. Although both approaches are reasonable, we find that the AT&T/WorldCom approach is the better of the two. Because the investment inputs adopted in the *Inputs Order* were based on publicly available RUS contract data, these data are verifiable and transparent. In addition, because the RUS contracts used in the Gabel Study were contracts for large jobs, they capture the economies of scale associated with the TELRIC reconstructed network. Further, inasmuch as the RUS contracts came from smaller LECs, they may overstate costs compared to Verizon because the RUS carriers probably lack the buying/bargaining power of Verizon.[780] Finally, we note that, in comments to the *Inputs Further Notice*, Sprint, SBC, and BellSouth indicated that the anchor and

---

[773] AT&T/WorldCom Ex. 14, at 25-28; AT&T/WorldCom Initial Cost Brief at 183-84; AT&T/WorldCom Reply Cost Brief at 80-82.

[774] Even if we were to use Verizon's pole investment per pole figure, we would apply it to the aerial structure generated by the MSM model run, not to the total number of poles that actually exist in Verizon's network.

[775] *Inputs Order*, 14 FCC Rcd at 20247-53, paras. 209-226; Gabel Study, at 1-3, 8, 33-34, 50-56.

[776] Verizon Ex. 108, at 41-42.

[777] *See, e.g., supra* sections IV(C)(2)(b), IV(C)(2)(h).

[778] *See Inputs Order*, 14 FCC Rcd at 20349-50, paras. 436-39.

[779] *See* Gabel Study, at 50.

[780] We note that the Commission declined to apply a buying power adjustment as advocated by AT&T and MCI because these parties failed to supply any data to quantify the need for such an adjustment. *Inputs Order*, 14 FCC Rcd at 20257, para. 233. This decision contrasts with the Commission's decision to apply a downward 15.2 percent buying power adjustment for aerial cable costs, which was based on specific data that Verizon (then Bell Atlantic) had provided to the Maine Commission. *Id.* at 20223-29, paras. 148-63.

guy wire costs used by the Commission were reasonable.[781] The AT&T/WorldCom approach may understate costs, however, because it is based solely on the large jobs reflected in the RUS contracts and thereby fails to account for small or individual replacement jobs, which would be necessary to maintain the reconstructed network.

300. Verizon's approach, on the other hand, probably overstates costs because it includes all of Verizon's small/individual replacement jobs. Specifically, ARMIS data for poles include all investments for jobs as small as a single pole job. Most of Verizon's poles were deployed years ago, and much of the recent investment in poles is due to small/individual pole replacement jobs. Notably, in response to a hearing record request, Verizon stated that the average number of poles per job in 1999 and 2000 was less than 1.4.[782]

301. Verizon's approach also raises implementation problems. Specifically, Verizon offers no testimony to show how it would apply its single input figure into the MSM, which, as described above, calculates pole investments for two different water levels, nine different density zones, and three different rock conditions, and uses different inputs for anchor and guy wire investments for each of three density zones. In particular, regarding the water table, the MSM makes various corrections for water levels at different points in the model. We are unable to identify the effect that use of Verizon's single per pole investment figure would have on these internal model corrections. In addition, even if we were able to determine how to apply the single Verizon input figure, it does not lend itself to generating geographically deaveraged rates as well as the disaggregated MSM aerial plant investment inputs do.[783]

302. Accordingly, because the approach proposed by AT&T/WorldCom is reasonable, was previously endorsed by the Commission based on independently verifiable, publicly available data, and because we are unable to implement Verizon's counter-proposal, we will use the AT&T/WorldCom aerial structure investment input data.

k. Digital Loop Carrier Type

(i) Introduction

303. In addition to cable and structure investments, the other key loop investment component consists of electronics. In the loop plant, electronics are generally contained, and their costs accounted for, in DLC systems. Thus, one of our critical determinations is the type(s) of DLC system(s) to use in a TELRIC model.

304. AT&T/WorldCom and Verizon both assume that a certain (albeit different) percentage of loops use fiber feeder cable and a certain percentage of loops are all-copper

781 *See Inputs Order*, 14 FCC Rcd at 20252-53, para. 222.

782 *See* Verizon Ex. 205 (Verizon response to record request no. 23 (requested Oct. 30, 2001)).

783 *See* 47 C.F.R. § 51.507(f).

loops.[784] Because we are using the MSM to generate the basic 2-wire loop rates, the model (*e.g.*, clustering algorithms, copper/fiber breakpoint) will determine the relative percentages of copper and fiber feeder plant. The key difference between the parties is whether, in a forward-looking network, to assume (1) that all fiber feeder would use next generation DLC (NGDLC) equipment that uses a GR-303 switch interface standard, or (2) that some fiber feeder would use integrated DLC (IDLC) equipment that uses a TR-008 switching interface standard and some would use universal DLC (UDLC) equipment.

305. Because the parties were often unclear or even inconsistent in their use of certain key DLC terms, we explain in detail the different types of fiber-based DLC systems relevant to this proceeding.[785] A DLC system consists of an RT in the outside plant, with a central office terminal (COT) in the central office (CO). The RT and the COT are typically connected by a fiber feeder facility. The RT terminates the metallic part of the loop coming from the end-user premises, converts the analog signal from the loop to digital format, and multiplexes the digital signals from a number of these lines onto fiber for carriage to the CO.[786] At the CO the fiber terminates on a fiber distribution frame (FDF). From the FDF, the signals may connect to a number of different kinds of COTs, depending on the type of DLC system used.

- *Universal Digital Loop Carrier (UDLC)* – With UDLC, the COT reverses the RT functions. That is, the COT de-multiplexes from multiplexed fiber formats to individual DS-0s, converts these DS-0s to analog format, and transmits the analog signals on copper pairs connecting to the switch via the Main Distribution Frame (MDF). The interface standard used in connecting the COT to the switch in an UDLC system is typically the TR-057 standard.[787] UDLC systems are the oldest type of fiber-based DLC system, dating to the 1970s.

- *Integrated Digital Loop Carrier (IDLC)* – With IDLC, all or part of the COT function is built, or integrated, into the switch, and there is no conversion from DS-0 to analog format (as occurs in an UDLC system). Other stages of multiplexing, between DS1 and higher speed formats, may either be built into the switch or provided in an external COT. IDLC systems were first developed in the 1980s.

---

[784] Loops may be all-copper loops either because they use copper feeder cable or because the customer location is close enough to the central office for the loop to consist only of distribution plant.

[785] For additional information on the development of different types of DLC systems, *see generally* AT&T Ex. 122, §§ 12.6-12.7 at 12-22 – 12-30; *see also Integrated Digital Loop Carrier System Generic Requirements, Objectives, and Interface*, GR-303-CORE, Issue 4 (Telcordia Dec. 2000); *Digital Interface Between the SLC-96 Digital Loop Carrier System and a Local Digital Switch*, GR-8-Core, Issue 01 (Telcordia Oct. 2001); *Functional Criteria for Digital Loop Carrier Systems*, GR-57-CORE, Issue 1 (Telcordia Oct. 2001).

[786] Copper carrier is sometimes used with small RTs, but this is not relevant to the issue here.

[787] *See Functional Criteria for Digital Loop Carrier Systems*, GR-57-CORE, Issue 01 (Telcordia Oct. 2001).

There are two main IDLC switch interface standards: TR-008[788] and GR-303.[789] The TR-008 standard was developed first (in the 1980s), while the GR-303 was developed more recently (in the 1990s). The main difference between them is that TR-008 requires 1:1 or 2:1 distribution to feeder line concentration, whereas GR-303 supports these and higher (*e.g.*, 3:1, 4:1) concentration ratios. (Concentration above the 1:1 level takes advantage of the fact that most people are not simultaneously using their lines by deploying less feeder plant than would be necessary to provide service to all lines at the same time.) Although DLC systems using a TR-008 interface can support a 2:1 concentration ratio, in this proceeding the parties discuss TR-008 only in terms of a 1:1 ratio. The GR-303 standard, unlike the TR-008 standard, was designed to enable DLC systems to support several interface groups of lines that connect to several different switches (*i.e.*, within one DLC system, use more than one interface to connect separate groups of lines to separate switches).

- *Next Generation Digital Loop Carrier (NGDLC)* – There is no universally accepted definition of NGDLC. The reference to "next generation" in NGDLC means different things to different people. Some use the term "NGDLC" interchangeably with "GR-303." Others use the term NGDLC to refer to DLC systems that include integration of digital subscriber line access multiplexer (DSLAM) functionality into the RT, along with the ability of the COT to split off the DSL signal and send it to an ATM switch in the CO. NGDLC systems may provide IDLC and/or UDLC functionalities. They may interface with the switch using the GR-303, TR-008, or TR-057 (universal) standard. Although there is no precise definition of what is meant by the "NG" in NGDLC, in this proceeding the parties most frequently use the term NGDLC to refer to the Alcatel Litespan®-2000 family of DLC systems (or equivalent systems) configured with the GR-303 switch interface standard.[790] Accordingly, we will use this definition of NGDLC systems for the limited purpose of this order.

(ii) Positions of the Parties

306. Verizon proposes the following breakdown for feeder plant systems: 17.7 percent copper; 24.7 percent UDLC; 57.6 percent TR-008 IDLC,[791] which results in 70 percent of the

[788] *See Digital Interface Between the SLC-96 Digital Loop Carrier System and a Local Digital Switch*, GR-8-CORE, Issue 01 (Telcordia Oct. 2001).

[789] *See Integrated Digital Loop Carrier System Generic Requirements, Objectives, and Interface*, GR-303-CORE, Issue 04 (Telcordia Dec. 2000).

[790] *See, e.g.*, WorldCom Ex. 119P (Bell Atlantic Network Planning Guideline, NP-G-97-027, Issue No. 1 (April 1999)), at 1-21 (confidential version); WorldCom Ex. 120P (Verizon Network Planning guideline, NP-G-99-021, Issue 1.0, Litespan-2000 Application Guidelines (Nov. 2000)), at 1-28 (confidential version); Tr. at 4084, 4173-89.

[791] Verizon Ex. 107, at 97; *see also* Verizon Ex. 122, at 60-61.

fiber feeder using IDLC systems and 30 percent using UDLC systems.[792] Verizon claims that these percentages represent its actual deployment breakdown in new growth areas.[793] Verizon then proposes to adjust its percentages by applying the forward-looking assumption that 10 percent of the total network would consist of loops that traverse NGDLC systems.[794]

307. Verizon argues that its assumption of any NGDLC is generous because it has not deployed any NGDLC in Virginia and, in light of anticipated developments in packet technologies, has no plans to deploy any.[795] TR-008 IDLC equipment, on the other hand, was developed before NGDLC equipment and has been and is being extensively deployed by Verizon. Because of this investment, including the switching and switching interface investments already made by Verizon, it is not cost effective for Verizon to upgrade to NGDLC. Therefore, Verizon intends to continue deploying TR-008 IDLC equipment.[796]

308. Verizon further argues that UDLC systems are necessary for the provision of unbundled loops either because: (1) IDLC and NGDLC loops (regardless of which switch interface standard, TR-008 or GR-303, is used) are not capable of being unbundled,[797] or (2) if such loops can be unbundled, extensive manual tasks (which lead to considerable non-recurring costs) are required to perform the unbundling.[798] Verizon also argues that certain types of retail special access lines can be provided only over UDLC-based loops or all-copper loops.[799] In addition, Verizon claims that certain OSS and network security concerns would need to be resolved before NGDLC unbundling could occur.[800] Although Verizon West has deployed NGDLC systems, it has yet to develop OSS that supports the unbundling of loops traversing such systems.[801] Finally, Verizon claims that it never undertook the deployment of NGDLC discussed in its guidelines from the late 1990s, and that Verizon's current plans do not include

---

[792] Verizon Ex. 107, at 97; Verizon Ex. 122, at 76; Verizon Initial Cost Brief at 88.

[793] Verizon Ex. 107, at 97-98; Verizon Ex. 122, at 85; *see also* Verizon Initial Cost Brief at 88.

[794] Verizon Ex. 107, at 97, 99; Tr. at 4154-57; Verizon Initial Cost Brief at 93-94; Verizon Reply Cost Brief at 65.

[795] Verizon Ex. 107, at 97, 99; Tr. at 4087; Verizon Initial Cost Brief at 93-94.

[796] Verizon Ex. 107, at 99; Verizon Ex. 122, at 83, 85; Tr. at 4076-78, 4150-59, 4169-76.

[797] Verizon Ex. 107, at 25-26, 97-99; Verizon Ex. 122, at 77-82; Tr. at 4070, 4151-53, 4179-86, 4577-87; Verizon Initial Cost Brief at 89-90; Verizon Reply Cost Brief at 61-64.

[798] Verizon Ex. 116 (NRC Panel Rebuttal), at 46-49; *see also* Verizon Ex. 100, Vol. 11, Non-Recurring Costs Summary; *see infra* section X.

[799] Verizon Ex. 122, at 77; Tr. 4074, 4078-85.

[800] Verizon Ex. 122, at 80-82; Tr. 4165-67, 4188-89, 4587; Verizon Initial Cost Brief at 90-93; *see also* Verizon Reply Cost Brief at 63.

[801] Tr. 4587-90; Verizon Initial Cost Brief at 90-92.

deployment of NGDLC systems in Virginia.[802]

309. AT&T/WorldCom claim that all fiber feeder plant should consist of GR-303 NGDLC systems.[803] They contend that NGDLC is the most advanced form of DLC currently available. Older forms of DLC, such as UDLC systems and IDLC systems that use a TR-008 switch interface, are less advanced and more costly systems, and, therefore, they should not be used in a TELRIC model.[804] AT&T/WorldCom claim that internal Verizon documents and other documents introduced into evidence show that Verizon is capable of unbundling NGDLC based loops today.[805] AT&T/WorldCom also claim that Telcordia™ Technologies, Inc.'s Notes on the Network demonstrates how to unbundle NGDLC loops.[806] Further, the Commission assumed 100 percent NGDLC in determining the DLC investment inputs to use in the *Inputs Order*.[807] AT&T/WorldCom contend that the unbundling of loops that traverse NGDLC systems would occur at the DS-1 level.[808]

(iii) Discussion

310. We agree with AT&T/WorldCom and will assume that all fiber feeder plant uses NGDLC systems. As we explain in the following subsections: (1) GR-303 NGDLC systems are more advanced and efficient systems than are TR-008 IDLC systems; (2) Verizon fails to meet its burden of proof of showing that the unbundling of NGDLC loops is not technically feasible; (3) Verizon non-cost testimony shows that NGDLC loops are capable of being unbundled today; (4) UDLC loops are not needed to provide non-switched special services; and (5) neither

---

802 Tr. 4156-59; *see also* Verizon Ex. 122, at 83; Verizon Initial Cost Brief at 93-94.

803 AT&T/WorldCom Ex. 12, at 20-21; AT&T/WorldCom Initial Cost Brief at 133-143; AT&T/WorldCom Reply Cost Brief at 54.

804 AT&T/WorldCom Ex. 12, at 20-30; *see also* AT&T/WorldCom Initial Cost Brief at 133-143; AT&T/WorldCom Reply Cost Brief at 54-57.

805 AT&T/WorldCom Ex. 12P (Recurring Cost Panel Rebuttal), at 27 (confidential version) (citing WorldCom Ex. 119P (confidential version)); WorldCom Ex. 119P, at 1-4, 12 (confidential version); WorldCom Ex. 120P, at 3-13 (confidential version); Tr. at 4167; AT&T/WorldCom Initial Cost Brief Proprietary at 133-43 (confidential version); AT&T/WorldCom Reply Cost Brief at 55-56; *see also* Tr. at 4611-18.

806 AT&T/WorldCom Initial Cost Brief at 135-36 (citing AT&T Ex. 122). Telcordia Technologies, Inc. (formerly known as Bellcore) is a telecommunications systems, software, and research company, which "was created as a center for technical expertise and innovation serving the U.S. regional Bell operating companies (RBOCs)." URL: http://www.telcordia.com/aboutus/background.html (visited June 18, 2003).

807 *See Inputs Order*, 14 FCC Rcd at 20276-77, para. 280 n.593 ("AT&T and MCI also claim that Sprint fails to make use of forward-looking technology such as GR303-capable hardware. . . . Contrary to AT&T and MCI's assertion, the data supplied by Sprint and reflected in the contract data adopted herein reflects the cost of GR303-capable hardware." (internal citations omitted)).

808 *See* AT&T/WorldCom Ex. 12, at 20.

unspecified security concerns nor Verizon's failure to develop OSS supports the need for UDLC loops. Although we resolve the DLC type issue in the recurring cost section, the actual impact on the recurring loop costs is relatively small. The effect of the DLC choice is potentially much greater on non-recurring costs because that is how Verizon proposes to recover the costs of unbundling NGDLC loops. Because we resolve non-recurring DLC cost issues based on the parties' interconnection agreements, however, we do not perform a detailed analysis of the effect on NRCs of our DLC type finding.[809]

(a) GR-303 NGDLC v. TR-008 IDLC

311. First, we find that, as between TR-008 IDLC systems and NGDLC systems, the MSM should use NGDLC systems. AT&T/WorldCom are correct that NGDLC systems are newer and more advanced than TR-008 ILDC systems. The main reason that Verizon assumes a majority of outside plant would use TR-008 IDLC systems is that Verizon's existing switches and DLC systems are designed to support TR-008 interfaces but would require upgrading or replacement to support GR-303 interfaces.[810] Existing Verizon switches and DLC systems, however, are not the appropriate basis for a TELRIC analysis, which is not constrained by the technical limitations of Verizon's embedded plant. When such constraints are removed, Verizon admits that more than ten percent NGDLC systems would be appropriate.[811] We note, moreover, that in the context of the loop plant costs, Verizon admits that no significant cost difference exists between TR-008 IDLC systems and NGDLC systems.[812] Thus, because NGDLC systems are more advanced and efficient than TR-008 IDLC systems, we will use NGDLC costs, and not TR-008 IDLC costs, to calculate loop costs.

(b) GR-303 NGDLC v. UDLC

312. The issue remains, however, whether investments for UDLC equipment should be included in the cost model or whether we should assume the use of 100 percent NGDLC equipment. Thus, we must decide whether, of the percentage of loops that traverse DLC systems, the breakdown should be (1) 100 percent NGDLC or (2) 70 percent NGDLC and 30 percent UDLC. For the reasons set forth in the following subsections, we agree with AT&T/WorldCom that a TELRIC model should use 100 percent NGDLC systems and should not assume any UDLC systems.

---

[809] *See infra* section X(C)(5).

[810] *See* AT&T/WorldCom Reply Cost Brief at 57.

[811] Tr. at 4554-56 (in response to questions from Commission staff on the ratio between TR-008 IDLC and GR-303 NGDLC assuming a scorched node pricing approach, Verizon witness Gansert responded as follows: "If you were hypothesizing that all constraints [of the existing Verizon network] disappear somehow, then you would certainly use more GR303. I don't think it would be a hundred percent—of the IDLC. . . . you would have a higher percentage of GR303. I'm not sure. I would have to look at it to understand what it was. I think we would need to look at some numbers to figure it out.").

[812] *Id.* at 4159, 4529-31.

(i) Burden of Proof

313. The Commission's rules place the burden of proof on Verizon to demonstrate that a method of accessing UNEs is not technically feasible. Rule 51.321(d) requires that the incumbent LEC "*must prove* to the state commission that the requested method of obtaining interconnection or access to network elements . . . is not technically feasible."[813] In the *Non-Cost Arbitration Order*, the Bureau relied on this rule to reject Verizon's proposal to require that the bona fide request process be used to obtain access to UNEs other than through collocation. Specifically, the Bureau found:

> The Commission's rule 51.321(d) expressly provides that an incumbent that denies a competitor's request for a particular method of obtaining access to UNEs must demonstrate to the state commission that the requested method of obtaining such access is not technically feasible.[814]

314. Here, Verizon essentially argues that it is not feasible to provide unbundled access to NGDLC loops.[815] Verizon, therefore, bears the burden to prove this claim. As explained below, Verizon fails to demonstrate that NGDLC unbundling is not currently available. Thus, Verizon fails to satisfy its burden of proof.

(ii) Technical Feasibility / Current Availability

(a) Verizon Non-Cost Testimony

315. We find that the record demonstrates that it is technically feasible to unbundle NGDLC loops, and that this technology is currently available. Although both sides introduced voluminous record evidence in the cost portion of the arbitration,[816] the evidence is conflicting and ultimately unsatisfying. The most revealing information on this issue comes from Verizon's testimony in the non-cost portion of the arbitration. There, a Verizon witness admitted that

---

[813] 47 C.F.R. § 51.321(d) (emphasis added).

[814] *Non-Cost Arbitration Order*, 17 FCC Rcd at 27208, para. 353.

[815] *See* AT&T/WorldCom Reply Cost Brief at 55.

[816] *See* AT&T/WorldCom Ex. 12, at 19-30; AT&T Ex. 120 (NYNEX Technical Document, Unbundling Loops in TSI (Time Slot Interchanger) Equipped Digital Loop Carrier Systems (1997)); AT&T Ex. 121 (Bell Atlantic Fundamental Planning, Guideline FP-G-97-005, Issue No. 1 (1997)); AT&T Ex. 122; AT&T Ex. 123 (Time Slot Interchange Applications in Remote Digital Terminals); AT&T Ex. 124 (NYNEX Technical Document Library, Loop Technologies Application Guidelines); WorldCom Ex. 116 (US West Communications Inc., GR-303 Deployment and Loop Unbundling (1998)); WorldCom Ex. 117 (SBC, GR-303 Deployment Issues – An ILEC Perspective (1998)); WorldCom Ex. 118 (Bell Atlantic, Loop Unbundling with a GR-303 Platform, Bellcore GR-303 Integrated Access Symposium (1998)); WorldCom Ex. 119P; WorldCom Ex. 120P; Verizon Ex. 107, at 24-26, 95-100; Verizon Ex. 122, at 76-85; Tr. 4069-92, 4146-89, 4528-33, 4554-58, 4575-91, 4608-19.

Verizon has had the technical ability to provide unbundled NGDLC loops for *four to five years* but chose not to implement a standard offering because competitive carriers had not sufficiently pursued such an offering.[817] Further, this same witness admitted that migrating from an NGDLC loop to a UDLC loop within the Litespan NGDLC system can occur automatically.[818] Indeed, in analyzing this testimony in the *Non-Cost Arbitration Order*, the Bureau found that "Verizon's expert testified that the assignment process, by which Verizon would assign an IDLC loop to either a UDLC or copper loop, *can be mechanized*."[819]

(b) Providing Special Services over NGDLC Lines

316. As noted above, Verizon contends that the existence of certain non-switched special access services, such as private lines, requires that almost 25 percent of the outside plant traverse UDLC systems. AT&T/WorldCom disagree, claiming that Verizon's own planning guidelines show that UDLC is not necessary to provision special access services.[820]

317. We agree with AT&T/WorldCom. Verizon may need to continue to deploy UDLC systems in its embedded network in Virginia because certain special access lines cannot be provided using TR-008 IDLC systems without incurring significant expenses. According to Verizon's own internal documents, however, these limitations do not restrict network design decisions in Verizon West (former GTE territory).[821] Thus, Verizon's own network implementation in its western territories supports the finding that UDLC systems are no longer necessary to provide non-switched special services.

---

[817] Tr. at 276-78, 292-93.

[818] *Id.* at 277-78.

[819] *Non-Cost Arbitration Order*, 17 FCC Rcd at 27319, para. 578 (emphasis added). We also note (and take administrative notice) that BellSouth, in its section 271 applications, repeatedly informed the Commission that it unbundles loops that traverse NGDLC and GR-303 IDLC systems, thereby demonstrating that such unbundling is technically feasible and currently available. *See, e.g.*, *Joint Application by BellSouth Corporation, BellSouth Telecommunications, Inc., and BellSouth Long Distance, Inc. for Provision of In-Region, InterLATA Services in Georgia and Louisiana*, CC Docket No. 01-227, Affidavit of Keith Milner at para. 118 (filed Oct. 2, 2001) (BellSouth GA/LA Milner Affidavit); *Joint Application by BellSouth Corporation, BellSouth Telecommunications, Inc., and BellSouth Long Distance, Inc. for Provision of In-Region, InterLATA Services in Florida and Tennessee*, CC Docket No. 02-307, Affidavit of Keith Milner at para. 99 (filed Sept. 20, 2002) (BellSouth FL/TN Milner Affidavit). We further note that it is not clear that all of the costs associated with BellSouth's multiple methods of unbundling NGDLC loops are included in the MSM. Verizon, however, does not acknowledge that these methods of unbundling are occurring today, let alone provide any evidence that AT&T/WorldCom fail to include specific costs associated with such unbundling in their proposal.

[820] AT&T/WorldCom Initial Cost Brief Proprietary at 135-36 (citing WorldCom Ex. 119P) (confidential version); AT&T/WorldCom Reply Cost Brief at 55.

[821] WorldCom Ex. 120P, at 3, 5, 12 (confidential version); Tr. at 4188 (Verizon conceding that growth in Verizon West is based on GR-303 NGDLC systems).

318. Further, even were UDLC systems necessary, Verizon fails to demonstrate that they would be necessary for a quarter of all loops. Verizon does not identify with specificity which types of non-switched special access lines it contends require the use of UDLC. Verizon identifies neither DS-3 nor DS-1 services but rather provides descriptions akin to private line services.[822] Thus, Verizon appears to be referring to voice and 64 kbps data special services only.[823] Although the Commission lacks data on the demand for special services, exclusive of other special access services (*e.g.*, DS-3s, DS-1s), Verizon's claim that one-fourth of its network requires UDLC systems strains credulity. Indeed, during the hearing, Verizon testified that approximately ten percent of its network consists of non-switched services.[824] When DS-3s and DS-1s (and perhaps other special access services) are excluded from this figure, the remaining lines would constitute only a fraction of this figure, perhaps even a negligible amount.

(c) Network Security and OSS

319. As noted above, Verizon claims that GR-303 NGDLC unbundling is not yet available because network security concerns and OSS implementation issues have yet to be resolved. AT&T/WorldCom disagree, contending that security issues, which Verizon fails sufficiently to explain, are eminently solvable, and that OSS issues are of the same variety previously overcome by Verizon in originally developing OSS for UNEs.[825] We disagree with Verizon that either security concerns or OSS issues warrant a finding that UDLC systems are required in the forward-looking, TELRIC-compliant network.

320. Experience with deployment of NGDLC systems in Verizon West territories directly undermines Verizon's position. Specifically, during the hearing Verizon admitted that GR-303 systems are used for growth throughout Verizon West territories. [826] Although Verizon claims that there are network security reasons not to deploy GR-303 NGDLC systems in Virginia, Verizon admits that its deployment guidelines for Verizon West territories remain in effect despite these concerns.[827] If Verizon has overcome its security concerns in its western territories, we see no reason (and no specific evidence is before us) that it cannot do so in Virginia. Thus, allegations of unspecified security concerns fail to show that NGDLC systems

---

[822] *See* Verizon Ex. 122, at 97.

[823] If Verizon is referring to DS-3 or DS-1 special access services, we note that we have excluded such lines from our calculation of the 2-wire loop costs. *See supra* section IV(C)(2)(b)(ii). UDLC systems thus would be unnecessary.

[824] *See* Tr. at 4160; Verizon Initial Cost Brief at 89. Verizon's statement that non-switched services comprise ten percent of its network is less than clear. A network is comprised of facilities, not services, and many of these facilities (*e.g.*, DLC systems) are shared among multiple services. Nevertheless, Verizon's claim appears inconsistent with its position that a quarter of its network must use UDLC to support non-switched services.

[825] *See* AT&T/WorldCom Ex. 12, at 29-30; Tr. 4615; AT&T/WorldCom Initial Cost Brief at 138-40.

[826] Tr. at 4188; *see* WorldCom Ex. 120P, at 3, 5, 12 (confidential version).

[827] *See* Tr. at 4165-68.

are not currently available.[828]

321. In addition, Verizon's lack of OSS to support NGDLC loop unbundling does not warrant a finding that loops that traverse these systems cannot be unbundled. Developing and implementing such systems is within Verizon's control.[829] The relevant inquiry is not whether Verizon has developed and deployed these systems, but whether the technology is "currently available."[830] In the *Local Competition First Report and Order*, the Commission recognized that, "although *technically feasible*, providing nondiscriminatory access to [OSS] functions may require *some modifications to existing systems*," but it nonetheless required incumbent LECs to provide such access.[831] Requiring Verizon to implement OSS to support NGDLC is beyond the scope of this order. Nevertheless, we rely on the Commission's reasoning in the *Local Competition First Report and Order* to reject Verizon's claim that its lack of OSS demonstrates that NGDLC loop unbundling is not technically feasible or currently available.[832]

322. Accordingly, because it is technically feasible to unbundle loops that traverse NGDLC systems and because the technology to do so is currently available, we will use AT&T/WorldCom's proposal of 100 percent NGDLC in our determination of loop rates.

l. Digital Loop Carrier Investments

(i) Introduction

323. Having determined that we will use 100 percent NGDLC systems where the MSM models fiber-based feeder plant, we now determine the appropriate NGDLC investment inputs.

(ii) Positions of the Parties

324. AT&T/WorldCom propose DLC investment inputs different from those the Commission uses in the SM. Specifically, AT&T/WorldCom propose: (1) higher line card costs; (2) lower common system costs; and (3) lower site preparation costs.[833] First, AT&T/WorldCom

---

828 We also note that BellSouth, in its section 271 applications, indicated that it uses multiple methods to unbundle loops that traverse GR-303 IDLC systems and NGDLC systems. *See, e.g.*, BellSouth GA/LA Milner Affidavit at para. 118; BellSouth FL/TN Milner Affidavit at para. 99.

829 *See* AT&T/WorldCom Ex. 12, at 29.

830 47 C.F.R. § 51.505(b)(1).

831 *See Local Competition First Report and Order*, 11 FCC Rcd at 15767-68, paras. 524-525 (emphasis added).

832 *See* AT&T/WorldCom Reply Cost Brief at 55-56. We also note that Bellsouth, in its section 271 applications, indicated that it can and does provision loops that originally traverse GR-303 IDLC systems and NGDLC systems to competitive LECs. *See, e.g.*, BellSouth GA/LA Milner Affidavit at para. 118; BellSouth FL/TN Milner Affidavit at para. 99. This shows the existence and availability of OSS (whether manual or automated) capable of performing the ordering, provisioning, billing and other functions necessary for an incumbent LEC to provision such loops.

833 AT&T/WorldCom Ex. 6, at 13-36.

propose higher input rates for DLC line cards based on the research of one of their witnesses.[834] Second, they exclude DLC line card costs from DLC common costs, claiming that the SM improperly included line card costs both in the common costs and in the stand-alone inputs.[835] Third, they propose site preparation cost inputs of $3,000 for high-density systems and $1,300 for low-density systems, instead of the $11,000 used in the SM for all systems.[836] Also, as the Commission did in adopting the SM,[837] AT&T/WorldCom assume that DLC investment costs are for NGDLC systems.[838] These cost inputs are based on the individual experiences of an AT&T/WorldCom witness, as well as the opinions of AT&T/WorldCom engineers and other experts who designed the HAI cost model.[839] AT&T/WorldCom also claim that the DLC inputs they propose are consistent with, or even higher than, those in Verizon's actual contract for Alcatel Litespan DLC equipment.[840]

325. Verizon challenges AT&T/WorldCom's proposed DLC investment inputs, claiming that they are based on the unsubstantiated opinions of one of AT&T/WorldCom's witnesses. Therefore, according to Verizon, they represent the same sort of groundless inputs that the Commission refused to countenance in the *Inputs Order*.[841] Verizon also argues that AT&T/WorldCom's use of Verizon's Litespan contracts is misplaced because the MSM inputs already include costs for engineering, furnishing and installation (*e.g.*, labor), whereas the Litespan contracts are materials-only contracts that do not include costs for any of these categories of activities.[842] Verizon does not propose a corrected input for use in the MSM.

(iii) Discussion

326. We agree with Verizon's criticisms of the new AT&T/WorldCom DLC investment inputs, and we therefore adopt, for purposes of this proceeding, the unmodified SM DLC investment inputs. First, Verizon correctly states that AT&T/WorldCom's proposed inputs rely solely on the unsubstantiated opinions of one of their witnesses, precisely the sort of data that the Commission rejected as an inappropriate basis for determining DLC investment inputs in the *Inputs Order*.[843]

---

834 *Id.* at 13-15.

835 *Id.* at 15-18, 32-33.

836 *Id.* at 33-36.

837 *See Inputs Order*, 14 FCC Rcd at 20276-77, para. 280 n.593.

838 AT&T/WorldCom Ex. 6, at 19-20.

839 *Id.* at 18; *see also* AT&T/WorldCom Reply Cost Brief at 58.

840 AT&T/WorldCom Ex. 18, at 13-14; *see also* AT&T/WorldCom Reply Cost Brief at 58.

841 Verizon Ex. 109, at 110-11; Verizon Initial Cost Brief at 162-63; Verizon Reply Cost Brief at 154-55.

842 Verizon Reply Cost Brief at 155.

843 *See Inputs Order*, 14 FCC Rcd at 20276, para. 281.

Second, Verizon is correct that its Litespan contract serves as an inappropriate point of comparison because the MSM inputs already include installation costs, whereas the Verizon contract with Litespan is a materials-only contract.[844] If the DLC Engineer, Furnish & Install (EF&I) factor reflected in Verizon's LCAM[845] were applied to the Litespan contract, the contract would generate DLC investment inputs significantly higher than those proposed by AT&T/WorldCom.

327. In addition, AT&T/WorldCom incorrectly assert that the Commission misunderstood their claim regarding the inclusion of DLC line card costs in the DLC investment calculations. To the contrary, the Commission comprehended AT&T/WorldCom's claim in the universal service proceeding that the SM double counted line cards by including them as both an individual line item and as part of DLC common costs. The Commission rejected this claim and found instead that DLC line equipment costs should be included in the DLC common costs.[846] We reject the identical argument here.

328. Although we reject AT&T/WorldCom's proposed NGDLC investment inputs, Verizon fails to proffer any specific alternative inputs for use in the MSM. We, therefore, have no alternative but to revert to the SM NGDLC investment inputs.[847]

m. Virginia Service Standards

(i) Positions of the Parties

329. Verizon claims that the network modeled by the MSM would not enable Verizon to comply with the Virginia Commission's service quality standards.[848]

330. AT&T/WorldCom claim that the Commission, in designing the SM, expressly designed a cost model that reflects the forward-looking costs of providing service.[849]

---

[844] *See* Verizon Reply Cost Brief at 155.

[845] We take no position on the appropriateness of the EF&I factor. Rather, we use it here for comparative purposes only.

[846] *See Inputs Order*, 14 FCC Rcd at 20275, para. 278.

[847] We note that using the DLC investment inputs from the SM may overstate costs. In the *Inputs Order*, the Commission relied on DLC contract data from non-rural LECs from 1995 to 1998. *See Inputs Order*, 14 FCC Rcd at 20275, para. 272. The Commission then adjusted these data to account for the declining costs of DLC systems, applying a "conservative" annualized downward adjustment of 2.6 percent to derive 1999 investment data. *See id.* at 20276-77, paras. 282-84. To the extent that DLC costs have continued to decline since 1999, but we continue to use the 1999 inputs, we would be overstating DLC costs.

[848] Verizon Ex. 109, at 25; Verizon Initial Cost Brief at 149.

[849] AT&T/WorldCom Initial Cost Brief at 37-39.

(ii) Discussion

331. We agree with AT&T/WorldCom and reject Verizon's claim. Verizon offers no specific evidence that the network modeled by the MSM would not be capable of providing service at quality levels required by the Virginia Commission.[850] Rather, Verizon merely presents unsubstantiated speculation. Such speculation fails to undermine the affirmative conclusion reached by the Commission in adopting the original SM that the model enables "the user to estimate the cost of building a telephone network."[851] Inasmuch as the Commission previously determined that the SM, on which the MSM is based, designs a network sufficient to provide service to Virginia consumers, we decline to find otherwise here.

D. Loop Types Not Directly Modeled by the MSM

1. 4-Wire, DS-1, and DS-3 Loop Types

a. Introduction

332. The MSM generates costs, and therefore rates, for the basic 2-wire loop only. AT&T/WorldCom propose to apply out-of-model computations to the basic 2-wire loop costs generated by the MSM to determine rates for 4-wire, DS-1, and DS-3 loops.[852] AT&T/WorldCom propose different out-of-model calculations to determine the 4-wire loop rate than they use to determine the DS-1 and DS-3 loop rates.[853]

333. Verizon criticizes the out-of-model calculations that AT&T/WorldCom use to generate rates for 4-wire, DS-1, and DS-3 loop types.[854] It challenges the individual adjustments made for each of these loop types, and it criticizes AT&T/WorldCom for using calculations to determine the 4-wire loop rate different from the calculations they use to determine the DS-1 and DS-3 loop rates.[855] Verizon also criticizes AT&T/WorldCom for failing to propose geographically deaveraged rates for the 4-wire and DS-1 loop types.[856]

---

[850] *See* Verizon Ex. 109, at 25; Verizon Initial Cost Brief at 149.

[851] *Inputs Order*, 14 FCC Rcd at 20166-67, para. 17; *Platform Order*, 13 FCC Rcd at 21325, 21336, 21348, paras. 4, 29, 60.

[852] AT&T/WorldCom Ex. 1, at 23-26; AT&T/WorldCom Ex. 23, Vol. 1 at 10-12, Attach. J; *see also* AT&T/WorldCom Initial Cost Brief at 167.

[853] *Compare* AT&T/WorldCom Ex. 1, at 23-24, *with* AT&T/WorldCom Ex. 1, at 25-26.

[854] Verizon Ex. 109, at 38-43; Verizon Reply Cost Brief at 139-40, 145.

[855] Verizon Ex. 109, at 39; Verizon Reply Cost Brief at 145.

[856] Verizon Ex. 109, at 42.

b. 4-wire Loops

(i) Positions of the Parties

334. AT&T/WorldCom derive the 4-wire loop rate by multiplying the 2-wire loop rate by a factor of 1.7. To arrive at this factor, AT&T/WorldCom adjust the basic 2-wire loop costs by: (1) increasing the NID costs to account for an additional overvoltage protector ($0.03 per month increase in the NID costs); (2) doubling distribution costs to account for the second 2-wire pair; (3) doubling the SAI costs; and (4) increasing total DLC costs by 40 percent.[857] Fiber feeder costs remain unchanged.[858]

335. Verizon contends that these adjustments to the 2-wire loop costs fail to capture the cost differences between the 2-wire loop and the 4-wire loop. First, because AT&T/WorldCom start with their proposed costs for the 2-wire loop, the 4-wire loop costs incorporate all the errors that Verizon attributes to the 2-wire loop costs.[859] Second, Verizon asserts that AT&T/WorldCom compound this problem by making additional errors specific to the 4-wire loop. For example, because 4-wire services generally are provisioned to businesses that have inside terminals instead of NIDs, AT&T/WorldCom inappropriately factor in higher NID costs rather than using the costs of the necessary inside terminals.[860] Verizon also claims that DLC costs should be increased by a factor of four, rather than 40 percent, to account for the additional DLC equipment necessary because, unlike 2-wire loops, 4-wire loops are unable to take advantage of GR-303 DLC concentration capabilities.[861] Finally, Verizon argues that AT&T/WorldCom fail to increase the component common equipment cost allocation by the two to four times necessary to account for the additional plug-in shelves that 4-wire loops require[862] and fail to propose deaveraged rates.[863]

336. AT&T/WorldCom respond that Verizon's contentions are misplaced. First, they claim that they properly establish the 2-wire loop costs.[864] Second, they point out that Verizon's own cost study uses a NID to calculate 4-wire loop costs.[865] Third, they contend that the 2-wire loop costs they propose do not include the concentration functionality, thus there is no need to account for

---

857 AT&T/WorldCom Ex. 1, at 23-24; AT&T/WorldCom Ex. 23, Vol. 1 at 10-11, Attach. J.

858 AT&T/WorldCom Ex. 1, at 24; AT&T/WorldCom Ex. 23, Vol. 1 at 11.

859 Verizon Ex. 109, at 38-39; Verizon Reply Cost Brief at 145.

860 Verizon Ex. 109, at 40.

861 *Id.* at 40-42.

862 *Id.*; *see also* Verizon Reply Cost Brief at 145.

863 Verizon Ex. 109, at 42.

864 AT&T/WorldCom Ex. 14, at 49.

865 *Id.* at 50; AT&T/WorldCom Initial Cost Brief at 167-68.

any lack of concentration capabilities for 4-wire loops.[866] Finally, they argue, the plug-in shelves are a *de minimis* component of common equipment costs, and therefore do not have a recognizable effect on 4-wire loop costs.[867]

(ii) Discussion

337. We adopt the component calculations that AT&T/WorldCom propose for the statewide averaged 4-wire loop rate, but we will calculate deaveraged rates in the manner that Verizon proposes.[868] AT&T/WorldCom demonstrate that their out-of-model calculations are reasonable and that Verizon's criticisms do not warrant alternative adjustments. Specifically, AT&T/WorldCom are correct that: (1) Verizon's model uses NID costs to calculate the 4-wire loop costs, and (2) they do not include the savings from concentration in determining the 2-wire loop costs, thus no adjustment is required for 4-wire loops.[869] Further, Verizon fails to identify the specific effect of AT&T/WorldCom's alleged understatement of the plug-in shelves component of common equipment costs. Finally, we agree with Verizon that the 4-wire loop rate should be deaveraged. The Virginia Commission previously deaveraged 4-wire loop rates,[870] and AT&T/WorldCom offer no reason for us not to do so here. We therefore will deaverage the 4-wire loop rate using the method previously adopted by the Virginia Commission (which we are also using to deaverage the 2-wire loop rate).

---

[866] AT&T/WorldCom Ex. 14, at 49-50; AT&T/WorldCom Initial Cost Brief at 168; AT&T/WorldCom Reply Cost Brief at 72.

[867] AT&T/WorldCom Ex. 18, at 9-11; AT&T/WorldCom Initial Cost Brief at 168; AT&T/WorldCom Reply Cost Brief at 72.

[868] Although we adopt the specific changes that AT&T/WorldCom propose, because we apply them to the average 2-wire loop costs that we calculate (as opposed to the costs calculated by AT&T/WorldCom), the cost relationship between the 4-wire loop and the 2-wire loop will be a factor different from the 1.7 factor that results from AT&T/WorldCom's calculations.

[869] *See* Verizon Ex. 107, at 177-78.

[870] *To Determine Prices Bell Atlantic-Virginia, Inc. is Authorized to Charge Competitive Local Exchange Carriers in Accordance with the Telecommunications Act of 1996 and Applicable State Law*, Case No. PUC970005, Final Order at 15-16 (Virginia Commission 1999) (*Virginia Commission 1999 Order*) (adopting *To Determine Prices Bell Atlantic-Virginia, Inc. is Authorized to Charge Competitive Local Exchange Carriers in Accordance with the Telecommunications Act of 1996 and Applicable State Law*, Case No. PUC970005, Staff Exhibit (Comparative Summary of Pricing Recommendations) at 17-19 (filed June 5, 1997) (*Virginia Staff Report*)).

c. DS-1 and DS-3 Loops

(i) Positions of the Parties

338. AT&T/WorldCom calculate DS-1 and DS-3 loop costs by determining the cost relationship between these loops and the basic 2-wire loop.[871] To do so, they first determine, based on Verizon ARMIS data,[872] that the average number of DS-0 equivalents per physical, non-switched DS-1 and DS-3 lines is approximately 8.0.[873] Because the 8:1 ratio includes a mix of DS-1s and DS-3s, AT&T/WorldCom then determine the ratios for DS-1s and DS-3s individually.[874] Relying on the Commission's *Transport Rate Structure Order*, AT&T/WorldCom assume that the DS-3:DS-1 cost ratio is 9.6:1.[875] AT&T/WorldCom also assume that 90 percent of non-switched lines are DS-1s and 10 percent are DS-3s.[876] Applying these two relationships, AT&T/WorldCom calculate DS-1 costs to be 4.3 times DS-0 costs and DS-3 costs to be 41.3 times DS-0 costs (*i.e.*, 9.6 times DS-1 costs).[877]

339. Verizon urges us to reject AT&T/WorldCom's DS-1 and DS-3 loop cost calculations. Verizon contends that AT&T/WorldCom improperly use a different DS-0 equivalent factor in determining the DS-1 and the DS-3 loop rates than they use to determine the 2-wire loop rates. Specifically, AT&T/WorldCom use a 12:1 DS-0 to DS-1 ratio and a 9.6:1 DS-3 to DS-1 ratio to determine DS-1 and DS-3 loop costs, while using a 24:1 DS-1 to DS-0 ratio and a 28:1 DS-3 to DS-1 ratio in their proposed DS-0 loop cost calculations.[878] Verizon also asserts that AT&T/WorldCom fail to provide support for their 12:1 DS-1 to DS-0 ratio or their 9:1 ratio of DS-3s to DS-1s,[879] and that they fail to account for sufficient investment for DS-1 electronics.[880] Finally,

---

871 AT&T/WorldCom Ex. 1, at 25-26; AT&T/WorldCom Ex. 23, Vol. 1 at 11-12.

872 AT&T/WorldCom claim that they rely on 2002 ARMIS data. *See* AT&T/WorldCom Ex. 1, at 25 n.28; AT&T/WorldCom Ex. 23, Vol. 1 at 12 n.8. ARMIS data for 2002 (and 2001) were not available at the time of the hearing. We believe it likely that, if AT&T/WorldCom relied on ARMIS data, they used 2000 ARMIS data, and assume so in our analysis.

873 AT&T/WorldCom Ex. 1, at 25; AT&T/WorldCom Ex. 23, Vol. 1 at 11-12.

874 AT&T/WorldCom Ex. 1, at 25; AT&T/WorldCom Ex. 23, Vol. 1 at 11-12.

875 *See Transport Rate Structure and Pricing*, CC Docket No. 91-213, Third Memorandum Opinion and Order on Reconsideration, 10 FCC Rcd 3030, 3039, 3049, 3062, paras. 13, 33-34, 62-63 (1994) (*Transport Rate Structure Order*).

876 AT&T/WorldCom Ex. 1, at 25; AT&T/WorldCom Ex. 23, Vol. 1 at 12.

877 AT&T/WorldCom Ex. 1, at 25-26; AT&T/WorldCom Ex. 23, Vol. 1 at 12. Specifically, AT&T/WorldCom's formulas are: (90% * 4.3) + (10% * 4.3 * 9.6) = 8. (4.3 * 9.6) = 41.3. In the first formula, AT&T/WorldCom solve for the 4.3. AT&T/WorldCom Ex. 1, at 26 n.29.

878 Verizon Ex. 109, at 42-44; Verizon Reply Cost Brief at 138-40.

879 Verizon Ex. 109, at 43-44.

880 *Id.* at 37.

AT&T/WorldCom do not propose deaveraged DS-1 loop rates.[881] Other than the rates determined from its cost studies, however, Verizon does not offer any specific counter proposal.

340. AT&T/WorldCom respond that they account for sufficient investment in DS-1 electronics (*i.e.*, line cards) by including costs for DS-0 line card slots in the DLC for the DS-0 equivalent counts.[882] AT&T/WorldCom also contend that Verizon is incorrect in its claim that AT&T/WorldCom use a 12:1 DS-0 to DS-1 equivalent cost ratio, when they actually use a 4.3:1 ratio.[883] They defend the 9.6:1 DS-1 to DS-3 ratio as the same ratio that the Commission adopted in the *Transport Rate Structure Order*.[884] AT&T/WorldCom also claim that Verizon's cost study produces relationships between DS-0 and DS-1 cost and between DS-1 and DS-3 costs similar to those AT&T/WorldCom propose.[885] AT&T/WorldCom propose a DS-1 loop rate that is 4.3 times their proposed average DS-0 loop rate and a DS-3 loop rate that is 9.6 times their DS-1 loop rate; Verizon proposes a DS-1 rate that is 6.1 times its DS-0 rate and a DS-3 rate that is 10.0 times its DS-1 rate.[886] Finally, AT&T/WorldCom claim that the use of ratios to determine the DS-1 and the DS-3 loop rates different from those used to determine the 2-wire loop costs is simply an allocation issue, and that it does not undermine the ratios used to determine the DS-1 and the DS-3 loop rates.[887]

(ii) Discussion

341. We will use the 4.3:1 DS-1 to DS-0 and the 9.6:1 DS-3 to DS-1 out-of-model factors proposed by AT&T/WorldCom to establish rates for the DS-1 and the DS-3 loop types. Although we are troubled by the lack of thoroughness and clarity in AT&T/WorldCom's analysis,[888] their factors are, nevertheless, the only factors proposed and therefore the only option before us. Verizon did not propose alternative factors.

342. We conclude that these factors are reasonable in light of Verizon's proposed rates and Commission precedent. AT&T/WorldCom are correct that the ratios in Verizon's proposed

---

881 *Id.* at 42.

882 AT&T/WorldCom Ex. 1, at 25-26; AT&T/WorldCom Ex. 23, Vol. 1 at 12; AT&T/WorldCom Initial Cost Brief at 167; AT&T/WorldCom Reply Cost Brief at 71.

883 AT&T/WorldCom Ex. 14, at 50.

884 AT&T/WorldCom Ex. 1, at 25 (citing *Transport Rate Structure Order*, 10 FCC Rcd at 3062, paras. 62-63); *see also* AT&T/WorldCom Ex. 14, at 50.

885 AT&T/WorldCom Ex. 14, at 50-51.

886 *See* Tr. at 4483; AT&T/WorldCom Initial Cost Brief, Attach. at 1.

887 *See* AT&T/WorldCom Initial Cost Brief at 125.

888 We have been unable, in our review of ARMIS data from various years including 2000, to identify the starting point for the AT&T/WorldCom calculations – *i.e.*, the 8.0, which represents the number of DS-0 equivalents per physical, non-switched DS-1 and DS-3 lines.

rates (from the LCAM) are similar to those they propose. Specifically, using Verizon's proposed statewide average 2-wire, DS-1, and DS-3 loop rates, the ratios are 6.1 and 10.0, respectively. In addition, in the *Access Charges Reform First Report and Order*, the Commission found that the ratio of outside plant (*i.e.*, loop) costs for PRI ISDN lines[889] to basic analog lines was approximately 5 to 1.[890] The Commission based this determination on cost studies submitted by Bell Atlantic, Ameritech, Pacific Bell, and US West.[891] The Bell Atlantic study (which included Virginia) alone, moreover, showed a 4.13 to 1 ratio.[892]

343. Because we are using the MSM to generate 2-wire loop rates,[893] we do not consider using the LCAM to establish DS-1 loop rates or the Verizon High Capacity Access Cost (Hi-Cap) model to establish DS-3 loop rates. The MSM and the LCAM and Hi-Cap models are fundamentally different models that use widely varying assumptions and inputs that are not possible to reconcile with any reasonable degree of confidence. Using these different models to determine the costs of different loop types would, therefore, invariably result in Verizon either over- or under-recovering its total outside plant costs, and thus violate the Commission's TELRIC rules.[894]

344. Although we use AT&T/WorldCom's cost factors to determine the DS-1 and the DS-3 loop rates, we agree with Verizon that AT&T/WorldCom create total cost and cost allocation problems by using different DS-0 equivalent computations (4.3:1 and 9.6:1) to determine DS-1 and DS-3 loop rates than they use to determine the DS-0 loop rates (24:1 and 28:1). As we explain in

---

[889] We assume, for purposes of this arbitration, that PRI ISDN loop costs and DS-1 loop costs are the same because Verizon submits a single cost study, establishing a single set of rates, for DS-1 loops and for PRI ISDN loops. For this same reason, although AT&T/WorldCom do not offer testimony specific to PRI ISDN loop costs, we find that the rates for the PRI ISDN type loop shall be the same as those we establish herein for the DS-1 loop type.

[890] *See Access Charge Reform*, CC Docket Nos. 96-262, 94-1, 91-213, 95-72, First Report and Order, 12 FCC Rcd 15982, 16028-34, paras. 111-22 (1997) (*Access Charge Reform First Report and Order*) (using this cost ratio to cap at 5 the number of end-user common line charges (*i.e.*, subscriber line charges or SLCs) that may be assessed by price cap carriers for a PRI ISDN service). The Commission relied on this decision in extending the rule to non-price cap carriers in 2001 in the MAG Order. *Multi-Association Group (MAG) Plan for Regulation of Interstate Services of Non-Price Cap Incumbent Local Exchange Carriers and Interexchange Carriers*, CC Docket Nos. 00-256, 96-45, 98-77, 98-166, Second Report and Order and Further Notice of Proposed Rulemaking in CC Docket No. 00-256, Fifteenth Report and Order in CC Docket No. 96-45, and Report and Order in Docket Nos. 98-77 and 98-166, 16 FCC Rcd 19613, 19640-41, para. 56 (2001) (*MAG Order*).

[891] *Access Charge Reform First Report and Order*, 12 FCC Rcd at 16030-33, paras. 113-20. The Commission excluded the cost study submitted by NYNEX, which showed a higher ratio, because it was determined to be an outlier. *Id*. at 16030-31, para. 113.

[892] *Id.* at 16030-31, para. 113.

[893] *See supra* section IV(B)(2).

[894] *See* 47 C.F.R. § 51.505(a-b).

detail elsewhere in this order, we resolve these problems by removing special access lines from the DS-0 loop cost calculations.[895]

345. Finally, we agree with Verizon that the DS-1 loop rate should be deaveraged. The Virginia Commission previously deaveraged DS-1 loop rates[896] and AT&T/WorldCom offer no reason for us not to do so here. We therefore adopt, for the DS-1 loop rate, the Verizon proposed deaveraging methodology, which is the same as that originally adopted by the Virginia Commission.[897]

2. xDSL, Off Premise Extension, and 4-wire CSS Loops

a. Positions of the Parties

346. Verizon proposes that the rates for xDSL loops and for off premise extension loops should be the same as the rates for the basic 2-wire loop.[898] AT&T/WorldCom do not challenge these positions.

347. The Verizon proposal for, and the AT&T/WorldCom restatement of, the 4-wire customer specified signaling (CSS) rates are the same as their proposed rates for the basic 4-wire loop.[899]

b. Discussion

348. Because there is no dispute among the parties on these points, we adopt the same rates for xDSL loops and for off premise extension loops that we establish for basic 2-wire loops. Similarly, because there is no disagreement among the parties, we adopt the same rates for 4-wire CSS loops that we establish for basic 4-wire loops.

3. 2-wire CSS, 2-wire ISDN BRI, and 4-wire DDS Loop Types

a. Positions of the Parties

349. The parties did not submit testimony specific to the 2-wire CSS, 2-wire ISDN BRI,

---

[895] *See supra* section IV(C)(2)(b)(ii).

[896] *Virginia Commission 1999 Order* at 15-16 (adopting *Virginia Staff Report* at 17-19).

[897] We note that neither side proposes deaveraged DS-3 loop rates, and that the Virginia Commission did not previously require DS-3 loop rates to be deaveraged. *See Virginia Commission 1999 Order* at 15-16 (adopting *Virginia Staff Report* at 17-19).

[898] Verizon Ex. 107, at 81, 125. Verizon defines an off premise extension unbundled loop as "a service that allows subscribers to receive phone calls placed to the same telephone number at two different subscriber locations." *Id*. at 81.

[899] *See* AT&T/WorldCom Initial Cost Brief, Attach. at 1.

or 4-wire digital data services (DDS) loop types. Verizon proposes to establish rates for these loop types using its loop cost studies.[900] Other than providing general descriptions of these loop types,[901] Verizon fails to offer any testimony or other evidence to explain its cost studies for these loop types or to support the inputs and assumptions reflected therein. AT&T/WorldCom do not offer any affirmative proposal to establish rates for these loop types. They provide detailed testimony challenging many of the inputs and assumptions used by Verizon in its LCAM study generally, which apply to all loop types, but they do not offer any challenges specific to these loop types.[902]

b. Discussion

350. Neither Verizon nor AT&T/WorldCom offer feasible proposals to establish TELRIC rates for these loop types. Both proposals rely on the LCAM, and, as we explain below, using the LCAM to establish rates for the 2-wire CSS, 2-wire ISDN BRI, and 4-wire DDS loops presents significant problems. To avoid these problems, we adopt rates for these loops based on cost ratios (as opposed to absolute values) derived from the LCAM.

351. Relying on the LCAM (including its inputs and model algorithms) for these three loop types, as the parties suggest, while using the MSM (including its inputs and model assumptions) as the basis to establish rates for other loop types admittedly raises significant issues regarding data mismatches. Simply put, the cost inputs and algorithms vary greatly between the cost models. The parties fail to provide sufficient evidence to enable us to resolve these problems. Neither side devotes any significant testimony or briefing to issues specific to these loop types. Verizon includes a skeletal summary of what these loop types are, and AT&T/WorldCom include a single paragraph of testimony that points the reader to their workpapers.[903] In order for us to establish rates for these loop types, we would therefore need to modify the LCAM to ensure its consistency with the MSM without any meaningful assistance from the parties. This we decline to do.

352. We note, moreover, that we do not expect there to be any significant demand for at least the 2-wire CSS and 4-wire DDS loops. These two loop types represent very old technologies. CSS should be necessary only where signaling system 7 (SS7) networks have not been deployed. DDS lines should be necessary only to support certain very old and slow modems (*e.g.*, early digital 2400 kbps modems). Arguably, because neither of these loop types represents the most efficient technology currently available, we should not be establishing separate rates for these loop types.

---

[900] *See* Verizon Ex. 100P, Vols. II-III, Parts B-2 (2-wire CSS), B-4 (2-wire ISDN BRI), and B-5 (4-wire DDS) (confidential version).

[901] Verizon Ex. 107, at 81-82.

[902] *Compare* AT&T/WorldCom Ex. 12, at 19-79, *with* AT&T/WorldCom Ex. 12, at 94-95.

[903] Verizon Ex. 107, at 81-82; AT&T/WorldCom Ex. 12, at 95-96. Although AT&T/WorldCom attempt to restate all of Verizon's loop rates, they acknowledge that they have not proposed all of the necessary adjustments. *See* AT&T/WorldCom Ex. 12, at 10, 12, 16, 19, 36.

Neither side raises this concern, however, and both propose rates for these loop types. We, therefore, will establish rates for these loop types. Nevertheless, given the minimal interest of the parties in these loop types and the fact that we may not use the LCAM for these loop types, we decline to adopt either side's proposal.

353. We therefore employ an alternative approach to generate cost-based rates for these three loop types. Having found cost ratios an appropriate basis for determining DS-1 and DS-3 loop rates,[904] we develop a similar cost ratio method to establish rates for the 2-wire CSS, 2-wire ISDN BRI, and the 4-wire DDS loop types. In particular, we use the ratios between the rates for these loop types (individually) compared to the rates for the basic 2-wire or 4-wire loop (as appropriate) from the AT&T/WorldCom restatement of Verizon's loop rates, and apply these ratios to the 2-wire or 4-wire (as appropriate) loop rates established in this order. Using this approach ensures that rates for all loop types are based on a single cost model and, thus, a uniform network design and uniform set of assumptions and cost inputs.

354. We begin our calculations with the basic 2-wire loop rates that we derive from the MSM[905] to determine rates for the 2-wire CSS and the 2-wire ISDN loop types, and with the basic 4-wire loop rates to determine rates for the 4-wire DDS loop type. We then apply to these rates (*i.e.*, the basic 2-wire and 4-wire loop rates) the cost ratios reflected in the LCAM between these loop types (*e.g.*, the ratio between the LCAM basic 2-wire loop rates and the LCAM 2-wire CSS loop rates). The following table identifies the ratios (in italics) between these loop types, using both the AT&T/WorldCom restatement rates and the Verizon proposed rates:[906]

[904] *See supra* section IV(D)(1)(c).

[905] *See infra* App. E, F.

[906] *See* AT&T/WorldCom Initial Cost Brief, Attach. at 1.

	ATT/WC	Verizon		ATT/WC	Verizon	ATT/WC 2W CSS/2W BUL	Verizon 2W CSS/2W BUL	% Difference Between ratios
2W BUL			2W CSS					
Cell 1	**4.98**	**17.86**	**Cell 1**	**7.00**	**25.85**	***1.41***	***1.45***	***2.9%***
Cell 2	7.37	26.31	Cell 2	9.49	34.50	*1.29*	*1.31*	***1.8%***
Cell 3	11.77	43.45	Cell 3	13.71	50.95	*1.16*	*1.17*	***0.7%***
AVG.:	6.18	22.33	AVG.:	8.20	30.28	*1.33*	*1.36*	***2.2%***

	ATT/WC	Verizon		ATT/WC	Verizon	ATT/WC 2W BRI/2W BUL	Verizon 2W BRI/2W BUL	
2W BUL			2W BRI					
Cell 1	4.98	17.86	Cell 1	5.91	23.14	*1.19*	*1.30*	***8.4%***
Cell 2	7.37	26.31	Cell 2	8.28	31.83	*1.12*	*1.21*	***7.1%***
Cell 3	11.77	43.45	Cell 3	12.65	48.87	*1.07*	*1.12*	***4.4%***
AVG.:	6.18	22.33	AVG.:	7.09	27.66	*1.15*	*1.24*	***7.4%***

	ATT/WC	Verizon		ATT/WC	Verizon	ATT/WC 4W DDS/4W CSS	Verizon 4W DDS/4W CSS	
4W BUL - CSS			4W DDS					
Cell 1	19.69	56.81	Cell 1	21.77	60.29	*1.106*	*1.061*	***-4.2%***
Cell 2	24.80	74.19	Cell 2	27.52	78.99	*1.110*	*1.065*	***-4.2%***
Cell 3	32.55	106.49	Cell 3	36.14	113.18	*1.110*	*1.063*	***-4.5%***
AVG.:	22.01	65.50	AVG.:	24.37	69.67	*1.107*	*1.064*	***-4.1%***

355. By way of example, if we apply the ratio analysis and use the ratios generated from the Verizon proposed rates, we would calculate the 2-wire CSS loop rate (see first line of the table above, in bold) for zone 1 by multiplying the basic 2-wire loop rate, zone 1, by 1.45. Were we instead to use the ratios generated from the AT&T/WorldCom restatement rates, we would use a ratio of 1.41 instead of 1.45. In this instance, using the ratio based on the Verizon proposed rates instead of the AT&T/WorldCom restatement rates would generate a 2.9 percent higher 2-wire CSS loop rate (for zone 1).

356. To complete this analysis, we must determine whether to use the ratios generated from the Verizon proposed rates or the AT&T/WorldCom proposed restatement rates. Electronics costs comprise a significant proportion of loop costs, and one of the major cost drivers for electronics is the type of DLC systems used. In determining basic 2-wire loop costs, we concluded that fiber-based loop feeder plant should use 100 percent NGDLC systems.[907] Because we adopt AT&T/WorldCom's position on that issue, and because electronics are a significant loop cost driver, we will use the ratios that result from the AT&T/WorldCom restatement rates rather than from the Verizon proposed rates. In reaching this conclusion, we note that the difference between the AT&T/WorldCom and Verizon ratios (the last column in the table, above) is generally small (less than five percent for all three loop types in all density zones, except for the 2-wire ISDN BRI loop type in zones 1 and 2). We further note that,

[907] *See supra* section IV(C)(2)(k).

although the AT&T/WorldCom ratios result in lower 2-wire CSS and 2-wire BRI ISDN loop rates than do the Verizon ratios, the AT&T/WorldCom ratios also result in higher 4-wire DDS loop rates. The effect, therefore, of our decision to use the AT&T/WorldCom ratios instead of the Verizon ratios is minimal.

V. SWITCHING

357. Local circuit switching refers to line-side and trunk-side facilities used to connect separate lines and trunks, including all of the features, functions, and capabilities of the switch. The Commission's TELRIC pricing rules apply to the rates charged when switching is offered as a UNE.[908] The *Local Competition First Report and Order* and the Commission's rules, however, provide only general guidance on the proper rate structure for incumbent LECs to use in recovering switching costs. The rules specify that an incumbent LEC shall recover local switching costs "through a combination of a flat-rated charge for line ports and one or more flat-rated or per minute usage charges for the switching matrix and for trunk ports,"[909] and tandem switching costs "through usage-sensitive charges, or in another manner consistent with the manner that the incumbent LEC incurs those costs."[910]

358. In its universal service orders, the Commission provided additional guidance for determining forward-looking switching costs. It identified the following guidelines for modeling local switching costs: individual switches should be identified as host, remote, or stand-alone; investment costs should be developed separately for each of these switch types; switch capacity constraints should be included; and modern, high-capacity digital switches should be used.[911] The Commission concluded that both models presented at the time -- the Benchmark Cost Proxy Model (BCPM) 3.0, which relied in part on the SCIS model, and HAI 5.0 -- "meet the . . . requirement that a model assume the least-cost, most-efficient and reasonable technology to provide the supported services."[912] It further concluded that the HAI model better satisfied the forward-looking pricing methodology than did the BCPM/SCIS model primarily because: (1) the HAI model is less complex than the BCPM/SCIS model, but "still provid[es] a degree of detail that is sufficient for the accurate computation of costs for federal universal service purposes;" and (2) proprietary SCIS model data were not entered into the record of that proceeding.[913] The Commission then incorporated the HAI switching cost computations into the

[908] 47 C.F.R. § 51.501 (TELRIC pricing rules apply to UNEs).

[909] 47 C.F.R. § 51.509(b); *see also* 47 C.F.R. § 51.507(c).

[910] 47 C.F.R. § 51.509(e); *see also* 47 C.F.R. § 51.507(c).

[911] *Platform Order*, 13 FCC Rcd at 21353, 21355, paras. 72, 76.

[912] *Id.* at 21355, para. 76.

[913] *Id.* at 21354-56, paras. 75, 77-78.

SM.[914] In so doing, however, the Commission expressly stated that switching costs are less significant than loop costs for universal service purposes,[915] and therefore it devoted less analysis to the switching and interoffice platforms and cost inputs than would have been necessary for purposes of determining unbundled switching and transport costs.[916]

A. Cost Model

1. Positions of the Parties

359. Verizon submitted cost studies to determine the costs of, and thereby the rates for, unbundled end-office and tandem switching.[917] The starting point in the Verizon switching cost study is the SCIS model.[918] The SCIS model is a computer system that has two modules, SCIS/Model Office (SCIS/MO) and SCIS/Intelligent Network (SCIS/IN).[919] The SCIS/MO module is used to develop switching investments and processor-related investments associated with features that do not require any specific, unique hardware.[920] The SCIS/IN module is used to develop incremental investments associated with vertical features.[921] Verizon uses the SCIS model to estimate the initial capital outlay for the physical material of the end-office and tandem switching equipment.[922]

---

914 *Id.* at 21354-57, paras. 75-80. HAI 5.0 uses a single cost module to determine both switching and transport costs. *See id*. at 21354, para. 74. In the universal service proceeding, the Commission adopted this module for use in determining switching and common transport costs. *See id.* at 21354-57, paras. 75-80; *see also infra* section VI(A).

915 *Platform Order*, 13 FCC Rcd at 21355, para. 75 ("In our evaluation of the switching modules in this proceeding, we note that, for universal service purposes, where cost differences caused by differing loop lengths are the most significant cost factor, switching costs are less significant than they would be in, for example, a cost model to determine unbundled network element switching and transport costs.").

916 *Compare Platform Order*, 13 FCC Rcd at 21353-57, paras. 71-80 (switching and interoffice platform), *with id*. at 21335-53, paras. 26-70 (loop platform); *compare Inputs Order*, 14 FCC Rcd at 20277-99, paras. 286-337 (switching and interoffice cost inputs), *with id*. at 20172-277, paras. 33-285 (loop cost inputs).

917 Verizon Ex. 100P, Vols. V, VI, IX (confidential version); Verizon Ex. 125P (Matt Supplemental Surrebuttal), Attach. A-G (confidential version); Verizon Ex. 161P (Matt Second Supplemental Surrebuttal), Attach. H-M (confidential version). Verizon submitted the Telcordia Common Channel Signaling Cost Information System (CCSCIS) study to determine signaling costs and rates. *See* Verizon Ex. 100P, Vol. VII, Parts E-1 and E-2 (confidential version).

918 Verizon Ex. 107P, at 179-211 (confidential version).

919 *Id*.

920 *Id*.

921 *Id*.

922 *Id*.

360. Although the outputs from the SCIS model are the foundation of Verizon's switching cost study, they are only the starting point in the switching cost calculations. Verizon uses additional data and applies calculations outside of the SCIS model to estimate the initial capital outlays for incumbent LEC and vendor labor; Engineer, Furnish, and Install (EF&I) factors; power; land; and buildings.[923] It applies cost factors and adds loadings to the capitalized investment obtained from the SCIS model to derive annual costs of capital, depreciation, income and other taxes, maintenance, overhead, regulatory assessments, uncollectibles, umbilical and SS7 link equipment, and right-to-use (RTU) licenses.[924] Verizon also makes certain adjustments to account for utilization (*i.e.*, fill) rates, and to convert an overall cost estimate that is developed initially on a busy hour equipment capacity minute-of-use (MOU) basis to separate cost estimates for originating and terminating traffic that are expressed on an all hour of the day billable MOU basis.[925]

361. AT&T/WorldCom do not challenge the ability of the Verizon switching cost study, including the SCIS model, to generate TELRIC-compliant switching rates.[926] Rather, they challenge most of the significant inputs used by Verizon to develop switching costs.[927] For example, AT&T/WorldCom contend that the limited data set used by Verizon to model switch prices is not appropriate for a forward-looking cost model because it primarily reflects additions to existing switches, rather than purchases of new switches that generally have a much higher vendor discount.[928] They also allege that the Verizon study does not use sufficiently forward-looking technology assumptions, particularly with respect to the type of DLC systems.[929] Finally, they contend that other costs estimated by Verizon, such as RTU fees that are paid to switch vendors for software, are excessive.[930]

362. AT&T/WorldCom affirmatively propose using the MSM to generate TELRIC-

---

923 *Id*.

924 *Id*.

925 *Id*. Converting capacity MOU to billable MOU and busy hour MOU to all hours MOU are discussed *infra* in the section on the Busy Hour to Annual MOU Ratio. *See infra* section V(C)(8).

926 *See* Tr. at 5386-87 (Q: (Mr. Kwiatkowski) "Do you have any specific criticism of SCIS itself? That is the mathematical formulas reflected in SCIS?" A: (Ms. Pitts) "Overall, probably not.") Indeed, Ms. Pitts, AT&T/WorldCom's lead witness on switching cost issues, was at one point "responsible for the technical development, production, documentation, and customer care for the SCIS family of models." AT&T/WorldCom Ex. 4 (Pitts Direct), at 1.

927 AT&T/WorldCom Ex. 12P, at 96-124 (confidential version).

928 AT&T/WorldCom Ex. 12, at 98-104.

929 *Id*. at 104-107.

930 *Id*. at 115-118.

compliant end-office and tandem switching rates and signaling rates.[931] The MSM contains a switching and transport module.[932] End-office switching costs in the MSM are based primarily on the regression analysis adopted by the Commission in the universal service proceeding.[933] There, the Commission analyzed the costs for end-office switching equipment using data from switch installations from 1989-1996.[934] It determined that the fixed cost for a host switch and a stand-alone switch was $486,700 and that the fixed cost for a remote switch was $161,800.[935] It further found that the variable cost for host, stand-alone, and remote switches was $87 per line.[936] Given these cost inputs, end-office switching costs in the MSM depend almost entirely on the number of lines per switch and the relative numbers of host, stand-alone, and remote switches in a network. The Switching/Transport module contains capacity checks, based on the number of lines, busy hour call attempts, and busy hour usage,[937] but these checks have minimal effect on the switching cost estimates generated by the MSM. AT&T/WorldCom also rely on the costs and calculations contained in the underlying SM to generate costs and rates for tandem switching.[938]

363. Verizon challenges the use of the MSM Switching/Transport module as fundamentally inappropriate for use in generating UNE rates, and it claims that many of the module's cost inputs are flawed as well. As a threshold matter, Verizon contends that the Switching/Transport module adopted by the Commission to determine switching costs for federal universal service purposes is inappropriate for use in developing absolute unbundled switching rates in Virginia.[939] Verizon asserts that, in the universal service proceeding, the Commission focused not on whether the calculations provided an accurate estimate of TELRIC switching costs, but rather on whether the module functioned sufficiently to calculate federal universal service switching costs.[940] Verizon claims that AT&T/WorldCom have done nothing in

---

931 AT&T/WorldCom Ex. 14, Attach. A; AT&T/WorldCom Ex. 23, Attach. A, J.

932 AT&T/WorldCom Ex. 14, Attach. A; AT&T/WorldCom Ex. 23, HAI Model Release 5.0a at 53-63 (1998) ("Switching/Transport module"); AT&T/WorldCom Initial Cost Brief at 188. Although AT&T/WorldCom filed a revised version of the Switching/Transport module later in the proceeding to update certain common transport costs, *see* Keffer Dec. 12 Letter, Install A, the general model descriptions provided in the initial cost model filing remain accurate.

933 *Inputs Order*, 14 FCC Rcd at 20279-93, paras. 290-323.

934 *Id.* at 20281-91, paras. 296-319.

935 *Id*. at 20281, para. 296.

936 *Id*.

937 AT&T/WorldCom Ex. 23, HAI Model Release 5.0a at 56-57.

938 *See* AT&T/WorldCom Ex. 23, Attach. A, J.

939 Verizon Ex. 109, at 47-50.

940 Verizon Switching Cost Brief at 26 (citing *Platform Order*, 13 FCC Rcd at 21354-56, paras. 75, 78).

this proceeding to improve the accuracy of the switching calculations for use in determining TELRIC switching costs, and that the switching cost estimates produced by the MSM, as well as the input values used to derive them, are therefore not representative of, or appropriate to use to determine, Verizon's forward-looking unbundled switching costs.[941]

364. Verizon contends that the MSM relies on outdated switching data, primarily data from a sample of switches that were deployed between 1989 and 1996.[942] According to Verizon, these input data are not only stale, but they reflect switches that are incapable of providing modern services and features.[943] It argues that many new features have been added to switches since 1996, almost all of which require additional investment, yet the Switching/Transport module fails to account for these modern features and functions or their associated costs.[944] Verizon claims, for example, that the module's data inputs do not reflect the additional costs associated with provisioning ISDN lines on a digital switch,[945] the considerable software investment necessary to comply with the mandates of the Communications Assistance for Law Enforcement Act and LNP obligations,[946] or the requisite hardware modifications included in the current Nortel and Lucent switches.[947] Because it fails to account for the complete range of technologies (both hardware- and software-related) currently being deployed, Verizon alleges that the MSM cannot develop switching costs that will compensate Verizon for all of the switching capabilities that it is required to provide.[948]

365. Verizon also claims that the MSM Switching/Transport module ignores proper switch sizing guidelines and engineering standards, thereby ensuring that the network modeled by the MSM would be incapable of providing adequate and reliable service to Verizon's customers.[949] For example, Verizon contends that the MSM incorrectly assumes that switch sizes are infinitely variable (*i.e.*, that a switch can be sized to meet perfectly the line count in a given

---

941 *Id*.

942 Verizon Ex. 109, at 47 (stating that switching data in the MSM dates back as far as 1983); Verizon Switching Cost Brief at 29-31.

943 Verizon Ex. 109, at 47.

944 Tr. at 5329-30.

945 Verizon Ex. 109, at 47-48.

946 Tr. at 5330-31.

947 Verizon Ex. 109, at 47-48.

948 Verizon also claims that the MSM significantly understates power and MDF investments, as well as central office construction costs. *Id.* at 91-92, Attach. 4; Verizon Initial Cost Brief at 150-51, 162-63. According to Verizon, these understatements, in turn, result in significantly understated switching costs. *See* Verizon Ex. 109P, at 91-93 (confidential version).

949 Verizon Ex. 109, at 50-52.

wire center).[950] In practice, however, Verizon notes that switches and switch components come in discrete sizes and cannot be customized to match exactly the demand in a particular wire center.[951] Therefore, according to Verizon, just as breakage requires the deployment of some excess capacity in the context of cables,[952] carriers will similarly incur the cost of some amount of excess switching capacity.[953] Verizon argues, however, that the MSM is incapable of accounting for these and other types of engineering realities.[954]

366. Verizon also asserts that the MSM cannot accurately account for peak period usage. In developing the SM, the Commission stated that a cost model must "ensure that adequate capacity exists in that switching facility to process all customers' calls that are expected to be made at peak periods."[955] Verizon argues, however, that the MSM fails to satisfy this basic criterion because it does not account for the fact that each central office and its associated trunking network experience an annual busy season, as well as a daily busy hour, characterized by periods of peak traffic loads.[956] Rather, the Switching/Transport module provides capacity for the same number of busy hour calls each day of the year without accounting for a busy season.[957] The uniform amount of usage that AT&T/WorldCom posit as peak traffic cannot, Verizon claims, account for peak periods resulting from seasonal fluctuations in demand, such as a resort community for which the bulk of the yearly traffic occurs over a few summer months.[958] As a result, Verizon asserts that the MSM models switches that would be incapable of handling traffic during busy season periods and, therefore, a network on which customers would experience frequent denials of service.[959]

2. Discussion

367. We adopt the Verizon switching cost study, including the SCIS model, because it

---

950 *See* Verizon Switching Cost Brief at 29.

951 Verizon Ex. 109, at 50-52.

952 *See supra* note 675.

953 Verizon Ex. 109, at 50-52; *see also* Verizon Switching Cost Brief at 29.

954 Verizon Ex. 109, at 50-52; *see also* Verizon Switching Cost Brief at 29.

955 *Inputs Order*, 14 FCC Rcd at 20164-65, para. 12; *see also id.* at 20277-78, para. 286.

956 *See* Verizon Ex. 109, at 50-52.

957 *Id.* at 50.

958 Resort communities typically experience upwards of 60-75 percent of their total annual traffic during a 2 or 3 month vacation period. *Id.* at 51.

959 *Id.* at 50-52.

better satisfies the key cost model criteria that we identify above.[960] Specifically, we find that the Verizon switching cost study, as compared to the MSM's Switching/Transport module, better complies with the Commission's TELRIC pricing rules and relies on cost inputs and assumptions that are more transparent, adjustable, and verifiable. To the extent that AT&T/WorldCom raise specific cost input issues, we address these issues in the following subsections.

368. Between the two cost models, only the SCIS model can be adjusted to reflect our findings regarding the most fundamental switching cost input issue: the relative percentages of new and growth switch equipment and the vendor discounts associated with each.[961] As we explain below, efficient carriers will grow their switches over time, and vendors offer different discounts to carriers for new switches than for growth switching equipment. The MSM Switching/Transport module uses inputs based on 100 percent new switch prices, and, presumably, those prices reflect the greater discounts associated with such switches.[962] The module documentation, however, does not identify the specific discount reflected in those prices, nor can the module be modified to account for the lower discount on growth switching equipment. The SCIS model, in contrast, may be adjusted by the user to reflect any desired discount, although Verizon proposes the lower discount based primarily on growth and upgrade purchases. Accordingly, because the key vendor discounts are discernable and adjustable only in the SCIS model, we find the Verizon switching cost study more transparent, adjustable, and verifiable than, and therefore preferable to, the MSM.

369. We also find that the Verizon switching cost study better complies with the Commission's TELRIC rules because it relies on more recent data and therefore better reflects forward-looking switching costs. Verizon's study relies on data from approximately 1998-2000,[963] the most recent data available prior to its submission of its cost studies in July 2001. AT&T/WorldCom, on the other hand, rely on data relating to switches installed between 1989 and 1996. Their proposed forward-looking switching costs are based, therefore, on a sample of switches reflecting decade old equipment. Although it is possible to extrapolate future values by applying regression analysis to historical data, as AT&T/WorldCom propose, the risks associated with such an approach increase the further into the future the historical data are projected, particularly where key variables (*e.g.*, equipment, technology, demand, traffic patterns) change considerably between the period represented by the historical data and the later period. For example, according to Verizon, dial equipment minute (DEM) growth per line occurred at an average rate of approximately one percent from 1989 to 1996, while per line DEM growth occurred at a rate of five percent between 1996 and 2000.[964] Over time, switch vendors

960 *See supra* section III(B)(3).

961 *See infra* section V(C)(1).

962 *See Inputs Order*, 14 FCC Rcd at 20289, para. 315.

963 *See* Verizon Ex. 100P, Vols. V, VI, IX (confidential version); Verizon Ex. 25P, Attach. A-G (confidential version); Verizon Ex. 161P, Attach. H-M (confidential version).

964 Tr. at 5334-36.

modify switch design and service providers modify switch equipment acquisition decisions to accommodate anticipated growth in subscriber usage levels. Because Verizon proposes using the most recent data available, it is not necessary to use an outdated regression trend analysis in the calculation of unbundled switching costs and rates, and instead we rely on the Verizon switching cost study.

370. Technological improvements in switches, moreover, increase the importance of using recent data to determine switching costs. A new switch purchased today can provide more optional or "vertical" features than can the switches reflected in the MSM's sample data. According to Verizon, in the mid-1990s switches included only four vertical features: call waiting, call forwarding, three-way calling, and speed dialing.[965] The Verizon study, in contrast, includes costs for switches that are capable of providing scores of vertical features.[966] There are costs associated with the switch hardware and software required to provide vertical features that should be included in the cost study.[967] The regression equation on which the MSM switch cost inputs are based does not explicitly include a variable for vertical feature costs. Although the regression analysis includes time trend variables intended to capture the effect of time on switch costs,[968] the record does not support a finding that a cost estimate reflecting prices for switches installed between 1989 and 1996, which included relatively few vertical features (and for which there were likely few subscribers), would adequately reflect forward-looking switch costs. Such costs include a considerably larger number of vertical features (and for which there are likely a relatively larger number of subscribers).[969]

371. Similarly, the Verizon switching cost study explicitly includes costs associated

---

[965] *Id.* at 5334, 5341-42.

[966] The same vertical feature, however, is included more than once in Verizon's tally of vertical features because some may be offered in connection with more than one service. Verizon Ex. 100P, Vol. VI, section 15, subsection 5.8, Features List at 2 (confidential version); Verizon Ex. 125P, Attach. B-1 (confidential version). The number of distinct vertical features that Verizon offered at the time of the hearing, nevertheless, is substantially greater than the number offered in the mid-1990s.

[967] We expect that these costs will increase as the number of vertical feature subscribers increases. Verizon presumably would need to design its switches to reflect anticipated demand for vertical features.

[968] *Inputs Order*, 14 FCC Rcd at 20287-89, paras. 311-14.

[969] Of the 946 switches in the sample on which the MSM Switching/Transport module is based, only 4 are host or stand alone switches that were installed in 1996, and only 22 are host or stand alone switches that were installed in 1995. *See id.* at 20279, para. 290. (We determined the number and timing of the observations comprising the SM's switch sample through review of these data, which are in the custody of the Bureau's Industry Analysis and Technology Division.) Costs for at least some vertical features are not reflected in the data for remote switches because a remote switch relies on a host switch to provide some vertical feature capability. Thus, the quantity and the quality of the information regarding vertical features switch costs reflected in the more recent 1995-96 observations are limited. In other words, whatever information on vertical feature costs that is reflected in the sample derives primarily from the 1989-1994 data. This compounds our concern that the regression equation does not account for today's vertical feature costs.

with switched digital lines, including ISDN. A switch purchased today serves a much larger percentage of digital lines compared to analog lines than did switches installed during 1989-1996.[970] The MSM produces a blended switch cost reflecting the costs for switches in the sample. That composite cost, based on the ARMIS data, reflects a relatively small percentage of high capacity digital lines and a relatively large percentage of low capacity (4 KHz or equivalent) analog lines. ARMIS data show that high capacity (64 kbps or equivalent) digital lines (*e.g.*, ISDN) did not reach one percent of lines until 1993, more than halfway through the sample period, and that they comprised only 4.28 percent of Verizon's switched access lines in 1996, the last year of the period.[971] In contrast, Verizon's study includes data from the year 2000, when ARMIS data indicate that approximately ten percent of the switched access lines served by Verizon's switches in Virginia were high capacity digital lines.[972] We find that a study based on data that explicitly account for the costs associated with digital lines is superior to a regression analysis based on sample data that may not fully account for the considerable increase in the percentage of digital lines occurring subsequent to the sample period.[973]

372. Further, we note that the Commission's adoption of the SM switching and transport module in the universal service proceeding does not compel the same result here. In the *Platform Order*, the Commission expressed a preference for a simpler switching cost study because switching costs are not as critical as loop costs for universal service purposes.[974] Having

---

[970] It is uncontroverted that the Verizon study includes switching costs associated with providing ISDN services. *See* Verizon Ex. 125P, Attachs. A, B2, B3, B4, D (confidential version); *see also* Tr. at 5196-200. The MSM Switching/Transport module, in contrast, relies on the regression trend analysis applied to data from 1989 to 1996. Indeed, AT&T/WorldCom concede that the SM, and therefore the MSM, does not produce cost estimates for ISDN. Tr. at 5197, 5199; *see also* AT&T/WorldCom Ex. 16 (Pitts Surrebuttal), at 4. The study that served as the basis for the MSM switching cost regression equation also indicates that ISDN switching costs are not fully reflected in the SM. *See* Gabel Study, *supra* note 765, at 114 ("During the years covered by this data set the overwhelming majority of the lines were for voice service. Therefore, to a large extent, the per line investment estimates do not reflect the additional costs associated with providing ISDN lines on a digital switching machine.").

[971] ARMIS Report 43-08, Table III (Access Lines in Service of Customer).

[972] *Id*. In addition, the MSM's regression trend analysis relies on data from 1989-1996, years in which, according to Verizon, DEMs grew by approximately one percent, and extrapolates such data to 1996-2000, years in which DEMs grew by approximately five percent. Tr. at 5334-36. We question the accuracy of using trend terms from a slow DEM growth period to estimate costs for a subsequent relatively fast growth period.

[973] Because, for the above stated reasons, we find the Verizon switching cost study preferable to the MSM Switching/Transport module, we need not address Verizon's other criticisms (*e.g.*, MDF and power costs, central office construction costs, peak period investment) of the MSM.

We note that neither side offered any significant testimony in support of its signaling cost studies. Because we adopt the Verizon switching cost study and because signaling is usually only provided in conjunction with switching, we adopt the CCSCIS to generate signaling rates. For the reasons we explain *infra* in section IX, we require Verizon to rerun its signaling cost study incorporating our findings regarding cost of capital, depreciation, and ACFs.

[974] *See Platform Order*, 13 FCC Rcd at 21354-55, paras. 75, 77.

concluded that the Verizon cost study is superior to the MSM for calculating unbundled switching costs, we place less weight on the relative simplicity of the MSM's Switching/Transport module. Similarly, concerns expressed in the universal service proceeding regarding the SCIS model's use of proprietary data do not arise here.[975] In this proceeding, AT&T/WorldCom and Bureau staff have had access to the Verizon study and its underlying data. Indeed, AT&T/WorldCom were able to re-run the Verizon switching cost study using different input data and thereby to propose restated switching rates.[976]

373. Finally, we have considered the effects of adopting the MSM for loop rates and the Verizon cost study for switching rates and believe that doing so is reasonable in the circumstances before us. In contrast to the relative cost analysis performed in the universal service proceeding, here the TELRIC rules require that we establish rates for each UNE, including switching, based on the costs attributable to that UNE.[977] Rates for a particular UNE are based on the total costs of the element divided by the total demand for the element.[978] Consistency between assumptions and data for the costs and the demand of a particular element is, therefore, crucial to determining the per unit costs of that element. Identity of model assumptions and data between different elements is not essential so long as they otherwise meet our key model criteria. Neither side, however, submitted cost studies that contain identical or consistent inputs and assumptions across all elements. For example, Verizon did not optimize inputs and outputs between its switching and loop cost studies,[979] and AT&T/WorldCom propose using the MSM for some UNEs and Verizon's cost studies for others.[980]

B. Shared Cost Allocation Between End-Office and Tandem Switching Functions

374. In the Verizon switching cost study, nine of the switches are combined end-office and tandem switches.[981] All other switches are either exclusively end-office switches or exclusively tandem switches.[982] In order to calculate end-office and tandem switching costs, we must determine the appropriate allocation of costs that are shared between end-office switching

---

975 *See id.* at 21355-56, paras. 77-78.

976 AT&T/WorldCom Ex. 12, at 97; AT&T/WorldCom Ex. 24 (Pitts Supplemental Surrebuttal), at 18-19.

977 *See* 47 C.F.R. § 51.505(a)-(c).

978 *See* 47 C.F.R. § 51.505(b).

979 Tr. at 4141-42.

980 *See infra* sections VI(A), IX.

981 Verizon Ex. 125 (Matt Supplemental Surrebuttal), Attach. H. Each combined switch in the Verizon study is a Lucent 5ESS switch. *Id*.

982 *See id*.

and tandem switching functions.

1. Positions of the Parties

375. Verizon proposes allocating shared costs as follows: It first uses the SCIS/MO to estimate the pure end-office switch costs.[983] Verizon then re-runs the SCIS/MO to estimate the combined pure end-office switch and combined end-office/tandem switch costs.[984] It determines the amount by which costs obtained in the second model run exceed those obtained in the first model run to arrive at the incremental investment associated with adding tandem trunks to end offices.[985] Verizon proposes to allocate only this incremental tandem investment to tandem switching.[986]

376. AT&T/WorldCom oppose Verizon's approach to allocating shared end-office and tandem switching costs. They contend that end-office switching costs should reflect efficiencies associated with combined end-office/tandem switch equipment.[987] Specifically, they assert that, for combined switches, the "getting started,"[988] equivalent POTS half call (EPHC), and SS7 link investment costs are common to both end-office and tandem switching functions.[989] They propose allocating "getting started" and EPHC investments to end-office switching and to tandem switching based on the relative number of local line and trunk ports and tandem ports.[990] They further propose developing allocation factors by converting line ports to equivalent trunk ports, because line ports use fewer switch resources than do trunk ports and because lines are concentrated whereas trunks have dedicated paths through the switch.[991] AT&T/WorldCom propose using a 4:1 line concentration ratio[992] to determine the number of trunk ports (*i.e.*, divide

---

983 We use the term "pure end-office switch" to refer to a switch that provides line-to-line and line-to-trunk, but not trunk-to-trunk, switching.

984 We use the term "combined end-office/tandem switch" to refer to a switch that provides line-to-line, line-to-trunk, and trunk-to-trunk switching.

985 Verizon Ex. 161 (Matt Second Supplemental Surrebuttal), at 5-6.

986 *Id.*

987 AT&T/WorldCom Ex. 24, at 10-13

988 The "getting started" cost of the switch, also known as the "first cost," represents the costs of the central processor, memory, maintenance, administrative, test, and spare equipment, and other common equipment. Similarly, "getting started" investment refers to investment for such equipment, and "getting started" equipment refers to this equipment.

989 AT&T/WorldCom Ex. 24, at 12.

990 *Id*.

991 *Id.* at 12 n.18.

the number of lines by four) in this allocation.[993] They also contend that SS7 link investments are limited to trunks and therefore should be allocated based on the relative number of end-office trunk ports and tandem trunk ports.[994]

2. Discussion

377. We adopt Verizon's approach to allocating costs that are shared between end-office and tandem switching functions. As a preliminary matter, we note that the effect of using AT&T/WorldCom's proposed allocation factors instead of Verizon's would be fairly minimal. AT&T/WorldCom estimate that use of their allocation factors would reduce Verizon's end-office switch costs by only four percent.[995]

378. Verizon's approach is preferable for several reasons. First, as we explain *infra* in the end-office switching rate structure section, we require Verizon to recover end-office switching costs, including "getting started," EPHC, and SS7 link costs, on a flat, per line basis, and not on a per MOU basis.[996] Any "getting started," EPHC, and SS7 link costs shared between tandem and end-office switch functions that are allocated to tandem switching would, however, under the parties' proposed tandem rate structures, be recovered on a per MOU basis. Second, recovery of these shared costs through either element will permit total element cost recovery and should not affect the total payments made by competitive LECs. Because the shared costs that AT&T/WorldCom propose allocating to tandem switching would equal precisely the shared costs that would be allocated away from end-office switching, and because we expect that competitive LECs that purchase unbundled end-office switching are also likely to purchase unbundled tandem switching, competitive LEC payments for these two switching elements

(Continued from previous page)

[992] Line concentration enables a LEC to reduce the number of DS-1 feeder facilities necessary by assigning a feeder transmission path as a telephone call is made instead of dedicating a specific channel in the feeder plant to a particular line at all times. *See* Verizon Ex. 122, at 183-85; Verizon Switching Cost Brief at 14. Concentration is possible because not all callers use the telephone at the same time.

[993] AT&T/WorldCom Ex. 24, at 12 n.18. In their restatement of the Verizon studies, AT&T/WorldCom allocate "getting started" and EPHC investments to end-office switching and tandem switching, respectively, based on the following formulas: ((lines/4) + local trunks)/((lines/4) + local trunks + tandem trunks) and tandem trunks/((lines/4) + local trunks + tandem trunks). They apply these allocation factors to 5ESS end-office switch and combined end-office/tandem switch investment. They do not apply these factors to Nortel or Siemens switch investment because none of the Nortel or Siemens switches is a combined end-office/tandem switch. *Id*.; *see also infra* section V(C)(3).

[994] AT&T/WorldCom Ex. 24, at 12 n.18. In their restatement of the Verizon studies, AT&T/WorldCom allocate SS7 link investments to end-office switching and tandem switching, respectively, based on the following formulas: local trunks/(local trunks + tandem trunks) and tandem trunks/(local trunks + tandem trunks). They apply these allocation factors to 5ESS end-office switch and combined end-office/tandem switch investment. They do not apply these factors to Nortel or Siemens switch investment because none of the Nortel or Siemens switches is a combined end-office/tandem switch. *Id*.

[995] *See id.* at 12.

[996] *See infra* section V(D).

would not vary significantly regardless of the allocation of shared costs.[997] AT&T/WorldCom fail to provide an economic rationale to support their proposed allocation factors, and, indeed, there is no absolute economically "correct" method of allocating shared costs. Accordingly, we find it preferable to allocate the shared switching costs to end-office switching because, as we explain *infra*, end-office switching costs will be recovered on a flat, per line basis.[998]

379. In addition, we note that AT&T/WorldCom do not justify their proposal to use a 4:1 line concentration ratio to convert line ports to equivalent trunk ports. This concentration ratio would be used to convert all of Verizon's lines to equivalent trunk ports and therefore should be based on the average of the efficient ratios for all lines. Although AT&T/WorldCom acknowledge that line concentration ratios vary widely, they propose the same 4:1 line concentration ratio they recommend for use with GR-303 NGDLC systems.[999] They fail to offer evidence, however, that the concentration ratio that they recommend for GR-303-based lines represents an average of the efficient ratios for all of Verizon's lines, including both analog lines and GR-303-based lines.

C. Cost Inputs

380. Having chosen a switching cost model and determined the allocation of shared end-office/tandem switching costs, we now resolve the cost input issues raised by the parties.

1. Switch Discount

a. Positions of the Parties

381. There is no dispute that large carriers such as Verizon routinely receive substantial discounts off the manufacturer's list price when purchasing switches.[1000] In the SCIS model, the amount of this discount represents a significant variable in calculating switch prices. The amount of the discount may vary considerably depending on whether the discount is for new switches or for additional equipment to accommodate additional users.[1001]

---

[997] Verizon argues that AT&T/WorldCom's proposed allocation methodology would reallocate combined end-office and tandem switch costs between end-office and tandem switching elements, but would not change the total amount of these costs. Verizon Reply Cost Brief at 113-14. We agree with Verizon based on our review of AT&T/WorldCom's restatement of Verizon's end-office and tandem switching cost studies.

[998] *See infra* section V(D).

[999] Analog line concentration is engineered within the switch, whereas GR-303-based line concentration is engineered outside the switch in the DLC system. As we explain *infra*, we adopt for GR-303 lines Verizon's proposed 3:1 concentration ratio rather than AT&T/WorldCom's proposed 4:1 ratio. *See infra* section V(C)(3).

[1000] *See, e.g.,* AT&T/WorldCom Switching Cost Brief at 5; Verizon Switching Cost Brief at 1-2.

[1001] *See, e.g.,* AT&T WorldCom Switching Cost Brief at 5; Verizon Switching Cost Brief at 1-2, 3-4.

382. Verizon states that its proposed switching costs properly reflect the best available estimate of the discounts that Verizon would receive as it incrementally upgrades and expands its network and that they are therefore appropriate for use in determining its forward-looking switching costs.[1002] Verizon bases the discount it uses in the SCIS model for the Lucent 5ESS switch and the Siemens EWSD switch on the discount it received on year 2000 purchases.[1003] It bases the discount for the Nortel DMS-100 and DMS-200 switches on the discount reflected in its current contract with Nortel and the purchases Verizon expects to make under this contract.[1004] Verizon's proposed discounts reflect almost entirely the discounts it receives on additions to existing switches (the "growth discount," as opposed to the "new switch discount"), because the purchases on which the proposed discounts are based are almost entirely for switch growth and upgrade equipment.[1005] Verizon argues that AT&T/WorldCom's proposed all-new switch discount is unrealistic and has been previously rejected by this Commission, the D.C. Circuit, and state commissions as inconsistent with TELRIC principles.[1006]

383. AT&T/WorldCom argue that the Commission's TELRIC pricing rules require the use of the most efficient technology and thus assume the deployment of new switching equipment.[1007] Therefore, they argue that the new switch discount is the appropriate discount for calculating the cost of this equipment.[1008] Furthermore, although the discounts that vendors give for purchasing a new switch historically have been greater than the discounts for add-on equipment or growth to an existing switch, AT&T/WorldCom assert that, more recently, Verizon has filed testimony in a variety of proceedings stating that the discounts it now receives for growth equipment have deepened and are roughly the same as the discounts for a new switch.[1009] Thus, AT&T/WorldCom argue that it is reasonable to rely entirely on new switch discounts when developing switch costs in this proceeding.

384. In contrast to the extensive record developed concerning end-office switching, the

---

[1002] Tr. at 5230, 5235; Verizon Switching Cost Brief at 4. Verizon's proposed discounts and supporting data for the Lucent 5ESS switch and Nortel DMS-100 and DMS-200 switches are set out in its cost studies. *See* Verizon Ex. 100P, Vol. IX, Tab VA Switch Discount Support, Exhibit Part C-P1 and Part C-P2 (confidential version). Its proposed discount and supporting data for the Siemens EWSD switch are set out in Verizon Ex. 122P (Recurring Cost Panel Surrebuttal), Attach. O (confidential version).

[1003] Verizon Ex. 122, at 166-67.

[1004] *Id*. at 167.

[1005] *See id*.; Verizon Ex. 125P, Attach. D (confidential version); Verizon Ex. 212P (Verizon response to record request no. 28 (requested Nov. 28, 2001)) (confidential version).

[1006] Verizon Switching Cost Brief at 6-7, 9-10 (citing *AT&T Corp. v. FCC*, 220 F.3d at 618).

[1007] AT&T/WorldCom Switching Cost Brief at 5-7; AT&T/WorldCom Reply Cost Brief at 82.

[1008] AT&T/WorldCom Switching Cost Brief at 6-7; AT&T/WorldCom Reply Cost Brief at 82.

[1009] AT&T/WorldCom Reply Cost Brief at 82.

parties devote little attention to tandem switching issues in their oral and written testimonies. Although the issues associated with tandem switching are similar to those associated with end-office switching, distinctions do exist and we address these distinctions as necessary.

b. Discussion

385. Switch vendors typically have provided relatively large discounts on the carrier's initial switch investment and smaller discounts on growth jobs based on their expectation that the carrier would grow the switch over time.[1010] A LEC that seeks to minimize switching costs over time may: (1) install a relatively large switch (on which there typically is a relatively large vendor discount) built to satisfy current demand and any demand growth expected over the life of the switch; or (2) install a relatively smaller switch built to satisfy current demand, and then "grow" the switch by adding components (on which there is a relatively small vendor discount) over time as demand increases. An efficient carrier would be expected to choose the option that has the least cost on an expected present value basis,[1011] *i.e.*, the expected value of the initial and the future cash outlays associated with each option discounted to present worth at the company's cost of capital.

386. Switching has a high degree of modularity, making it relatively cost effective to grow a switch over time by adding components to it.[1012] Moreover, as Verizon argues, efficient carriers do add to or grow their switches over time,[1013] presumably because they expect this approach to minimize costs. By growing the switch over time, rather than installing a large switch, the carrier reduces the risk and cost of installing too much capacity, given that demand growth is always uncertain. Furthermore, by growing the switch over time, the carrier reduces the risk and cost of installing unused capacity that becomes obsolete and is replaced, given that technological change is also uncertain. The carrier also reduces the costs of financing and maintaining the switch over its life by growing it over time.[1014]

[1010] *See, e.g., Georgia/Louisiana 271 Order*, 17 FCC Rcd at 9059, para. 81 (generally, vendors have provided a greater discount for new switches and smaller discounts for growth or expansion of existing switches).

[1011] Present value refers to the worth today of a payment, or a series of payments, to be made in the future. The concept of present value is illustrated by asking the following question: how much money today is equivalent to $100.00 one year from today, if this sum can be invested and earn a 10 percent annual rate of return? The answer is $90.91 because $90.91 invested at ten percent would grow to 100.00 ($100.00/1.10). In this example, $90.91 is the present value of $100.00 payable one year from today.

[1012] Verizon Ex. 123 (Garfield Surrebuttal), at 10-11; AT&T/WorldCom Ex. 12, at 113-14; Tr. at 5440-42, 5445-47.

[1013] Verizon Ex. 122, at 166-67.

[1014] If carriers did not typically grow their switches over time, it is unlikely that switch vendors would provide relatively large discounts on the initial switch investment. *Id*. at 178-179; Verizon Switching Cost Brief at 9-10; Verizon Reply Cost Brief at 101-102; *see also Joint Application by BellSouth Corporation, BellSouth Telecommunications, Inc. and BellSouth Long Distance, Inc. for Provision of In-Region, InterLATA Services in* (continued….)

387. Accordingly, as a threshold matter, we conclude that TELRIC-based switch costs should reflect switch manufacturer prices for both new equipment and growth equipment; therefore, we reject both Verizon's proposed discount (based largely on growth additions) and AT&T/WorldCom's proposed discount (based entirely on new switch purchases). This limited departure from baseball arbitration is consistent with Commission precedent regarding switch discounts in the context of section 271 applications. Upon consideration of arguments similar to those presented here, the Commission found that an assumption of 100 percent growth additions is inconsistent with TELRIC principles, but it also rejected arguments that the TELRIC rules require an assumption of 100 percent new switches.[1015]

388. In order to implement this conclusion, we require Verizon to use in the SCIS model three separate vendor discounts to model costs attributable to end-office switching, as set forth in sections V(C)(1)(b)(i)(a), V(C)(1)(b)(ii)(a), and V(C)(1)(b)(iii), below. First, we will use the discounts that Verizon currently receives on new switches in order to calculate "getting started" investment.[1016] Second, we will use a weighted average discount reflecting Verizon's current discount on new switches and growth equipment in order to estimate switch investment other than "getting started," trunk port, and SS7 link investment. Third, we will use a separate discount for end-office switching investment attributable to trunk ports and SS7 links.

389. We must also develop vendor discounts for new switches and growth equipment for use in the SCIS model to develop tandem switching costs. Based on the record before us, we conclude that the appropriate discounts for tandem switching costs are similar to the discounts for end-office switching.[1017] For tandem switching, however, we conclude that we need only two discounts. We will use the discounts that Verizon currently receives on new switches for tandem switching "getting started" investment. We will use a weighted average discount reflecting Verizon's current discounts on new switches and growth equipment for estimating tandem switch investment, other than "getting started" investment.

(Continued from previous page)
Alabama, Kentucky, Mississippi, North Carolina, and South Carolina, WC Docket No. 02-150, Memorandum Opinion and Order, 17 FCC Rcd 17595, 17635, para. 83 (2002) (*BellSouth Multistate 271 Order*) (levels of new and growth switch discounts reflect vendors' judgments about anticipated purchases); *Georgia/Louisiana 271 Order*, 17 FCC Rcd at 9059, para. 81 (vendor discounts are valid only when an overall purchase of both new and growth equipment is made).

[1015] *See, e.g., Rhode Island 271 Order*, 17 FCC Rcd at 3318, para 34 (The Commission "strongly question[ed]" an assumption of 100 percent growth additions. "Although an efficient competitor might anticipate some growth additions over the long run, rates based on an assumption of all growth additions and no new switches do not comply with TELRIC principles."); *Georgia/Louisiana 271 Order*, 17 FCC Rcd at 9059-60, para. 82 (rejecting AT&T's claim that the use of a mix of new and growth switch purchases in a cost model may never be used to determine forward-looking costs, because it may not be cost-effective to acquire all of the projected need at the outset).

[1016] As we explain *supra* note 988, the "getting started" equipment is the central processor, memory, maintenance, administrative, test, and spare equipment, and other common equipment.

[1017] *See, e.g.,* Verizon Ex. 107, at 194.

(i) "Getting Started" Switch Investment Discount

(a) End-Office Switch "Getting Started" Investment

390. As we discuss more fully below, we conclude that end-office "getting started" investment is best estimated using the discounts that Verizon currently receives on new switches. Thus Verizon should estimate end-office "getting started" investment using the discounts it received on new switch purchases in 2000.[1018]

391. We agree with AT&T/WorldCom that, for purposes of selecting the appropriate switch discount, the "getting started" costs are fixed costs.[1019] That is, they are costs that do not vary with the number of lines, trunks, or usage on the switch. Verizon agreed with AT&T/WorldCom that switch manufacturers today design switches that are limited only in the number of lines that they can serve.[1020] As Verizon noted at the hearings, advances in digital switching have increased the capacity of the switch to as many as 250,000 lines.[1021] Each of Verizon's wire centers in Virginia serves far fewer than 250,000 switched access lines.[1022] Verizon acknowledges, moreover, that the central processor of the Lucent 5ESS switch, which accounts for a large majority of Verizon's switch costs and lines,[1023] will not exhaust.[1024] Verizon also states that it has not had to install as many new switches in recent years as it would have had the processor limit been exceeded.[1025] The SCIS model is consistent with these real-world experiences. The office-by-office results in Verizon's SCIS study show extremely low levels of processor utilization, indicating that the amount of traffic on switches could increase tremendously without the need to add processor capacity.[1026] Verizon's study also shows that the central processor of each of its switch technologies is expected to have so much capacity that it

[1018] In response to a staff record request, Verizon identified the discounts it actually received in 2000 on new Lucent 5ESS, Nortel DMS-100, and Siemens EWSD switches. *See* Verizon Ex. 216P (Verizon response to record request no. 32 (requested Nov. 28, 2001)) (confidential version). We direct Verizon to use these actual new switch discounts to estimate end-office "getting started" investment for the Lucent 5ESS, Nortel DMS-100, and Siemens EWSD switches in its compliance filing. *See id*.

[1019] *See* AT&T/WorldCom Ex. 4, at 7-8; AT&T/WorldCom Ex. 12, at 11-12.

[1020] Tr. at 3448-49.

[1021] *Id.* at 5381-82, 5449-50.

[1022] Verizon Ex. 226P (Verizon response to record request no. 42 (requested Nov. 29, 2001)) (confidential version).

[1023] *See* Verizon Ex. 123, at 10; *see also* Verizon Ex. 125P, Attach. D (confidential version).

[1024] Tr. at 5457 (Gansert: "[O]ur assumption at the current time would be that for most of our switches the central processor is not going to exhaust.").

[1025] *Id.* at 5449 (Gansert: "[I]t's true that if you exceeded the [processor's] limit, you would have to put in more switches, and over recent years we haven't been doing that.").

[1026] AT&T/WorldCom Ex. 12, at 111-12.

need not be replaced over the life of the switch.[1027] Finally, the SCIS model user guide indicates that the "getting started" costs for the switch technology in the Verizon study that accounts for most of the investment and most of the lines are independent of both usage and the number of lines.[1028]

392. Verizon does provide examples of components of the "getting started" equipment that it has replaced or augmented over the life of the switch.[1029] Verizon fails, however, to provide empirical evidence to quantify the extent to which it has grown or replaced the "getting started" components of the switch. It does not, for example, provide any evidence to support an estimate of the percentage of overall investment in the "getting started" components of a modern switch that would be installed initially and the percentage that would be installed subsequent to the initial installation date. These examples therefore do not undermine the other record evidence that supports the conclusion that the new switch discount is appropriate for estimating the "getting started" investment.

393. Moreover, whatever the extent to which "getting started" equipment is replaced or augmented, Verizon acknowledges that a primary reason for doing so is to upgrade the switch, not to accommodate growth, especially for the Lucent 5ESS switch, which comprises the majority of Verizon's switch investment.[1030] To the extent that "getting started" equipment is augmented or replaced for reasons other than growth, use of a discount other than the new switch discount to develop "getting started" investment would result in rates that recover from current subscribers costs for future upgrades from which they receive no benefit today.

394. Finally, Verizon's experience with regard to replacing or augmenting "getting started" equipment derives in part from switches that were installed many years ago and that have had lives exceeding those that may be expected for a modern digital switch installed today, the starting point for developing forward-looking costs. That is, a switch installed today may never reach the age of a number of Verizon's existing switches. We recognize that a modern digital switch installed today may have a relatively shorter life by prescribing a 12-year switch life as the basis for calculating depreciation expense.[1031] This 12-year life is at the low end of the Commission's safe-harbor range and likely is shorter than one that we would have prescribed for developing unbundled switching prices several years ago. Given that a digital switch installed today would have a shorter life than one installed years ago, we also would expect that

---

[1027] *Id*.

[1028] AT&T/WorldCom Ex. 24P (Pitts Supplemental Surrebuttal), at 16-17 (confidential version); *see also* Verizon Ex. 123, at 6 (stating that SCIS models "the investment for processor-related equipment and other equipment independent of switch size (*i.e.*, lines and trunks) and traffic").

[1029] Verizon Ex. 122, at 175.

[1030] *Id*. at 178; Tr. at 5434-38, 5440-41 (for example, carriers might add processing capacity over time to run application software that supports advanced features or to accommodate new regulatory mandates, such as LNP).

[1031] *See supra* section III(D)(3).

commensurately less of the "getting started" equipment would be replaced or augmented over the life of a switch installed today than would be the case with respect to a switch installed years ago. Thus, based on the record before us, we find it inappropriate to use a discount other than the new switch discount to estimate "getting started" investment.

395. We base the new switch discounts for use in estimating the "getting started" investment on the discounts Verizon actually received on new switch purchases it made in 2000.[1032] These discounts are appropriate for calculating forward-looking costs, because they are discounts actually received through a competitive bidding process on recent (as of the time the record closed) new switch purchases.

396. Verizon argues that use of the switch discounts it received on new switch purchases to calculate the weighted average discount would understate its costs because digital circuit switching is at the end of its life-cycle.[1033] It argues that vendors offer higher discounts at the end of a life-cycle because research and development costs for these switches are lower than at the beginning of the cycle.[1034] We disagree. Record evidence indicates that an efficient carrier would receive this discount on the purchase of a new switch today, and that is the appropriate basis for determining the level of the vendor discount under the Commission's TELRIC rules. There is no record evidence that Verizon is replacing digital circuit switches with a newer technology, *e.g.*, packet switches. Moreover, as noted above, the relatively short 12-year depreciation life we adopt for switching adequately captures the effect of nearing the end of the digital switching life-cycle on an efficient carrier's switching costs.[1035]

397. AT&T/WorldCom restate Verizon's switch cost study by basing investment for each component of the switch on the new switch discount.[1036] In this re-statement, they use new switch discounts reflected in Verizon's contracts with Lucent, Nortel, and Siemens that were obtained through discovery in a UNE pricing proceeding before the New Jersey Commission.[1037] AT&T/WorldCom argue that, for one of these switch technologies, use of the discount obtained during the New Jersey proceeding in their restatement of Verizon's cost study results in an overstatement of Verizon's costs because Verizon acknowledges receiving a much higher

[1032] As we explain below, these discounts also will be used in calculating the weighted average discount used to estimate investment other than "getting started" investment.

[1033] Verizon Ex. 213P (Verizon response to record request no. 29 (requested Nov. 28, 2001)) (confidential version); Verizon Switching Cost Brief at 5-6.

[1034] Verizon Ex. 213P (confidential version); Verizon Switching Cost Brief at 5-6.

[1035] *See supra* section III(D).

[1036] AT&T/WorldCom Ex. 12, at 104.

[1037] *Id*. at 104, Attach. 3.

discount on more recent new switch purchases of this technology.[1038]

398. We reject the new switch discounts proposed by AT&T/WorldCom for use in Verizon's switching cost study because they are based on older contracts that may not reflect the discount Verizon would receive for new switches obtained though a competitive bidding process.[1039] We have been unable to determine the dates of some of the contracts on which AT&T/WorldCom rely,[1040] but the contract with Lucent for 5ESS switches, which account for a large majority of Verizon's switch costs and lines in its study,[1041] is a 1997 contract that was not subject to a competitive bidding process.[1042] The parties agreed, however, that new switch prices reflected in prior vendor contracts typically represent the highest prices that Verizon would pay, given that it might obtain a lower price from competitive bids.[1043] Use of prior contract prices for new switches may therefore overstate the price that an efficient carrier would pay today for a new switch. Thus we conclude that Verizon's year 2000 new switch purchases, which it made pursuant to a competitive bid process, are the best record evidence of the new switch discounts an efficient carrier would receive. Finally, we note that, in any event, the discounts reflected in the contracts proffered by AT&T/WorldCom are comparable to those Verizon received for its 2000 new switch purchases, particularly for Lucent 5ESS switches.

(b) Tandem Switch "Getting Started" Investment

399. We adopt discounts for estimating tandem switching "getting started" investment for Lucent 5ESS and DMS-200 switches that are the same as the discounts Verizon actually received on new end-office switch purchases in 2000.[1044] We find that tandem switching "getting started" investment is best estimated using these discounts for three reasons. First, these are discounts actually received on relatively recent new switch purchases. Second, no party argues that there is a difference between the vendor discounts that apply to end-office and tandem switching equipment. Verizon uses the same vendor discount in its tandem switching study as it

[1038] AT&T/WorldCom Switching Cost Brief at 13 n.14. The information on the new switch discount that Verizon received in 2000 from the vendor of this particular technology apparently was not available to AT&T/WorldCom before they submitted their re-statement.

[1039] Verizon Ex. 122, at 173; Verizon Ex. 216P (confidential version); Verizon Ex. 217P (Verizon response to record request no. 33 (requested Nov. 28, 2001)) (confidential version).

[1040] *See* AT&T/WorldCom Ex. 12, Attach. 3; Verizon Ex. 218P (Verizon response to record request no. 34 (requested Nov. 28, 2001)) (confidential version). Neither of these sources provides copies of the contracts relied on by AT&T/WorldCom or clearly indicates the years these in which these contracts were executed.

[1041] *See* Verizon Ex. 123, at 10.

[1042] *See* Verizon Ex. 218P (confidential version).

[1043] AT&T/WorldCom Ex. 12, at 104; Tr. at 5269-71.

[1044] We direct Verizon to use in its compliance filing the new Lucent 5ESS and DMS-100 switch discounts identified in its response to staff record request no. 32. *See* Verizon Ex. 216P (confidential version).

does in its end-office switching study.[1045] AT&T/WorldCom re-state Verizon's end-office and tandem switching study using the same vendor discount.[1046] Third, nine of the 13 switches for which investment is developed in Verizon's tandem switch study provide both tandem and end-office switching functions.[1047]

(ii) Other Switch Investment

400. In order to implement our conclusion that switching costs should reflect a combination of new and growth purchases,[1048] we must develop weights to assign to the new and growth switch discounts. As we explain more fully below, to determine the appropriate weights, we must estimate, for end-office switches, line growth over the life of the switch and, for tandem switching, tandem trunk growth over the life of the switch.

(a) End-Office Switch Investment (Other Than "Getting Started," Trunk Port, and SS7 Link Investment)

401. To estimate end-office switching investment, other than "getting started" investment and trunk port and SS7 link investment (other end-office switch investment), we adopt weighted average discounts for the Lucent 5ESS, Nortel DMS-100, and Siemens EWSD switches.[1049] We require Verizon to modify its end-office switching study by: (1) calculating the weighted average discount for each of these switch technologies using the discounts and the new line and growth line weights discussed below; and (2) estimating other end-office switch investment for each of these switch technologies using each of these weighted average discounts.

402. *Weighting*. We determine the new switch and growth equipment weights for use in calculating the weighted average discount applicable to other end-office switch investment as follows: First, we assume that a new switch sized to serve current demand is placed in service today, and then we calculate the percentages of the present value for the investments required for all lines expected to be installed on the switch over its life representing both lines installed today (new lines) and lines expected to be installed on the switch over its life other than those installed

[1045] Verizon Ex 107, at 194, 207-208.

[1046] AT&T/WorldCom Ex. 12, at 104, Attach. 3.

[1047] The nine switches that provide both end-office and tandem switching functions are Lucent 5ESS switches. Verizon also develops in its study investment for one 5ESS tandem switch and three Nortel DMS-200 switches that provide only tandem switching. Verizon Ex. 161P, at 5, Attach. H.

[1048] *See supra* para. 386.

[1049] The weighted average discounts that we adopt in this order are to be calculated by: (1) multiplying the weight we adopt for the new switch discount by the new switch discount we adopt; (2) multiplying the weight we adopt for the growth switch equipment discount by the growth switch equipment discount we adopt; and (3) summing (1) and (2).

today (growth lines). The first percentage is the weight that applies to the new discount. The second percentage is the weight that applies to the growth discount. Present values are appropriate because they recognize that money has a time value, and the capital outlay for the growth lines is incurred in the future, not today.[1050]

403. We base the present value analysis on the following assumptions: (1) a cost of capital of 12.95 percent as discussed in section III(C)(3) *supra*; (2) a 2.5 percent annual line growth rate, as explained below; (3) growth lines are installed every two years;[1051] and (4) a switch life of 12 years as discussed in section III(D)(3) *supra*. Given these assumptions, the percentage of new lines installed on the switch is 88 percent, and the percentage of growth lines is 12 percent.[1052]

404. The 2.5 percent annual line growth rate is our finding of estimated line growth over the 12-year life of a switch that is placed into service today. This growth rate estimate is consistent with the annual switched line growth rate assumed by Verizon in its switching cost study for the period 2001-2003.[1053] It is lower than the 4.58 percent annual switched line growth rate assumed by AT&T/WorldCom in the MSM for the period 2001-2002.[1054] We find that the AT&T/WorldCom forecasted growth rate is too high for their forecasted periods, and much too high for the 12-year life of a switch placed in service today. ARMIS data show that Verizon VA's switched access lines grew at rates of 5.01, 6.68, 5.62, 5.01, .51, and -5.13 percent for 1996 through 2001, respectively.[1055] The geometric average annual growth rate for the period 1996-2001 is 2.87 percent, and the arithmetic average annual growth rate is 2.95 percent. These numbers capture the growth rate after the passage of the 1996 Act. More recently, growth has slowed. The geometric average annual growth rate for the years 1999-2001 is .05 percent, and the arithmetic average annual growth rate for this period is .13 percent. These numbers capture the more recent downward trend in the rate of growth of switched access lines. In light of these trends, we find that a 2.5 percent growth rate is a reasonable estimate of the growth rate of Verizon VA's switched access lines over the next 12 years.

[1050] One generally prefers having an amount of money today to having the same amount of money at some point in the future. Consider the worth of a dollar received today versus the worth of a dollar received in the future. The dollar that is received today is worth more than one received in the future because a return on today's dollar may be earned immediately by investing it, but none may be earned on a future dollar until it is received.

[1051] The assumption that growth lines are installed every two years is based on the opinions expressed at the hearings by both Verizon and AT&T/WorldCom. Both parties agreed that LECs typically add lines to the switch approximately every two or three years. Tr. at 5265-67. There is no significant difference in the results of the present value analysis if lines are assumed to be added every three years, rather than every two years.

[1052] *See* Appendix C.

[1053] Verizon Ex. 226P (confidential version).

[1054] AT&T/WorldCom Ex. 23, Attach. D.

[1055] ARMIS Report 43-08: Switch Access Lines in Service by Technology.

405. *New and Growth Switch Discounts*. We must select new and growth switch discounts in order to calculate the weighted average discount used to estimate other end-office switching investments. For the reasons set forth above,[1056] we adopt new switch discounts based on the new switches Verizon purchased in 2000.[1057]

406. We adopt growth switch discounts for the Lucent 5ESS and the Siemens EWSD based on the growth and upgrade purchases Verizon made in 2000[1058] because they are discounts actually received on recent growth and upgrade purchases. For Nortel DMS-100 switches, we adopt a growth switch discount that is based on the discount Verizon receives on growth and upgrade purchases under its current contract.[1059]

(b) Tandem Switch Investment Other Than "Getting Started" Investment

407. Based on the weights and discounts discussed below, we adopt weighted average discounts to estimate tandem switching investment, other than "getting started" investment (tandem switching other investment), for the Lucent 5ESS and Nortel DMS-200 switches. We require Verizon to modify its tandem-office switching study by: (1) calculating the weighted average discount for each of these switch technologies using the discounts and the new trunk and growth trunk weights discussed below; and (2) estimating tandem switching other investment for each of these switch technologies using each of these weighted average discounts.

408. *Weighting*. We determine the new tandem switch and growth equipment discount weights for use in calculating the weighted average discount applicable to tandem switching other investment as follows: First, we assume that a new tandem switch sized to serve current demand is placed in service today, and then we calculate the percentages of the present value of

---

[1056] *See supra* section V(C)(1)(b)(i)(a).

[1057] We direct Verizon to use the new Lucent 5ESS, Nortel DMS-100, and Siemens EWSD switch discounts identified in its response to staff record request no. 32 in its compliance filing. *See* Verizon Ex. 216P (confidential version).

[1058] We direct Verizon to use as the growth discount for the Lucent 5ESS and Siemens EWSD switches in its compliance filing the growth discounts that it identified for each of these switches in response to staff record request no. 29. *See* Verizon Ex. 213P (confidential version). The Lucent 5ESS growth discount identified in Verizon's response to this record request is equal to the Lucent discount in Verizon's cost study. *Compare id*., *with* Verizon 100P, Vol. IX, VA Switch Discount Support, Exhibit Part C-P1 (confidential version). The Siemens growth discount identified in Verizon's response to this record request is based on the switch equipment expenditure data identified in the cost study accompanying Verizon's surrebuttal panel testimony. *See* Verizon Ex. 125P, Attach. O, (revised) Exhibit C-P3 (confidential version). It is not identical to the discount in Attachment O because the data in that attachment include expenditures on new switch and growth and upgrade equipment. The Siemens discount identified in response to the record request reflects only expenditures on growth and upgrade equipment.

[1059] We direct Verizon to use as the growth discount for the DMS-100 switch in its compliance filing the Nortel discount identified in Verizon's cost study. *See* Verizon Ex. 100P, Vol. IX, VA Switch Discount Support, Exhibit Part C-P2, at 2 (confidential version).

the investments required for trunks expected to be installed on the switch over its life representing: (1) trunks installed today (new trunks); and (2) trunks expected to be installed on the switch over its life other than those installed today (growth trunks). The first percentage is the weight that applies to the new discount. The second percentage is the weight that applies to the growth discount.

409. We base the present value analysis for other tandem investment on the assumptions we use to calculate other end-office investment, except that we assume a three percent annual trunk growth rate. Given these assumptions, the percentage of new trunks installed on the switch is 85 percent, and the percentage of growth trunks is 15 percent.[1060]

410. Trunk growth is a function of busy hour switched access usage growth, which in turn is a function of switched access line growth and busy hour switched access usage per line growth. We estimate that the expected busy hour switched access usage per line growth rate over the 12-year life of a switch is approximately five percent per year, given forecasts of 2.5 percent per year switched access line growth, as explained in para. 404, above, and 2.5 percent per year busy hour switched access usage per line growth, as explained below.

411. The annual 2.5 percent busy hour usage per line growth rate is lower than the annual busy hour usage per line growth rate assumed by Verizon in its switching cost studies for the period 2001-2003.[1061] We find that Verizon's claimed usage per line growth rate is too high for its study period and much too high for a 12-year life of a switch placed in service today. Our 2.5 percent estimate for busy hour usage per line growth is based on ARMIS data showing that Verizon VA's all hour of the day (not busy hour) usage per switched access line grew at rates of 5.76, 3.38, 2.01, 7.72, 4.89, and 4.19 percent for 1996 through 2001, respectively. The geometric average annual growth rate for the period 1996-2001 is 4.64 percent. The arithmetic average annual growth rate for this period is 4.66 percent. In this case, however, past usage per switched access line growth may not be indicative of future growth. A principal reason for usage per switched access line growth since 1996 is dial-up Internet usage growth. Going forward, however, dial-up Internet growth rates and therefore switched access usage growth rates should slow, as Internet usage over DSL and cable modem lines increases.[1062] It seems

---

[1060] *See* Appendix D.

[1061] Verizon Ex. 226P (confidential version).

[1062] The Bureau estimated that only one percent of occupied housing units in Virginia had a high speed line in service as of December 1999, whereas 15 percent had such a line as of December 2002. *See Federal Communications Commission Looks at Data on Growth of Broadband Subscribership In Rural Areas*, FCC Press Release (Aug. 6, 2003). This growth in high speed lines coincides with the successively slower usage per switched access line growth rates reflected in the ARMIS data for Verizon Virginia subsequent to 1999. The Bureau also estimated that only two percent of occupied housing units nation-wide had a high speed line in service as of December 1999, whereas 16 percent had such a line as of December 2002. *Id*. Thus, the growth in Virginia high-speed lines mirrored nation-wide growth. Nielsen/NetRatings recently reported that time spent online nationally by high-speed Internet subscribers in January 2003 rose 64 percent from the prior January while time spent online by dial-up subscribers decreased three percent. *See Broadband access outpacing dial-up connections* (Mar. 5, 2002) (continued….)

reasonable to expect, therefore, that switched access usage over the next 12 years will be closer to the lowest growth rate during the 1996-2001 period, 2.01 percent in 1998, than the 1996-2001 average growth rate of approximately 4.7 percent. Thus we find that a 2.5 percent switched access usage per line per year growth rate is a reasonable estimate for Verizon VA over the next 12 years.[1063]

412. Verizon forecast both the annual growth rate of busy hour switched access usage[1064] and the annual growth rate of trunks.[1065] Its predicted trunk growth rate is approximately 41 percent lower than its predicted busy hour switched access usage growth rate.[1066] We find that Verizon's busy hour switched access usage growth rate is too high because it is based, in part, on a busy hour usage per line forecast that we determined is too high.[1067] We base the trunk growth rate on the busy hour switched access usage growth rate we adopt above,[1068] five percent per year, reduced by the amount by which Verizon's switched access usage growth rate exceeds its trunk growth rate. This calculation results in a switched access trunk growth rate of approximately three percent (a busy hour switched access usage growth rate of five percent per year less 41 percent).

413. *New and Growth Switch Discounts*. We must select new and growth switch discounts in order to calculate the weighted average discounts used to estimate other tandem switch investments. For the reasons set forth above,[1069] we base the new switch discounts on the

(Continued from previous page)
<http://www.usatoday.com/tech/news/2002/03/05/broadband- report.htm>. We would expect roughly the same usage changes in Verizon Virginia's territory as these nation-wide usage changes.

[1063] We also note that there is no obvious basis in the record for developing a busy hour growth rate forecast that differs from an all hour of the day forecast.

[1064] Verizon's annual growth rate forecast of busy hour switched access usage is equal to its line growth rate forecast plus its busy hour usage per line growth rate forecast. *See* Verizon Ex. 107, at 200-201; Verizon Ex. 226P (confidential version); Verizon Ex. 125P, CD-ROM "VZ-VA FCC ARB (Additional Cost Studies)," Folder "VA EXCEL and WORD STUDIES," Folder "VA SWITCHING SUPPORT FILES," Folder "VA UNBUNDLED REC & SWITCH," Excel File "Backup VA MOUR-10-31 Part C-8," Worksheet "EO MOU," cells C58, D58, D60, Worksheet "Tdm MOU," Cells G12, G14, G21 (confidential version); Verizon Ex 161, at 5, Attach. H.

[1065] Verizon Ex. 125P, CD-ROM "VZ-VA FCC ARB (Additional Cost Studies)," Folder "VA EXCEL and WORD STUDIES," Folder "VA SWITCHING SUPPORT FILES," Folder "VA UNBUNDLED REC & SWITCH," Excel File "Backup VA MOUR-10-31 Part C-8," Worksheet "EO MOU," cell D60, Worksheet "Tdm MOU," Cells G12, G14, G21 (confidential version); Verizon Ex 161, at 5, Attach. H.

[1066] *See supra* notes 1064-65.

[1067] *See supra* para. 411.

[1068] *See supra* section V(C)(1)(b)(i)(b).

[1069] *See supra* section V(C)(1)(b)(i)(a).

discounts Verizon received on new switch purchases in 2000.[1070] We adopt growth switch discounts for the Lucent 5ESS switches based on the growth and upgrade purchases Verizon made in 2000.[1071] For Nortel DMS-200 switches, we adopt a growth discount based on growth and upgrade purchases Verizon expects to make under its contract with Nortel.[1072] These discounts are appropriate for the reasons we give above and because they relate to Verizon's expenditures for both tandem and end-office equipment.[1073]

(iii) End-Office Switch Trunk Port and SS7 Link Investment

414. Based on the weights and discounts discussed below, we adopt for estimating end-office trunk port and SS7 link investment weighted average discounts for the Lucent 5ESS, Nortel DMS-100, and Siemens EWSD switches. We require Verizon to modify its end-office switching study by: (1) calculating the weighted average discount for each of these switch technologies using the discounts and the new trunk and growth trunk weights discussed below; and (2) estimating end-office trunk port and SS7 link investment for each of these switch technologies using each of these weighted average discounts.

415. *Weighting*. We calculate these weighted average vendor discounts using weights reflecting the three percent per year trunk port growth rate that we developed above, resulting in 85 percent new switch trunks and 15 percent growth trunks.[1074] We use the trunk growth rate to estimate the vendor discount for both end-office and tandem trunk ports because there is no reason to expect that they would grow at different annual rates. Verizon uses the same trunk growth rate forecast in its tandem and end-office switching cost studies, as do AT&T/WorldCom in their re-statement of these studies.[1075] We use the trunk growth rate to estimate the vendor

[1070] We direct Verizon to use the new Lucent 5ESS and Nortel DMS-100 switch discounts identified in its response to staff record request no. 32 as the new switch discounts for Lucent 5ESS and Nortel DMS-200 tandem switches in its compliance filing. *See* Verizon Ex. 216P (confidential version); *see also infra* section XIII.

[1071] We direct Verizon to use as the growth discount for Lucent 5ESS tandem switches in its compliance filing the growth discounts that Verizon identified for Lucent 5ESS switches in response to staff record request no. 29. *See* Verizon Ex. 213P (confidential version). The Lucent 5ESS switch growth discount identified in Verizon's response to this record request is the same as the Lucent 5ESS discount identified in Verizon switching cost study. *Compare id.*, *with*, Verizon 100P, Vol. IX, VA Switch Discount Support, Exh. Part C-P1 (confidential version).

[1072] We direct Verizon to use as the growth discount for DMS-200 tandem switches in its compliance filing the Nortel discount identified in Verizon's cost studies. *See* Verizon Ex. 100P, Vol. IX, VA Switch Discount Support, Exh. Part C-P2 at 2 (confidential version).

[1073] Verizon Ex. 107, at 194.

[1074] *See supra* para. 409.

[1075] Verizon Ex. 125P, CD-ROM "VZ-VA FCC ARB (Additional Cost Studies)," Folder "VA EXCEL and WORD STUDIES," Folder "VA SWITCHING SUPPORT FILES," Folder "VA UNBUNDLED REC & SWITCH," Excel File "Backup VA MOUR-10-31 Part C-8," Worksheet "EO MOU," cells D58, D60, Worksheet "Tdm MOU," cells G9, G12, G14, G21 (confidential version); AT&T/WorldCom Ex. 24P, CD-ROM "VZ-VA FCC ARB, Docket (continued….)

discount for end-office SS7 link investments because these investments are needed only for inter-office traffic.

416. *Switch Discounts*. For the reasons set forth above, we require Verizon to calculate these weighted average vendor discounts using the new and growth discounts that we require it to use to estimate other end-office investment.[1076]

2. Switch Demand and Sizing

417. There is a need for consistency between the line and trunk growth assumptions we make to calculate the weighted average discount, the physical size of the switch for which the discount is used to estimate investment, and the number of line ports, trunk ports, and minutes of use over which to spread the investment. If there is an inconsistency, cost per unit may be overstated or understated.

418. Regarding physical size, we therefore require that end-office switch investment be based on a switch sized physically to accommodate the present value of the investments required for the number of lines and trunks it will serve over a 12-year period, assuming a 2.5 percent annual rate of line growth, a three percent annual rate of trunk growth, and that these lines and trunks are installed every two years. We also require that tandem office switch investment be based on a switch sized physically to accommodate the present value of the investments required for the number of trunks it will serve over a 12-year period, assuming a three percent annual rate of trunk growth, and that trunks are installed every two years.

419. Regarding demand, we require that the line port demand over which to spread end-office investment reflect the present value of the investments required for the number of line ports demanded over a 12-year period, assuming a 2.5 percent annual rate of line growth and that line demand grows every year. For developing dedicated tandem trunk port prices, we require that the trunk port demand over which to spread trunk port investment reflect the present value of the investments required for the number of trunk ports demanded over a 12-year period, assuming a three percent annual rate of trunk port growth, and that trunk port demand grows every year. For developing common trunk port prices, we require that the minutes of use over which trunk port investment is spread reflect the present value of the investments required for the number of tandem switch minutes demanded over the a 12-year period, assuming a five percent annual rate of minutes growth, and that tandem trunk demand grows every year.

420. We also require that end-office and tandem office switch investment be based on traffic and subscriber calling characteristics (*e.g.*, busy hour calls per trunk), identical to those in Verizon's proposed cost study, except for busy hour hundred call seconds (CCS) per line and per

(Continued from previous page)

00251, Workpapers Supporting Supplemental Surrebuttal of Catherine E. Pitts," Folder "VA Unbundled REC & SWITCH," Excel File "Switch Backup," Worksheet "EO MOU," cells D58, D60, and Worksheet "Tdm MOU," cells G9, G12, G14, G21 (confidential version).

[1076] *See supra* paras. 405-06.

trunk assumptions. Busy hour CCS per line and per trunk assumptions must reflect the sizing and demand assumptions set forth in the two previous paragraphs.

3. Digital Loop Carrier

a. Positions of the Parties

421. In its switching cost study, Verizon assumes a mix of 42.4 percent analog ports and 57.6 percent IDLC ports.[1077] Verizon bases these percentages on inputs from its loop cost study. In that study, Verizon assumes that 57.6 percent of loops use IDLC systems and that 42.4 percent of loops either use UDLC systems or are all-copper loops.[1078] Further, as in its loop study, Verizon assumes that ten percent of all loops use GR-303 IDLC switch interface technology and that the remaining IDLC loops use TR-008 switch interface technology.[1079] For the ten percent of lines that are served using GR-303 IDLC systems, Verizon assumes a line concentration ratio of 3:1, based on the experience of its engineers, who, Verizon contends, balance the resource savings associated with higher concentration ratios against the risk of blocked calls if the concentration ratio is too high.[1080]

422. AT&T/WorldCom challenge the mix of analog to digital line ports, and the DLC assumptions on which they are based, in the Verizon cost study. They propose an assumption that all DLC-based lines (82 percent in the Verizon study) use GR-303 NGDLC systems and therefore enter the switch via a digital port.[1081] They therefore propose a digital to analog port ratio of 82:18. AT&T/WorldCom argue that NGDLC technology is currently available and may be used to provide unbundled loops.[1082]

423. Verizon claims, as it does in its loop analysis, that AT&T/WorldCom assume an unjustifiably high percentage of NGDLC loops.[1083] Verizon argues that UDLC loops are necessary to provide stand-alone unbundled loops and that, given that Verizon-East has deployed almost no GR-303 NGDLC systems, it is appropriate to assume the use of TR-008 IDLC systems in a forward-looking cost study.[1084]

[1077] Verizon Ex. 107, at 187; Verizon Switching Cost Brief at 12.

[1078] *See supra* section IV(C)(2)(k)(ii).

[1079] Verizon Ex. 107, at 187; Verizon Switching Cost Brief at 12-13; *see also supra* section IV(C)(2)(k)(ii).

[1080] Verizon Ex. 122, at 183-85; Verizon Switching Cost Brief at 14-15.

[1081] AT&T/WorldCom Ex. 12, at 104-07; AT&T/WorldCom Ex. 24, at 9-10

[1082] *See supra* section IV(C)(2)(k)(ii).

[1083] *See id*.

[1084] *See* Verizon Switching Cost Brief at 12-14.

424. AT&T/WorldCom also contend that Verizon's 3:1 line concentration ratio is too low and that the appropriate ratio is 4:1.[1085] They further assert that even a 4:1 ratio is conservative, as evidenced by the fact that Verizon's 1999 network planning guidelines assumed a higher line concentration ratio in evaluating the potential benefits of DLC systems that use the GR-303 switch interface standard.[1086] Further, AT&T claims that its competitive LEC facilities are engineered using NGDLC systems configured with line concentration ratios of higher than 3:1.[1087] WorldCom, however, notes that, to the extent that it uses NGDLC systems, it configures them with less than a 3:1 concentration ratio.[1088]

b. Discussion

425. As we explain at length in our loop analysis, we adopt AT&T/WorldCom's assumption that all fiber-fed loops use GR-303 NGDLC systems. We found there that: (1) GR-303 NGDLC systems are more advanced and efficient than TR-008 IDLC systems; (2) it is technically feasible to unbundle NGDLC loops; (3) Verizon fails to demonstrate that UDLC systems are necessary to provision special services; and (4) neither Verizon's OSS nor its security concerns undermine these conclusions.[1089] Because NGDLC loops enter the switch through a digital, rather than analog, port, we require Verizon to re-run its switching cost study assuming that all fiber-fed loops use GR-303-capable digital ports.

426. Because of the need for consistent assumptions for loop plant and switching, however, we do not adopt the 82:18 digital to analog port ratio proposed by AT&T/WorldCom. Instead, we require Verizon to re-run its cost model using the percentage of digital ports that the MSM calculates for NGDLC-based loops and the percentage of analog ports that the MSM calculates for all-copper loops. Specifically, Verizon shall use 78.9 percent digital ports and 21.1 percent analog ports in its cost study re-run.[1090] Use of these figures ensures consistent DLC technology assumptions between the loop cost study and the switching cost study.

[1085] AT&T/WorldCom Ex. 12P, at 104-07 (confidential version); AT&T/WorldCom Ex. 24, at 9-10.

[1086] AT&T/WorldCom Ex. 12P, at 31 (confidential version).

[1087] Letter from Mark Keffer, AT&T Chief Regulatory Counsel, Atlantic Region, to Magalie R. Salas, Secretary, Federal Communications Commission, CC Docket Nos. 00-218, 00-251, at response to record request no. 9 (requested Nov. 28, 2001) (filed Dec. 21, 2001) (confidential version) (Keffer Dec. 21 Letter) (The public version of this response was filed on Jan. 4, 2002. *See* Letter from Mark Keffer, AT&T Chief Regulatory Counsel, Atlantic Region, to Magalie R. Salas, Secretary, Federal Communications Commission, CC Docket Nos. 00-218, 00-251 (filed Jan. 4, 2002)).

[1088] WorldCom responses to record requests no. 2-4 (filed Jan. 18, 2002) (confidential version).

[1089] *See supra* section IV(C)(2)(k)(iii).

[1090] Of the 3,724,335 lines modeled by the MSM, 2,937,347, or 78.9 percent, use NGDLC systems. The remainder, or 21.1 percent, are all-copper loops.

427. We also require Verizon to use its proposed 3:1 line concentration ratio for digital ports in its cost study re-run.[1091] Verizon asserts that line concentration is engineered as an inverse function of usage.[1092] Verizon's 3:1 line concentration assumption, which is based on the expertise of its network engineers,[1093] seems reasonable given that usage growth is exceeding line growth[1094] and actual NGDLC system deployment (including line concentration) is only beginning.[1095] Evidence introduced by AT&T/WorldCom shows that, depending on the application, line concentration ratios of both greater than or less than 3:1 may be appropriate,[1096] thus Verizon's proposal may assume either too much or too little concentration. The AT&T/WorldCom evidence, which is based in large part on the experiences of AT&T's and WorldCom's competitive LEC operations, does not undermine the reasonableness of Verizon's proposal for the purpose of setting UNE prices for Verizon's operations as an incumbent LEC in Virginia.

4. Fill Factors

a. Positions of the Parties

428. As we explain *supra* in the loop section of this order, fill factors represent the percentage of total usable capacity of a facility that is expected to be used to meet a measure of demand.[1097] Verizon asserts, without further elaboration, that it bases its analog line port and digital trunk port fill factors on its "current operating objectives."[1098] It proposes a digital line port fill factor that is considerably lower than its analog line port fill factor because it claims that switch capacity is installed before RT capacity.[1099] To arrive at its proposed fill factors, Verizon first inputs an administrative fill factor into the SCIS model.[1100] The SCIS model accounts for

[1091] This concentration ratio is specific to line concentration for the digital ports and is independent of the line concentration ratios that Verizon uses in the switches themselves.

[1092] *See* Verizon Ex. 107, at 183-185.

[1093] *See* Verizon Ex. 122, at 184-85; Verizon Switching Cost Brief at 14.

[1094] *See supra* section V(C)(1)(b)(ii)(b).

[1095] *See* Verizon Switching Cost Brief at 13 n.20.

[1096] *See* Keffer Dec. 21 Letter, at response to record request no. 9 (requested Nov. 28, 2001) (confidential version); WorldCom responses to record requests no. 2-4 (filed Jan. 18, 2002) (confidential version).

[1097] *See supra* section IV(C)(2)(g).

[1098] Verizon Ex. 107, at 195-96.

[1099] *Id*. at 195.

[1100] *Id.* at 196; *see also* Verizon Ex. 168 (Errata on Matt Supplemental Surrebuttal). Verizon uses different inputs for administrative fill for each of the different switching fill factors, *i.e.*, analog line ports, digital line ports, and digital trunk ports. *See* Verizon Ex. 168, at 1-3, 8.

breakage in its estimate of investment.[1101] Verizon then applies a utilization adjustment factor (UAF) to adjust the investment derived from the SCIS model to reflect its proposed fill factors.[1102] It develops the UAF by determining the fill reflected in the SCIS model investment and the percentage by which this investment must be increased to reflect its proposed fill factors.[1103]

429. The UAFs that Verizon applies to the SCIS model investment are weighted averages of separate UAFs developed for different switch technologies (*i.e.*, Lucent 5ESS, Nortel DMS-100 and DMS-200, and Siemens EWSD switches).[1104] Verizon uses weighted average UAFs for trunk ports and line ports by weighting the UAFs for the different technologies by the average number of trunks per node and the average number of lines per node, respectively.[1105] These weighted average UAFs are applied to weighted average investments developed from the SCIS model for the same technologies.[1106] The weighted average end-office line port investment developed using the SCIS model is based on the number of lines on each type of switch.[1107] The weighted average end-office trunk port investment developed using the SCIS model also is based on the number of lines.[1108] The weighted average tandem office trunk port investment developed using the SCIS model is based on the number of tandem trunks.[1109]

430. AT&T/WorldCom restate Verizon's switch cost study using only the fill factor

[1101] *See* Verizon Ex. 107, at 197.

[1102] Verizon Ex. 122, at 186-88; *see also* Verizon Ex. 168.

[1103] *See* Verizon Ex. 122, at 186-88; Verizon Ex. 168.

[1104] *See* Verizon Ex. 168.

[1105] For example, Verizon calculates the weights for use in calculating the weighted average analog line port UAFs by dividing the average number of analog lines on Lucent 5ESS, Nortel DMS-100, and Siemens EWSD switches by the sum the averages. *See* Verizon Ex. 168, at 3.

[1106] More specifically, in the case of POTS and ISDN BRI line ports, the weighted average UAFs for analog line ports, GR-303 line ports, and TR-008 line ports are weighted by the percentage of the total POTS lines that are analog, GR-303, and TR-008 in the Verizon study, then this weighted average of the weighted averages is applied to POTS and ISDN PRI investment derived from the SCIS model. Verizon Ex. 168, at 5. In the case of dedicated IDLC line ports, the weighted average UAFs for GR-303 line ports and TR-008 line ports are weighted by the percentage of the total of these two lines that are GR-303 and TR-008 lines in the Verizon study, then this weighted average of the weighted averages is applied to IDLC investment derived from the SCIS model. *Id*.

[1107] Verizon Ex. 161P, CD-ROM "VZ-VA FCC ARB (Additional Cost Studies)," folder "VA EXCEL & WORD STUDIES," folder "VA SWITCHING SUPPORT FILES," folder "VA Unbundled Ports Support" (confidential version).

[1108] *Id*.

[1109] *Id*.

reflected in the investment that is derived from the SCIS model.[1110] They claim that these fill factors are sufficient and that the additional UAFs are unnecessary.[1111] In addition, they assert that, even if the UAFs are appropriate, Verizon improperly determined the UAF for digital trunk ports by including remote switches, which do not support trunks, in its UAF calculation for the digital trunk port fill factor.[1112]

431. In an errata filing, Verizon recalculated its UAF for digital trunk ports excluding remote switches from its calculation.[1113]

b. Discussion

432. We adopt Verizon's proposed analog line port fill factor for both analog and digital ports and adopt Verizon's proposed trunk port fill factor. We depart slightly from baseball arbitration, however, in order to require Verizon to correct an error in its calculation of the digital trunk port UAF, as described below.

433. We find that Verizon's proposed analog line port fill factor is reasonable. The proposed fill factor is consistent with, although slightly higher than, Verizon's actual analog line port utilization, and with the line port fill factor that AT&T/WorldCom propose to use in the MSM.[1114] Were we to assume only three to five percent excess line capacity on a switch for administrative, growth, breakage, churn, and capacity limits on busy hour usage, this would produce a fill factor of roughly between 75 and 85 percent, below that proposed by Verizon. In addition, AT&T/WorldCom fail to explain why the fill factor resulting from the SCIS model, exclusive of the UAF, is appropriate. Accordingly, because Verizon's experienced analog line port fill is substantially similar to the fill factor it proposes and because no other viable option was presented by the parties, we adopt Verizon's proposal.[1115]

434. We find that none of the parties substantiates its proposed digital line port fill factor. Although Verizon proposes a digital line port fill factor that is less than its analog line port fill factor, it fails to introduce any evidence substantiating this figure. Verizon provided its actual analog port utilization, but it failed to provide its actual fill for digital line ports. Although Verizon argues that switch capacity is installed before RT capacity, and that, therefore,

---

[1110] AT&T/WorldCom Ex. 24, at 13-14.

[1111] *Id.*

[1112] *Id.* at 13.

[1113] *See* Verizon Ex. 168.

[1114] Verizon Ex. 107, at 196; AT&T/WorldCom Ex. 23, CD-ROM file "VA_C and P Tel Co of VA_VA Direct Filing_WC," worksheet "User Adjustable Inputs," at cell J13.

[1115] Specifically, in its compliance filing, we direct Verizon to use the analog line port fill factor identified on page 195 of its initial cost panel testimony. *See* Verizon Ex. 107P, at 196 (confidential version).

utilization of switch digital line ports is lower than utilization of lines at the DLC RT,[1116] it fails to submit any evidence regarding the degree to which the digital line port fill is lower than the analog port fill. Nor does it provide any evidence of the relative difference between the digital and analog line port fill factor levels. AT&T/WorldCom similarly fail to support their proposal to exclude the UAF from the fill factor. Consequently, in the absence of evidence supporting the use of a different fill factor for digital lines, we adopt Verizon's proposed analog port fill factor as the digital line port fill factor.[1117]

435. We adopt Verizon's proposed digital trunk port fill factor because it is nearly identical to the only relevant record evidence on this point, the digital trunk port fill that Verizon has experienced. AT&T/WorldCom offer no evidence that this fill level is inefficient. We also note that Verizon addressed AT&T/WorldCom's concern that the UAF calculation for digital trunk ports erroneously included remote switches, thus mooting this concern.[1118]

436. In analyzing AT&T/WorldCom's allegation that Verizon miscalculated the digital trunk port UAF and Verizon's response thereto, we have identified an error in the UAF calculation that we require Verizon to correct.[1119] Specifically, Verizon uses incorrect weights to calculate this UAF. The weights Verizon uses to develop the separate weighted average UAFs for digital trunks and digital and analog lines imply a different mix of lines and trunks on 5ESS, DMS-100, DMS-200, and EWSD switches than Verizon uses to develop investment using the SCIS model.[1120] The purpose of weighted averages is to reflect the characteristics of the switches for which costs are being developed. To accomplish this and maintain logical consistency, the weights reflected in the weighted average UAF factors and the weighted average investment must be the same. We therefore require Verizon to develop the separate weighted average UAFs for digital trunks and digital and analog lines based on the mix of lines and trunks on 5ESS, DMS-100, DMS-200, and EWSD switches Verizon is required to use to develop investment using the SCIS model in its compliance filing.

5. Trunk Utilization Level

a. Positions of the Parties

437. In addition to using fill factors in its switching cost calculations, Verizon includes

[1116] Verizon Ex. 107, at 195.

[1117] Specifically, in its compliance filing, we direct Verizon to use the analog line port fill factor identified on page 196 of its initial cost panel testimony as the digital line port fill factor. *See* Verizon Ex. 107P, at 196 (confidential version).

[1118] Specifically, in its compliance filing, we direct Verizon to use the digital trunk port fill factor identified on page 196 of its initial cost panel testimony. *See id*.

[1119] This error applies to all of Verizon's UAF calculations, not just its digital trunk port UAF calculation.

[1120] *See* Verizon Ex. 125P, Attach. A (confidential version); Verizon Ex. 168, at 3, 10.

assumptions on busy hour utilization levels in its cost studies. Busy hour utilization refers to the amount of peak-period traffic carried on an individual trunk. Verizon develops a busy hour utilization number for each switch in its switching studies.[1121] These numbers are measured in CCS per trunk.

438. AT&T/WorldCom assert that Verizon's assumed CCS busy hour utilization levels for end-office and tandem trunk ports are too low.[1122] They claim that Verizon confirmed its underutilization of trunks in a discovery response in which Verizon states that it assumed that traffic on tandem trunks associated with two switches excluded from its cost study is carried via existing direct trunks or by other tandem trunks included in the study.[1123] AT&T/WorldCom also argue that Verizon's assumed busy hour trunk utilization levels are inappropriately low because they are substantially below the maximum reasonable utilization assumed in the SCIS model.[1124]

b. Discussion

439. We find Verizon's busy hour trunk utilization levels to be reasonable.[1125] We disagree with AT&T/WorldCom's contention that Verizon effectively conceded in discovery that its utilization level is too low. First, AT&T/WorldCom place undue weight on the treatment of traffic carried on the excluded trunks, which represent only a very small percentage of the total tandem trunks and end-office trunks in the Verizon studies.[1126] Second, to the extent that Verizon assumes that traffic on the excluded trunks is absorbed by other existing trunks, the utilization of the existing trunks reflected in its cost study is higher than it otherwise would be.

440. We also disagree with AT&T/WorldCom's assertion that Verizon's use of trunk port utilizations below the maximum utilization means that trunk utilization is too low. Although AT&T/WorldCom may be correct that the busy hour utilizations used in the Verizon

[1121] Verizon Ex. 125P, Attach. B1-B4 (confidential version); Verizon Ex. 161, Attach. H.

[1122] AT&T/WorldCom Ex. 24, at 14.

[1123] *Id*.

[1124] *Id*.

[1125] To the extent that Verizon revises its trunk utilizations due to the other changes that we require Verizon to make to its switching cost studies in its compliance filing, we do not expect such changes to result in lower utilizations than those reflected in Verizon's current switching studies. We therefore direct Verizon to document and explain in its compliance filing the basis for any decrease in utilization levels.

[1126] There are fewer than 10,000 tandem trunks connected to the excluded switches. Verizon assumes that the traffic on these trunks would be handled by direct trunks or by other tandem trunks. AT&T/WorldCom Ex. 24, at 14. In Verizon's cost study, the number of tandem trunks is substantially more than an order of magnitude greater than 10,000, and the number of end-office trunks is considerably greater still. *See* Verizon Ex. 125P, Attach. D (confidential version); Verizon Ex. 161, Attach. H. Thus, the excluded trunks therefore represent a minimal percentage of either the total tandem or the total end-office trunks, even after adjusting the total trunk figures downward to make the excluded and the total trunk numbers comparable.

cost study are below the SCIS model's maximum reasonable utilization,[1127] the maximum level represents the highest, but not the only, or even the most, reasonable level. AT&T/WorldCom, moreover, fail to identify any alternative busy hour CCS per trunk utilization assumptions for use in the SCIS model. Indeed, in their restatement of the Verizon switching cost studies, they use the same busy hour CCS per trunk assumptions that Verizon uses.[1128] AT&T/WorldCom also fail to submit any engineering formulas, tables, or studies to support use of a higher CCS per trunk utilization.

6. EF&I Factor

a. Positions of the Parties

441. The switching EF&I factor represents the ratio of total installed digital switch investment, including investment for material, engineering, furnishing, and installing of a switch, to the material-only investment.[1129] In the Verizon switching cost study, the EF&I factor is applied to forward-looking investment to estimate forward-looking total installed investment.[1130] The EF&I factor is therefore large if the switching vendor discount is large and the discount applies only to material costs.

442. Verizon proposes an EF&I factor based on 1998 investment data for the Verizon-East footprint.[1131] Because Verizon installed a relatively small number of switches in the Verizon-East footprint in 1998,[1132] its proposed EF&I factor reflects a correspondingly large fraction of growth and upgrade investment on which Verizon receives a relatively small discount.[1133] Verizon also showed that, had it based its EF&I factor solely on the new switches

[1127] Verizon Ex. 125P, Attach. H (confidential version); Verizon Ex. 161P, Attach. D (confidential version).

[1128] AT&T/WorldCom Ex. 24P, Workpapers (CD-ROM), folder "VA REC&SWITCH," file "Switch Backup," worksheets "EO MOU," "Tdm MOU" (confidential version). We also note that the input value used by AT&T/WorldCom in the MSM for the maximum CCS per trunk utilization is 27.5 CCS per trunk, a value that is considerably lower than maximum value assumed by the SCIS model and that is not inconsistent with the weighted average end-office trunk utilization in Verizon's study. *See* AT&T/WorldCom Ex. 23, CD-ROM file "VA_C and P Tel Co of VA_VA Direct Filing_WC," worksheet "User Adjustable Inputs," at cell J13.

[1129] Verizon Ex. 122, at 201.

[1130] *Id*.

[1131] Verizon Ex. 100P, Vol. XII, Part G-4b at 8 (confidential version); Verizon Ex. 122, at 201.

[1132] Verizon Ex. 219P (Verizon proprietary response to record request no. 35 (requested Nov. 28, 2001)) (confidential version).

[1133] We determined this by examining the number of new switches Verizon-East installed in 1998 and its total material only switch investment for that year. Verizon Ex. 100P, Vol. XII, Part G-4b-VA 2000 Investment Loading Factors.xls, WP_Pg8 (confidential version); Verizon Ex. 219P (confidential version). We then looked at Verizon-East's switch purchases in 2000, for which Verizon provided the purchase price. Verizon Ex. 224 (Verizon response to record request no. 40 (requested Nov. 29, 2001)). Taking the material only price for the most expensive (continued….)

that it installed in 2000 and for which Verizon received a relatively large vendor discount, the factor would have been approximately 58 percent higher than Verizon's actual proposed EF&I factor.[1134]

443. AT&T/WorldCom propose an EF&I factor of 1.27 for Verizon's switching cost study.[1135] Their proposed factor is based on: (1) vendor EF&I investments obtained by running the SCIS model; (2) a telephone company only (*i.e.*, excluding vendor EF&I) EF&I factor developed by Verizon for a 1992 Commission proceeding concerning Open Network Architecture elements; and (3) Virginia sales tax.[1136]

b. Discussion

444. We adopt Verizon's proposed switching EF&I factor.[1137] As we explain above, the vendor discount used to estimate the switch investment to which the EF&I factor applies will be based largely on the new switch discount.[1138] Because the Verizon EF&I factor reflects a relatively large percent of growth and upgrade jobs for which Verizon receives a relatively small discount, but will be applied in the cost study to investments that reflect mostly the relatively large discount Verizon receives for new switches, this factor may be conservative. For example, if Verizon's new year 2000 switches were used to determine the EF&I factor, the factor would be considerably higher. The Verizon factor is preferable, moreover, because it relies on 1998 data, rather than on (in substantial part) decade-old data as AT&T/WorldCom propose. Data of more recent vintage are more appropriate for a forward-looking cost calculation than decade-old data.

(Continued from previous page)
switch Verizon-East purchased in 2000 (which is more than three times as large as the average Verizon (Virginia) switch) and multiplying it by the number of switches that Verizon-East installed in 1998 results in a value that is approximately 17 percent of total Verizon-East digital switch investment (material only) for 1998. *See* Verizon Ex. 226P (confidential version). If we start instead with a price twice as high as the most expensive switch Verizon-East purchased in 2000, and multiply it by the number of switches Verizon-East installed in 1998, the result is a value that is only 34 percent of total Verizon-East digital switch investment (material only) for 1998. Thus, even by these conservative measures, it is evident that Verizon-East's switch investment reflects a relatively large proportion of growth and upgrade purchases.

[1134] Verizon Ex. 224.

[1135] AT&T/WorldCom Ex. 12, Attach. 7.

[1136] AT&T/WorldCom Ex. 12, at 120-21, Attach. 2, 7.

[1137] We direct Verizon to use in its compliance filing the EF&I factor identified on page 8, line 7, of its switching investment loading studies. *See* Verizon Ex. 100P, Vol. XII, Part G-4b at 8 (confidential version).

[1138] *See supra* section V(C)(1)(b).

7. Right-To-Use Fees

a. Positions of the Parties

445. RTU fees are charges paid by a carrier to a switch vendor for software.[1139] RTU fees for a new switch and for upgrades and growth additions are among the long-run costs that an efficient carrier would incur; therefore, they may be reflected in unbundled switching prices. Verizon developed a RTU factor based on Verizon East's actual software expenditures in 1999 and 2000 and Verizon-East's forecasted software expenditures for 2001 and 2002.[1140] Verizon explains that in 1999 an accounting change required carriers to capitalize, rather than to expense, RTU fees.[1141] Verizon further explains that RTU expenditures that in the past had been spread over several years were "brought into" 1999.[1142]

446. AT&T/WorldCom contend that the 1999 expenditures, which are more than twice as high as those in any other year,[1143] are artificially high due to the accounting change and therefore should be excluded from Verizon's calculations of the RTU fees.[1144]

447. Verizon also claims that, if we require it to assume a higher percentage of new switches in its cost study than it proposes, then its proposed RTU fee would be too low because it primarily reflects expenditures on software for existing switches rather than new switches. In 1999 and 2000, Verizon installed a relatively small number of new switches, and it claims it is unlikely to install many digital switches going forward.[1145] Verizon claims that the amount of RTU-fees it proposes to recover is conservative because the up-front payment for new switch RTU fees is approximately $2 million per switch.[1146] To support this latter claim, Verizon relies on an AT&T-Lucent switch contract.[1147] Assuming a 12.95 percent cost of capital and a 12-year switch life, a per switch $2 million up-front payment is equivalent to equal annual payments of

---

[1139] Verizon Ex. 107, at 203.

[1140] Verizon Ex. 100P, Vol. XII, Part G-9, VA RTU Factor Study, WP1_Pg1 (confidential version).

[1141] Tr. at 5438-39.

[1142] *Id.*

[1143] *See* Verizon Ex. 100P, Vol. XII, Part G-9, VA RTU Factor Study, WP1_Pg1 (confidential version).

[1144] AT&T/WorldCom Switching Cost Brief at 22-23.

[1145] *See* Verizon Ex. 219P (confidential version).

[1146] *See* Verizon Ex. 122 at 198-99. Because Verizon did not include a revised per switch per year RTU figure in its revised cost study, we calculated this amount based on Verizon's methodology in its earlier filing. *See id*., Attach. S.

[1147] *Id*. at 198-99, Attach. A.

approximately $337,211 per switch, an amount several times greater than Verizon's proposal.[1148]

b. Discussion

448. We agree with AT&T/WorldCom and therefore require Verizon to recalculate its RTU fee excluding the 1999 data. The 1999 data appear anomalous, and Verizon fails to demonstrate that the claimed 1999 fees represent actual cash expenditures solely related to software purchased in that year. We also reject as unsupported by the evidence Verizon's contention that its RTU fee is conservative because new switch up-front RTU fees may be as high as $2 million per new switch.

449. Verizon fails to address the fundamental question why 1999 expenditures are so much higher than its actual 2000 expenditures and its 2001 and 2002 forecasted expenditures. It offers no rationale explaining whether and for what reasons RTU fees might be sharply higher in a given year, as compared to other years, or otherwise exhibit some pattern that includes such spikes. Nor did Verizon provide any evidence that expenditures during any year for which the rates are set in this proceeding would even approach the 1999 level. The RTU factor and the rates reflecting this factor established for the rate period should reflect the level of expenditures expected during the rate period. Accordingly, we require Verizon to exclude the 1999 data.

450. We also reject Verizon's claim that its proposed factor is conservative because this claim is not supported by relevant evidence. Verizon's only support for this assertion is its characterization of an AT&T contract with Lucent.[1149] We decline to rely on this contract for several reasons. AT&T's contract reflects the bargaining ability of AT&T, and Verizon likely has a different, perhaps greater, ability. The RTU fee in the AT&T contract also reflects the likely give-and-take inherent in most contract negotiations, and it is not clear what AT&T received in exchange for any concession it might have made relative to RTU fees. Nor is it clear whether what AT&T received as part of the bargain would be of similar value to Verizon. Thus, inferring what Verizon pays for new switch RTU fees based on the AT&T/Lucent contract is inappropriate unless all of the rates, terms, and conditions in the AT&T/Lucent contract are similar to those in a Verizon/Lucent contract (evidence of which is not in the record). In addition, we note that Verizon did not introduce into evidence any of its contracts with Lucent, nor did it propose a RTU fee for new switches based on any of its own data, either of which would seem more probative than the AT&T/Lucent contract. Therefore, Verizon's reliance on the AT&T/Lucent contract fails to demonstrate that its proposed RTU fee is reasonable.

451. Accordingly, based on the record before us, we require Verizon to recalculate its RTU fees in its compliance filing based on its 2000-2002 data, excluding its 1999 data, as proposed by AT&T/WorldCom. In addition, consistent with the discussion in section III(E)(3), *supra*, Verizon should exclude from its calculations its proposed forward-looking conversion

[1148] *See supra* sections III(C)(3)(d), III(D)(3).

[1149] Verizon Ex. 122, at 198-99, Attach. A.

factor.

8. Busy Hour to Annual MOU Ratio

a. Positions of the Parties

452. Verizon uses a busy hour to annual MOU ratio (BHAR) to estimate the number of minutes over which to spread its estimate of the usage sensitive switching costs.[1150] Verizon uses the same BHAR to calculate both end-office and tandem switching costs.[1151] It multiplies its estimate of per busy hour capacity MOU[1152] switching costs[1153] by the BHAR to determine per all hour of the day MOU switching costs.[1154] The BHAR equals the busy hour to busy day MOU ratio (BHTD) divided by the number of equivalent busy days in a year.[1155] The BHTD is the fraction of busy day MOU that is in a busy day hour.[1156] Verizon adjusts the tandem switching costs per capacity MOU to reflect billable MOU in its study by multiplying these costs by the ratio of its estimate of total conversation and non-conversation MOU to its estimate of conversation MOU.[1157]

453. WorldCom asserts that Verizon's MOU calculations, and by implication its BHAR, are flawed.[1158] Because WorldCom proposes recovery of end-office switching costs through a flat rate rather than an MOU charge, it claims that the complexities of this issue need

[1150] Verizon Ex. 107, at 199, 201, 207-08.

[1151] *Id*.

[1152] Capacity MOU reflects the total time the switch is in use. These MOU include those for conversation time, *i.e*., the time that a switch is in use while subscribers are talking to each other, and non-conversation time, *i.e*., the time required for dialing, ringing, call set-up, and the time associated with calls that are not completed. Non-conversation times are not measured by the switch's billing recordings and therefore cannot be billed. Verizon adjusts the tandem switching costs per capacity MOU to reflect billable MOU in its study. *Id*. at 202, 207-08.

[1153] Verizon develops per busy hour MOU switching costs as follows: It first uses the SCIS model to develop switching investment. It then divides investment by busy hour capacity MOU. Next, Verizon converts the resulting investment per busy hour capacity MOU to total switching costs per busy hour capacity MOU by applying ACFs and investment loading factors. *Id*. at 199-201, 207-08.

[1154] *Id*. at 201, 207-08.

[1155] Verizon Ex. 100P, Vol. VI, Part C-8-1, Busy Hour to Annual Ratio – Back-Up (confidential version).

[1156] *Id*; Verizon Ex. 223 (Verizon response to record request no. 39 (requested Nov. 29, 2001)).

[1157] Verizon Ex. 107, at 207-08; Verizon Ex. 161P, CD-ROM "VZ-VA FCC ARB (Additional Cost Studies)," folder "VA UNBUNDLED REC&SWITCH," file "Back-up_VA MOUR_10_31 Part C-8," worksheets "Inputs," cell L17, and "NCT ADJ" (confidential version).

[1158] *See* WorldCom Ex. 6 (Goldfarb Direct), at 6.

not be resolved if that proposal is adopted.[1159]

b. Discussion

454. We agree with WorldCom that Verizon's proposed BHAR for end-office and tandem switching is flawed. As explained above, the BHAR calculation first requires that Verizon determine the busy day MOU and the number of equivalent busy days in a year. Based on our analysis of the Verizon switching cost studies, we have been unable to verify how Verizon calculated either of these inputs. Therefore, we do not know either the usage characteristics of the busy days that Verizon sampled or how those days compare to an average day. Verizon's failure to clearly document this information renders us unable to determine whether its switching cost study complies with TELRIC principles. In particular, we are unable to determine whether Verizon spreads its switching costs over an appropriate number of days.[1160]

455. We find it unnecessary to correct Verizon's BHAR with regard to end-office switching costs because we agree with WorldCom and find that all end-office switching costs must be recovered through flat-rated port charges, rather than per minute charges. Correcting Verizon's BHAR, therefore, arises only with respect to tandem switching costs, which are recovered through per minute charges.[1161]

456. To test the reasonableness of Verizon's annual MOU estimate, we examined DEM data published in ARMIS.[1162] Although the percentage of total DEMs that are tandem switching DEMs is not reported in ARMIS, we used the data in Verizon's cost studies to determine the percentage of Verizon's tandem busy hour MOU relative to its end-office busy hour MOU. We then applied this percentage to the total reported DEMs from ARMIS to produce an estimate of 2001 tandem switching DEMs. DEMs are billable MOU for Verizon.[1163] Therefore, we

---

[1159] *See id*. at 6-7.

[1160] We note that, in reviewing Verizon-New Jersey's section 271 application, the Commission observed that the number of days that Verizon-New Jersey used in its BHAR "raise[d] serious questions," but it did not resolve this issue because it found that Verizon-New Jersey's non-loop rates were TELRIC-compliant based on a benchmark comparison to New York rates. *Application by Verizon New Jersey, Inc., Bell Atlantic Communications, Inc. (d/b/a Verizon Long Distance), NYNEX Long Distance Company (d/b/a Verizon Enterprise Solutions), Verizon Global Networks Inc., and Verizon Select Services Inc., for Authorization to Provide In-Region InterLATA Services in New Jersey*, WC Docket No. 02-67, Memorandum Opinion and Order, 17 FCC Rcd 12275, 12295, para. 48 (2002) (*New Jersey 271 Order*); *see also Application by Verizon New England., Verizon Delaware Inc., Bell Atlantic Communications, Inc. (d/b/a Verizon Long Distance), NYNEX Long Distance Company (d/b/a Verizon Enterprise Solutions), Verizon Global Networks Inc., and Verizon Select Services Inc., for Authorization To Provide In-Region, InterLATA Services in New Hampshire and Delaware*, 17 FCC Rcd 18660, 18683, 18703, paras. 37, 70 n.248.

[1161] *See infra* section V(D).

[1162] *See* ARMIS Report No. 43-04: Table I, Separations and Access Table.

[1163] DEMs reflect conversation and non-conversation MOU. There is one originating DEM and one terminating DEM, *i.e*., two DEMs, associated with each conversation MOU. *See* 47 C.F.R. § 36.125(a)(3) and Glossary. (continued….)

compared the 2001 tandem switching DEMs that we calculated against the billable MOU estimate in Verizon's cost study. This comparison shows that Verizon's billable MOU estimate in its tandem switching study is approximately twenty-four percent lower than the 2001 DEMs estimate for tandem switching.[1164] Accordingly, we find Verizon's number of equivalent annual busy days in the BHAR, and therefore the BHAR, unreasonable.

457. Because we find that Verizon's BHAR calculation is unreasonable, but neither AT&T nor WorldCom proposed an alternative calculation, we depart from baseball arbitration and require Verizon to use 339 days as the number of equivalent annual busy days in the BHAR. Verizon's proposed tandem switching rate is an average rate that effectively spreads expected costs for the study period (2001-2003) over expected demand at the mid-point of this three-year period.[1165] As we explain above, based on ARMIS DEM data and the tandem to end-office switch busy hour MOU ratio reflected in Verizon's switching cost studies, we calculated the 2001 tandem switching DEMs for Verizon. Spreading Verizon's tandem switching costs over these DEMs, which we adjust to account for our tandem switch MOU growth rate, and accepting Verizon's proposed BHTD, requires that the BHAR be based on 339 equivalent busy days. We thus direct Verizon to use in its compliance filing 339 equivalent busy days in its BHAR calculation.[1166]

D. Rate Structure

1. Background

458. The Commission's general rate structure rules specify that UNE rates be structured consistently with the manner in which the costs of providing them are incurred.[1167] In other words, the basis on which the element is sold to the competitive LEC should reflect the basis on which the cost is incurred by the incumbent LEC. If, for example, the incumbent LEC were to pay the switch manufacturer a per line fee for some of the switch hardware or software,

(Continued from previous page)
Verizon proposes applying an originating switching rate and a terminating switching rate to both intra-switch and inter-switch calls. Verizon Ex. 107, at 201. DEMs are therefore billable MOU for Verizon.

[1164] The billable MOU are lower than the 2001 DEMs even though Verizon assumed an annual tandem switching MOU growth rate between 2001 and 2003. *See* Verizon Ex. 161P, Attach. H, CD-ROM "VZ-VA FCC ARB (Additional Cost Studies)," folder "VA UNBUNDLED REC&SWITCH," file "Back-Up_VAMOUR_10_31 Part C-8," worksheet "Tdm MOU" (confidential version).

[1165] Verizon Ex. 107, at 200-01, 207-08; Verizon Ex. 161P, CD-ROM "VZ-VA FCC ARB (Additional Cost Studies)," folder "VA EXCEL & WORD STUDIES," folder "VA SWITCHING SUPPORT FILES," folder "VA UNBUNDLED REC&SWITCH," file "VAMOURRECIPCOMP0_3l01," worksheet "Assumptions," cell B17 (confidential version). The mid-point for this three-year period is June 30, 2002.

[1166] We also direct Verizon to use in its compliance filing the same BHTD that it used in its original cost study filing. *See* Verizon Ex. 100P, Vol. VI, Part C-8-1, Busy Hour to Annual Ratio – Back-Up (confidential version).

[1167] 47 C.F.R. § 51.507(a); *Local Competition First Report and Order*, 11 FCC Rcd at 15874, para. 743.

then the incumbent LEC should recover these switch costs from the competitive LEC on the same basis. If the incumbent LEC were to recover these costs on a per MOU basis, then this would provide the competitive LEC's subscribers with an uneconomic incentive to reduce usage of this switch hardware or software.

459. The Commission's general rate structure rules also specify that the costs of shared facilities should be recovered in a manner that efficiently apportions them among users, either through usage-sensitive charges or capacity-based flat-rated charges.[1168] That is, these costs should be allocated among subscribers on the basis of their causal responsibilities. The Commission's specific rate structure rule for local switching specifies that costs for this element be recovered through a combination of a flat-rated charge for line ports and one or more flat-rated or per MOU charges for the switching matrix and trunk ports, but it does not specify a particular combination or means for determining the appropriate combination.[1169]

2. Positions of the Parties

460. Verizon proposes to recover the non-traffic-sensitive costs of the switch through a per port charge and the traffic-sensitive costs through a per MOU charge.[1170] According to Verizon, usage affects the costs of providing many of the services associated with switching and thus should be reflected in the rate structure. Verizon states that, when assessing the network demand and purchasing switches and switch upgrades, it is required to forecast switch usage and purchase sufficient capacity to accommodate that usage.[1171] Verizon proposes to recover the following costs on a per MOU basis: "getting started" costs, EPHC costs, RTU software costs, and "shared peak-period costs."[1172]

[1168] 47 C.F.R. § 51.507(c); *Local Competition First Report and Order*, 11 FCC Rcd at 15874, para. 755.

[1169] 47 C.F.R. § 51.509(b); *Local Competition First Report and Order*, 11 FCC Rcd at 15874, para. 757. In reviewing section 271 applications, the Commission has rejected arguments that the TELRIC pricing rules require that at least a certain percentage of shared switching costs must be recovered through flat-rated charges. *See, e.g.*, *Application of Qwest Communications International, Inc. for Authorization to Provide In-Region InterLATA Services in the States of Colorado, Idaho, Iowa, Montana, Nebraska, North Dakota, Utah, Washington, and Wyoming*, WC Docket No. 02-314, Memorandum Opinion and Order, 17 FCC Rcd 26303, 26422, para. 209 (2002) (*Qwest Multistate 271 Order*). In the section 271 context, however, the Commission does not engage in a *de novo* review of a state commission's decision. Rather, the Commission simply determines whether the end result is within the range of rates that a reasonable application of TELRIC principles would produce. As noted above, the Commission's rules give state commissions flexibility to permit recovery of switching matrix and trunk port costs through "one or more flat-rated *or* per minute usage charges." 47 C.F.R. § 51.509(b) (emphasis added).

[1170] Verizon Ex. 115 (West Rebuttal), at 2-3.

[1171] Verizon Ex. 109, at 52-54.

[1172] Verizon Ex. 122, at 191. Shared peak-period costs include non-ISDN line CCS and ISDN CCS, D channel access PPS, PPB channel access PPS, inter-switch PPS, and SS7 link and trunk CCS. AT&T/WorldCom Ex. 12, at 109.

461. AT&T/WorldCom assert that much of the total cost of a switch is associated with memory and processors and is incurred at the time a switch is placed in operation.[1173] According to AT&T/WorldCom, these "getting started" costs do not vary with usage.[1174] They further assert that the majority of the costs of today's generation of digital switches is driven by ports, rather than usage, and only a very small percentage of the overall equipment in current digital switches is engineered based on peak-period usage.[1175] According to AT&T/WorldCom, based on actual Verizon total switch costs, most costs are non-usage sensitive and should be allocated to the port rather than MOU rate elements.

462. AT&T and WorldCom diverge slightly with regard to the precise allocation between usage and non-usage sensitive rate elements. AT&T recommends that Verizon continue to assess switching charges using the rate design currently in place, *i.e.*, a separate fixed monthly port charge to recover the non-usage sensitive switch costs as well as a per MOU charge to recover the usage sensitive costs.[1176] Specifically, AT&T agrees with Verizon that shared, peak-period costs should be recovered on a usage sensitive basis.[1177] WorldCom argues that all costs, even the shared, peak-period costs, should be recovered through a flat-rated port charge.[1178]

3. Discussion

a. "Getting Started" Costs

463. We conclude above, for purposes of determining the appropriate switch discount, that the "getting started" cost of the switch is a fixed cost, meaning that it does not vary with the number of ports or the level of usage on the switch.[1179] We find here that the "getting started" costs of the switch should be recovered on a per line port basis. "Getting started" costs are incurred for capacity that is shared among subscribers. Verizon incurs these costs to be ready to provide service upon demand. Given the record evidence that modern switches typically have large amounts of excess central processor and memory capacity,[1180] the usage by any one subscriber or group of subscribers is not expected to press so hard on processor or memory capacity at any one time as to cause call blockage, or a need for additional capacity to avoid such

[1173] AT&T/WorldCom Ex. 4, at 7.

[1174] *Id*.

[1175] *Id*.

[1176] AT&T Ex. 4 (Kirchberger Direct), at 13-14.

[1177] *Id*.

[1178] WorldCom Ex. 6, at 7.

[1179] *See supra* section V(C)(1)(b)(i).

[1180] *See supra* para. 391.

blockage. Thus, no one subscriber or group of subscribers is any more or any less causally responsible for the processor or memory capacity costs. Principles of cost causation, therefore, support a per line port cost recovery approach because, more than any other approach, it spreads getting started costs to carriers in a manner that treats equally all subscribers served by a switch.

464. In addition, charging a per line port price for the central processor and memory recovers these costs from competitive LECs on a competitively neutral basis, thereby potentially extending to many different subscribers the benefits of competition. The incumbent LEC incurs central processor and memory costs in order to provide service to all of the subscribers served by the switch's line ports. A competitive LEC may serve some of these subscribers and the incumbent LEC may serve some of these subscribers. The incumbent LEC's central processor and memory costs do not vary with respect to whether a subscriber connected to its switch is a high or low volume user, a residential or business user, or a peak-period or off-peak-period user. A competitive LEC faces no advantage or disadvantage in competing against the incumbent LEC if it pays for use of the central processor and memory on a per line port basis. If the incumbent LEC chooses to recover relatively more or less of the central processor and memory cost from high volume business users or low volume residential users, for example, the competitive LEC is able to compete with the incumbent LEC (or another competitive LEC) by doing the same.

465. A per MOU price for the central processor and memory, in contrast to a per line port price, would not recover these costs on a competitively neutral basis. Again, the incumbent LEC's central processor and memory costs do not vary with respect to whether a subscriber connected to its switch is a high or low volume user, a residential or business user, or a peak-period or off-peak-period user. A competitive LEC suffers a competitive disadvantage for high volume users relative to the incumbent LEC if the incumbent LEC recovers central processor and memory costs from the competitive LEC on a per MOU basis. The competitive LEC would pay more to serve the high volume users, while the incumbent LEC could recover the central processor and memory costs, which do not vary with usage, on a per line basis from all of its subscribers, including high volume users. Principles of cost causation do not, therefore, support a per MOU price, because it would recover proportionately more of the "getting started" costs from high usage subscribers than from low usage subscribers.

466. We disagree with Verizon's argument that it "grows" or replaces virtually all of the components of a switch over its life and that, therefore, costs for the central processor are usage sensitive and should be recovered on a per MOU basis.[1181] Verizon fails to show that it would expect to replace the central processor of a modern switch for the specific reason that usage increases over the life of the switch. It identifies three reasons why the processor would be replaced. First, manufacturers continuously upgrade switch software to improve the operational and administrative efficiency of the switch.[1182] These software upgrades at some point require an upgrade to the processor. Second, software is added frequently over time to add

[1181] Verizon Ex. 123, at 6-12.

[1182] Tr. at 5435.

the capability to provide new vertical features as they are developed or to accommodate new regulatory mandates such as number portability.[1183] The software added to the switches over time for these reasons at some point requires a processor upgrade. Third, an increase in subscriber usage per line or the number of lines connected to the switch may increase to the point at which the processor must be augmented.[1184]

467. The first two reasons for replacing or upgrading the processor relate to obsolescence, not to the level of subscriber usage over time. Switch obsolescence is accounted for in the useful life of the switch prescribed for estimating the depreciation expense recovered in the switch prices. Showing that the central processor may be replaced due to obsolescence does not demonstrate that processor capacity costs are usage sensitive or should be recovered on that basis. We note that for purposes of determining depreciation expense we have adopted an asset life at the low end of the Commission's safe harbor range: 12 years.[1185] We believe that this relatively short switch life is adequate to reflect the need to upgrade the processor for reasons of obsolescence.[1186]

468. With respect to the frequency with which Verizon would expect to augment the central processor or memory of the switch as usage increases, the only evidence adduced is that processor switch blocking occurred in New Hampshire.[1187] Verizon did not indicate, however, how many switches or subscribers connected to these switches experience blocking, or even whether these switches were modern digital switches. Instead, most of the written and oral testimony and evidence supplied by Verizon and AT&T/WorldCom, as discussed above, indicates that the central processor and memory of a modern switch installed today are unlikely to exhaust as a result of increased subscriber usage.[1188]

b. EPHC Costs

469. EPHC costs relate only to the Lucent 5ESS switch.[1189] The 5ESS switch is based

[1183] *Id.*

[1184] *Id.* at 5435-36.

[1185] *See infra* section III(D).

[1186] The useful life for estimating depreciating expense reflects the average life of the various components of a switch. There is no separate useful life for each separate component of the switch, such as the central processor.

[1187] Tr. at 5448.

[1188] Verizon also provided in its surrebuttal testimony examples of various "getting started" components of the switch that it has grown or replaced. Verizon Ex. 122, at 176-78. Verizon explains that the majority of these components were upgrades developed by the switch manufacturer. Again, the fact that Verizon upgrades the "getting started" equipment does not demonstrate that these costs are incurred as a result of increases in subscriber usage. As we discuss above, moreover, Verizon does not provide empirical evidence to quantify the extent to which it has grown or replaced the "getting started" components of the switch. *See supra* section V(C)(1)(b)(i).

[1189] Verizon Ex. 123, at 10. EPHC stands for "equivalent POTS half call."

on a distributed processor architecture. The primary building block of the Lucent 5ESS distributed processor architecture is the switching module.[1190] The common equipment of the switching module consists of a processor complex and equipment designed to terminate line interface and trunk interface equipment.[1191] These common equipment costs are referred to as EPHC costs in the SCIS model output work papers.

470. The parties agree that in general port capacity is reached before processor capacity in the Lucent 5ESS switch modules.[1192] The SCIS model user guide indicates that the switch modules in the Lucent 5ESS switch by design have excess call capacity and that they therefore are expected to be port limited rather than terminal limited.[1193] AT&T/WorldCom argue that there is excess call capacity for every switch in the Verizon switch cost study.[1194] When the number of ports on the switch module reaches capacity, a new switch module is purchased. That is, according to AT&T/WorldCom, the port capacity exhausts before the call capacity of these modules. Verizon states that Lucent has evolved the processor capacities of these modules to stay one step ahead of call volume demand, thereby enabling the modules to avoid processor exhaust.[1195] It did claim, however, that there are circumstances where the processor capacity is reached before the port capacity of the module.[1196]

471. We conclude that EPHC costs should be recovered on a per line port basis. EPHC costs, like "getting started" costs, are incurred for capacity that is shared among subscribers. Verizon incurs these costs to be ready to provide service upon demand. The balance of the record evidence supports a finding that the Lucent 5ESS switch module costs do not vary with respect to usage. Verizon states that there are circumstances when the processor capacity of the module may be increased before its port capacity is reached, or when port demand is limited in order to avoid processor exhaust, thereby suggesting that the EPHC costs vary with usage.[1197] It did not quantify the frequency with which this occurs, however, nor did it provide any other details regarding these situations. Absent such evidence, we cannot conclude that the EPHC costs vary with usage, given the other evidence and testimony in the record. Accordingly, consistent with our analysis of cost causation and competitive neutrality with respect to "getting started" costs, we require that EPHC costs be recovered on a per port basis.

[1190] *Id*.

[1191] *Id*.

[1192] *Id.* at 11; AT&T/WorldCom Ex. 24, at 16-17.

[1193] AT&T/WorldCom Ex. 24, at 17; *see also* Verizon Ex. 123, at 10.

[1194] Tr. at 5446-47.

[1195] Verizon Ex. 123, at 11.

[1196] *Id.* at 12-14.

[1197] *Id*.

c. RTU Fees

472. Verizon pays RTU fees to switch vendors for switch software. Verizon states that it generally does not pay RTU fees on a per MOU or on a per line basis.[1198] Rather, Verizon most often pays the RTU fees on a per switch basis.[1199] Verizon also states that, in contracts for Lucent switches, which require software to be loaded into discrete service modules, payment might be made on the basis of the number of service modules.[1200] Accordingly, we find that RTU fees should be recovered on a per port basis for reasons similar to those set forth above with respect to "getting started" costs and EPHC costs.

d. Shared Peak-Period Costs

473. The parties agree that shared, peak-period costs – non-ISDN line CCS and ISDN CCS, D channel access PPS, PPB channel access PPS, inter-switch PPS, and SS7 link and trunk CCS – vary with usage.[1201] They are shared capacity costs. AT&T/WorldCom emphasize, and Verizon does not dispute, that these costs are incurred for equipment that is engineered and purchased based on peak-period demand.[1202] The record supports a finding that the equipment for which these costs are incurred is a limiting resource and that congestion or blocking will occur as usage increases.[1203]

474. Peak-period users are causally responsible for shared capacity that is engineered to satisfy peak-period demand. The need to install additional capacity to avoid call blocking (or an unacceptably high rate of blocking) by installing more of this equipment results entirely from usage at its peak. If off-peak usage were to decrease to zero, no costs would be saved whatsoever. Although the parties all agree that peak-period pricing is correct in principle,[1204] no party proposes a peak-period rate structure because such an approach is extremely difficult to

---

[1198] Tr. at 5492-93.

[1199] *Id*. In response to a record request, Verizon states that it generally pays for the right to use software on a "buyout basis" for base generic software. Verizon Ex. 231 (Verizon response to record request no. 47 (requested Nov. 29, 2001)). We understand the term "buyout basis" as used by Verizon to be equivalent to a per switch or per module basis. Tr. at 5494. Buyout basis may also refer to payment on the basis of all or a subset of a carrier's switches. Tr. at 5155.

[1200] Tr. at 5493.

[1201] Verizon Ex. 122, at 195; AT&T/WorldCom Ex. 12, at 109.

[1202] Verizon Ex. 109, at 53; AT&T/WorldCom Ex. 12, at 109.

[1203] Verizon Ex. 109, at 53; AT&T/WorldCom Ex. 12, at 109.

[1204] Tr. at 5475; AT&T/WorldCom Switching Cost Brief at 26.

implement in practice.[1205] Instead, Verizon and AT&T propose recovery of these costs through a per MOU price that is developed by dividing total cost by total annual minutes of use, not peak-period minutes of use, and imposed on all minutes of use.[1206] In contrast, WorldCom proposes a flat per port price for recovery of these shared, peak-period driven costs.[1207]

475. Although neither approach is ideal, we believe that the flat per port price advocated by WorldCom is the better approach. A per MOU price for recovery of these shared, peak-period driven capacity costs, as proposed by Verizon and AT&T, would fail to signal to competitive LECs that these costs vary with subscribers' usage during the peak period in particular. Competitive LECs paying for subscribers' off-peak usage based on a price developed by spreading costs over all minutes of use would pay too much relative to the costs for which they bear causal responsibility. Competitive LECs paying this same price for subscribers' peak-period usage would pay too little. A per MOU rate therefore could result in under-utilization of Verizon's switches during non-peak periods and over-utilization during peak periods.

476. A per MOU price for recovery of shared, peak-period costs also may place the competitive LEC at a competitive disadvantage, as WorldCom points out.[1208] Because Verizon's costs vary with peak-period usage, Verizon may be able to recover shared, peak-period costs from its subscribers by offering a per MOU price for peak-period minutes of use and a zero price for unlimited off-peak minutes of use. A competitive LEC may not be able to recover its costs by offering the same peak/off-peak prices that Verizon offers, however, because the competitive LEC's costs would reflect how Verizon bills the competitive LEC and not how Verizon actually incurs the cost.

477. A flat per port price for recovery of these shared, peak-period driven costs, as proposed by WorldCom, avoids the competitive concerns that arise with a per MOU charge. A flat per port price for recovery of shared, peak-period costs also avoids problems in Verizon's switch cost study associated with estimating the minutes of use over which to spread its switching costs. The Verizon study uses a ratio of busy hour minutes of use to annual minutes of minutes of use (BHAR ratio) to convert its estimate of switch costs per busy hour to switch costs per annual minutes of use. As explained above, the BHAR ratio that Verizon proposes is flawed because it significantly underestimates the annual minutes of use over which the switching costs are spread.[1209] By spreading switching costs over line ports, rather than annual minutes of use,

[1205] For example, different switches would have different peak periods. Peak-period pricing would require either different prices for different switches based on the probabilities of peak-period usage for each switch, or developing some meaningful way to reflect peak-period usage probabilities in statewide or UNE zone average rates.

[1206] AT&T Ex. 4, at 14; Verizon Ex. 115, at 2-3.

[1207] WorldCom Ex. 6, at 5.

[1208] *Id*. at 5-6.

[1209] *See supra* section V(C)(8); *see also New Jersey 271 Order*, 17 FCC Rcd at 12295, para. 48 (noting "serious questions" regarding Verizon's assumptions underlying its busy hour determinations).

this problem is avoided.

478. Verizon argues that flat-rated recovery of costs that vary with usage would result in low volume subscribers subsidizing high volume subscribers.[1210] We have no basis on the record to conclude that Verizon is correct. We do not know the extent to which low or high volume subscribers' usage occurs during the peak period or non-peak periods, and, therefore, we do not know whether a flat per port price or a per MOU price imposed on all subscriber minutes is more likely to recover these shared, peak-period driven costs from subscribers in proportion to their peak-period usage. Thus we cannot assess the extent to which low volume users would be subsidizing high volume users, or vice versa, under either rate structure. We acknowledge that the approach we adopt is imperfect in the sense that it would fail to signal to competitive LECs the costs that Verizon would incur if subscriber usage were to increase, which could result in over-utilization of Verizon's switches, and blocked calls, during peak periods. Given that Verizon already offers flat-rated calling to its own end-users,[1211] however, we do not believe that offering similar pricing to competitive LECs would increase the likelihood of blocked calls due to increased calling by competitive LEC customers.

479. AT&T/WorldCom suggest that we adopt different results for the two different agreements before us.[1212] AT&T and Verizon agree that shared, peak-period costs should be recovered through a per MOU charge on all usage. As noted above, however, WorldCom argues, and we agree, that these costs should be recovered on a flat, per port basis. Thus, consistent with "baseball arbitration," we could adopt a per MOU charge for the AT&T-Verizon agreement and a flat, per port charge for the WorldCom-Verizon agreement.

480. Verizon argues, however, that prescribing two different rate structures raises the possibility that a competitive LEC paying the flat, per port rate would target high volume users, while a competitive LEC paying the combined flat, per port and per MOU rates would target low volume users,[1213] which might preclude Verizon from recovering all of its shared costs.[1214] Verizon is correct in theory. The per port price is an average price and the per MOU price is an average price. A carrier serving low volume subscribers would pay Verizon an amount that is less than the overall cost per subscriber, if it pays for the shared peak-period driven capacity costs on a per MOU basis; a carrier serving high volume subscribers would pay Verizon an amount equal to the overall cost per subscriber, if it pays for the shared peak-period driven capacity costs on a per port basis. Verizon would not recover all of its shared costs under this scenario if it were to lose enough high volume and low volume subscribers to these competitive

[1210] Verizon Switching Cost Brief at 23.

[1211] AT&T/WorldCom Switching Cost Brief at 26.

[1212] *See* AT&T/WorldCom Switching Cost Brief at 27.

[1213] Tr. at 5474-75.

[1214] *Id.*

LECs and is unable to recover a disproportionate share of these costs from its own subscribers.

481. AT&T/WorldCom respond that the risk of under-recovery that Verizon would face if it offers two different rate structures is no different from the risk it currently faces by offering its residential subscribers a choice between flat-rated or message unit pricing plans.[1215] They also note that a competitive LEC paying the per MOU price for unbundled switching bears the risk of paying peak-period driven capacity costs for off-peak usage , while Verizon does not incur these costs in off-peak periods or face that risk.[1216]

482. We agree with Verizon that a requirement to offer unbundled switching on both a flat-rated, per port basis and a combined flat-rated, per port and per MOU basis creates the potential for under-recovery of switching costs. AT&T/WorldCom's analogy to retail rates is not convincing. The Commonwealth of Virginia has jurisdiction over the risk of under-recovery that Verizon faces by offering its own residential subscribers flat-rated and message unit pricing options. The matter before the Bureau is the risk of under-recovery that Verizon would face if required to offer unbundled switching on both a flat-rated, per port basis and a combined flat-rated, per port and per MOU basis to wholesale customers. AT&T/WorldCom allege that the relative risk faced by Verizon due to its retail flat-rated and message unit pricing options is similar to the risk associated with offering competitive LECs both flat-rated, per port and per MOU pricing options, but they did not quantify this risk. Nor could we know, based on the record, whether this is an acceptable level of risk for Verizon to bear when selling unbundled switching to competitors. We therefore reject AT&T/WorldCom's arguments that in this proceeding we should require Verizon to offer unbundled switching on both a flat-rated, per port basis and a combined flat-rated, per port and per MOU basis.[1217]

483. Based on the potential for under-recovery that might exist if we require two different rate structures, we find that the shared, peak-period costs should be recovered on a flat, per port basis in both agreements. As explained above, this approach avoids the competitive disadvantages associated with use of a per MOU price imposed on all usage and it avoids the problems involved with estimating the minutes of use over which to spread an estimate of switching costs.

[1215] *Id.* at 5478.

[1216] *Id.* at 5479.

[1217] We recognize that the rates we establish in this arbitration proceeding reflect a different mix of port charges and usage charges than the rates contained in Verizon's agreements with other competitive LECs in Virginia. Because this would be true even if we allowed Verizon to recover the shared, peak period costs on a per MOU basis, we do not believe the existence of these other agreements is reason not to permit consistency between the two agreements at issue here.

E. Reciprocal Compensation

1. Background

484. Pursuant to section 251(b)(5) of the Act, incumbent LECs are obligated to "establish reciprocal compensation arrangements for the transport and termination of telecommunications."[1218] In the *Local Competition First Report and Order*, the Commission decided that TELRIC pricing was appropriate for reciprocal compensation under section 251(b)(5).[1219]

485. Verizon proposes two separate rate elements for reciprocal compensation: (1) "Meet-Point A End Office MOU," and (2) "Meet-Point B Tandem MOU." Meet Point A End Office MOU applies to traffic originating with a competitive LEC end-user and terminating to a Verizon end-user for which Verzion provides end-office switching, and it is designed to recover costs for end-office switching and a shared end-office trunk port.[1220] Meet-Point B Tandem MOU applies to traffic originating with a competitive LEC end-user and terminating to a Verizon end-user for which Verizon provides end-office switching, tandem switching, and shared transport.[1221] The rate for this element is designed to recover costs for end-office switching, a shared end-office trunk port, tandem switching, two shared tandem trunk ports, and shared transport.[1222]

486. Verizon states that it developed the end-office switch usage cost for reciprocal compensation by determining the costs associated with basic usage (service without optional features). Verizon excludes, however, the "getting started" investments identified by the SCIS model and the RTU fees.[1223] According to Verizon, these costs are not affected by the additional

---

[1218] 47 U.S.C. § 251(b)(5). For purposes of reciprocal compensation, "transport," under the rules now in effect, consists of "transmission and any necessary tandem switching of telecommunications traffic subject to section 251(b)(5) of the Act from the interconnection point between the two carriers to the terminating carrier's end office switch that directly serves the called party." 47 C.F.R. § 51.701(c). "Termination" is "the switching of telecommunications traffic at the terminating carrier's end office switch, or equivalent facility, and delivery of such traffic to the called party's premises." 47 C.F.R. § 51.507(d).

[1219] *Local Competition First Report and Order*, 11 FCC Rcd at 16023, para. 1054. The Commission subsequently established a set of rate caps that govern the exchange of traffic delivered to internet service providers, subject to certain conditions. *Intercarrier Compensation for ISP-Bound Traffic*, CC Docket No. 96-98, Order on Remand and Report and Order, 16 FCC Rcd 9161 (2001), *remanded sub nom. WorldCom, Inc. v. FCC,* 288 F.3d 429 (D.C. Cir. 2002). We leave it to the parties to determine under their interconnection agreements under what circumstances the rates we establish in this case will apply. *See Non-Cost Arbitration Order*, 17 FCC Rcd at 27173, para. 280.

[1220] Verizon Ex. 100P, Vol. VI, Part C-10, Supporting Information (confidential version).

[1221] *Id*.

[1222] *Id*.

[1223] Verizon Ex. 107, at 204

usage to which the reciprocal compensation rates apply, and therefore they should not be included as part of reciprocal compensation pursuant to sections 251(b)(5) and 252(d)(2)(A) of the Act.[1224] Verizon proposed a separate tandem office switch usage cost for reciprocal compensation that also excludes the "getting started" investments and RTU fees.[1225]

487. According to AT&T/WorldCom, Verizon's argument that "getting started" costs and RTU fees do not vary with usage applies equally to UNE switching and to the termination of traffic that is subject to reciprocal compensation.[1226] Accordingly, AT&T/WorldCom argue that we should adopt their proposal to recover the "getting started" cost of a switch and the associated RTU fees on a flat per port basis. In the alternative, AT&T/WorldCom argue that, if we do not adopt this proposal, these costs should be more fairly apportioned to all traffic, including traffic subject to reciprocal compensation, and not just to UNE switch usage rates.[1227] They argue that Verizon's proposal to include these costs in UNE switching rates but not in reciprocal compensation rates is inconsistent with its acknowledgement that "on a strictly technical basis, the switch does not treat either type of terminating call differently.[1228]

2. Discussion

488. We find that end-office switch and shared end-office trunk port costs should be excluded from both Meet-Point A and Meet-Point B reciprocal compensation prices, consistent with our decision to adopt a flat, per port price for unbundled end-office switching. The general formula for developing a UNE price under TELRIC is to divide total cost by total demand. If we prescribe a flat, per line port price for unbundled end-office switching, including shared end-office trunk ports, the switch price equals total switch costs divided by total line ports. The price derived from this formula, if imposed on both competitive LECs that purchase the incumbent LEC's line ports and the incumbent LEC's end-users, would fully compensate the incumbent LEC for all of its switch costs. Competitive LECs that pay a flat, per line port price for unbundled end-office switching should not, therefore, pay the incumbent LEC any additional amount for use of end-office switching to terminate reciprocal compensation traffic.

489. We also find that "getting started" costs and RTU fees associated with tandem switches should be recovered in Meet-Point B reciprocal compensation prices, not just UNE tandem usage prices. Switch engineering requirements and therefore costs do not vary according to whether an incumbent LEC switch is terminating UNE or reciprocal compensation traffic.

[1224] Verizon Ex. 122, at 194.

[1225] Verizon Ex. 107, at 204.

[1226] *Id*. at 117.

[1227] *Id*. at 118. AT&T/WorldCom do not distinguish between end-office and tandem switching for purposes of this argument.

[1228] AT&T/WorldCom Ex. 12, at 116.

Verizon conceded that "from a cost perspective" a "terminating minute is a terminating minute" with regard to an end-office switch.[1229] There is no reason that a similar conclusion would not apply to tandem switch usage. Moreover, the Commission has adopted the same TELRIC pricing standard for UNEs and for reciprocal compensation,[1230] but Verizon admits that it applied different pricing standards in developing these rates.[1231] Tandem switch costs that are recovered in prices applying to reciprocal compensation traffic therefore should be equal to tandem switch costs that are recovered in prices applying to UNE traffic.

F. Features

1. Background

490. Costs for the numerous vertical features that do not require specific, unique hardware are included in Verizon's proposed per port and per MOU switch prices.[1232] Verizon proposes "port additives" or per port prices to recover costs for 34 vertical features that have specific, unique hardware.[1233] These charges would apply only to lines that use the feature.[1234] Verizon uses the SCIS/IN module to develop the additional hardware costs associated with these vertical features. SCIS/IN bases these additional costs on vendor prices for this specific, unique hardware.[1235] The user enters as an input into SCIS/IN the price discount that the carrier receives on hardware purchases from the vendor, as well as a number of inputs relating to subscriber usage.[1236]

491. AT&T/WorldCom do not propose separate prices for any vertical features if we adopt the MSM to develop switch costs.[1237] The MSM does not develop separate costs for any vertical features. According to AT&T/WorldCom, the composite prices derived from the MSM

[1229] Tr. at 5488-89; *see also id.* at 5501-02.

[1230] *Local Competition First Report and Order*, 11 FCC Rcd at 16023, para. 1054.

[1231] Tr. at 5505.

[1232] Verizon Ex. 107, at 181-182.

[1233] *Id*. at 182.

[1234] Tr. at 5520-21.

[1235] Verizon Ex. 107, at 205.

[1236] For example, to develop the distinctive ringing/call waiting (DRCW) feature offered in connection with Centrex service, the user must specify the number of: (1) busy hour (BH) screen line editing (SLE) sessions per line; (2) entries added per BH SLE session; (3) entries deleted per BH SLE session; (4) holding time seconds per session; (5) BH DRCW calls per line; and (6) SLE lines per central office.

[1237] AT&T/WorldCom Switching Cost Brief at 8.

recover all switch costs, including vertical feature costs.[1238] If we adopt the SCIS model, AT&T/WorldCom argue that Verizon fails to provide support for its input values and that this failure is grounds for disallowing these separate vertical feature prices entirely.[1239] Alternatively, AT&T/WorldCom re-state the Verizon vertical features cost study using different vendor discounts and different inputs for certain features.[1240] AT&T/WorldCom emphasize that their ability to evaluate fully Verizon's proposed inputs is limited by Verizon's failure to document how it developed these inputs.[1241]

2. Discussion

492. We reject Verizon's proposed separate vertical feature prices. Verizon identifies values for the inputs its uses in the SCIS/IN module, but it does not provide any justification for these input values. Verizon defends these input values against AT&T/WorldCom's criticism by arguing that they are based on the judgment of a product manager who has over 25 years of experience.[1242] It fails, however, to document or explain any of the data, assumptions, methodologies, calculations, formulas, or workpapers that might have been used by this product manager to develop these inputs.[1243]

493. Although Verizon has not met its burden of proof with respect to features cost inputs,[1244] AT&T/WorldCom do not dispute that there are in fact costs associated with these features, nor do they dispute that these costs are not recovered elsewhere. Accordingly, rather than adopt AT&T/WorldCom's suggestion that we disallow these costs entirely, we will instead require Verizon to re-run the SCIS/IN with the inputs proposed in AT&T/WorldCom's restatement and the vendor discounts we adopt in section V(C)(1)(b) above.[1245] We note that there is a need for consistency between the line growth assumptions we make to calculate the weighted average discount, the sizing of the switch in estimating the vertical feature investment,

---

[1238] *Id*.

[1239] AT&T/WorldCom Ex. 12, at 105.

[1240] *Id*.

[1241] *Id*. at 104-05.

[1242] Verizon Ex. 122, at 190-91.

[1243] *See* AT&T/WorldCom Ex. 12, at 105.

[1244] 47 C.F.R. § 51.505(e).

[1245] *See supra* section V(C)(1)(b). In particular, to the extent that the additional investment includes "getting started" investment, we direct Verizon to use the discount we adopt for "getting started" investment, *see supra* section V(C)(1)(b)(i); to the extent that the additional investment includes other end-office switch investment, we direct Verizon to use the discount we adopt for that investment, *see supra* section V(C)(1)(b)(ii)(a); to the extent that the additional investment includes end-office switch trunk port or SS7 link investment, we direct Verizon to use the discount we adopt for that investment, *see supra* section V(C)(1)(b)(iii).

and the number of line ports over which to spread the investment. We therefore require that the investment calculated using the SCIS/IN module should reflect the specific, unique hardware to provide vertical features for a switch sized to accommodate the present value of the investments required for the number of lines installed on the switch over a 12-year period, assuming a 2.5 percent annual rate of line growth, and that these lines are installed every two years. We also require that the line port demand over which to spread this vertical feature investment reflect the present value of the investments required for the number of line ports demanded over a 12-year period, and for which the associated end-user buys these vertical features, assuming a 2.5 percent annual rate of line growth, and that line demand grows every year.

VI. INTEROFFICE TRANSPORT

494. Interoffice transport refers to the transmission facilities used to carry traffic between incumbent LEC or competitive LEC wire centers or switches. There are two primary forms of local interoffice transport: (1) dedicated transport, and (2) common or shared transport.[1246] Essentially, dedicated transport is interoffice transport that is dedicated to a particular carrier and common transport is interoffice transport that is shared by more than one carrier.[1247]

495. The Commission's TELRIC pricing rules apply to the rates charged when dedicated and common transport are offered as UNEs.[1248] The *Local Competition First Report and Order* and the Commission's rules, however, provide only general guidance on the proper manner for incumbent LECs to recover dedicated transport and common transport costs. The Commission's rules require that dedicated transport costs "be recovered through flat-rated charges."[1249] An incumbent LEC may recover common transport costs "through usage-sensitive charges, or in another manner consistent with the manner that the incumbent LEC incurs those costs."[1250]

496. In its universal service orders, the Commission provided additional guidance for determining an incumbent LEC's forward-looking transport costs. In its analysis of the common transport cost models in the *Platform Order*, the Commission found that "models should accommodate an interoffice network that is capable of connecting switches designated as hosts and remotes in a way that is compatible with the capabilities of equipment and technology that

[1246] Because the parties generally use the term common transport rather than shared transport, we do so as well in this order. *See, e.g.*, Verizon Ex. 100, Vol. VI, Part C-9, section 1.1 (Service Description) ("Common Transport is one of the Unbundled Elements available to CLECs.").

[1247] Rates for dark fiber transport and for entrance facilities are discussed *infra* in section IX.

[1248] 47 C.F.R. §§ 51.501 (TELRIC pricing rules apply to UNEs).

[1249] 47 C.F.R. §§ 51.507(b), 51.509(c); *see also Local Competition First Report and Order*, 11 FCC Rcd at 15874, para. 744.

[1250] 47 C.F.R. § 51.509(d); *see* 47 C.F.R. § 51.507(c).

are available today and are consistent with current engineering practices."[1251] The Commission concluded that both models presented at the time – the BCPM and HAI 5.0 – "assume the least-cost, most-efficient and reasonable technology to provide the supported [universal] services. . . [and both] interconnect switching facilities with state-of-the-art SONET rings."[1252] The Commission further concluded that the HAI model better satisfied the forward-looking pricing methodology than the BCPM model did. Specifically, the Commission found that the HAI model (1) was less complex than the BCPM, while still providing sufficient detail to determine accurately common transport costs, and (2) relied on data computations and assumptions that were more readily available for review and comment.[1253] The Commission then incorporated the HAI model common transport module into the SM.[1254] Notably, however, because the Commission was determining universal service costs, it did not address dedicated transport costs and cost models.

A. Cost Models

1. Positions of the Parties

497. Verizon submitted cost studies that generate rates for both common transport and dedicated transport.[1255] To generate rates for dedicated transport, Verizon determines the fixed, monthly investment costs and the per mile investment costs, assuming the use of SONET technology (including SONET add/drop multiplexers (ADMs) and digital cross-connects (DCSs)), and assuming a "reasonable" utilization rate (*i.e.*, fill factor).[1256] Verizon uses negotiated prices from its most recent vintage vendor contracts then available (*i.e.*, 1998 contracts) to determine the material prices, and applies loading factors, including the EF&I factor, and land and building factors to generate total installed investment.[1257] The VRUC system

[1251] *Platform Order*, 13 FCC Rcd at 21353, para. 72.

[1252] *Id.* at 21355, para. 76. SONET stands for Synchronous Optical Network, and generally refers to fiber optic transmission facilities that operate at bit rates from 51.84 mbps to 39.812 gbps. *See* NEWTON'S TELECOM DICTIONARY 684-685 (18th ed. 2002).

[1253] *Platform Order*, 13 FCC Rcd at 21355-57, paras. 77-80.

[1254] *Id.* at 21354-57, paras. 75-80; *see also Inputs Order*, 14 FCC Rcd at 20291-92, para. 321 ("In the *Platform Order*, we concluded that the federal mechanism should incorporate, with certain modifications, the HAI 5.0a switching and interoffice facilities module.").

[1255] *See* Verizon Ex. 107, at 212-21; Verizon Ex. 100P, Parts C-9 (common transport) and D-2 (dedicated transport) (confidential version).

[1256] Verizon Ex. 107, at 214-218; *see* Verizon Initial Cost Brief at 117-18.

[1257] Verizon Ex. 107, at 40-47, 216-18. Verizon uses its VCost system to apply the transport EF&I factor. Verizon Ex. 100, Vol. VII, Part D-2, section 1 (Study Overview), subsection 1.3 (Cost Study Methodology) at 1.

is then used to obtain per unit investments.[1258] The Verizon study subsequently populates circuit designs within the Verizon network and weights these designs by frequency of use to determine an average dedicated transport investment at the DS-0 level. Verizon determines higher levels of investments on a DS-0 equivalent basis.[1259] Finally, Verizon applies ACFs to each investment account.[1260]

498. Verizon generates the fixed per MOU common transport rates and the per mile common transport rates in the same manner that it generates dedicated transport rates. Indeed, Verizon imports the final DS-1 dedicated transport costs into its common transport study.[1261] The Verizon common transport study also imports trunk costs from the SCIS cost model.[1262] Verizon then derives the common transport MOU rates from the imported monthly costs by dividing these costs by the per trunk average number of MOUs.[1263] Concurrent with the filing of its revised switching cost study and its November 1, 2001 revised UNE rate proposal, Verizon submitted corrections to certain algorithms in its common transport study.[1264] These corrections caused its proposed per mile common transport rate to double.[1265]

499. AT&T/WorldCom criticize Verizon's common transport cost study as improperly based on the costs of Verizon's embedded SONET ring architecture, with forward-looking adjustments applied to this embedded base.[1266] AT&T/WorldCom argue, therefore, that Verizon does not attempt to model a forward-looking network design as required by TELRIC principles.[1267] AT&T/WorldCom allege, moreover, that Verizon's forward-looking adjustments are merely unsubstantiated opinions of its subject matter experts.[1268]

[1258] *Id.* at 41, 216-17. VRUC is a cable investment inventory containing data from actual property cost records on the cost and amount of outside plant units deployed. The data are maintained on an annual basis. *Id*. at 120. EF&I factors are applied to the materials-only equipment prices. *Id.* at 121. For interoffice transport, the VRUC database contains total installed investments for fiber cable, including engineering and installation costs. *Id*. at 41, 216-17.

[1259] *Id.* at 218.

[1260] *Id*.; Verizon Initial Cost Brief at 118; *see supra* section III(E) for a discussion of ACFs.

[1261] Verizon Ex. 100P, Vol. VI, Part C-9 (Common Transport), sections 1.2 (Cost Study Methodology) and 3 (Inputs) (confidential version); *see also* AT&T/WorldCom Initial Cost Brief at 195.

[1262] Verizon Ex. 100P, Vol. VI, Part C-9 (Common Transport), section 3 (Inputs) (confidential version).

[1263] Verizon Ex. 107, at 219.

[1264] *See* Verizon Ex. 180; Tr. at 5594-95 (admitting same into evidence).

[1265] *See* Tr. 5637-38.

[1266] AT&T/WorldCom Initial Cost Brief at 193.

[1267] *Id.*

[1268] *Id*. (citing Tr. at 5628).

500. AT&T/WorldCom affirmatively propose using the MSM to generate TELRIC-compliant rates for common transport only.[1269] The MSM contains a switching and interoffice transport module.[1270] This module, like the Verizon cost study, assumes the use of SONET ring technology and network architecture.[1271] It models a network of two classes of rings: host/remote and tandem/host/standalone.[1272] As inputs, the module uses the total line count for every wire center; the distance between switches; peak traffic assumptions; and the distribution of local intraoffice, local interoffice, intraLATA toll, interexchange access, and operator services traffic.[1273] Calling minutes and volumes data inputs are derived from ARMIS data.[1274] The PNR database is used to provide line counts for the serving areas (each associated with a particular wire center), as well as wire center locations and interoffice distances.[1275] The module determines the traffic per subscriber based on the traffic assumptions and calculates the number of trunks necessary to carry this volume of traffic.[1276] Finally, the module uses an optimizing algorithm to ensure the modeling of the efficient construction of SONET rings.[1277]

501. To generate rates for dedicated transport, AT&T/WorldCom propose starting with the Verizon cost study,[1278] but correcting certain cost inputs, which will thereby enable the

[1269] *See* Tr. at 5551, 5559-62, 5599; AT&T/WorldCom Initial Cost Brief at 188-89; *see also* AT&T/WorldCom Ex. 7, at 3; Verizon Initial Cost Brief at 173.

[1270] *See* AT&T/WorldCom Ex. 14, Attach. A; AT&T/WorldCom Ex. 23, HAI Model Release 5.0a at 53-63 ("Switching/Transport module"); AT&T/WorldCom Initial Cost Brief at 188. Although AT&T/WorldCom filed an updated version of their common transport study later in the proceeding, *see* Keffer Dec. 12 Letter, Install A, the general model descriptions provided in the initial cost model filing remain the same.

[1271] AT&T/WorldCom Ex. 23, Switching/Transport module at 59.

[1272] *Id.*

[1273] *Id.* at 54; *see* AT&T/WorldCom Initial Cost Brief at 193.

[1274] AT&T/WorldCom Ex. 23, Switching/Transport module at 54.

[1275] *Id.* PNR Associates, the supplier of the PNR database, is now TNS Telecoms. *See* TNS Telecoms, *Notification Page* (visited Mar. 5, 2003) < http://www.indetec.com>. In the *Inputs Order*, the Commission adopted PNR's road surrogating algorithm to develop customer number and location data. *Inputs Order*, 14 FCC Rcd at 20176-20817, paras. 40-62.

[1276] AT&T/WorldCom Ex. 23, Switching/Transport module at 59.

[1277] *Id.* at 60.

[1278] AT&T/WorldCom Initial Cost Brief at 188-89; *see also* Tr. at 5562-63, 5599. AT&T/WorldCom claim that the MSM does not model dedicated transport, entrance facilities, or dark fiber transport. Rather, the MSM generates only per minute costs per DS-0 equivalent for dedicated transport. *See* AT&T/WorldCom Initial Cost Brief at 188. AT&T/WorldCom concede that these costs are not readily translated into fixed monthly costs, as required by the Commission's rules. *Id.*; 47 C.F.R. § 51.509(c). Thus, AT&T/WorldCom do not propose using the MSM to generate rates for dedicated transport elements.

Verizon study to generate TELRIC-compliant dedicated transport rates.[1279] The specific flaws that AT&T/WorldCom claim require correction are discussed individually, below.[1280]

502. Verizon claims that the MSM transport module is fundamentally incapable of generating forward-looking UNE rates and that the flaws in the MSM are not subject to any cure short of rejecting the model outright.[1281] Verizon alleges that the AT&T/WorldCom module is flawed for the following reasons: (1) it assumes a network inconsistent with Verizon's actual network in Virginia;[1282] (2) it relies on incorrect demand data;[1283] (3) it underestimates trunk counts;[1284] (4) it improperly determines the busy hour;[1285] (5) it fails to include capitalized labor costs that are necessary to account for circuit design, central office translations, and pre-activation testing;[1286] (6) it understates OC-3 multiplexing investments;[1287] (7) it understates investments for remote switches;[1288] (8) it fails to include any investment for umbilical cable between host and remote switches;[1289] (9) it improperly drops two wire centers;[1290] (10) it fails to optimize inputs and outputs with the loop module;[1291] and (11) it uses improper SONET electronics prices.[1292]

[1279] AT&T/WorldCom Initial Cost Brief at 180; *see also* Tr. at 5559-63, 5599.

[1280] *See infra* sections VI(B)-(D); AT&T/WorldCom Ex. 12. at 127, 137-38; AT&T/WorldCom Initial Cost Brief at 189-92; AT&T/WorldCom Reply Cost Brief at 94-96.

[1281] Verizon Ex. 163, at 8-9, 21, 24; Verizon Ex. 108, at 53-54.

[1282] Verizon Ex. 163, at 9-10, 13; Verizon Ex. 108 at 53-54; Verizon Initial Cost Brief at 121.

[1283] Verizon Ex. 109, at 57, 60; *see* Verizon Ex. 108, at 54.

[1284] Verizon Ex. 109, at 57-60, 64-65.

[1285] *See id.* at 50-51, 53-55.

[1286] *Id.* at 59.

[1287] Verizon Ex. 162, at 12-15; *but see* Verizon Ex. 109, at 65, *as modified by* Verizon Ex. 171 (Updated Calculations (Switching and IOF) in the Rebuttal Testimony of Francis J. Murphy) at 2 (The MSM, "with the AT&T/WorldCom changes, no longer understates ADM and DCS investment."); *see also* Tr. at 5634-35.

[1288] Verizon Ex. 162, at 11-15; *see* Tr. at 5606-07.

[1289] Verizon Ex. 163, at 15-17.

[1290] *Id.* at 8, 20-21.

[1291] Verizon Ex. 162, at 9.

[1292] *Id.* at 10 (citing Letter from William Jordan, Vice President, Federal Regulatory, BellSouth, to Magalie Roman Salas, Secretary, Federal Communications Commission, CC Docket Nos. 96-45 and 97-160 (filed Aug. 7, 1998)).

2. Discussion

503. *Dedicated Transport.* We adopt the Verizon dedicated transport cost study to establish dedicated transport rates. Because both Verizon and AT&T/WorldCom support use of the Verizon model to generate rates for dedicated transport, no controversy exists regarding the choice of cost model for this element.[1293] We analyze the appropriate forward-looking inputs that should be used in the Verizon model below.[1294] Verizon's dedicated transport study, moreover, complies with core TELRIC principles. Most notably, it assumes the deployment of the most efficient technology currently available for interoffice transport – fiber optic rings based on SONET technology.[1295]

504. *Common Transport.* We adopt the Verizon cost study to generate rates for common transport.[1296] We find the Verizon common transport cost study preferable to the MSM transport module because the Verizon study is the same basic study that we adopt for dedicated transport rates, and because it models a lower-cost, efficient network design based on available technology than does the MSM.

505. The key principle underlying TELRIC is that UNE prices should reflect the cost of the network that would exist in a competitive market (*i.e.*, the most efficient network using currently available technology).[1297] Both the MSM and the Verizon cost study are consistent with this core TELRIC principle. Specifically, both models assume that the transport network consists of fiber optic rings connecting circuit equipment based on SONET technology.[1298] In addition, both models are suitably transparent, with the user able to adjust the inputs. Both sides also agree that an optimal transport study would consider the actual traffic flows among the various nodes. Neither side, however, presents such a study because, they agree, such a study is not feasible.[1299] Consequently, we are presented with two admittedly imperfect, but TELRIC-

---

[1293] *See Local Competition First Report and Order*, 11 FCC Rcd at 15812, para. 618.

[1294] *See infra* sections VI(B)-(D).

[1295] *See* Verizon Ex. 107, at 214-18.

[1296] Common transport appears to be the one element for which Verizon proposes a lower rate than do AT&T/WorldCom. Despite this, the parties were unable to reach agreement on the rates for common transport. Tr. at 5551-53.

[1297] *See Local Competition First Report and Order*, 11 FCC Rcd at 15846, para. 679.

[1298] Verizon Ex. 107, at 214-18; AT&T/WorldCom Ex. 23, Switching/Transport module at 59.

[1299] Verizon Ex. 163, at 9 ("The data needed to design a whole SONET network at one time, accounting for the node-to-node circuit demand, is extraordinarily large and essentially unreliable for purposes of a model, because the demand constantly varies. Moreover, even if the data could be created, the required computations would be unmanageably large."); AT&T/WorldCom Initial Cost Brief at 194 ("A principal complaint by Verizon of the [MSM] is that it does not take into account the point-to-point traffic in developing facilities. But this criticism applies equally to Verizon's cost model."); *see also* Tr. at 5548, 5585-93.

compliant, common transport cost studies from which to choose.[1300]

506. As a practical matter, the network deployed to provide common transport is the same as the network deployed to provide dedicated transport. The difference lies not in the network configuration so much as in the particular UNE leased by, and the rate paid by, the competitive carrier. Dedicated transport is charged on a flat-rate basis, whereas common transport rates are usage-based.[1301] Consequently, consistency suggests use of the same model to calculate both dedicated and common transport rates, absent evidence that a model complies with the Commission's rules for one transport element, but not the other. No party has offered the MSM for both dedicated and common transport. Rather, both sides agree – and we have found – that the Verizon cost study should be used to establish dedicated transport rates. Verizon's common transport study is based on its dedicated transport study. Indeed, the Verizon common transport study imports many of its costs from the Verizon dedicated transport study.[1302] The primary difference between the two studies is the process by which the common transport study converts transport costs to per MOU rates. Accordingly, because (1) we find (and AT&T/WorldCom agree) that the Verizon study should be used to set TELRIC-compliant dedicated transport rates, (2) the Verizon common transport study is based on the Verizon dedicated transport study, and (3) AT&T/WorldCom do not challenge the process that Verizon uses to convert transport costs to common transport per MOU rates,[1303] we adopt the Verizon common transport cost study.[1304]

507. AT&T/WorldCom's critique of the Verizon common transport study fails to show that the Verizon study does not comply with the Commission's rules. AT&T/WorldCom's primary criticism of the Verizon study is that it uses Verizon's existing network as a starting point for calculating costs, rather than following a reconstructed network approach.[1305] Given the similarities between the Verizon and the AT&T/WorldCom models, the argument essentially is that the existing network design used by Verizon is less efficient than the reconstructed network design modeled by the MSM.

508. We find AT&T/WorldCom's argument unconvincing. First, although a reconstructed network design may be more efficient than the existing incumbent LEC network

---

[1300] *See* AT&T/WorldCom Initial Cost Brief at 195 ("The interoffice module of the [MSM] is by no means perfect, but it provides an appropriate, if conservative, estimate of transport costs.").

[1301] *See* 47 C.F.R. § 51.509(c), (d).

[1302] *See* Verizon Ex. 100P, Vol. VI, Part C-9 (Common Transport), sections 1.2 (Cost Study Methodology) and 3 (Inputs) (confidential version).

[1303] AT&T/WorldCom Initial Cost Brief at 195.

[1304] Because we determine not to use the MSM to set common transport rates, we need not (and therefore do not) address Verizon's criticisms, or AT&T/WorldCom's responses thereto, of the MSM transport module.

[1305] *Id.* at 193.

because the embedded network may not deploy the most efficient current technology, in this specific instance the existing network modeled by Verizon deploys SONET transport technology, which both sides argue is efficient and currently available. Indeed, this is the same technology modeled by AT&T/WorldCom in the MSM. Because the existing network modeled by Verizon uses the technology that would be deployed in a competitive market, we cannot conclude that the network modeled by Verizon reflects a less efficient design than would exist in a competitive market. Second, the additional concerns raised by AT&T/WorldCom are largely input issues (*e.g.*, the number of nodes per ring, the EF&I factor), rather than modeling issues. AT&T/WorldCom implicitly concede that, with appropriate inputs (which we address below), the Verizon common transport cost study is capable of modeling a forward-looking transport network.[1306] Finally, a simple comparison of the costs and rates produced by the two models supports the finding that the Verizon study results in the "lowest cost network configuration," as required by the Commission's rules.[1307] Because Verizon has incentives to overstate rather than understate the cost of providing network elements, and because Verizon's common transport cost study satisfies the Commission's other criteria (*e.g.*, transparency; use of efficient, currently available technology), the fact that Verizon's cost study produces a lower cost estimate[1308] indicates that its study better reflects a lower cost network configuration for common transport than does the MSM. Accordingly, we conclude that the Verizon cost study is the better choice for calculating common transport costs and rates.

B. Dedicated Transport Rate Structure – Digital Cross-Connect Systems and Multiplexing Equipment

1. Positions of the Parties

509. The parties disagree whether DCS or multiplexing equipment should be included in the costs, and hence the rates, for dedicated transport. Verizon proposes including the costs for DCS and multiplexing in the calculation of dedicated transport costs.[1309] It claims that DCS and multiplexing are integral parts of dedicated transport.[1310] Verizon also claims that it is under no obligation to offer either DCS or transport multiplexing as a stand-alone UNE, and therefore it need not price either on a stand-alone basis.[1311] AT&T/WorldCom claim that they should be able to order dedicated transport with or without DCS or multiplexing, and that we should establish different rates for multiplexing, for DCS, and for dedicated transport inclusive and exclusive of multiplexing and/or

[1306] *See id.* at 195.

[1307] *See* 47 C.F.R. § 51.505(b)(1).

[1308] *See* AT&T/WorldCom Initial Cost Brief at 188, Attach. at 3.

[1309] Verizon Ex. 122, at 159-61.

[1310] *Id.* at 159-60; *see also* Tr. at 5617-19.

[1311] Verizon Ex. 122, at 159-60.

DCS.[1312]

2. Discussion

510. We find that dedicated transport rates should be established separately for dedicated transport that includes both DCS and multiplexing, that includes each individually, and that includes neither. We decline to establish separate stand-alone rates for DCS or multiplexing.

511. We base these findings on our determinations in the *Non-Cost Arbitration Order*. There, we found that Verizon is not required to make available DCS or transport multiplexing as stand-alone UNEs, but that Verizon must make available dedicated transport both with and without DCS and/or multiplexing.[1313] Consistent with this determination, we require that Verizon, in its compliance filing, establish rates for dedicated transport (at each capacity level (*e.g.*, DS-1, DS-3, STS-1, OCn)) in the following manner: (1) including DCS and multiplexing; (2) including DCS only; (3) including multiplexing only; and (4) including neither DCS nor multiplexing.

C. Number of Nodes per SONET Ring and Number of Ports per Node

1. Positions of the Parties

512. Verizon assumes the use of OC-48 SONET rings, which have a capacity of 48 DS-3s, as the basis for its dedicated transport cost study.[1314] Because each DS-3 requires two ports, each ring has 96 ports.[1315] Although Verizon's current network in Virginia averages 3.79 nodes per OC-48 ring, Verizon estimates that on a forward-looking basis it will average six nodes per OC-48 ring.[1316] This assumption results in 16 ports per node (96 / 6 = 16).[1317] Verizon uses its forward-looking estimate of six nodes per ring to determine the flat-rate monthly recurring dedicated transport rates.[1318] Verizon uses the existing 3.79 figure to establish the per mile dedicated transport rate.[1319]

513. AT&T/WorldCom agree that Verizon's assumption of OC-48 SONET rings, with 48

[1312] AT&T/WorldCom Ex. 12, at 125, 132-40; Tr. at 5612-19; AT&T/WorldCom Initial Cost Brief at 190-91.

[1313] *See Non-Cost Arbitration Order*, 17 FCC Rcd at 27279-86, paras. 492-506; *see also id.* at 27142-46, paras. 210-17.

[1314] Verizon Ex. 122, at 149-50; *see* Verizon Initial Cost Brief at 118.

[1315] Verizon Ex. 122, at 149.

[1316] *Id.* at 149-52; Verizon Initial Cost Brief at 118-20.

[1317] Verizon Ex. 122, at 150.

[1318] *Id.* at 149; Verizon Initial Cost Brief at 118.

[1319] *See* Verizon Ex. 122, at 154-55; Tr. at 5622.

DS-3s per ring and 96 ports per ring, is reasonable,[1320] but they do not agree with Verizon's assumption of six nodes per ring. Rather, AT&T/WorldCom argue that the number of nodes per ring will decrease in a forward-looking environment from the number of nodes per ring today.[1321] They do not, however, propose a reduced number. Instead, they propose using the number of nodes in Verizon's network today, 3.79.[1322] This figure is consistent with number of nodes per SONET ring that Verizon has on its actual networks in New York and Massachusetts.[1323] Using 3.79 as the number of nodes, AT&T/WorldCom calculate the number of ports per node to be approximately 26.[1324] AT&T/WorldCom also claim that Verizon made equivalent errors in calculating the number of ports per node for STS-1 and OC-3 dedicated transport. AT&T/WorldCom propose that the number of ports per node for these transport facilities should be 26 and 9, respectively.[1325]

2. Discussion

514. We adopt AT&T/WorldCom's position. In re-running its transport cost studies, we require Verizon to assume 3.79 nodes per OC-48 SONET ring. We also require Verizon to assume 26 ports per node for OC-48 SONET rings and STS-1 capacity dedicated transport, and 9 ports per node for OC-3 dedicated transport.

515. These are the only conclusions supported by the record. Both sides agree that 3.79 nodes represent the average number of nodes per OC-48 SONET ring in Verizon's network in Virginia today.[1326] Although data from Verizon's existing network may not be the best source of data to use in determining TELRIC rates, it is the only objective data before us on this issue.[1327] When asked directly by Commission staff to identify the objective support for assuming six nodes instead of 3.79, Verizon merely responded that six was the forward-looking estimate provided by its

[1320] AT&T/WorldCom Ex. 12, at 126.

[1321] *Id.* at 129-30 n.122; Tr. at 5630-32.

[1322] AT&T/WorldCom Ex. 12, at 127; AT&T/WorldCom Initial Cost Brief at 189-90.

[1323] Tr. at 5630-31; AT&T/WorldCom Initial Cost Brief at 189-90.

[1324] AT&T/WorldCom Ex. 12, at 127, 129 n.121 (explaining their calculations).

[1325] *Id.* at 131.

[1326] Tr. at 5628-29; Verizon Reply Cost Brief at 94-95; AT&T/WorldCom Initial Cost Brief at 189; AT&T/WorldCom Reply Cost Brief at 95. Verizon claims in its surrebuttal testimony that the 3.79 figure is too low because it does not include nodes located outside Virginia that are on rings that are located in both Virginia and other states (*e.g.*, a ring that traverses both Virginia and Maryland). Verizon Ex. 122, at 151, *as modified by,* Verizon Ex. 179 (Errata to Recurring Cost Panel Surrebuttal), at 1. Verizon, however, provides no detailed explanation of how such rings and their associated nodes factor into its cost model. Moreover, Verizon fails to provide a recalculation of the 3.79 figure that would have corrected for this issue, and, as discussed in more detail below, Verizon uses the 3.79 node input in determining the per mile dedicated transport rates.

[1327] *See* Verizon Ex. 122, at 155.

experts.[1328] Verizon fails to provide any additional support for its supposition.[1329] In addition, AT&T/WorldCom claim that a forward-looking network would utilize fewer nodes per ring than are used today, not more as Verizon claims.[1330] Verizon's unsupported statements fail to demonstrate that the number of nodes per ring would increase in a forward-looking network. Because neither side provides us with valid support for a number of nodes other than the 3.79 existing in Verizon's network today, and because AT&T/WorldCom propose to use the 3.79 figure, we have no basis to use any figure other than 3.79. This is particularly true in light of our previous conclusion that the Verizon cost study and the actual Verizon transport network reflect forward-looking transport technology (*i.e.*, SONET).

516. Verizon's use of six nodes to calculate the monthly recurring dedicated transport rates, moreover, is inconsistent with its use of 3.79 nodes to calculate the dedicated transport mileage rate. Verizon attempts to explain this discrepancy by claiming (1) that it needs to use the existing node locations for mileage calculations in order to take into account the physical attributes of the existing network (such as geography), but (2) that these considerations are immaterial to determining the proper forward-looking electronic configuration.[1331] We find Verizon's argument unpersuasive. If actual, current local conditions require Verizon to calculate its forward-looking mileage costs using the current number and location of nodes, then Verizon must also take these same factors into account in calculating the forward looking electronic configuration of its rings. This Verizon fails to do. Conversely, if Verizon's forward-looking network would have, on average, six nodes per ring, then this same assumption must apply when calculating mileage rates. Thus, we conclude that Verizon inappropriately models two different dedicated transport networks, one to determine the monthly recurring rates and one to determine the distance (*i.e.*, per mile) rates.

517. In addition, Verizon claims that many of the inputs and assumptions in its model are interrelated and that one input or assumption cannot be changed without altering numerous others. Specifically, Verizon claims that all of the following inputs and assumptions are interrelated: the number of nodes, the average load on the ring, and the amount of interconnection between rings.[1332] Verizon fails, however, to provide any alternative inputs in the event that we determine, as we do here, that AT&T/WorldCom propose a more appropriate input for the number of nodes per ring. Therefore, because no record exists on which to change any of these related inputs, we do not alter them.

518. Finally, we note that, although the parties discuss this issue in their testimony only with respect to dedicated transport, the issue is also relevant to the rates generated by

[1328] Tr. at 5626-28; *see also* Verizon Ex. 107, at 155.

[1329] AT&T/WorldCom Reply Cost Brief at 95.

[1330] Tr. at 5631-32.

[1331] Verizon Ex. 122, at 154-55; Tr. at 5628-29; *see* Verizon Initial Cost Brief at 119.

[1332] Verizon Ex. 122, at 152-54; Tr. at 5633.

Verizon's common transport study. Indeed, as stated above, the Verizon common transport study itself is based on the Verizon dedicated transport study. Therefore, we require that the AT&T/WorldCom proposal of 3.79 nodes per ring be used in the Verizon dedicated transport cost study, and in the relevant inputs imported into the Verizon common transport study from the dedicated transport study.[1333]

D. EF&I Factor

1. Positions of the Parties

519. Verizon proposes an EF&I factor for transport of 53.2 percent.[1334] The EF&I factor is one method Verizon uses to arrive at the "total cost installed" of facilities and equipment when the contract price for facilities or equipment purchased by Verizon from third party suppliers does not include the engineering, furnishing and installation costs.[1335] Among the facilities to which the Verizon cost studies apply an EF&I factor is interoffice transport.[1336] Verizon applies an EF&I factor only to those investments for which the data in the VRUC database do not include engineering, furnishing and installation costs with the investment amounts.[1337] Verizon relies on data contained in its Detailed Continuing Property Record (DCPR) database to calculate the EF&I factor.[1338] The DCPR database contains material costs and in-place costs for each piece of equipment.[1339] To calculate the EF&I factor, Verizon divides the sum of the total material-only investments in a plant account (*e.g.*, SONET equipment) by the sum of the total installed investment in that account.[1340] Verizon adjusts the EF&I factor upward to ensure that the costs for engineering, furnishing and installation remain constant when material prices decline as a result of forward-looking assumptions (*i.e.*, Verizon assumes that labor costs remain constant even if material costs decline, thus increasing the EF&I factor).[1341] Verizon develops its EF&I factors on a region-wide basis for the entire Verizon East footprint, based on the classes of equipment being placed rather

[1333] *See* AT&T/WorldCom Initial Cost Brief at 195 ("If the Commission decides to use Verizon's common transport costs, however, those costs were developed using the same underlying cost elements set forth in Verizon's dedicated transport cost study, and accordingly the same adjustments proposed by AT&T and WorldCom should therefore be made to the common transport costs.").

[1334] Verizon Initial Cost Brief at 122.

[1335] Verizon Ex. 107, at 40.

[1336] *Id.* at 41, 217.

[1337] *Id.* at 41. Verizon claims to develop EF&I factors for digital circuit equipment, the digital switch, and SONET circuit and other terminal equipment. Verizon Initial Cost Brief at 56 n.54.

[1338] Verizon Ex. 107, at 42.

[1339] Tr. at 4632-33; *see* Verizon Ex. 107, at 42.

[1340] Verizon Ex. 107, at 42; Tr. at 5080-83.

[1341] Verizon Ex. 107, at 42-43.

than the specific equipment installed, and based on actual 1998 accounting data.[1342] The EF&I factor applied to a particular piece of equipment is thus the average factor for the entire plant account, assigned on a *pro rata* basis to the individual piece of equipment.[1343] Verizon uses its VCost system to apply the transport EF&I factor.[1344]

520. AT&T/WorldCom claim that the 53.2 percent transport EF&I factor proposed by Verizon is unreasonable when compared to those adopted in other states, including New York.[1345] They contend that Verizon fails to identify separately the installation and miscellaneous costs that it uses to calculate the transport EF&I factor.[1346] AT&T/WorldCom instead propose using the transport EF&I factor that Verizon proposed in New York and that was adopted by the New York Commission – 36.4 percent.[1347]

521. Verizon objects to what it perceives as AT&T/WorldCom's unsupported attack on the credibility of its presentation.[1348] Verizon admits that the DCPR database is not accurate for individual pieces of equipment, but it claims that the database is accurate in the aggregate.[1349] Verizon also claims that the New York EF&I figure is inapposite because the that figure is based on 1997 data and the Virginia figure is based on 1998 data.[1350] Moreover, Verizon maintains that, because equipment costs will decrease over time, but installation costs will not, the EF&I factor will increase over time.[1351]

2. Discussion

522. We find that, although we have some concerns about both Verizon's and AT&T/WorldCom's proposals, the Verizon proposal is the better of the two proposals because it relies on more recent vintage data. Therefore, under the baseball arbitration rules,[1352] we adopt

[1342] *Id.* at 44; Verizon Initial Cost Brief at 122-23; Verizon Reply Cost Brief at 96.

[1343] Verizon Ex. 107, at 44; Tr. at 5080-83; *see* Verizon Initial Cost Brief at 57.

[1344] Verizon Ex. 100, Vol. VII, Part D-2, section 1 (Study Overview), subsection 1.3 (Cost Study Methodology) at 1.

[1345] AT&T/WorldCom Ex. 12, at 138; AT&T/WorldCom Initial Cost Brief at 191-92.

[1346] AT&T/WorldCom Ex. 12, at 137-38.

[1347] *Id.* at 138; AT&T/WorldCom Initial Cost Brief at 192.

[1348] Verizon Initial Cost Brief at 96-97.

[1349] Verizon Ex. 107, at 44; Tr. at 5080-83.

[1350] Verizon Ex. 122, at 158-59; Verizon Initial Cost Brief at 96-97.

[1351] Verizon Ex. 122, at 158-59; Verizon Initial Cost Brief at 96-97.

[1352] *See supra* section II(C).

Verizon's proposed transport EF&I factor.

523. There is some doubt about the reliability of both Verizon's and AT&T/WorldCom's proposed EF&I factors. Our concerns stem from the fact that the EF&I factor for a specific piece of equipment is derived by applying to the equipment an unsupported *pro rata* share of the cost of installing all equipment associated with that account.[1353] As a result, the relationship between the actual installation costs associated with particular pieces of equipment and the installation estimates used to determine the EF&I factor is unclear. The actual costs may be less than or greater than the *pro rata* allocation. Verizon's claim that the lack of accuracy of the individual in-place costs is not relevant because the factor is calculated on an aggregate basis[1354] may not resolve this issue because the *pro rata* allocation appears to bear no relationship to the EF&I costs associated with any particular type of equipment within an account.[1355] In addition, we were unable to identify individual SONET equipment for which the in-place costs in the DCPR database were actually 1.532 times the material costs or how the VCost system applies the transport EF&I factor. Because both Verizon's and AT&T/WorldCom's proposals rely on Verizon's EF&I methodology, our methodological concerns apply equally to both proposals.

524. Although both sides use the same general approach, the Verizon proposal is superior because it uses more recent vintage data. Specifically, Verizon relies on 1998 vendor contracts,[1356] whereas the Verizon New York factor proposed by AT&T/WorldCom uses 1997 data.[1357] We reject AT&T/WorldCom's assertion that the 1997 data is somehow superior to the 1998 data used by Verizon here. First, their claim that the New York Commission endorsed the use of the 1997 data[1358] is misleading. Our review of the relevant New York orders indicates that the transport EF&I factor was not contested in that proceeding, and, therefore, that the New York Commission did not directly address this issue.[1359] AT&T/WorldCom thus offer no valid reason for us to reject Verizon's 1998 data in favor of older 1997 data.[1360]

[1353] Verizon Ex. 107, at 42, 44; Tr. at 5080-81.

[1354] Verizon Ex. 107, at 44; Tr. at 5080-83; *see* Verizon Initial Cost Brief at 57.

[1355] Verizon Ex. 107, at 42, 44; Tr. at 5080-83.

[1356] Verizon Ex. 107, at 44; Verizon Initial Cost Brief at 122-23; Verizon Reply Cost Brief at 96.

[1357] AT&T/WorldCom Ex. 12, at 138; AT&T/WorldCom Initial Cost Brief at 192.

[1358] AT&T/WorldCom Ex. 12, at 138; AT&T/WorldCom Initial Cost Brief at 192.

[1359] *See Proceeding on Motion of the Commission to Examine New York Telephone Company's Rates for Unbundled Network Elements*, Case 98-C-1357, Recommended Decision of Administrative Law Judge Joel A. Linsider on Module 3 Issues (New York Commission May 16, 2001), *modified in part*, *New York Commission Pricing Decision*.

[1360] *Cf. Investigation by the Department of Telecommunications and Energy on its Own Motion into the Appropriate Pricing, based upon Total Element Long-Run Incremental Costs, for Unbundled Network Elements and Combinations of Unbundled Network Elements, and the Appropriate Avoided-Cost Discount for Verizon New* (continued….)

525. Second, Verizon is correct that, as material costs decline, the EF&I factor should increase.[1361] We agree with Verizon that, while transport material costs have been declining in recent years, transport EF&I costs, which are largely driven by labor costs, have not.[1362] If EF&I costs remain fairly constant while material costs decline, then the EF&I factor will, as a mathematical matter, increase. Although we note that Verizon's proposed EF&I factor increased considerably from the 36.4 percent proposed in New York to the 53.2 percent proposed here,[1363] we find reasonable Verizon's explanation that its transport EF&I factor should have increased when more recent, lower, 1998 cost data are used, particularly when presented with no countervailing data by AT&T/WorldCom.

526. Accordingly, we adopt the 53.2 percent transport EF&I factor that Verizon proposes. Further, we note, just as we noted in the nodes per ring section,[1364] that although the parties discuss the transport EF&I factor in their testimony only with respect to dedicated transport, the issue is also relevant to the rates generated by Verizon's common transport study. Indeed, as stated above, the Verizon common transport study itself is based on the Verizon dedicated transport study. Therefore, we adopt the Verizon transport EF&I factor for use in both the Verizon dedicated and common transport studies.[1365]

(Continued from previous page)
England, Inc. d/b/a Verizon Massachusetts' Resale Services in the Commonwealth of Massachusetts, Docket No. 01-20, Order at 342 (Massachusetts Commission Jul. 11, 2002) (Massachusetts Department rejecting the AT&T proposal to determine the transport EF&I factor based on 1997 data rather than 1998 data) (*Massachusetts Commission Pricing Decision*).

[1361] Verizon Ex. 122, at 158-159; Verizon Initial Cost Brief at 96-97.

[1362] Verizon Ex. 122, at 158-159; Verizon Initial Cost Brief at 96-97.

[1363] We find the amount of the increase particularly troubling because Verizon calculates its EF&I factor on a region-wide basis for the entire Verizon East footprint, including both Virginia and New York. *See* Verizon Ex. 107, at 44.

[1364] *See supra* section VI(C).

[1365] *See* AT&T/WorldCom Initial Cost Brief at 195 ("If the Commission decides to use Verizon's common transport costs, however, those costs were developed using the same underlying cost elements set forth in Verizon's dedicated transport cost study, and accordingly the same adjustments proposed by AT&T and WorldCom should therefore be made to the common transport costs.").

VII. ACCESS TO OSS

A. Background

527. In the *Local Competition First Report and Order*, the Commission required incumbent LECs to provide access to their OSS on an unbundled basis pursuant to section 251(c)(3).[1366] Specifically, the Commission required incumbent LECs to provide nondiscriminatory access to the systems used for pre-ordering, ordering, provisioning, maintenance and repair, and billing.[1367]

B. Positions of the Parties

528. Verizon proposes a recurring charge for Access to OSS of $.84 per month per competitive LEC line. Verizon seeks to recover two types of costs through this charge: (1) initial development costs to make access to Verizon's OSS possible; and (2) the associated recurring capital costs and ongoing maintenance expenses associated with provisioning OSS access on an ongoing basis.[1368] The development costs identified by Verizon are costs to modify Verizon's pre-existing "core" systems and to develop new "middleware" systems and interfaces necessary to provide competitors with access to the core systems.[1369] The ongoing recurring costs identified by Verizon are costs incurred to maintain and update the software and hardware used to provide competitive LECs with access to Verizon's OSS.[1370] In support of its proposal, Verizon provides extensive testimony regarding the changes it made to its existing OSS and the new systems it developed in order to provide access to competitive LECs.[1371]

529. Verizon's cost study identifies development costs attributable to Virginia operations based on its claimed actual region-wide costs that Verizon incurred from 1996 through 1999, which it projects forward using productivity and inflation adjustments.[1372] Verizon allocates region-wide costs to Virginia based on the percentage of access lines located in Virginia.[1373] Verizon identifies $227 million in region-wide development costs, of which $22.7

[1366] *Local Competition First Report and Order*, 11 FCC Rcd at 15763, para. 516.

[1367] *Id.* at 15766-67, para. 523.

[1368] Verizon Ex. 107, at 242-43. After 10 years, the development costs would be fully recovered and the recurring charge would fall to $.47 per line per month. *Id.* at 295-96.

[1369] *Id.* at 273.

[1370] *Id.* at 284.

[1371] *Id.* at 254-72.

[1372] *Id.* at 275-76.

[1373] *Id.* at 245-46.

million is allocated to Virginia.[1374] Although the core systems are used by both Verizon and the competitive LECs, Verizon asserts that none of the development costs identified in its cost study resulted in improvements to the basic functioning of the core systems for Verizon's own use.[1375]

530. Verizon also identifies ongoing recurring costs attributable to Virginia.[1376] As with the development costs, these costs were incurred on a region-wide basis and allocated to Virginia operations.[1377] Verizon identifies $50 million in region-wide ongoing costs, of which $4.9 million is allocated to Virginia.[1378] The ongoing costs reflect the annual carrying cost of capital investment needed for the general purpose computer equipment used to provide competitive LECs with access to OSS. The ongoing costs also reflect maintenance expenses for work done to improve software performance and correct operational faults. Verizon assumes that the annual maintenance cost for a system is 15 percent of the initial development cost.[1379] As with development costs, Verizon asserts that these ongoing costs are completely separate from the costs it incurs to maintain the core OSS for its own retail use.[1380] To avoid double recovery, Verizon removed $48 million in ongoing expenses from its calculation of ACFs.[1381]

531. Although Verizon presents separate estimates of its development costs and ongoing costs, it does not actually distinguish between these two categories in its internal accounting systems.[1382] Instead, Verizon assumes that all OSS expenses for 1996 and 1997 were related to development work. For 1998, Verizon assumes that an amount equal to 15 percent of 1996 and 1997 investments represents maintenance of the systems installed in 1996 and 1997, and that the remaining expense is attributable to development work.[1383] Similarly, an amount equal to 15 percent of development work for 1996, 1997, and 1998 is assumed to represent maintenance of the systems installed in those years. Verizon states that the 15 percent factor is

[1374] *Id.* at 245.

[1375] *Id.* at 244; Tr. at 3972-73.

[1376] Verizon Ex. 107, at 245.

[1377] *Id.* at 245-46.

[1378] *Id.* at 245.

[1379] *Id.* at 288-89.

[1380] *Id.* at 244.

[1381] *Id.* at 66; Verizon Ex. 122, at 245. We discuss this adjustment in greater detail in our discussion of ACFs. *See supra* section III(E)(3)(c).

[1382] Verizon Ex. 107, at 276.

[1383] *Id.* at 277; Tr. at 3927-28.

supported by independent industry sources.[1384]

532. Verizon asserts that its actual OSS costs for 1996-1999 represent the forward-looking costs of providing access to OSS because they were incurred fairly recently and have been adjusted forward to reflect productivity and inflation. Verizon also states that the systems at issue were developed with input from AT&T/WorldCom and other competitive LECs and that most of these systems are still in use today.[1385] Verizon proposes to recover both the development costs and the ongoing recurring costs through a single monthly recurring charge to competitive LECs. Verizon calculates the proposed charge by spreading the total cost over the number of UNE loops, platform/combinations, and resold lines that are forecasted to be in service in Virginia over a 10-year period.[1386]

533. AT&T/WorldCom propose a fundamentally different approach to recovery of OSS-related costs. They characterize Verizon's initial development costs as "competition onset" costs that are attributable to the transition from a monopoly to a competitive environment.[1387] AT&T/WorldCom argue that these costs are not caused by competitive LECs and therefore should not be recovered through UNE charges. They further suggest that imposing these costs on competitive LECs would not be competitively neutral because competitive LECs also incur their own costs in order to use Verizon's systems.[1388] To reflect the unique nature of these development costs, AT&T/WorldCom's primary proposal is that all companies bear their own costs for access to OSS and that Verizon not be permitted to impose an OSS charge on competitive LECs.[1389]

534. As an alternative to their preferred approach, AT&T/WorldCom propose that Verizon recover any one-time development costs in connection with providing access to OSS through a competitively neutral surcharge on all Virginia telecommunications users.[1390] AT&T/WorldCom suggest that the Commission's treatment of LNP costs provides precedent for this approach, as do recent decisions of the California Commission approving similar surcharges.[1391] If we were to accept Verizon's estimates of development costs,

---

[1384] Verizon Ex. 107, at 289-93.

[1385] *Id.* at 249-50. Moreover, even if some systems are not in use today, Verizon states that the current systems build on the earlier systems, and therefore competitive LECs still benefit from this development work. Verizon Ex. 122, at 235-36.

[1386] Verizon Ex. 107, at 251-54.

[1387] AT&T/WorldCom Ex. 12, at 145.

[1388] *Id.* at 146.

[1389] *Id.* at 147; Tr. at 3959.

[1390] AT&T/WorldCom Ex. 12, at 146.

[1391] *Id.* at 150-52; Tr. at 3952-54.

AT&T/WorldCom's proposed monthly surcharge would equal $.08 per line for a period of ten years.[1392]

535. If Verizon is authorized to recover its OSS development costs from competitive LECs, AT&T/WorldCom challenge the amount Verizon proposes to recover. First, AT&T/WorldCom argue that the costs calculated by Verizon are not forward-looking because they are based on Verizon's actual costs for systems that are no longer state-of-the-art.[1393] In a forward-looking network, AT&T/WorldCom assert, Verizon would design its OSS to accommodate multiple providers from the start, rather than incurring costs to modify existing retail systems. AT&T/WorldCom also argue that Verizon has not provided sufficient documentation to justify the costs upon which its charges are based and it has not demonstrated that it excluded costs of developing uniform systems following the Bell Atlantic/NYNEX merger.[1394]

536. AT&T/WorldCom also argue that Verizon's ongoing OSS costs, such as software maintenance, are a normal cost of business that should be recovered in the same way as other recurring expenses, through its ACFs.[1395] AT&T/WorldCom point out that maintenance costs are not separately tracked by Verizon, and therefore there is no way to determine if the charge is appropriate.[1396] As to ongoing capital costs, AT&T/WorldCom suggest that Verizon has significantly overstated these costs by relying on 1998 figures, rather than forward-looking numbers that reflect the substantial price decreases for computer equipment since then.[1397]

C. Discussion

537. In this arbitration, we must resolve three questions with respect to Verizon's OSS costs: (1) whether Verizon should be able to recover OSS costs through a monthly recurring charge, through its ACFs, or through an end-user surcharge; (2) whether recovery should be based on the actual costs Verizon incurred in modifying its OSS or the forward-looking cost of providing competitive LECs with access to the OSS functionality; and (3) whether Verizon should be able to recover all of its OSS costs from competitive LECs, or only a portion of those costs.

538. On the first question, Verizon is correct that access to OSS is a separate UNE and therefore may have a price that is charged to competitive LECs for each customer they serve,

[1392] AT&T/WorldCom Ex. 12, at 149-50.

[1393] *Id.* at 153-54.

[1394] *Id.* at 154-58.

[1395] *Id.* at 160-61, 163; Tr. at 3959-60.

[1396] AT&T/WorldCom Ex. 12, at 161.

[1397] *Id.* at 162.

whether through UNEs or resale. In the *Local Competition First Report and Order*, the Commission clearly established that access to OSS is a separate UNE, a result strongly advocated by competitive LECs.[1398] Because access to OSS is a separate network element, it is subject to the pricing standards in section 252(d)(2) and the Commission's TELRIC pricing rules. For the same reason, we reject AT&T/WorldCom's argument that these costs should be recovered solely through ACFs, or solely through an end-user surcharge. Incumbent LECs recover the costs of every other UNE that the Commission has identified through a distinct charge for that UNE, and there is no Commission precedent that supports AT&T/WorldCom's proposal to deny Verizon that same opportunity with respect to this particular UNE.

539. As to the second question, to be consistent with TELRIC, the OSS charge must be based on the forward-looking cost of deploying efficient systems. We agree with AT&T/WorldCom that one way to develop a TELRIC-based OSS rate is to calculate the cost of systems that accommodate multiple providers from the start, rather than the cost of modifying legacy systems.[1399] Under that approach, AT&T/WorldCom are correct that neither the capital cost nor the maintenance expense would be attributable solely to competitive LECs.[1400] AT&T/WorldCom do not, however, provide any information whatsoever on the cost of this type of forward-looking OSS.

540. Verizon offers two rationales for its proposal to recover the costs it actually incurred modifying its legacy OSS during 1996-1999. One rationale is that it is entitled to recover from competitive LECs all the costs it actually incurred because these costs were forward-looking at the time and would not have been incurred but for the entry of competitive LECs.[1401] We disagree with Verizon's suggestion that it is entitled to a dollar-for-dollar recovery of costs incurred in upgrading its OSS if those costs were forward-looking *at the time they were incurred*. Such an approach is at odds with the purpose of a TELRIC proceeding. Nothing in the Commission's UNE pricing rules entitles any incumbent LEC to recover the actual costs incurred for any part of its network, including the OSS. Rather, an incumbent LEC is entitled to charge a rate that reflects the forward-looking economic cost of providing a UNE.[1402]

541. The second rationale offered by Verizon is that the recent costs it incurred

---

[1398] *Local Competition First Report and Order*, 11 FCC Rcd at 15763, para. 516.

[1399] AT&T/WorldCom Ex. 12, at 154.

[1400] *Id.*

[1401] Verizon Ex. 122, at 226 ("This proceeding is about determining whether the costs Verizon VA incurred to provide CLECs with Access to OSS as required by the Act were forward-looking at the time they were incurred."); *id*. at 215 ("Verizon VA would not have modified its OSS to provide access if it had not been required to do so for the CLECs' benefit, and if the CLECs left the market, Verizon would not continue to carry these costs.").

[1402] *See* 47 C.F.R. § 51.505.

represent the best estimate of the current forward-looking cost of deploying new OSS.[1403] This rationale is consistent with TELRIC principles, although it may not generally be the case that past expenses, without adjustment, are a valid proxy for forward-looking costs. In this case, however, we will adopt Verizon's cost estimates.[1404] Verizon's approach recognizes that OSS is different from other UNEs. The data regarding customers and facilities that are the core of Verizon's OSS have been developed over a period of decades. To determine the cost of providing access to OSS and the underlying data regarding Verizon customers and facilities, we must make some assumption about the state of the existing OSS. It is not possible to assume a "blank slate" as we do in developing the forward-looking cost of the physical plant,[1405] and Verizon's choice of 1996 as the starting point is not unreasonable.

542. AT&T/WorldCom criticize Verizon's estimates of OSS development costs, but they present no alternative figures and provide no basis on which we can determine independently the appropriate amount of OSS development costs. For example, AT&T/WorldCom have not specified the costs associated with systems that they claim are no longer in use, they have not specified how to reflect price decreases since 1999, and they have not identified the costs associated with newer systems that perform the necessary OSS functions. For similar reasons, we will accept Verizon's estimates of the ongoing expenses for OSS. Verizon's estimate that expenses will be 15 percent of development costs is essentially an ACF that is supported by anecdotal evidence, rather than actual expense-to-investment ratios. Although the 15 percent ratio would be more convincing if Verizon actually tracked these costs separately, AT&T/WorldCom provide no evidence to demonstrate that a 15 percent figure is inappropriate.

543. As to the final question, we agree with Verizon that incumbent LECs should be permitted to recover the forward-looking costs of providing access to OSS solely from competitive LECs.[1406] Although AT&T/WorldCom are correct that these costs are similar to LNP costs, the fact that Congress did not establish specific cost recovery requirements for OSS as it did for LNP is a key distinction that makes the Commission's LNP precedent

[1403] Verizon Ex. 122, at 226 ("Verizon VA's costs are forward-looking because they reflect the most forward-looking technology currently deployed to provide CLEC access to Verizon VA's OSS.").

[1404] We agree with Verizon that, in order to avoid double recovery, the amount to be recovered should be reduced to reflect OSS costs that already have been recovered pursuant to the mechanism established by the Virginia Commission in its 1997 pricing decision. Verizon Ex. 107, at 283. We also accept Verizon's decision to amortize development costs over 10 years and to apply a gross revenue loading factor to account for uncollectibles. *Id.* at 282-83. AT&T/WorldCom do not challenge these aspects of Verizon's proposal.

[1405] For example, even if Verizon had followed AT&T/WorldCom's suggestion of projecting the cost of new systems that would accommodate multiple carriers from the start, there still would be a cost associated with loading the data from the legacy systems into the new systems.

[1406] This principle would not apply to costs that are incurred by the incumbent LEC for systems that benefit both retail and wholesale customers. In this proceeding, however, AT&T/WorldCom did not demonstrate that Verizon's retail customers benefit from the systems at issue.

inapplicable.[1407] Allowing incumbent LECs to recover the forward-looking costs of providing access to OSS solely from competitive LECs is consistent with the approach followed by a number of state commissions and approved in two federal district court decisions.[1408]

544. We acknowledge AT&T/WorldCom's general concerns that allowing incumbent LECs to recover OSS costs from competitive LECs creates an incentive for inefficient deployment of OSS.[1409] We do not think that such concern is warranted in this case, however. The costs Verizon has identified in this proceeding were incurred before Verizon could be sure that it would be allowed to recover those costs. The uncertainty of recovery suggests that Verizon had an incentive to spend its money efficiently. Moreover, Verizon is correct that competitive LECs have played an important role in the timing and substance of the OSS decisions made by Verizon, which further limits the likelihood that Verizon has deployed OSS inefficiently.

545. Although we have concerns about the validity of the ten-year forecast of competitive LEC demand that Verizon uses to calculate the OSS rate, we will allow it in this case. A forecast of competitive LEC demand over a shorter period of time would almost certainly be more reliable, but allowing Verizon to recover OSS costs over a shorter period would inflate the monthly charge paid by competitive LECs to a point that might constitute a barrier to entry. By spreading recovery over a ten-year period, Verizon appropriately limits the burden on competitive LECs created by this charge. Spreading the recovery of development costs over ten years also is consistent with Verizon's argument that new systems build on old systems, and that the benefit of development work extends beyond the period that a particular system is in use.[1410] Recovery over a shorter period might be more appropriate if the development costs were limited to those systems actually in use today.

546. Our decision to allow Verizon to recover OSS costs from competitive LECs is consistent with our decision elsewhere in this order to limit Verizon's ability to impose NRCs on competitive LECs. By limiting recovery for performing manual processes, but allowing recovery of costs associated with automating those processes, we provide Verizon the incentive to adopt automated systems for the activities necessary to turn up service to a competitive LEC. At the same time, we provide competitive LECs an incentive to consider the costs associated

[1407] 47 U.S.C. § 251(e)(2).

[1408] *See Bell Atlantic-Delaware, Inc. v. McMahon*, 80 F. Supp.2d 218, 248 (D. Del. 2000) ("Nothing on the face of the Act prohibits imposing an additional charge to compensate Bell for providing OSS access to its competitors."); *AT&T Communications of the South Central States, Inc. v. BellSouth Telecommunications, Inc*., 20 F. Supp. 2d 1097, 1104-05 (E.D. Ky 1998) (upholding Kentucky Commission decision permitting BellSouth to recover OSS costs solely from competitive LECs); *Costing and Pricing of Unbundled Network Elements, Transport, and Termination*, Docket No. UT-003013, Thirteenth Supplemental Order (Washington Commission Jan. 31, 2001).

[1409] AT&T/WorldCom Initial Cost Brief at 196.

[1410] Verizon Ex. 122, at 235-36.

with any future improvements in OSS that they request. A contrary approach would have the effect of rewarding Verizon for maintaining manual processes even where it might otherwise be efficient to automate, while placing little constraint on competitive LEC demands for new systems.

VIII. DUF

A. Positions of the Parties

547. The DUF service provides resellers and some UNE purchasers with the intraLATA local and toll call usage record details of their end-users.[1411] Verizon proposes several DUF charges, the most significant of which is a charge of $.0015 per message for "Message Recording."[1412] Verizon provides information identifying the number of employees needed to provide the DUF and the costs associated with those employees, and it argues that its proposed charges are necessary to recover these costs.[1413]

548. AT&T/WorldCom argue that there should be no separate charge for the DUF because Verizon has failed to demonstrate that these costs are not recovered through ACFs.[1414] If a charge is permitted, AT&T/WorldCom propose a Message Recording charge of $.00006 per message.[1415] AT&T/WorldCom argue that Verizon's proposed charge of $.0015 per message is substantially higher than the current price in Virginia ($.000246) and other states.[1416] AT&T/WorldCom state that the basis for the charge, $1.1 million for 15 support employees, is completely unsubstantiated and that Verizon does not explain what these people do.[1417] AT&T/WorldCom also challenge the demand assumptions that Verizon uses to convert costs to rates. According to AT&T/WorldCom, Verizon's estimate of initial demand is too low, and it grows that demand too slowly.[1418] Specifically, AT&T/WorldCom state that Verizon assumes a growth rate in DUF usage of just one percent, but in its OSS study it assumes that competitive LEC lines will grow at an annual rate of 24 percent.

549. Verizon responds that the proposed price is higher than existing rates because the

[1411] Verizon Ex. 107, at 239.

[1412] Verizon Ex. 140 (Errata to Cost Study), at 1; AT&T/WorldCom Ex. 12, at 167.

[1413] Verizon Ex. 122, at 209.

[1414] AT&T/WorldCom Ex. 12, at 168.

[1415] AT&T/WorldCom Reply Cost Brief, Attach. at 3.

[1416] AT&T/WorldCom Ex. 12, at 167. For example, assuming 200 messages per line per month, the charge would add $.30 to the monthly price of a loop. *Id*. at 167-68.

[1417] *Id.* at 168.

[1418] AT&T/WorldCom Initial Cost Brief at 199-200.

existing rates were calculated based on anticipated demand that was much greater than actual demand.[1419] Actual demand for the DUF service has been over 90 percent lower than anticipated, but the amount of labor required has been the same as anticipated. The demand estimates used in Verizon's DUF study are based on the expert opinion of the manager of the DUF service.[1420] Verizon states that the demand estimates differ from the estimates in its OSS study because not all competitive LECs need or use DUF.[1421] For example, DUF is not necessary for carriers that provide a service using their own switch, nor is it necessary if a carrier offers a flat-rated service. Verizon claims there is no double recovery of DUF costs because it removes the costs associated with revenue-producing computers from its ACF calculations, which has the effect of removing DUF costs from the ACFs.[1422]

B. Discussion

550. The issues presented in the arbitration are: (1) whether Verizon should be permitted to charge for providing a DUF, and (2) if so, what that charge should be. As to the first issue, we conclude that Verizon should be permitted to recover DUF costs through a separate charge. Although AT&T/WorldCom argue that Verizon did not demonstrate that these costs are not recovered through ACFs, AT&T/WorldCom witness Murray essentially conceded that they are not reflected in the ACFs used in the MSM.[1423] Because we are using the MSM to set recurring loop rates, and because we cannot find that the costs are recovered through the MSM, it is appropriate that Verizon recover them through a separate charge to those competitive LECs that use the DUF. With respect to Verizon's models, Verizon provided an explanation of why these costs are not otherwise recovered, and AT&T/WorldCom has not demonstrated that this explanation is incorrect.

551. As to the second issue, the amount of the DUF charge, there are two components: cost and demand. With respect to cost, we will accept Verizon's estimate of DUF costs. AT&T/WorldCom have not demonstrated that Verizon's estimate is unreasonable. Verizon identifies the specific personnel involved in providing DUF, and AT&T/WorldCom have not demonstrated that the service can be provided more efficiently.

552. With respect to demand, we decline to use the demand estimates from Verizon's DUF study, and instead we will use the demand estimates in Verizon's OSS study. We are not convinced by Verizon's argument that demand for DUF will grow at a lower rate than demand

[1419] Verizon Ex. 122, at 208.

[1420] Tr. at 3987.

[1421] *Id.* at 3992-94.

[1422] Verizon Ex. 122, at 209-10.

[1423] Tr. at 3996-97 ("I think probably we do acknowledge that certain elements of the costs may need to be recovered through the restated Verizon cost study charges . . . we haven't proposed to zero it out, and we haven't put a number in there derived directly from the Synthesis Model.").

for competitive LEC lines generally. Furthermore, we are not convinced that the increased demand estimate requires us to increase the estimated total cost of providing DUF. Verizon acknowledges that a significant portion of the DUF costs are fixed in the sense that a certain number of employees are needed no matter how many customers take the service.[1424] Given the limited evidence provided by Verizon regarding the specific functions involved in providing the DUF, we are not able to identify any types of costs that should increase if we use a different estimate of demand.

IX. MISCELLANEOUS UNES

A. Positions of the Parties

553. Verizon proposes cost studies and rates for subloops, the NID, enhanced extended link testing, entrance facilities, dark fiber transport, dark fiber loops, customized routing, and service management systems (SMS).[1425] AT&T/WorldCom do not submit affirmative cost studies for these UNEs, but rather propose restating the rates generated by the Verizon cost studies.[1426]

B. Discussion

554. We adopt the Verizon cost studies to generate rates for these UNEs, subject only to the changes that we require elsewhere in this order for cost of capital, depreciation, and ACFs. The Verizon cost studies are the only ones before us. Although AT&T/WorldCom propose restated rates for these UNEs, they do not identify clearly in their briefs, written testimony, or live hearing testimony the changes that they propose to apply to the Verizon studies. Indeed, with two narrow exceptions, AT&T/WorldCom fail to discuss any of these UNEs at all in their post-hearing briefs.[1427] AT&T/WorldCom similarly do not discuss their restatements of these UNEs in their written testimony.[1428] We were unable to verify the changes that AT&T/WorldCom

[1424] Tr. at 3997-98 ("it's not a linear relationship . . . There are a lot of fixed non-volume-sensitive costs").

[1425] *See* Verizon Ex. 100P, Vols. IV, VII, Parts B-8 (Subloop Distribution – 2 Wire, Subloop Distribution – 4 Wire, Subloop Feeder – DS-1), B-9 (Subloop Feeder – DS-3), B-11 and B-12 (NID), B-14 (Enhanced Extended Link Testing), D-1 (Entrance Facilities), F-1 (Dark Fiber – IOF and loops), F-2 (Customized Routing), and F-4 (SMS) (confidential version); Verizon Ex. 180, Tab D (Revised Proposed Summary of Costs); *see also* Verizon Ex. 107, at 80-82.

[1426] *See* AT&T/WorldCom Ex. 12, at 95-96; *see also* AT&T/WorldCom Ex. 14, at 31-32.

[1427] There are three mentions of the term "dark fiber" in the fiber feeder fill factor section, and a single mention of the term "entrance facilities" in the interoffice transport section, of the AT&T/WorldCom Initial Cost Brief. AT&T/WorldCom Initial Cost Brief at 161, 191 n.163.

[1428] The AT&T/WorldCom Recurring Cost Panel Rebuttal Testimony contains only a single paragraph that mentions "other UNEs," which states that their restatements are contained generally in their workpapers. AT&T/WorldCom Ex. 12, at 95-96.

claim to have made to the Verizon cost studies in their workpapers, other than the master inputs (*i.e.*, cost of capital, depreciation, ACFs), which we analyze elsewhere in this order.[1429] As we stated previously, we are required to resolve only those issues that are clearly presented to us.[1430] Because AT&T/WorldCom fail to identify clearly the changes that they propose making to the Verizon cost studies for these UNEs, apart from the master inputs, we need not address the proposed restatements. Therefore, we adopt the Verizon proposed cost studies and rates for these UNEs, subject to the requirement that Verizon adjust them to conform to our decisions on master input issues (*i.e.*, cost of capital, depreciation, ACFs).[1431]

X. NON-RECURRING CHARGES

A. Background

555. Non-recurring costs may be thought of as the "installation" or "set-up" costs an incumbent LEC incurs processing and provisioning a competitive LEC order for a UNE. NRCs constitute an upfront cost to the competitive LEC that is generally not recoverable if it subsequently loses the end-user customer served with the UNE. Consequently, as the Commission recognized in the *Local Competition First Report and Order*, NRCs can be a serious barrier to entry, especially if they are unduly high.[1432] The Commission concluded that, as a general rule, rates for UNEs should recover costs in the manner in which they are incurred.[1433] The Commission also required that recurring costs be recovered through recurring charges, rather than through a NRC.[1434] The Commission gave discretion to state commissions, however, to require incumbent LECs to recover non-recurring costs through recurring charges over a reasonable period of time. The Commission found that recovery of non-recurring costs through recurring charges was a "common practice" that "fully compensated" the incumbent LECs for their non-recurring costs.[1435]

556. The non-recurring costs at issue in this case primarily are labor costs; both sides agree that other network costs should be recovered through recurring charges. The parties disagree profoundly as to almost every aspect of the calculation of these labor costs, including the characteristics of the "forward-looking" network, its degree of automation, and the actual procedures the incumbent LEC should be assumed to follow in setting up a UNE, and thus as to

[1429] *See supra* sections III(C)-(E).

[1430] *See supra* section II(C).

[1431] *See supra* sections III(C)-(E).

[1432] *Local Competition First Report and Order*, 11 FCC Rcd at 15875, para. 747.

[1433] *Id.* at 15874, para. 743.

[1434] *Id.* at 15874-75, para. 745.

[1435] *Id.* at 15875-76, para. 749.

the non-recurring (and recurring) costs incurred. In addition, they disagree sharply as to the manner in which these costs should be recovered, that is, whether through recurring or NRC.

B. Non-Recurring Cost Models

1. Positions of the Parties

557. Both Verizon and AT&T/WorldCom provided studies intended to identify the costs to be recovered through NRCs.[1436] We will evaluate these studies in accordance with our TELRIC pricing rules and the standards for TELRIC cost models established by the Commission in the *Universal Service* proceeding.[1437]

a. Verizon Model

558. Verizon's non-recurring cost model "seeks to measure the non-recurring costs that Verizon VA truly expects to incur in the future as it efficiently expands and replaces its network over time."[1438] Verizon argues that the relevant network for the purpose of calculating NRCs is the actual network as Verizon expects it to exist at the end of the three-year planning period.[1439] As a result, Verizon's non-recurring cost study assumes a different forward-looking network than its recurring cost studies. Specifically, the non-recurring cost study assumes significantly less use of IDLC than the recurring cost study, although slightly more than in Verizon's current network.[1440] The model also assumes that all stand-alone UNE loops must be provisioned over copper or UDLC facilities.[1441] Verizon argues that this difference in network assumptions is necessary because network assumptions that depart significantly from the network Verizon actually plans over the next three years would result in a substantial understatement of the non-recurring costs Verizon actually will incur (because activities Verizon actually performs would not be necessary on a network using more advanced technology).[1442]

559. Verizon's non-recurring cost study is designed to identify the costs of performing manual activities that are necessary to provide UNEs to competitive LECs. Verizon assumes that the company has forwarding-looking OSS in place, but it does not assume that all ordering

---

[1436] Verizon Ex. 100, Vol. 11; AT&T/WorldCom Ex. 23, Vol. 2.

[1437] *See, e.g., Universal Service First Report and Order*, 12 FCC Rcd at 8912-16, para. 250; *see supra* section III(B).

[1438] Verizon Initial Cost Brief at 183.

[1439] Verizon Ex. 107, at 300.

[1440] *Id.* at 325-26.

[1441] *Id.* at 328-29.

[1442] *Id.* at 326-27.

and provisioning activity will be mechanized. Rather, Verizon assumes that orders must sometimes be handled manually, both due to competitive LEC error and because some activities will not occur with sufficient frequency to warrant mechanization.[1443] For example, Verizon assumes that all "complex" orders for six lines or more will continue to need manual attention, even in a forward-looking environment.[1444]

560. Verizon's non-recurring cost study classifies costs into four categories: (1) Service Order; (2) Central Office Wiring; (3) Provisioning; and (4) Field Installation.[1445] For each non-recurring activity within these four categories, Verizon follows a multi-step process to estimate the "forward-looking labor time" for an activity, which is then multiplied by a labor rate to produce the NRC.[1446] Specifically, Verizon's time estimates for each activity are the product of three component factors that are estimated through three separate and largely independent processes.

561. First, through a survey of its employees, Verizon estimated the average amount of work time required to perform these activities today.[1447] For the survey, Verizon divided non-recurring functions into a large number of individual steps ("activities") and asked each surveyed worker how long it took him on average to complete each activity.[1448] For each activity, Verizon calculated the average of the times reported by the survey respondents.

562. Second, Verizon adjusted the average work times through a Typical Occurrence Factor, which was developed based on the frequency with which field managers expect those activities to be performed in the current environment.[1449] Verizon states that this factor was developed by Verizon managers experienced in supervising this work,[1450] but Verizon supplies

[1443] *Id.* at 330-35.

[1444] *Id.* at 331.

[1445] *Id.* at 298.

[1446] *Id.* at 300.

[1447] *Id.* at 311.

[1448] Different methods were employed for two work groups. For TISOC (Telecom Industry Service Operations Center), which performs ordering functions, time estimates were based on a "time and motion study" performed by Verizon and validated by an outside contractor. *Id.* at 313-14 (as corrected by Verizon's motion dated Nov. 29, 2001). For loop assignment functions (performed by MLAC, Mechanized Loop Assignment Center), times were based on actual records of time and output. *Id.* at 315. The worker survey was the basis for all other time estimates, the vast majority of activities measured. *Id.* at 311-12.

[1449] *Id.* at 316.

[1450] *Id.*

few additional details on the procedures, criteria, or methods used to reach this estimate.[1451]

563. Third, Verizon applied a Forward-Looking Adjustment Factor designed to reflect system enhancements and efficiencies expected to develop during the non-recurring cost study period.[1452] This adjustment factor was developed by a panel of 15 Verizon "subject matter experts,"[1453] but again Verizon provides few details on criteria or procedures employed, other than that estimates would represent a consensus of the panel after discussion.[1454] After application of these adjustments, Verizon multiplied the time required for a particular activity by the labor rate for that activity to arrive at the cost for each activity. Each NRC is the sum of the costs of the activities required to perform it, with markups for common costs and an uncollectibles factor ("gross revenue loading").[1455]

b. AT&T/WorldCom Model

564. The AT&T/WorldCom non-recurring cost model is similar to Verizon's in that it is based on time and frequency estimates and labor rates for the various activities for which costs will be recovered through NRCs. AT&T/WorldCom developed the anticipated time and frequency of each non-recurring activity using a panel of subject matter experts.[1456] Like Verizon, AT&T/WorldCom provide little detail regarding the process used by these experts in developing their estimates or the factual bases underlying the estimates.

565. AT&T/WorldCom assume a newly built, efficient network that is highly automated, constrained only by current wire center locations.[1457] The network AT&T/WorldCom assume in their non-recurring cost model is the same forward-looking network they use for purposes of calculating recurring charges.[1458] The AT&T/WorldCom model also makes a number of assumptions that limit the activities for which a NRC is imposed. For example, AT&T/WorldCom assume that a forward-looking network would have 100 percent dedicated

[1451] A letter went to managers updating these estimates. *See* Verizon Ex. 100, Vol. XI, Part H, Section M. The letter does not reveal criteria or guidelines, however.

[1452] Verizon Ex. 107, at 316-17.

[1453] *Id.* at 317.

[1454] Verizon Ex. 100, Vol. XI, Part H, Section L. As Verizon notes, detailed instructions were provided "on the importance, purpose and intent of the analysis," but not on criteria or methodology, other than that forward-looking adjustments were to be based on consensus. Verizon Ex. 107, at 317.

[1455] *Id.* at 304.

[1456] AT&T/WorldCom Ex. 2 (Walsh Direct), at 29-30.

[1457] *Id.* at 13-14.

[1458] *Id.* at 30-31; AT&T/WorldCom Ex. 13 (NRC Panel Rebuttal), at 9-10.

inside plant (DIP) and 100 percent dedicated outside plant (DOP).[1459] As a result of these assumptions, AT&T/WorldCom include no NRC for central office wiring or for placing DCSs at the SAI.[1460]

566. AT&T/WorldCom assume that no manual processing is needed at the ordering stage and that any order that contains an error can be returned automatically to the competitive LEC without manual intervention.[1461] AT&T/WorldCom's non-recurring cost model assumes that Verizon's OSS are capable of operating at a two percent fallout rate at the provisioning stage.[1462] AT&T/WorldCom define fallout as orders where manual intervention is needed to fix an error made by a competitive LEC.[1463] AT&T/WorldCom also take the position that any costs resulting from errors in, or associated with correcting, Verizon's databases should not be borne solely by competing LECs.[1464] According to AT&T/WorldCom, these costs would be recovered in recurring charges (through ACFs), rather than in NRCs.[1465] AT&T/WorldCom assert that Verizon's current OSS is capable of performing at this level.[1466] Unlike Verizon, the AT&T/WorldCom non-recurring cost model assumes that a forward-looking network will make use of IDLC equipment and that IDLC loops can be unbundled.[1467]

2. Discussion

567. We find that AT&T/WorldCom's model is more consistent with the *Local Competition First Report and Order*, the Commission's rules, and the criteria adopted in the *Universal Service* proceeding. Thus, we adopt it for use in this arbitration to develop NRCs. One important criterion is that the model must build the most efficient network possible using currently available technology, constrained only by current switching locations.[1468] The AT&T/WorldCom model, which is based on the SM used by the Commission in calculating universal service support, clearly meets the TELRIC requirement of optimization constrained

[1459] Tr. at 4664-67.

[1460] *Id.* at 4664, 4667.

[1461] AT&T/WorldCom Ex. 2, at 33.

[1462] *Id.* at 33-34.

[1463] *Id.* at 33.

[1464] *Id.* at 16-19.

[1465] *Id.*

[1466] *Id.* at 33; Tr. at 4939-40.

[1467] AT&T/WorldCom Ex. 2, at 34.

[1468] 47 C.F.R. § 51.505(b); *Universal Service First Report and Order*, 12 FCC Rcd at 8913, para. 250(1).

only by current switching locations.[1469] In contrast, Verizon's model is not based on an optimization constrained only by current switching locations. Rather, it is tied to existing processes and the existing network.[1470] Furthermore, it is not evident that the "forward-looking adjustment factors" proposed by Verizon are sufficient to bring the model within TELRIC standards. To the contrary, the ground rules for these adjustments seemed to preclude such adjustments, focusing only on expected improvements in performing a particular sub-task, not on the possibility of entirely new procedures based on an alternative, more efficient, currently available, technology.

568. A major source of the difference in the network assumptions is the way in which the parties interpret the requirement to use currently available technology. Verizon takes the view that only the technology it expects to install in its network during the study period is "currently available,"[1471] and it goes so far as to exclude from its non-recurring cost model some equipment that it includes in its recurring cost model (specifically, IDLC equipment). AT&T/WorldCom take the opposite approach, interpreting "currently available" as any technology that is theoretically feasible, even if it has not actually been implemented by any carrier. Similarly, the parties disagree about the capabilities of "currently available" OSS.

569. As a general matter, we conclude that AT&T/WorldCom's approach is more consistent with TELRIC requirements.[1472] We are not convinced by Verizon's argument that it is appropriate to use different network assumptions in calculating recurring and non-recurring costs. This approach almost certainly would result in over-recovery or under-recovery of costs.[1473] Furthermore, although Verizon is correct that AT&T/WorldCom's NRC study does not include certain types of costs, in most cases this exclusion is based on an assumption that the costs will be recovered in recurring charges, rather than an overly optimistic assumption about the capabilities of currently available technology.

570. Another standard established by the Commission for evaluating cost models is that "underlying data must be verifiable, network design assumptions must be reasonable, and

[1469] *Platform Order*, 13 FCC Rcd at 21335, 21361, paras. 26, 92.

[1470] Verizon Ex. 107, at 300.

[1471] *Id.* at 301.

[1472] However, as we discuss below with respect to unbundling of IDLC loops, it is not clear that all of the assumptions AT&T/WorldCom make reflect the use of currently available technology. *See infra* section X(C)(5).

[1473] Tr. at 4927-28 (discussing the relationship between labor and capital). Moreover, no state commission has explicitly endorsed Verizon's approach, Tr. at 4898, and a number of states have made clear the importance of using a consistent set of network assumptions. *See* AT&T/WorldCom Ex. 8 (Murray Direct), at 50-52; *see also Generic Investigation Re: Verizon Pennsylvania, Inc.'s Unbundled Network Element Rates*, Docket No. R-00016683, Tentative Order at 178 (Pennsylvania Commission Oct. 24, 2002) (*Pennsylvania Commission Pricing Decision*); *Massachusetts Commission Pricing Decision* at 429.

model outputs must be plausible."[1474] Both parties made underlying data, formulas, and mechanics of their models available, although the relative complexity of Verizon's model makes it more difficult to analyze. Both models are lacking, however, with respect to verifiability of the task time estimates they produce. Upon analysis, both parties' estimates are highly subjective.[1475]

571. For AT&T/WorldCom's model, the criteria and deliberations that produced the time estimates are undocumented and unverifiable.[1476] AT&T/WorldCom's time and frequency estimates are based solely on the subjective opinion of its subject matter experts. We have been provided with no objective evidence to support these estimates.

572. Although Verizon provides more support for its survey-based current average times, close examination of the survey process reveals numerous serious methodological errors and casts considerable doubt upon the meaningfulness of the results. We identify here a few of the more serious concerns with the survey results. First, the instructions to employees as to the purpose of the survey left no doubt that their responses would be used in adversarial UNE rate proceedings to determine charges to be imposed on Verizon's competitors.[1477] Given these instructions, it is reasonable to expect that Verizon's employees would feel encouraged to overestimate times for completing activities.

573. Second, Verizon calculates the time that the average respondent reported for a given activity, rather than the average time that the activity required.[1478] Verizon's approach is based on an implicit, and unreasonable, assumption that each respondent performed the activity the same number of times.[1479] It seems far more likely that respondents with relatively high activity times performed the activity less frequently than respondents with relatively low activity times.[1480] By failing to factor in the frequency with which respondents performed the relevant

---

[1474] *Universal Service First Report and Order*, 12 FCC Rcd at 8915, para. 250(8).

[1475] Tr. at 4952 ("[I]n the end, the forward-looking costs of both studies are the process of subject matter expert opinions as to forward-looking costs in processes that seem to be documented in roughly a similar way.").

[1476] *Id.* at 4955-56 (conceding that AT&T/WorldCom produced no documentation on the bases for its time and frequency estimates).

[1477] These instructions begin as follows: "Bell Atlantic has been requested by its State Commissions to provide well documented cost studies supporting the non-recurring rates it plans to charge for provisioning Unbundled Network Elements (UNEs) and Retail products and services. These studies will support rates for ordering, provisioning, and installing all UNEs, products and services the Company is expected to provide." Verizon Ex. 100, Vol. XI, Part H, Section K.

[1478] Tr. at 4915.

[1479] Verizon states that it had no idea how frequently respondents performed the relevant task. *Id.* at 4706. The effect of not knowing, however, is to assume that each respondent performed the activity the same number of times.

[1480] A more plausible assumption than Verizon's would be that each respondent spent the same amount of time per week performing the activity (for example, 40 hours per week, or 1 hour per week). A sensitivity analysis (continued….)

task, there is a systematic bias toward higher estimates.[1481]

574. The validity of Verizon's results is further undermined by the extreme variations observed in the original survey data. For many individual activities, the maximum time reported is 50 or even 100 times the minimum observation, as parties with access to the proprietary survey data can easily confirm.[1482] This makes the methodological bias discussed in the previous paragraph all the more serious, because Verizon's methodology disproportionately exaggerates the impact of unusually large observations.

575. Third, the mechanics of Verizon's survey methodology tend to produce a "padded" estimate even before the averages are calculated. For each activity, the minimum time that could be reported was one minute. As a result, even a simple job that might require a total of 5 or 10 minutes would, if broken down into twenty steps, generate a minimum estimate of 20 minutes. Furthermore, many of these activities are performed sequentially, but doing any one activity in isolation would typically involve a considerable amount of getting started time that would not be required for each step in a multi-step procedure. Verizon's time estimates would be overstated to the extent respondents included this getting started time in their responses.

576. In addition to the problems with the survey itself, we have concerns about how the resulting time estimates are adjusted in the second and third steps of the process.[1483] Verizon's time estimates are adjusted by two factors (an "occurrence factor" and a "forward-looking adjustment factor"), but there is no documentation of the processes or criteria that

(Continued from previous page)
performed by Bureau staff on the survey data showed that Verizon's implicit assumption substantially increases the estimated average time in every case. Of nine individual activities analyzed, Verizon's method at least doubled the estimate for a third and increased it by over 50 percent for another third, relative to this alternative assumption. Parties with access to the proprietary original survey data can easily confirm this effect by weighting each respondent's observation by the number of times the respondent could have performed the activity in a 40-hour period (or any other period) and computing the frequency-weighted average time. The point is not that this is the correct methodology, but rather that Verizon's implicit assumption generates a substantial upward bias relative to this more plausible assumption. This further weakens our confidence in Verizon's results.

[1481] This bias can be illustrated through a simple hypothetical. Suppose, for example, that only two technicians perform Task X, and that they spend all their time performing this task. One technician always works under favorable conditions and on average requires 12 minutes to perform the task. The second technician always performs under difficult conditions and on average requires 60 minutes to perform the task. Verizon's methodology would report an average task time of 36 minutes ((12 + 60) /2). But in an hour, the first worker would complete the task 5 times and the second worker would complete it once. The average task time, therefore, is 2 hours (120 minutes), divided by the 6 task completions, or 20 minutes per task.

[1482] This variation suggests that respondents did not have the same understanding of what was included in the activity, or that the activities were so poorly defined that they do not actually describe the same work activities. It may also have reflected observations from respondents who rarely perform the activity, and thus are not proficient at it. These and numerous similar possibilities suggest that the survey is not well designed.

[1483] These concerns regarding the adjustments to the time estimates apply not only to the estimates produced by the employee survey, but also to the estimates for activities performed by the TISOC and MLAC. *See supra* note 1448.

produced the two adjustment factors, other than that the latter was based on a consensus after discussion.[1484] As a result of the survey errors and biases, and the subjective nature of the subsequent adjustments, we have no more confidence in Verizon's time and frequency estimates than we do in those advocated by AT&T/WorldCom.

577. Another Commission-specified evaluation criterion is that a cost model "must include the capability to examine and modify the critical assumptions and engineering principles."[1485] Both models have some ability to modify at least some critical assumptions. It would be difficult to modify the engineering principles embedded in Verizon's model, however, because it is difficult to discover what they are. Indeed, Verizon provides little explanation of what many of its non-recurring activities actually involve, why they exist, or when they are necessary. In contrast, AT&T/WorldCom supplied a detailed and thorough "assumptions binder" that lays out the precise task being performed for each NRC, the activities and steps required to complete it, how it fits into the network design assumptions, and when it is necessary.[1486] AT&T/WorldCom's model is clearly superior as to the transparency and reviewability of its network design assumptions and procedures.

578. In summary, we have limited confidence in the time and frequency estimates contained in both models provided by the parties. We would have preferred the parties to have provided a great deal more information describing the relevant activities and explaining the basis for the time and frequency estimates. Notwithstanding these concerns, we must select one of the models as a starting point in developing NRCs because the information on the record provides an insufficient basis for us to develop time and frequency estimates independently.

579. As between the two models presented in this case, we conclude that the AT&T/WorldCom model is more consistent with the guidelines of the *Local Competition First Report and Order* and the criteria specified in the *Universal Service* proceeding. Specifically, in comparison to Verizon's model, AT&T/WorldCom's model is based on network assumptions that more closely follow TELRIC principles, it is more transparent with respect to the underlying design assumptions, and it is easier to adjust. A number of specific problems must be resolved, but the AT&T/WorldCom model appears the better choice for a starting point.

580. Our conclusions regarding the relative merits of the two models are confirmed by the experience of state commissions in Verizon's service territory over the last few years. Verizon has submitted variations of its NRC model based on the same survey and methodology in several state proceedings.[1487] Every state commission has recognized various significant

---

[1484] Verizon Ex. 100, Vol. XI, Part H, Section L; Tr. at 4746 (conceding that there is no documentation of the basis for the adjustments).

[1485] *Universal Service First Report and Order*, 12 FCC Rcd at 8915, para. 250(9).

[1486] *See* AT&T/WorldCom Ex. 23, Vol. 2, Technical Assumptions Binder.

[1487] Verizon submitted the model in New York, Massachusetts, New Jersey, Delaware, and Washington, D.C. Verizon Ex. 107, at 302. In addition, essentially the same model was subsequently submitted in Pennsylvania, (continued….)

upward biases. In most states, Verizon's was the only model submitted on the record, and thus the state commission relied upon it, but made downward adjustments to offset observed biases.[1488] The AT&T/WorldCom model has been presented and fully supported only in more recent state proceedings and, in two of those cases, the state commission rejected Verizon's model completely in favor of AT&T/WorldCom's model.[1489]

C. Implementation Issues

1. Costs to be recovered by NRCs

a. Positions of the Parties

581. A major dispute between the parties is what costs should be recovered through NRCs, and what recovery mechanism, if any, should be available for costs not recovered through NRCs. Verizon defines non-recurring costs as costs associated with the one-time activities necessary to process and provision competitive LECs' requests for the initiation, change, or disconnection of service, or for other one-time activities.[1490] Verizon states that the most efficient means of recovering these costs is to charge them to the cost causer – the competitive LEC requesting the activity.[1491] Verizon states that it should be allowed to recover through NRCs all costs "incurred in response to a specific event [UNE order] initiated by a specific cost-causer."[1492] That is, any cost incurred in the course of provisioning a competitive LEC's order for a UNE should be recovered through a NRC. Verizon argues that its position is supported by the announcement in the *Local Competition First Report and Order* of a "general rule that costs

(Continued from previous page)

where the state commission issued a Tentative Decision on October 24, 2002. *See Pennsylvania Commission Pricing Decision* at 173-80.

[1488] *See, e.g., New York Commission Pricing Decision* at 141-43 (reducing fallout rate to 2 percent); *In Re: Review of Bell Atlantic Rhode Island TELRIC Study*, Docket No. 2681, Report and Order at 68 (R.hode Island Commission Nov. 18, 2001) (reducing work time estimates by 57 percent) (*Rhode Island Commission Pricing Decision*); *Massachusetts Commission Pricing Decision* at 457 (reducing work time estimates to the lower end of a 95 percent confidence interval); *In the Matter of the Board's Review of Unbundled Network Elements Rates, Terms and Conditions of Bell Atlantic-New Jersey, Inc*. Docket No. TO00060356, Order at 162-63 (New Jersey Commission Mar. 6, 2002) (revising or eliminating task times) (*New Jersey Commission Pricing Decision*).

[1489] *Pennsylvania Commission Pricing Decision* at 173, 178; *In the Matter of the Implementation of the District of Columbia Telecommunications Competition Act of 1996 and Implementation of the Telecommunications Act of 1996*, Docket No. 962-T-671, Opinion and Order at 150 (D.C. Commission Dec. 6, 2002) (*D.C. Commission Pricing Decision*). Although the AT&T/WorldCom model was introduced in an earlier proceeding in Massachusetts, the state commission stated that it did not consider this alternative model in its decision because its sponsors did not advocate it on final brief "except in the context of proposing specific modifications to Verizon's NRCM." *Massachusetts Commission Pricing Decision* at 403, n. 168.

[1490] Verizon Ex. 107, at 298.

[1491] *Id.*

[1492] *Id.*

should be recovered in a manner that reflects the way they are incurred."[1493] Verizon proposes a total of approximately 115 NRCs to recover the costs of these activities.

582. AT&T/WorldCom offer a different approach to NRCs. They state that only costs of activities that solely benefit the competitive LEC ordering the UNE should be recovered through NRCs.[1494] Under this "reusability" test, if an activity need not be repeated in order to serve a subsequent UNE customer, then it also benefits these potential future customers and should be recovered through recurring charges.[1495] For example, one-time activities such as placing cross-connects at the FDI should be recovered through recurring charges because Verizon can reuse that connection for a subsequent customer (and these costs are recovered in recurring rates in Verizon's retail operations).[1496] In contrast, AT&T/WorldCom would allow NRCs to recover the cost of placing cross-connects at the MDF because this would benefit only the competitive LEC ordering the loop.[1497] AT&T/WorldCom propose a total of 49 NRCs, of which 18 are separately stated disconnection NRCs.

b. Discussion

583. We conclude that the approach advocated by AT&T/WorldCom more closely follows the TELRIC principles established by the Commission. Consequently, we will establish prices only for the activities identified in the AT&T/WorldCom model. Verizon misconstrues the citation from paragraph 745 of the *Local Competition First Report and Order,* which, in context, refers primarily to recovering costs of dedicated facilities through flat charges rather than usage-sensitive charges. The *Local Competition First Report and Order* specifically prohibits recovery of recurring costs through NRCs, but specifically permits recovery of non-recurring costs through recurring charges because of the potential barrier to entry posed by large NRCs.[1498]

584. Verizon implicitly acknowledges that many of the costs at issue are currently recovered through recurring charges, *i.e*., through ACFs, because it proposes to avoid double recovery by subtracting NRC revenues from the costs it uses to calculate ACFs.[1499] Verizon failed, however, to demonstrate that the NRC revenues it removes from the ACF calculation bear

[1493] *Local Competition First Report and Order*, 11 FCC Rcd at 15874-75, para. 745.

[1494] AT&T/WorldCom Ex. 2, at 9-12.

[1495] *Id.* at 9-10; AT&T/WorldCom Ex. 8, at 29-31.

[1496] AT&T/WorldCom Ex. 8, at 31; Tr. at 4667-68.

[1497] Tr. at 4892.

[1498] *Local Competition First Report and Order*, 11 FCC Rcd 15874-75, para. 745.

[1499] As we explain in more detail in the discussion of ACFs, we do not require Verizon to make its proposed adjustment given the approach to NRCs that we adopt in this section. *See supra* section III(E)(3)(c).

any relationship to the costs of the activities for which it seeks to impose NRCs in this case. Accordingly, there is a significant likelihood that there is a mismatch between the costs recovered through NRCs and the costs not recovered through ACFs. AT&T/WorldCom's approach, which recovers more costs through recurring charges, diminishes the problems associated with attempting to match the costs recovered through NRCs and the costs excluded from the ACF calculations. For this reason, we conclude that the better approach is to recover these costs through ACFs and not through NRCs unless the activity provides no benefit to any future user of the same facility or if the cost of the activity is not reflected in the ACF calculations.

2. Manual installation activities

a. Positions of the Parties

585. The AT&T/WorldCom model assumes that each loop is fully connected from the end-user all the way into the central office and that no additional outside plant or inside plant is needed to provision the loop to a competitive LEC.[1500] As a result of this assumption of 100 percent DIP and 100 percent DOP, the AT&T/WorldCom model does not develop NRCs for moves or rearrangements that may be needed at the central office or the FDI.[1501] According to AT&T/WorldCom, costs for this type of work are recovered either as a capital expense (part of constructing a loop) or a maintenance expense ("rearrangements"). AT&T/WorldCom argue that these costs are presently recovered through recurring charges, as demonstrated by the fact that Verizon proposes to avoid double recovery by subtracting NRC revenues from the costs that produce ACFs.[1502] AT&T/WorldCom also demonstrate that Verizon recovers similar costs related to other parts of the loop (*e.g.*, the NID, the drop) through recurring charges.[1503]

586. Verizon argues that the costs of every activity undertaken pursuant to a competitive LEC UNE order should be recovered through a NRC, including rearrangements in the central office or field dispatches for rearrangements at the FDI.[1504] Verizon proposes a substantial Field Installation surcharge (approximately $100 for most UNEs) "when necessary to complete the service order or when requested by the competitive LEC."[1505] This charge would apply only when the relevant activities actually are necessary to complete an order, and therefore competitive LECs generally will not know at the time they order a UNE whether or not these surcharges apply. Verizon states that no incumbent LEC employs AT&T/WorldCom's assumed

[1500] AT&T/WorldCom Ex. 2, at 23.

[1501] AT&T/WorldCom Ex. 8, at 31.

[1502] AT&T/WorldCom Ex. 2, at 24-25.

[1503] Tr. at 4800-02.

[1504] Verizon Ex. 107, at 301-02.

[1505] Verizon Ex. 124 (NRC Panel Surrebuttal), at 96; Tr. at 4795.

100 percent DIP and DOP.[1506] Verizon would avoid double recovery by subtracting NRC revenues (as a proxy for non-recurring costs) from the costs used to calculate ACFs.[1507]

b. Discussion

587. We find that AT&T/WorldCom's assumption of 100 percent DIP and DOP is reasonable. Not only is this a surer method of avoiding double recovery, but it also seems to conform to the retail practice of recovering these costs through recurring charges. In addition, it furthers the policy objective of minimizing barriers to entry. Verizon's critique of AT&T/WorldCom's assumption of 100 percent DIP and DOP misconstrues AT&T/WorldCom's model. As AT&T/WorldCom explained, the assumption of 100 percent DIP and DOP is a modeling convention that is designed to reflect that these costs are recovered in the recurring cost study, not an assumption that any real network would be built this way. This assumption does not prevent Verizon from recovering any costs because AT&T/WorldCom provide for recovery of these costs through ACFs, just like all other loop maintenance expenses.

588. For similar reasons, we agree with AT&T/WorldCom that Verizon's proposed surcharge should not be permitted. These costs are more appropriately recovered through ACFs, which apparently is how Verizon recovers them today, as demonstrated by its proposal to back out these amounts from its ACF calculations. Recovery through recurring charges avoids the problem of knowing how much to reduce ACFs to avoid double recovery and reduces the risk of high NRCs creating an artificial barrier to entry. This approach also is more consistent with the pro-competitive policy goals of the 1996 Act.[1508]

3. Manual processing activities

a. Positions of the Parties

589. The AT&T/WorldCom model assumes that no manual intervention is needed at the time an order is placed and that there will be a two percent fallout rate at the provisioning stage.[1509] That is, the model assumes that orders placed by competitive LECs are either accepted electronically or rejected electronically and that, once accepted, only two percent of orders will require manual intervention by Verizon due to some error *caused by the competitive LEC*.[1510] AT&T/WorldCom argue that competitive LECs should not have to pay in NRCs the cost of manual processing that is attributable to errors in Verizon's databases or other network

[1506] Verizon Ex. 116, at 39-45.

[1507] Verizon Ex. 107, at 321-22.

[1508] *Local Competition First Report and Order*, 11 FCC Rcd at 15875-76, paras. 749-751.

[1509] AT&T/WorldCom Ex. 2, at 33.

[1510] *Id.* at 33-34.

defects.[1511] AT&T/WorldCom state that recurring charges recover network maintenance and repair costs, including database synchronization, and these costs do not belong in NRCs.[1512] For similar reasons, the AT&T/WorldCom model largely omits design time in calculating NRCs. AT&T/WorldCom argue that these costs generally should be included in the recurring cost study.[1513] In the model's Technical Assumptions Binder, however, AT&T/WorldCom seem to acknowledge that design time is necessary for provisioning some UNEs.[1514]

590. Verizon argues that the assumptions in the AT&T/WorldCom model are unrealistic. Verizon states that some orders are simply too complex to be processed electronically, such as orders for more than five new POTS loops at a single location.[1515] Verizon also argues that no incumbent LEC has ever achieved a two percent fallout rate.[1516] Verizon proposes a four percent fallout rate in its model, which it states is very ambitious.[1517] Verizon argues that even when fallout is due to errors in Verizon databases or other network defects, the competitive LEC is the 'cost-causer' because the defect would not have caused a problem if not for the order.[1518] In such cases, manual handling is necessary and should be recovered in a NRC. Verizon states that maintenance expenses recovered through ACFs reflect different processes than correcting errors that are revealed in the course of provisioning a competitive LEC order.[1519]

591. Furthermore, Verizon states that some "fallout" is and should be manual processing by design because it is not cost-effective to automate complex orders.[1520] Verizon contends that AT&T/WorldCom's model includes "design time" only for the two percent of orders that require manual intervention, even though some UNEs inherently require manual design 100 percent of the time, such as 4-wire loops, DS1 loops, designed transport, and digital

[1511] *Id.* at 16-17.

[1512] *Id.*

[1513] *See, e.g.*, AT&T/WorldCom Ex. 21 (NRC Panel Surrebuttal), at 39-42 (discussing costs associated with DS1 and DS3 interoffice transport).

[1514] *See, e.g.*, AT&T/WorldCom Ex. 23, Vol. 2, Technical Assumptions Binder at 37 ("The exception to non-designed loops is the 4-wire loop (analog or digital) which by its very nature constitutes a designed service/circuit.").

[1515] Verizon Ex. 116, at 10.

[1516] *Id.* at 14-17.

[1517] *Id.* at 15.

[1518] *Id.* at 69.

[1519] Verizon Ex. 124, at 99-100.

[1520] Verizon Ex. 116, at 10, 25-26.

designed loops.[1521] Verizon argues that no automated system exists that can perform such designs and that developing such systems would be extremely expensive for rather rarely performed functions.[1522] Finally, Verizon proposes a Manual Surcharge (approximately $20.00 for most UNEs) that is imposed whenever a competitive LEC requests that an order be handled manually.[1523]

b. Discussion

592. We find that the two percent fallout rate used in the AT&T/WorldCom model is consistent with TELRIC requirements. We note that several state commissions have adopted this position.[1524] We also find that it is reasonable to assume, as AT&T/WorldCom do, that competitive LEC orders that have errors are returned electronically to the competitive LEC and resubmitted and that manual intervention by Verizon at the ordering stage should be unnecessary. We do not agree with Verizon that competitive LECs should pay NRCs that reflect manual handling of all orders for six or more lines. As noted by AT&T/WorldCom, this policy appears to be a "workaround" designed to deal with the possibility that Verizon's OSS cannot reliably determine the available facilities for a given location.[1525] We also disagree with Verizon that costs associated with database errors are appropriately recovered from competitive LECs through NRCs. Database maintenance is a recurring cost that should be recovered in recurring charges through ACFs, and not through a NRC.[1526] Allowing Verizon to impose NRCs on competitive LECs to correct database errors provides no incentive to Verizon to avoid such errors.

593. We agree with Verizon, however, that a number of the UNEs at issue are inherently "custom-designed" elements and that AT&T/WorldCom do not appear to allow for necessary design time. Accordingly, for the elements AT&T/WorldCom have identified as designed elements, some sort of adjustment is necessary.[1527] There is, however, little record evidence on which to determine an adjustment to AT&T/WorldCom's model. We require both

[1521] *Id.* at 25-26; *see* AT&T/WorldCom Ex. 23, Vol. 2, at 83, 104, 130, 137.

[1522] Verizon Ex. 116, at 10, 14.

[1523] Verizon Ex. 100, Vol. 11, Non-Recurring Costs Summary.

[1524] Commissions in numerous states inside and outside the Verizon service territory have found the two percent fallout rate appropriate. *See, e.g.*, *Massachusetts Commission Pricing Decision* at 483; *New York Commission Pricing Decision* at 143; *Pennsylvania Commission Pricing Decision* at 178; *Investigation of the Southern New England Telephone Company's (SNET) Proposed Unbundled Network Elements (UNE) Non-Recurring Charges (NRCs)*, Docket No. 98-09-01, Decision at 34 (Connecticut Commission Jan. 5, 2000).

[1525] AT&T/WorldCom Ex. 21, at 21.

[1526] At least one Verizon witness conceded as much. Tr. at 4909 ("Database maintenance is essentially a recurring activity, and it is [in] recurring rates.").

[1527] These elements include 4-wire loops, DS1 loops, DS3 loops, and interoffice transport.

parties to negotiate further on this point in light of the issues decided in the arbitration order. If the parties are unable to reach a negotiated agreement, they may seek further arbitration of this issue. Until such time as the NRC for these elements is adjusted to include design time, we direct Verizon to provide any necessary design services subject to true-up.[1528]

4. Disconnection costs

a. Positions of the Parties

594. Verizon's proposed NRCs include both connection costs and an amount equal to the costs of disconnecting service.[1529] Verizon estimates the cost of eventual disconnection and discounts it to present value assuming a 2.5-year life for every UNE.[1530] Verizon argues that it should not bear the risk of non-collection and that combining connect and disconnect charges is a standard practice in the telecommunications industry that allows Verizon to recover disconnect costs from the cost causer.

595. The AT&T/WorldCom model proposes separate disconnection NRCs. AT&T/WorldCom state that collecting disconnection costs at the time service is installed, as Verizon proposes, unnecessarily raises entry costs and discriminates against competitive LECs that provide superior service and thus keep their customers longer than average.[1531] They argue that an incumbent LEC's risk of non-collection from a competitive LEC is much lower than from a retail customer and that disconnection is not always necessary.[1532] For example, if Verizon wins back the end-user customer, the UNE may remain unchanged. Furthermore, they argue, if the UNE involves a retail customer that migrated from Verizon, the retail customer already paid for disconnection in the installation charge, and charging the competitive LEC again would constitute double recovery.[1533]

b. Discussion

596. We agree with AT&T/WorldCom that disconnect costs, if any, should be recovered at the time of disconnection. Verizon has acknowledged that when a customer terminates service it generally leaves the facility in place so that it can be used by a subsequent

[1528] The true-up will occur once NRCs for these designed elements are established through negotiation or arbitration, and will be calculated for the period beginning on the date the rates in this order become effective.

[1529] Verizon Ex. 107, at 335-36.

[1530] *Id.* at 335.

[1531] AT&T/WorldCom Ex. 13, at 71.

[1532] *Id.* at 71-73

[1533] *Id.* at 72-73.

customer.[1534] In many cases, there is no real cost associated with disconnection because the end-user merely switches LECs, but continues to be served over the same network elements with minimal or no change in provisioning. If another LEC wins the customer, either Verizon or another competitive LEC, the installation NRC will in most cases cover any costs of connecting the UNE to the new LEC's facilities.[1535]

597. Collecting disconnection charges at the time of installation unnecessarily raises entry costs in contravention of the Act's goals of promoting competition. Moreover, the calculation of the disconnect cost is more complicated and more prone to error when that cost is recovered at the time of installation. Specifically, calculating the appropriate charge requires an assumption as to how long the competitive LEC will retain a customer, so that the future disconnection cost can be discounted to its present value. In this case, Verizon assumed that the average customer will stay with a competitive LEC for 2.5 years,[1536] but it provides no evidence to support this figure.

598. We also disagree with Verizon that recovering disconnect costs at the time of installation is appropriate because it may be too difficult to collect from a competitive LEC once service is disconnected. We note that the risk of non-collection only exists if the competitive LEC exits the market. In such cases, Verizon's "uncollectibles" markup to its UNE prices is a better way of addressing these costs.

5. Unbundling of IDLC Loops

a. Positions of the Parties

599. The AT&T/WorldCom model assumes that IDLC loops should be unbundled electronically from the central office by rolling the end-user's loop onto a "virtual DS1" that runs from the RT to a competitive LEC switch.[1537] The total cost for this unbundling, according to AT&T/WorldCom, is $0.26, although the competitive LEC would also have to buy a "virtual DS1," which is not currently a UNE, and incur a NRC of $19.20 to serve one to 24 unbundled loops.[1538]

600. In the Verizon model, IDLC loops are unbundled by moving an IDLC customer to copper or UDLC, then running jumpers to the MDF and then to the competitive LEC's

[1534] Tr. at 4831-33.

[1535] For example, suppose WorldCom wins an AT&T end-user served over a UNE-Loop. It seems unlikely that the costs of rearranging an MDF jumper from AT&T's to WorldCom's collocation facilities would be substantially different than for a rearrangement from Verizon to WorldCom.

[1536] Verizon Ex. 107, at 335.

[1537] AT&T/WorldCom Ex. 2, at 32; AT&T/WorldCom Ex. 23, Vol. 2, Technical Assumptions Binder, at 98-99.

[1538] AT&T/WorldCom Ex. 23, Vol. 2, Price List.

collocation facilities.[1539] Adding the Field Installation surcharge that applies to all unbundling jobs,[1540] Verizon's proposed total NRC for this unbundling is $260.27.[1541] Verizon contends that AT&T/WorldCom's proposal is not based on "currently available technology" and would involve a newly defined UNE (virtual DS1 from the RT to the competitive LEC switch).[1542]

b. Discussion

601. It is not necessary for us to decide whether AT&T/WorldCom's proposal for unbundling IDLC loops is feasible using current technology. The non-cost portion of this proceeding established a method by which we can decide the appropriate NRC without resolving the question of precisely how to unbundle an IDLC loop. Specifically, Verizon offered not to charge a competitive LEC more for unbundling an IDLC loop than for a copper or UDLC loop in situations where a spare facility is available.[1543] Consequently, we will assume for the purposes of calculating the loop unbundling charge that all loops are copper or UDLC. This would produce a somewhat higher NRC than proposed by AT&T/WorldCom, but one still quite lower than that proposed by Verizon.

6. Migrations (Hot Cuts)

a. Positions of the Parties

602. AT&T/WorldCom propose a simple process for moving a loop from a Verizon switch to a competitive LEC switch. According to AT&T/WorldCom, there are two key steps in transferring a loop. The first step, which may be completed any time before the cutover, consists of placing a new wire from the frame to the competitive LEC's equipment.[1544] The second step, which occurs at the negotiated due date and time, is for the Verizon switch to send a translation message deactivating service, and for the CLEC switch to send a message activating the new service.[1545] AT&T/WorldCom state that this simple process is adequate and that the additional

---

[1539] Verizon Ex. 116, at 49. The charge for this activity is $159.48. *See* Verizon Ex. 100, Vol. 11, Non-Recurring Costs Summary.

[1540] Verizon Ex. 124, at 96.

[1541] The Field Installation Surcharge is $100.79. Verizon Ex. 100, Vol. 11, Non-Recurring Costs Summary.

[1542] Verizon Ex. 116, at 46-47.

[1543] *See Non-Cost Arbitration Order*, 17 FCC Rcd at 27274, 27317, 27319, paras. 478, 574, 578. This offer is reflected in the agreements between the parties. *See, e.g.*, Agreement between MCIMetro Access Transmission Services, Inc. and Verizon Virginia, Inc., § 3.18 (filed Sept. 3, 2002).

[1544] AT&T/WorldCom Ex. 13, at 65.

[1545] *Id*.

steps added by Verizon increase the risk of problems.[1546]

603. In contrast, Verizon outlines a labor intensive, complex process that it claims is necessary to prevent end-user service interruptions.[1547] It states that, without these safeguards, "hot cuts" would have caused service interruptions for 11 percent of transferred end-users during a recent month.[1548] Verizon contends that AT&T/WorldCom's proposed simple method is untenable because the processes involved in a hot cut are so complicated that human intervention is necessary to ensure completion of the job without interrupting service to the customer.[1549] Verizon also argues that AT&T/WorldCom's contention that Verizon's processes are too complicated is "hypocrisy of the highest order" because most of the processes were requested by AT&T/WorldCom or other competitive LECs.[1550]

b. Discussion

604. Based on the record before us, we adopt AT&T/WorldCom's hot cut proposal. We agree with AT&T/WorldCom that the process set forth in their model is sufficient in most cases.[1551] With an efficient OSS in place, there should be limited need for the types of manual coordination activities that Verizon claims are necessary. Our decision to establish the hot cut NRC based on this highly automated process is not in any way intended to prevent competitive LECs from negotiating for (and paying for) a process that includes more manual intervention by Verizon to reduce the risk of error caused by either party.

XI. BROADBAND ISSUES

A. Loop Qualification

1. Introduction

605. Wireline broadband services include services that use xDSL to send signals over

[1546] *Id.* at 34 ("Verizon's process is far more labor intensive, shifts control to a department that is unequipped to discover such problems, and disrupts the efficient work activities that would be available with existing OSS.").

[1547] Verizon Ex. 116, at 23-24 ("These work steps include arranging for the necessary resources to perform work at the Verizon frame (which includes cross-connects and dial-tone checks), the RCMAC work (switch translations), and a technician dispatch if necessary, as well as coordinating the timing of these steps. The RCCC also notifies the CLEC when these tasks are completed and then, after getting the 'go ahead' from the CLEC, coordinates the precise timing for cutting service over to the CLEC.").

[1548] Verizon Ex. 124, at 76.

[1549] *Id.* at 82.

[1550] *Id.* at 80.

[1551] As noted above, this NRC is not appropriate for designed elements, including 4-wire loops, DS1 loops, DS3 loops, and interoffice transport.

copper wires to packet switches.[1552] Loop Qualification is the process of ascertaining loop characteristics such as metallic length and the presence of such impediments to xDSL transmission as load coils, bridged taps, and "disturbers" such as T-1 lines. LECs use these characteristics to determine which, if any, xDSL services they will offer on a particular loop and also what line conditioning might be required to enable various types of xDSL service. Loop qualification may be a simple matter of consulting a database, but it also may require additional research, depending on how much and what type of information is needed.

606. The simplest method of loop qualification is to access the Loop Facility Assignment and Control System (LFACS). This database is now available to competitive LECs electronically at no additional cost[1553] and, in theory, contains extensive data about loop characteristics. The competitive LECs argue that, if LFACS were fully and accurately populated, it would suffice for the vast majority of their loop qualification requirements.[1554] Verizon does not directly contest this claim, but it notes that LFACS was designed before xDSL was developed, for other purposes.[1555] As a result, LFACS is neither fully populated nor entirely accurate. Thus LFACS is frequently inadequate for qualification purposes.

607. Verizon proposes three methods of loop qualification in addition to LFACS. First, it developed a Mechanized Loop Qualification (MLQ) Database, which contains additional loop information, and for which it proposes a recurring charge. If more detailed information is required for a particular loop, Verizon proposes that a competitive LEC can order Manual Loop Qualification or, for even more detail, an Engineering Query, with associated NRCs for review of paper cable plats.[1556] The competitive LECs oppose these charges.

[1552] The small "x" before the letters DSL signifies DSL as a generic transmission technology, rather than a particular form of DSL.

[1553] According to Verizon:

> A requesting CLEC also can electronically request and receive certain qualification information contained in Verizon VA's Loop Facility Assignment and Control System (LFACS) database. In fact, in October 2001, Verizon implemented an enhancement to its OSS that provides CLECs with electronic access to loop make-up information (including cable segment lengths and gauges, bridged tap lengths, gauges and locations, load coil locations, and DLC system types) as that information currently exists in the LFACS database. Verizon VA is not proposing any charge for such access at this time.

Verizon Initial Cost Brief at 209 n.228 (citing Verizon Ex. 116, at 55; Verizon Ex. 124, at 149-50).

[1554] *See* AT&T/WorldCom Ex. 13, at 158.

[1555] Verizon Ex. 124, at 147-48.

[1556] *See* Verizon Ex. 107, at 126; Verizon Ex. 124, at 144.

2. Positions of the Parties

608. Verizon views its MLQ Database, which it has developed over the past several years, as the "primary means by which CLECs obtain loop qualification information" and asserts that "[a] CLEC that seeks to offer xDSL-based services should be able to get all of the qualification information it needs from the Database."[1557] The Database indicates whether the loop is qualified for xDSL by Verizon's standards, meaning that "the total loop length, including any bridged tap, is less than 18,000 feet, the loop is not served by DLC, and T-1 is absent from the loop's binder group."[1558] The data are actually organized by terminal and indicate whether any available loops in the terminal in question are xDSL qualified. If a qualified loop is available in the terminal, the competitive LEC can order xDSL-compatible loops (that is, Verizon can transfer the distribution subloop to make an xDSL-compatible loop).[1559] The Database does not necessarily contain all information that may be relevant to all forms of xDSL that a competitive LEC may wish to offer.[1560] Verizon argues, however, that "the functionality built into its loop qualification database is more than sufficient for the vast majority of xDSL services. The need for [additional] loop make-up detail should be confined to very, very few cases."[1561] Development of this database involves systematic testing using a Mechanized Loop Test (MLT)[1562] on a sample of loops from each terminal.[1563] To recover the related costs, Verizon proposes to assess a recurring charge ($0.26 per month) on all xDSL-capable loops (used by Verizon or by competitive LECs) and line sharing and line splitting arrangements ordered by competitive LECs.[1564] Verizon proposes to amortize these costs over a 30-month period, which it asserts represents the "average 'service life' for a customer's use of a retail xDSL-based service."[1565]

609. As noted, Verizon also proposes NRCs for a Manual Loop Qualification and an

---

[1557] Verizon Ex. 107, at 127.

[1558] *Id.* at 128-29; *see also id*. at 131.

[1559] *See id.* at 129.

[1560] *See id.* at 131; Verizon Ex. 124, at 145-46; AT&T/WorldCom Ex. 13, at 159-60.

[1561] Verizon Ex. 124, at 148.

[1562] "An MLT test determines the effective length (including any bridged tap and customer and CO wiring) of a loop by measuring its capacitance. The process involves sending a voltage pulse from testing equipment located in an MLT test center, through a central office switch port, and through the loop being tested. Only working loops, *i.e.*, loops connected to a switch port and provided with dial tone, can be MLT-tested." Verizon Ex. 107, at 128 n.23.

[1563] *Id.* at 129.

[1564] AT&T/WorldCom Ex. 13, at 156; Verizon Ex. 107, at 132-33.

[1565] Verizon Ex. 107, at 134.

Engineering Query. A Manual Loop Qualification consists of an examination of paper cable plats by an engineering clerk, to obtain more detailed information about a loop than exists in LFACS or in Verizon's new MLQ Database.[1566] Specifically, the clerk reviews plats for the presence or absence of both load coils and DLC. The clerk also computes the total loop length, including bridged taps. These characteristics largely determine which, if any, types of xDSL the LEC will offer over the loop (and the quality of service likely to result).[1567] The Engineering Query process provides a competitive LEC with additional loop makeup information, including the location and length of bridged taps, the number and location of load coils (if any), the length and gauge of cable segments, the location of the DLC RT and the type of DLC (if present), and the presence of potential T-1 disturbance.[1568] Verizon describes this as "an incremental step beyond that of the Manual Loop Qualification."[1569]

610. Verizon asserts that it is not required to provide this detailed information through a mechanized (electronic) process.[1570] Rather than incur the substantial costs of creating such a database, Verizon finds it appropriate that "the costs of paper-record review are imposed in a cost-causative manner only on those CLECs whose services require the additional information."[1571]

611. AT&T/WorldCom claim they are not requesting that Verizon create a "massive and costly" database.[1572] They argue that the relevant data for loop qualification should already exist in Verizon's databases:

> Incumbents installed loop inventory management databases such as LFACS, in different forms, over 20 years ago. … [T]he databases contain at least some loop makeup information on each and every loop. Although the incumbents did not fully populate these databases with all the categories of loop makeup data at their inception, it has long been standard within the industry that all plant changes should be input to the databases on a going forward basis. The incumbents' engineering personnel were supposed to enter the modified loop makeup of existing plant into the database any time the plant was altered. … [T]he necessary loop makeup data for virtually all of the [sic] Verizon's plant should

[1566] *See id.* at 137; Verizon Ex. 116, at 55 n.21. The charge would not be assessed on loops in wire centers in which the MLT testing has not been completed. Verizon Ex. 124, at 153.

[1567] Verizon Ex. 107, at 137.

[1568] *Id.* at 137.

[1569] *Id.*

[1570] *Id.* at 132.

[1571] *Id.* at 131.

[1572] AT&T/WorldCom Ex. 21, at 61 (quoting Verizon Ex. 116, at 54).

now reside in the relevant databases.[1573]

612. In support of this contention, AT&T/WorldCom cite Verizon's own claim that, for 90 percent of recent orders, LFACS contained all needed loop detail, and note that Verizon assumes further improvement to 96 percent (*i.e.*, four percent "fallout").[1574] These parties argue that Verizon's new MLQ Database, however, does not include the information that they need and assert that it actually was designed and developed only to meet the needs of Verizon's own retail DSL operations.[1575] AT&T/WorldCom request read-only electronic access to Verizon's existing databases (which Verizon states it has now made available): "All that competitors seek is to have read-only access to [the] underlying data … in LFACS and similar databases."[1576]

613. The competitive LECs argue that, when necessary loop qualification data are missing, Verizon should promptly correct its database(s) and "provide the information to the requesting carrier, in an expeditious manner, without new charges being imposed on the competitor."[1577] In other words, Verizon need not fully populate its database, but it should be required to supply missing information promptly at no charge when it is needed. "To the extent that information needed for loop qualification resides only in Verizon's 'plats' (which are paper plant records), rather than in electronic databases, it reflects Verizon's failure to populate its databases as it should have given the upgrades that Virginia ratepayers have been funding for years."[1578]

614. AT&T/WorldCom also argue that Verizon's proposed NRCs for the Manual Loop Qualification and the Engineering Query create the wrong incentives: "As long as Verizon can pass along to its competitors the cost of whatever manual, short-run processes it imposes, the company will have every incentive to delay implementation of more efficient, electronic interfaces."[1579] Should we find some recovery appropriate for manual loop qualification and engineering queries, these parties assert that their NRC Model can be used to set rates for these processes.[1580]

[1573] AT&T/WorldCom Ex. 13, at 165.

[1574] AT&T/WorldCom Ex. 21, at 62.

[1575] AT&T/WorldCom Ex. 13, at 159.

[1576] *Id.* at 160.

[1577] *Id.* at 166.

[1578] *Id.* at 165.

[1579] *Id.* at 164.

[1580] AT&T/WorldCom Ex. 21, at 56.

3. Discussion

615. As discussed below, we reject some of Verizon's proposed loop qualification charges and substantially reduce other such charges. We agree with AT&T/WorldCom that, if Verizon had followed standard practices or its own procedures, it would have populated the LFACS database much more fully. Thus, if adopted, Verizon's proposed loop qualification charges would recover costs made necessary by its own failures. The proposed charges also reflect some inefficient manual procedures and other procedures designed primarily for Verizon's own retail purposes. We do not believe that an efficient, forward-looking network would incur such costs and, accordingly, Verizon should not be permitted to impose the associated charges on its competitors.

616. We agree with AT&T/WorldCom that the MLQ Database is of limited value to competitive LECs and appears to have been designed primarily for Verizon's retail xDSL operations. Although Verizon evidently intends to offer only limited, basic forms of xDSL, competitive LECs may wish to offer more advanced forms and thus require more loop makeup detail. Accordingly, we reject Verizon's proposed recurring charge.[1581]

617. With respect to the Manual Loop Qualification and Engineering Query NRCs, assuming competitive LECs do now have full electronic access to the data in LFACS, as Verizon indicates in the record, the need for manual qualification should be fairly rare. We take notice of the finding of the New York Commission that, if Verizon had followed its own procedures in recent decades, LFACS would contain the needed data for a higher proportion of orders.[1582] Thus, allowing Verizon to impose its proposed manual charges would permit it to impose the costs of its own inefficiency on its competitors and does not provide proper incentives to develop efficient procedures.

[1581] There are, moreover, a number of difficulties with Verizon's computation of the proposed charge. For example, amortization over 30 months assumes that neither Verizon nor another carrier will ever use the line for DSL services again, which seems unlikely. If we were to conclude that Verizon's proposed charges reflect more than mere corrections of Verizon's past failures to follow its own stated procedures, they should be viewed as something in the nature of a permanent improvement that should be amortized over a substantially longer period (such as the remaining life of the loops).

[1582] In the New York DSL proceeding, the administrative law judge found that, if Verizon had followed its own database procedures over recent decades in recording additions and modifications to loops, LFACS would contain much more of the needed data, and thus would suffice for a significantly greater percentage of loops. *Proceeding on Motion of the Commission to Examine New York Telephone Company's Rates for Unbundled Network Elements,* Case 98-C-1357, ALJ Recommended Decision at 165 (May 16, 2001) (*New York ALJ DSL Recommended Decision)*, *aff'd*, Order on Unbundled Network Element Rates at 132-33 (Jan. 28, 2002) (*New York Commission DSL Decision*). For this reason, and to provide Verizon with an incentive to improve its database and implement efficient procedures, the New York administrative law judge recommended substantial reductions in Verizon's proposed loop qualification rates. *New York ALJ DSL Recommended Decision* at 165. The New York Commission affirmed the ALJ's recommendation, which, it found, explained "why the rate was being set toward the low end of the range of reason for these costs." *New York Commission DSL Decision* at 132-33.

618. At the same time, requiring Verizon to perform manual loop qualification at no charge may encourage excessive or frivolous requests from competitive LECs in situations in which the data may be of little value to them. Accordingly, we permit Verizon to impose charges for Manual Loop Qualification and an Engineering Query, but not at the levels it proposes. Verizon's proposed charges for these NRCs ($114.52 and $139.42, respectively)[1583] are calculated using the same methodology that we rejected with respect to other NRCs, leading us to conclude that they are overstated.[1584] The record in this proceeding does not, however, contain information that would provide a reasonable basis for reducing these charges.[1585] As with other NRCs, therefore, we direct AT&T/WorldCom to add these NRCs to their model and calculate the charges accordingly. That is, we direct AT&T/WorldCom to add these NRCs to their model using their methodology. This should produce charges considerably lower than those proposed by Verizon, thus providing an incentive for Verizon to improve its database and implement efficient procedures but also some disincentive for competitive LECs to make unneeded requests.

B. Wideband Testing

1. Introduction

619. Verizon proposes a monthly recurring charge of $2.19 per xDSL capable loop[1586] to recover the costs of its Wideband Test System (WTS). WTS is the equipment and associated operational support used to ensure that a loop, from the end-user customer to the DSLAM, is capable of supporting the desired services. WTS isolates problems to either the data or the voice layer. Verizon uses the Hekimian testing system in Virginia, which has remote and spectrum testing capabilities.[1587]

2. Positions of the Parties

620. Verizon asserts that use of WTS minimizes costs associated with the dispatch of service technicians to central offices and customer locations to check trouble reports, which may involve problems unrelated to the loop. "Without reliable test results, Verizon would have no choice but to dispatch a technician to try to isolate every reported trouble, which would be a

[1583] *See* AT&T/WorldCom Ex. 13, at 156; Verizon Ex. 124 at 144.

[1584] *See supra* section X(B)(2).

[1585] Although AT&T/WorldCom, as noted above, argue that LFACS data are currently sufficient for about 90 percent of orders and that Verizon expects to be able to improve this to 96 percent, it is not entirely clear that AT&T/WorldCom refer only to xDSL orders or to the LFACS data required to evaluate a loop's xDSL potential. In fact, this statement appears to refer to all orders. Thus the present record does not appear to provide a reliable basis for specifying a particular further rate reduction.

[1586] AT&T/WorldCom Ex. 13, at 103.

[1587] Verizon Ex. 107, at 150.

misuse of limited technician resources and highly inefficient."[1588] Although competitive LECs are free to do their own testing, Verizon argues that, before provisioning the loop, it still must perform its own testing "to ensure the loop is functioning free of spectrum or noise problems."[1589] Verizon further argues that "[i]t is fundamentally unfair for AT&T/WorldCom to seek to hold Verizon VA to high wholesale service standards, while refusing to contribute to the cost of achieving such standards."[1590]

621. AT&T/WorldCom argue that Verizon has provided no justification for recovering from competitors the costs of the Hekimian system.[1591] Further, because competitive LECs frequently provide their own testing systems (testing capability is normally built into the DSLAM), these carriers complain that Verizon is asking them to pay twice for testing.[1592] Accordingly, they argue that competitors should have to pay for access to Verizon's wideband testing capability system *only* if they choose to use it and *only* if Verizon provides full access to it.[1593] AT&T/WorldCom note that both the New York and Massachusetts Commissions found that competitors, not Verizon, will bear the consequences of their decisions to opt out of Verizon's WTS if this results in additional dispatches.[1594]

3. Discussion

622. We agree with AT&T/WorldCom that competitive LECs that provide their own testing system should not be required to pay for Verizon's WTS. Accordingly, AT&T/WorldCom will pay Verizon's proposed recurring charge only if they elect to use Verizon's WTS.[1595] Further, should they choose not to use Verizon's system, they will be responsible for additional service dispatches that are not caused by problems on the Verizon

[1588] *Id.* at 151-52.

[1589] Verizon Ex. 124, at 106-07.

[1590] *Id.* at 105-06.

[1591] AT&T/WorldCom Ex. 13, at 104.

[1592] *See id.* at 105, 115.

[1593] *Id.* at 105.

[1594] *Id.* at 112 (citing *Proceeding on Motion of the Commission to Examine New York Telephone Company's Rates for Unbundled Network Elements*, Case No. 98-C-1357, Opinion and Order Concerning Line Sharing Rates at 26 (New York Commission May 26, 2000) *(New York Commission Line Sharing Order)*; *Verizon New England, Inc. dba Verizon Massachusetts*, Decision T.E. 98-57-Phase III at 76 (Massachusetts Commission Sept. 29, 2000) (*Massachusetts Commission Line Sharing Order*)).

[1595] *See New York Commission Line Sharing Order* at 25-26. Because all competitive LECs are not required to use (or pay for) WTS, we expect that the resulting charge for the optional service will be based upon reduced demand. This, in turn, should result in a rate higher than the rate originally projected, which would have been imposed on all competitive LECs. We direct Verizon to recalculate its proposed charge in accordance with our decision.

lines.[1596] Finally, they cannot hold Verizon to the same performance metrics as on lines on which Verizon performs this testing.[1597]

C. Line-sharing OSS

1. Introduction

623. Verizon proposes a monthly per line recurring charge of $0.84 for line-sharing OSS.[1598] Verizon divides these OSS costs into three categories: (1) those to be shared between line sharing and line splitting; (2) those related to internal ordering and billing OSS that are shared by line splitting and line sharing; and (3) those to be shared among line sharing, line splitting, and subloop unbundling.[1599] Verizon amortized its capital costs over five years.[1600]

2. Positions of the Parties

624. Verizon explains that it engaged Telcordia "to enhance its provisioning and inventory systems to recognize the particular requirements for line sharing, line splitting, and subloop service offerings for CLECs."[1601] The OSS costs associated with line sharing "include the amortization of one-time expenses in connection with the required Telcordia-provided OSS software for line sharing (and its associated installation and testing), which was necessary to enhance Verizon VA's inventory systems to recognize line sharing."[1602]

625. The OSS costs incorporated in Verizon's cost study include Telcordia costs to enhance the LFACS and the Service Order Analysis and Control (SOAC) software and the costs associated with Telecom Group Systems (TGS) or Information Systems for expansion and enhancement of the pre-ordering, ordering, and billing systems.[1603] Verizon claims that these enhancements were required for the systems to recognize that line sharing and line splitting arrangements involve more than one service provider. Further, Verizon states that enhancements were made to the Loop Engineering Information System (LEIS), the LEAD system, the Network

[1596] *See id.* at 26-27.

[1597] *See id.* at 27.

[1598] AT&T/WorldCom Ex. 13, at 116.

[1599] Verizon Ex. 124, at 111.

[1600] *Id.*

[1601] Verizon Ex. 107, at 147.

[1602] *Id.* at 146.

[1603] *Id.* at 147-48.

and Services Data Base (NSDB), and the Provisioning Analyst Workstation.[1604]

626. AT&T/WorldCom argue that, like its support for its more general OSS study, Verizon's cost support for its line sharing OSS study is inadequate.[1605] They argue that the Commission should hold Verizon to a strict burden of proof to justify cost recovery claims for modifications to its OSS in connection with line sharing.[1606] They claim that Verizon has not met this burden.[1607]

627. Should the Commission decide to use Verizon's proposed cost study for line sharing OSS, however, AT&T/WorldCom recommend two modifications. First, they ask that the Commission direct Verizon to remove software maintenance costs from the line sharing OSS cost study. They contend that Verizon's markup for annual ongoing software maintenance is inappropriate, given its admission that it does not separately track ongoing maintenance costs for OSS projects.[1608] Accordingly, AT&T/WorldCom state that Verizon should move software maintenance costs into general ACFs and recover these costs, like other ongoing OSS costs, over all lines.[1609] Second, these carriers argue that the ten-year amortization that applies to costs for access to OSS should also apply here. As Verizon itself acknowledges with respect to access to OSS, use of a ten-year period would "'mitigate the impact on competing carriers and spread the costs among a relatively large number of CLECs.'"[1610] Along with the corrections to Verizon's ACF factors, which are advocated by AT&T/WorldCom's Recurring Cost Panel in reply testimony, these modifications would result in a charge of $0.54 per month per line.[1611]

3. Discussion

628. We conclude that it is appropriate to allow Verizon to recover the costs that it incurred to enhance its line-sharing OSS through the proposed per line recurring charge, but as modified by some of AT&T/WorldCom's requests. Specifically, we direct the parties to apply the same amortization period as is used for other OSS and to remove line sharing OSS costs from

[1604] *Id.* at 148.

[1605] AT&T/WorldCom Ex. 13, at 116.

[1606] *Id.* at 118-19.

[1607] *Id.* at 119.

[1608] *Id.* at 117 (citing Verizon Ex. 107, at 276).

[1609] Consequently, AT&T WorldCom state that Verizon should not back out these costs from its ACF calculation. *See* AT&T/WorldCom Ex. 12, at 94.

[1610] AT&T/WorldCom Ex. 13, at 117-18 (quoting Verizon Ex. 107, at 252).

[1611] *Id.* at 119.

the calculation of ACFs.[1612]

D. Cooperative Testing

1. Introduction

629. Verizon proposes a NRC of $30.78 for cooperative testing.[1613] In cooperative testing, which would occur only upon the request of a competitive LEC in the course of initial provisioning of an xDSL line, a Verizon field technician works with the competitive LEC to test and trouble-shoot the line.[1614] Cooperative testing is normally performed from the end-user's premises and may also require the participation of a frame technician at the central office.[1615] Cooperative testing supplements the standard testing performed in conjunction with provisioning.[1616]

2. Positions of the Parties

630. Verizon asserts that cooperative testing, which is performed only at the request and direction of a competitive LEC, involves the expenditure of time by a Verizon technician.[1617] Verizon argues that this testing eliminates the need for a competitive LEC to dispatch its own technician and thus benefits the competitive LEC, which should pay for it.[1618]

631. AT&T/WorldCom argue that the Commission should reject this charge. According to them, cooperative testing "was established in New York because Verizon-New York was providing many DSL-capable loops to competitors that did not even meet basic continuity requirements."[1619] They note that the Massachusetts[1620] and Maryland[1621] Commissions

---

[1612] *See supra* sections VII(C) and III(E)(3)(c).

[1613] AT&T Ex. 13 (Talbott Direct), at 139.

[1614] *See* Verizon Ex. 107, at 142-44; Verizon Ex. 124, at 128.

[1615] *See* Verizon Ex. 107, at 142-43.

[1616] Verizon Ex. 124, at 128.

[1617] *Id.*

[1618] *Id.*

[1619] AT&T/WorldCom Ex. 13, at 140.

[1620] "[I]t is inappropriate to permit Verizon to levy a 'cooperative testing' charge on CLECs, which is based on costs that are caused by provisioning difficulties experienced by both Verizon and CLECs for stand-alone xDSL loops …. The record shows that CLECs already incur their own cost for the cooperative test. Moreover, the record is clear that Verizon believes such testing is 'mutually beneficial'; therefore, Verizon should share in the cost of cooperative testing by absorbing all of its own costs associated with this test as CLECs do …. Finally, the Department agrees that shifting the costs of this test to CLECs relieves Verizon of an incentive to improve its loop performance." *Massachusetts Line Sharing Order* at 113, *cited in* AT&T/WorldCom Ex. 13, at 140-41 n.148.

rejected Verizon's proposed cooperative testing charge, reasoning that each party should bear its own costs and that the proposed charge would enable Verizon to shift the costs of its own inefficiency to its competitors. AT&T/ WorldCom argue, in accordance with these decisions, that, if Verizon's own provisioning difficulties create the need for cooperative testing, its competitors should not be forced to pay for cooperative testing and thus bear the costs of Verizon's inefficiencies.[1622]

3. Discussion

632. We agree with AT&T/WorldCom and reject Verizon's proposed cooperative testing charge. To the extent that Verizon is obligated to provide an xDSL-capable loop,[1623] its competitors should not have to pay an additional charge when Verizon does not meet its obligation. We find that disallowing Verizon's charge for cooperative testing should provide the correct incentive to Verizon to provision its xDSL lines efficiently.

E. Loop Conditioning Issues

1. Introduction

633. Loop conditioning is the process of removing impediments to xDSL transmission to enable a loop to carry xDSL service. Verizon proposes NRCs for loop conditioning to remove load coils[1624] and bridged taps.[1625] It also proposes a charge, to be imposed on each conditioning

(Continued from previous page)

[1621] "The Commission finds that each party should bear its own costs with respect to Cooperative Testing. Both parties, the ILEC and the CLEC, enjoy the benefits of engaging in cooperative testing and, as such, it would be grossly unfair to require CLECs to bear the burden of paying for their costs as well as for Verizon's. Additionally, Verizon, not the CLEC, has the duty and obligation of delivering a functioning high frequency portion of the loop to the CLEC ordering the line sharing UNE. Verizon's argument that cooperative testing is necessary for it to comply with this obligation is not compelling. The Commission believes that the proper allocation of the costs for cooperative testing is for each party to shoulder its own expenses." *Rhythms Links, Inc. v. Bell Atlantic-Maryland, Inc.*, Case No. 8842, Phase II, Order No. 76852 at 39 (Maryland Commission Apr. 3, 2001) (*Maryland Digital Line Sharing Rate Order*), *clarified on denial of reconsideration*, Order No. 77074 (Maryland Commission June 29, 2001), *cited in* AT&T/WorldCom Ex. 13, at 141 n.149.

[1622] AT&T/WorldCom Ex. 13, at 140.

[1623] *Triennial Review Order*, section VI(A)(4)(a)(v).

[1624] A load coil is an inductor that is connected into a loop in order to improve its voice transmission characteristics. *New York 271 Order*, 15 FCC Rcd at 4088 n.828.

[1625] A bridged tap is any portion of a loop that is not in the direct talking path between the central office and the service users' terminating equipment. For example, a bridged tap may be an extension of the circuit beyond the service user's location. *See Deployment of Wireline Services Offering Advanced Telecommunications Capability*, CC Docket No. 98-147, Memorandum Opinion and Order, and Notice of Proposed Rulemaking, 13 FCC Rcd 24012, 24086 n.316 (1998) (*Advanced Services Order and NPRM*) (subsequent history omitted). It permits the appearance of the loop at a number of alternative servicing terminal locations, which gives the telephone company greater flexibility in reassigning a telephone number to a different address without rearranging existing facilities. (continued….)

task, for an engineering work order. The engineering work order is a detailed plan for performing the conditioning task and recording it in database records and on cable plats.[1626]

2. Positions of the Parties

634. Verizon proposes to impose a NRC for loop conditioning only in extraordinary cases and will recover ordinary conditioning in recurring charges that cover normal network maintenance. Verizon argues that this policy accommodates provision of xDSL services of the varieties and qualities that it considers appropriate and that competitive LECs wishing to offer other xDSL services should bear the cost of any extraordinary conditioning that may be needed.[1627] In accordance with its proposal policy, Verizon would not impose a NRC for load coil removal below 18,000 feet.[1628] Verizon explains that "where load coils are present on copper loops longer than 18,000 feet, the load coils generally cannot be removed because they are necessary for the circuits to function at voice grade standards. Verizon VA does not condition such loops for itself, but it will do so in the relatively rare case that a CLEC requests it."[1629] Similarly, because xDSL technologies are generally designed to operate with up to 6,000 feet of bridged tap, Verizon proposes to remove bridged taps as normal network maintenance (*i.e.*, recovering the costs through ACFs rather than NRCs) only on loops with more than 6,000 feet of bridged taps.[1630] Verizon contends that its proposed NRCs are legitimate and are cost justified.

635. In addition to the charges for the actual conditioning work, Verizon proposes to impose an engineering work order charge in excess of $600 on each conditioning task.[1631] This charge would cover the cost of certain work associated with loop conditioning, such as verifying facilities availability, writing the work order, preparing the special bill generated as a result of construction, and updating records.[1632] Verizon would impose the full charge even where the competitive LEC has previously ordered an Engineering Query (discussed above), because the loop information might have changed since the competitive LEC placed the original order.[1633] On surrebuttal, Verizon challenges AT&T/WorldCom's expert's forward-looking estimate of the

(Continued from previous page)
New York 271 Order, 15 FCC Rcd at 4088 n.829. In order to provide xDSL, bridged taps generally have to be removed. *See Advanced Services Order and NPRM*, 13 FCC Rcd at 24086 n.316.

[1626] *See* Verizon Ex. 107, at 140-41.

[1627] *See id*. at 126-27; Verizon Initial Cost Brief at 203-04.

[1628] *See* Verizon Ex. 107, at 126-27.

[1629] Verizon Initial Cost Brief at 204.

[1630] *Id.* (citing Tr. at 5000, 5027-28); *see also* Verizon Ex. 107, at 126-27.

[1631] *See* AT&T Ex. 13, at 144.

[1632] *See* Verizon Ex. 107, at 140-41.

[1633] *See id*. at 141-42.

labor required to perform an engineering work order.[1634]

636. AT&T/WorldCom argue, first, that an efficient, forward-looking network does not include inhibitors, such as load coils and excessive bridged taps, and that loops in such a network need not be "deconditioned" to carry DSL-based services.[1635] They claim that the premise that these inhibitors must be removed to render a loop suitable for the provision of DSL-based services applies to Verizon's embedded network and violates network engineering guidelines that have been in place since 1980.[1636] Second, they contend that they pay recurring loop rates that recover the costs of a forward-looking network in which conditioning is unnecessary.[1637] Thus, according to AT&T/WorldCom, they cannot also be charged NRCs for these activities because the Commission's rules prohibit recovering "more than the total, forward-looking economic cost of providing the applicable element."[1638]

637. Even if some NRC is appropriate, AT&T/WorldCom argue that a forward-looking network is designed to meet Carrier Service Area (CSA) guidelines and that a NRC should not be applied for bridged tap removal unless requested on loops with less tap than allowed under the CSA standards.[1639] These standards specify that bridged taps not exceed 2,500 feet, with no single tap longer than 2,000 feet.[1640] AT&T/WorldCom also contend that, due to inefficient methods and general flaws in Verizon's NRC Model, its cost study exaggerates the costs associated with removing load coils and bridged taps.[1641] In particular, AT&T/WorldCom argue that, if the Commission allows line conditioning NRCs, it should assume that conditioning is performed on a batch basis of 25 or 50 lines at a time, rather than one line at a time as assumed by Verizon.[1642] This would, of course, result in greatly reduced charges.

638. AT&T/WorldCom also challenge Verizon's proposed procedures and methodology for its proposed engineering work order. They argue that this is among the most

---

[1634] Verizon Ex. 124, at 141-43.

[1635] *See* AT&T/WorldCom Ex. 8, at 54, 58; AT&T/WorldCom Ex. 13, at 145 n.154.

[1636] *See* AT&T/WorldCom Ex. 8, at 54, 58; AT&T/WorldCom Ex. 13, at 145.

[1637] *See* AT&T/WorldCom Ex. 21, at 58-59.

[1638] AT&T/WorldCom Ex. 8, at 58-61 (citing, *inter alia,* 47 C.F.R. 51.507(e)); *see also* AT&T/WorldCom Ex. 13, at 145-46.

[1639] *See* AT&T/WorldCom Ex. 8, at 54. The CSA standard was adopted in 1980, but it is implemented only as plant is installed or rebuilt. *See* AT&T/WorldCom Ex. 6, at 5-7; AT&T/WorldCom Ex. 13, at 143 n.152; Verizon Ex. 124, at 132.

[1640] AT&T WorldCom Ex. 6, at 7; Verizon Ex. 124, at 132.

[1641] AT&T/WorldCom Ex. 13, at 148-50 and Attach. A.

[1642] *Id*. at 150-51 and Attach. A.

severely overstated of all Verizon's proposed NRCs.[1643] They present a restated estimate by an expert that purports to show that an efficient, forward-looking estimate would be a bit less than five percent of Verizon's estimate.[1644] In addition, they would allow only one engineering work order charge per service order for loop conditioning.[1645]

3. Discussion

639. We allow Verizon to recover loop conditioning costs through NRCs, as specified below. AT&T/WorldCom argue that loop conditioning is unnecessary in a forward-looking network, and thus such costs are unrecoverable. We acknowledge that these carriers highlight a possible tension between our TELRIC pricing rules,[1646] which apply to both recurring and non-recurring costs, and prior decisions of this Commission with respect to loop conditioning. We act here under authority delegated to us by the Commission, which has specifically stated that requesting carriers "bear the cost of compensating the incumbent LEC for [loop] conditioning," even though a contemporary network might not require such conditioning.[1647] Although we find reasonable Verizon's proposal to charge loop conditioning NRCs only in "extraordinary" cases, we find its proposed charges are unsustainable for the same reasons we reject its other proposed NRCs, *i.e.,* Verizon substantially overstates forward-looking costs.[1648] Accordingly, as with other NRCs, we direct AT&T/WorldCom to add loop conditioning to their model, as discussed below.

640. AT&T/WorldCom assert that load coils are typically removed on a batch basis, that is, entire binder groups at a time.[1649] Such batch conditioning yields a much lower cost per

---

[1643] *Id.* at 79-91, 148-150, and Attach. A.

[1644] *See id*., Attach. A.

[1645] *See id*. at 152.

[1646] *See, e.g.*, 47 C.F.R. §§ 51.505(b)(1), 51.507(e).

[1647] *See Local Competition First Report and Order*, 11 FCC Rcd at 15692, para. 382, *cited in* Verizon Initial Cost Brief at 204 n.221. *But see Maryland Digital Line Sharing Rate Order* at 34-35, *cited in* AT&T/WorldCom Ex. 13 at 147 (denying recovery for load coil removal because FCC rulings relevant only "to states that have assumed copper feeder for purposes of calculating forward looking costs."); *Massachusetts Commission Line Sharing Order* at 87 ("The FCC has not directed states to assume copper feeder in calculating TELRIC, and, without such a directive, it would be illogical for the FCC to mandate the recovery of costs that are relevant only to a network assumption that may not have been approved in a particular state.").

[1648] *See supra* section X(B)(2)*; cf. New York ALJ DSL Recommended Decision* at 162 (allowing the "concept of Verizon's loop conditioning charges," subject to corrections necessitated by flaws the ALJ found in Verizon's development of these charges and "to possible prospective change in light of the reexamination of DSL provisioning technology"), *aff'd New York Commission DSL Decision*.

[1649] *See* AT&T/WorldCom Ex. 13, Attach. A. A "binder group" is a group of 25 or 50 pairs bound by a thin color-coded ribbon within a copper cable sheath. *Id*. at n.1.

line because, as AT&T/WorldCom illustrate,[1650] many of the steps required in conditioning (for example, travel, set up, opening the splice case) need be performed only once to condition either a single line or an entire binder group. Verizon does condition loops shorter than 18,000 feet on a batch basis.[1651] These short loops, however, are not at issue here, because Verizon recovers the costs of conditioning them in its recurring charges as part of its network maintenance. Accordingly, Verizon does not seek additional recovery through NRCs for these lines. The proposed NRC for load coil removal would apply only to loops longer than 18,000 feet. Thus the question is whether it is feasible to condition these longer loops on a batch basis.

641. Based on the record before us, we conclude that batch load coil removal is not feasible for loops longer than 18,000 feet. Demand for DSL services on such longer loops is lower because, under currently deployed technology, most forms of DSL services do not work well (*i.e.,* attained speeds are low) at distances greater than 18,000 feet.[1652] Moreover, if the loop is longer than 18,000 feet, removal of load coils renders the loop unusable for voice service.[1653] Further, as distance from the switch increases, the probability of finding an entire binder group in which no pair is carrying voice service becomes very low.[1654] This makes batch coil removal on long loops impractical.[1655] Thus, although batch conditioning appears feasible and efficient for shorter loops, it does not appear feasible for the longer loops for which Verizon is proposing to charge a NRC. Accordingly, for loops longer than 18,000 feet, we direct the parties to assume conditioning of one loop at a time[1656] because batch load coil removal is unlikely to be feasible for the long loops to which the charge would apply.

642. We also permit Verizon to charge for bridged tap removal, but we agree with AT&T/WorldCom that Verizon may impose this charge only when the bridged tap is within the

---

[1650] *See id*., Attach. A, at paras. 11-12.

[1651] Tr. at 4994.

[1652] This conclusion may be modified in the future as new technology extends the reach of xDSL. *See, e.g.*, Brian Hammond, *NECA Study Sees Cost of Rural Broadband Declining*, TR DAILY, Apr. 28, 2003 (suggesting that new repeater technology will soon be available that may extend the "reach" of xDSL to distances as great as 100,000 feet).

[1653] Tr. at 4994.

[1654] *See id.* at 4994-97; 5005-07.

[1655] *See* Verizon Initial Cost Brief at 207-08; *see also* Verizon Ex. 124, at 135 ("As a result of tapering at … distances [farther than 18,000 feet from the wire center] cable cross-section sizes are substantially smaller than those closer to the office and certainly less likely to have completely spare 25-pair loaded complements that could be unloaded at the same time.").

[1656] It is conceivable that in some cases two or more loops might be conditioned at once, but there is no record evidence to support such a finding. In a future proceeding, however, a party could attempt to demonstrate that, on average, more than one loop is conditioned at a time, and thus that certain elements of the cost should be allocated among several loops.

current CSA standards. In other words, when the tap does not exceed 2,500 feet, with no single tap longer than 2,000 feet and the competitive LEC seeks removal, the competitive LEC will have to pay a removal charge. Verizon advocated and we agreed to apply CSA standards to recurring charges for loop design.[1657] Moreover, Verizon argues with respect to load coils that it "proposes recovery of costs for line conditioning through a NRC if -- and only if -- a CLEC requests conditioning that exceeds Verizon's network design standards."[1658] This argument applies with equal force to bridged taps. We also note that Verizon's proposal to remove bridged taps as normal network maintenance only on loops with more than 6,000 feet of bridged taps would benefit very few loops.[1659] Accordingly, we apply the CSA standards to bridged taps. We reject Verizon's NRC Model computation of the bridged tap charge for the same general reasons that we rejected its computation for load coil removal and other NRCs. We direct AT&T/WorldCom to estimate this cost assuming conditioning of one loop at a time, because batch conditioning also is unlikely to be feasible for bridged tap removal.[1660]

643. We find persuasive AT&T/WorldCom's criticisms of Verizon's engineering work order estimate. Their restated calculation is more credible than Verizon's, which is based on its NRC Model, rejected elsewhere in this order.[1661] Accordingly, we allow a single engineering work order charge per service order, using AT&T WorldCom's calculations.

644. Finally, we note that paragraph 751 of the *Local Competition First Report and Order*[1662] requires a rebate or other cost sharing arrangement where, as here, Verizon performs and charges for non-recurring activities that may in the future benefit other competitive LECs, or Verizon's own xDSL service. Given the churn for this type of service, we find such subsequent benefits likely to occur. Although neither party proposed a method to implement such cost-sharing,[1663] we direct the parties to do so in their compliance filings.

[1657] *See supra* section IV(C)(2)(f). We also note that Verizon should have been applying these standards for any new plant installed in the past two decades. *See* AT&T/WorldCom Ex. 6, at 7; AT&T WorldCom Ex. 13, at 143 n.152.

[1658] Verizon Initial Cost Brief at 203-04.

[1659] Less than five percent of loops nationwide contain more than 6,000 feet of bridged taps, according to a 1983 survey. *See* AT&T Ex. 122, at Fig. 12-6 (Bridged-Tap Length Distribution) (2000). Presumably there would be even fewer today.

[1660] *See* Verizon Initial Cost Brief at 207-08 (and authority cited therein); *see also supra* note 1656.

[1661] *See supra* section X(B)(2).

[1662] 11 FCC Rcd at 15876, para. 751.

[1663] *See* Tr. at 5017-21, 5030-44 (discussing implementation of paragraph 751).

F. NRCs for Establishing Line Sharing

1. Introduction

645. Verizon proposes certain NRCs for establishing line sharing. These charges would recover the cost of re-arranging cross-connects in the central office to insert a splitter, and to connect the high frequency portion of the loop to a competitive LEC's collocation facility.

2. Positions of the Parties

646. Verizon bases its line-sharing NRC on its NRC for a new UNE loop. Verizon explains that line sharing requires the disconnection of an existing cross-connect on the MDF and the establishment of two new cross-connects. It claims that Verizon's charges for these cross-connects are the same as the central office wiring charge of a two-wire initial loop ($35.10) for the first cross-connect, and the same as a two-wire additional loop central office wiring charge ($19.87) for the second.[1664]

647. AT&T/WorldCom argue that Verizon overstates the line sharing NRC. First, several steps related to confirming that a line is functioning cannot be necessary, because line sharing always involves an already working line.[1665] Still other activities appear unnecessary because they should be performed by the line sharing OSS, for which Verizon imposes a separate charge.[1666] Finally, these carriers argue that Verizon's line sharing NRC suffers from the flaws of the Verizon NRC Model, discussed at section X(B)(2) of this order.[1667]

3. Discussion

648. We allow Verizon to impose a NRC for establishing line sharing, but subject to AT&T/WorldCom's proposed adjustments. These adjustments are reasonable because we find that Verizon overstates the non-recurring costs associated with implementing line sharing and because Verizon already recovers some of these costs through the line-sharing OSS charge. Because, for reasons stated elsewhere in this order, we reject Verizon's NRC model,[1668] we direct AT&T/WorldCom to calculate the line-sharing NRC using their model. Although AT&T/WorldCom did not propose a NRC for establishing line sharing, these parties state that their model can produce any other NRCs as needed.[1669]

[1664] *See* Verizon Ex. 107, at 153.

[1665] AT&T/WorldCom Ex. 13, at 122.

[1666] *Id*. at 123.

[1667] *Id*. at 121.

[1668] *See supra* section X(B)(2).

[1669] AT&T/WorldCom Ex. 21, at 56.

G. Splitter-related Charges

1. Introduction

649. Carriers providing xDSL services use a passive filter, or splitter, to split the digital and voice signals and direct them to the packet-switched network and circuit-switched network, respectively. The competitive LECs purchase the splitter.[1670] Verizon proposes three splitter-related charges. Two are alternative recurring charges, which recover costs for administrative and support functions within Verizon's network. Verizon also proposes a one-time installation charge, if the competitive LEC asks Verizon to install the splitter.[1671]

2. Positions of the Parties

650. Under the first option (Option C), the competitive LEC purchases the splitter and either Verizon or a Verizon-approved vendor installs it in Verizon's central office space and Verizon maintains and supports it.[1672] Under this Option, Verizon proposes a recurring charge for splitter administration and support which contains ACF-type components: a network maintenance factor (to recover splitter repair, maintenance, and similar expenses), a wholesale marketing factor (to recover "product management, advertising and customer-interfacing functions associated with the wholesale market"), and a support factor (to recover a range of support functions such as information management, research and development).[1673] Verizon contends that "it is entirely appropriate to recover administration and support expenses, even when the CLEC owns the splitter. Verizon VA incurs these general expenses for *all* UNEs. There is no reason that a CLEC who chooses to own the splitter should avoid these costs."[1674] Verizon argues that, even though it has no investment in the splitter, the competitive LEC's investment serves as a proxy or surrogate base for estimating these recurring costs.[1675]

651. Under the second option (Option A), the competitive LEC purchases and installs the splitter in its collocation cage.[1676] Verizon also proposes to charge for administrative and support functions under Option A.[1677] As with Option C, Verizon explains that it assesses these

[1670] *See* Verizon Ex. 107, at 153-54.

[1671] *See id*. at 155-58.

[1672] *Id*. at 153-54.

[1673] *See* Verizon Ex. 100, Vol. IV at Parts B-15 and B-16, *cited in* Verizon Ex. 107, at 155.

[1674] Verizon Ex. 124, at 104.

[1675] Verizon Ex. 107, at 159.

[1676] *Id*. at 154. There is no Option B. *See id.* at 154 n.33. Verizon explains that it refers in testimony to Options "A" and "C" to remain consistent with references in its cost studies. Option A is identified in Verizon's proposed interconnection agreement as Option "1," and Option C is identified as Option "2." *Id*.

[1677] *Id*. at 159; Verizon Ex. 124, at 104.

general support costs on all UNEs.[1678] Verizon claims that, even in Option A, it faces increased costs for testing, but it has not quantified these costs.[1679]

652. Finally, with respect to its proposed NRC for splitter installation, Verizon explains that, if a competitive LEC requests that Verizon install the splitter, a one-time installation charge is applied.[1680] Competitive LECs also have the option of arranging for the installation of the splitter in a Verizon central office through the use of an approved installation vendor.[1681]

653. AT&T/WorldCom complain that Verizon's implied maintenance costs, which are based on digital equipment, are excessive for a splitter, which is a "simple, passive device[]."[1682] They also object to paying ACF-type charges based on investment that Verizon did not make.[1683] Moreover, these parties contend that it is inappropriate for Verizon to charge anything under Option A, where the competitive LEC purchases the splitter and installs it in space for which it has already fully paid.[1684] AT&T/WorldCom argue that "Verizon has provided no support for its assertion that a competitor's decision to collocate a splitter causes Verizon to incur any of these types of cost."[1685] With respect to Verizon's proposed NRC for splitter installation, AT&T/WorldCom object to Verizon's choice of splitter location,[1686] to Verizon's EF&I factor,[1687] and to Verizon's computation of NRCs.[1688]

3. Discussion

654. We allow Verizon to impose a maintenance charge for Option C using its proposed ACFs because we agree that it is not feasible to develop a separate maintenance factor for every piece of equipment. We otherwise allow no recovery because Verizon has not met its

[1678] Verizon Ex. 124, at 125.

[1679] *See id*. at 125-26.

[1680] Verizon Ex. 107, at 155.

[1681] *Id*.; Verizon Ex. 124, at 122.

[1682] AT&T/WorldCom Ex. 13, at 126-27.

[1683] *See id*. at 130-36.

[1684] *Id*. at 131.

[1685] *Id*. at 132.

[1686] *Id*. at 123-25.

[1687] *Id*. at 126-30.

[1688] *Id*. at 137-39.

burden of showing what costs it actually incurs under Option C.[1689] Further, we reject any recurring charges for Option A because Verizon has not demonstrated that it incurs any incremental costs when a competitive LEC purchases and installs a splitter in a collocation cage for which it is already fully compensating Verizon. If any increased testing costs result, Verizon has not quantified them. Most importantly, however, the competitive LEC incurs these costs itself and should not have to pay them twice.

655. We adopt Verizon's proposed charge for splitter installation when it performs the actual installation. We find Verizon's evidence, in the form of actual vendor quotes, to be more credible than the competitive LEC estimates for splitter installation. Verizon's proposed EF&I factor also appears reasonable. As Verizon argues, if a competitive LEC finds Verizon's charge unreasonable, it may hire its own approved vendor.

H. ISDN Electronics

656. Verizon proposes a NRC to recover the capital costs of, and installation labor for, repeater equipment that enables ISDN-BRI to function on longer loops.[1690] Verizon proposes this NRC only for ISDN-BRI, as distinguished from Primary Rate ISDN, loops.

1. Positions of the Parties

657. Verizon claims that repeater equipment is necessary when metallic loop length is greater than 18,000 feet. It also claims that the costs of this equipment are not included in its development of the ISDN-BRI loop rate.[1691]

658. AT&T/WorldCom argue that the non-recurring cost that Verizon reports for this element is duplicative of costs Verizon recovers through its recurring charges for digital (*i.e.,* ISDN or DSL-capable) loops.[1692] Verizon's forward-looking recurring costs for the digital line -- regardless of loop length -- already include required electronics.[1693] AT&T/WorldCom argue that competitors pay more for ISDN loops than for analog loops, and the increment paid on a recurring basis to Verizon reflects the costs of providing ISDN over fiber for loops of all lengths.[1694] Thus, AT&T/WorldCom claim that Verizon's proposed NRC is for the exact same

[1689] Specifically, we reject Verizon's wholesale marketing and support factors.

[1690] Verizon Ex. 107, at 162.

[1691] *Id*.

[1692] AT&T/WorldCom Ex. 13, at 153-55.

[1693] *Id*. at 153.

[1694] *Id*.

capability – but under the assumption of a different, all-copper network.[1695]

659. These carriers also argue that Verizon should have treated the repeater material cost as it would ordinarily treat its other loop investments – as a recurring cost.[1696] A repeater is a relatively discrete network component, with a high degree of reusability.[1697] They contend that there is no valid reason that Verizon could not use the same repeater to serve a future customer at the same location, or reuse the repeater to provide ISDN services to a different wholesale or retail customer of the company.

2. Discussion

660. We reject Verizon's proposed charge. Elsewhere in this order, with respect to recurring charges, we adopt higher rates for ISDN-BRI loops than for basic two-wire loops, using AT&T/WorldCom's restatement of Verizon's proposal.[1698] This restatement presumes fiber, rather than copper, facilities.[1699] Accordingly, we agree with AT&T/WorldCom that the recurring charge for ISDN-BRI loops already includes the forward-looking costs of providing the functionality for which Verizon here proposes an additional NRC.

661. Moreover, Verizon does not adequately support its claim that the costs of this equipment were not included in its ISDN-BRI loop rate development. Verizon's loop cost study description for ISDN-BRI states that it includes costs of "equipment hardware and common plug-in cards and … channel plug-in cards for BRI service."[1700] The cost summary includes entries for "electronics: common" and "electronics: plug-ins,"[1701] but it does not describe what electronics were included or how the results were developed. We note that the term "electronic plug-ins" would generally include repeaters. Thus we find that Verizon has not demonstrated that the repeater costs it seeks to recover here are not already recovered in these electronics charges.

XII. RESALE

662. The 1996 Act requires that Verizon make available "for resale at wholesale rates any telecommunications service that [Verizon] provides at retail to subscribers who are not

---

[1695] *Id*.

[1696] *Id*. at 154.

[1697] *Id.*

[1698] *See supra* section IV(D)(3)(b).

[1699] *See supra* section IV(C)(2)(k)(iii).

[1700] *See* Verizon Ex. 100, Part B-4 § 1.1 at 000700.

[1701] *See id.*, Part B-4 § 2.6 at 000744.

telecommunications carriers."[1702] Acting for the Virginia Commission, we must establish wholesale rates based on Verizon's retail rates, "excluding the portion thereof attributable to any marketing, billing, collection, and other costs that will be avoided by [Verizon]."[1703] These sections of the 1996 Act are independent of those that set forth Verizon's unbundling requirements, including the TELRIC pricing standard.[1704]

663. The Commission's original resale pricing rules were vacated by the United States Court of Appeals for the Eighth Circuit.[1705] In the *Local Competition First Report and Order*, the Commission adopted a "reasonably avoidable" standard governing the costs that must be considered avoided when calculating the wholesale discount.[1706] That is, the Commission found that any costs that "reasonably can be avoided" by the incumbent LEC when it provides a service at resale must be considered avoided in determining the discount.[1707] The Commission's rules were ultimately vacated by the Eighth Circuit in *Iowa Utilities II* because the court found that the rules were inconsistent with the plain meaning of the statute.[1708]

664. In *Iowa Utilities II*, the Eighth Circuit found that the appropriate standard for determining avoided costs is not those costs that "can be avoided," but rather "those costs that the [incumbent LEC] will actually avoid incurring in the future."[1709] Further, the court explained that, when determining avoided costs, the regulator may not assume that the incumbent is acting as a wholesaler only, but rather must assume that the incumbent provider is acting as both a wholesale and a retail provider.[1710]

[1702] 47 U.S.C. § 251(c)(4)(A).

[1703] 47 U.S.C. § 252(d)(3). The full text of this section is as follows:

> WHOLESALE PRICES FOR TELECOMMUNICATIONS SERVICES.—For the purposes of section 251(c)(4), a State commission shall determine wholesale rates on the basis of retail rates charged to subscribers for the telecommunications service requested, excluding the portion thereof attributable to any marketing, billing, collection, and other costs that will be avoided by the local exchange carrier.

[1704] *Compare* 47 U.S.C. §§ 251(c)(4)(A), 252(d)(3) (resale standard), *with* 47 U.S.C. §§ 251(c)(3), 252(d)(1) (UNE standard).

[1705] *Iowa Utils. Bd. v. FCC*, 219 F.3d 744, 754-56, 765 (8th Cir. 2000) (*Iowa Utilities II*) (vacating rules 47 C.F.R. §§ 51.609, 51.611), *rev'd on other grounds sub nom. Verizon. v. FCC*, 535 U.S. at 467.

[1706] *Local Competition First Report and Order*, 11 FCC Rcd at 15956-57, para. 912.

[1707] 47 C.F.R. § 51.609(b).

[1708] *Iowa Utilities II*, 219 F.3d at 754-56, 765.

[1709] *Id.* at 755.

[1710] *Id.*

665. The Commission has not conducted any further rulemaking to provide additional guidance on establishing wholesale discounts.

A. Timing – Whether to Set Wholesale Discount Rates in this Proceeding

1. Positions of the Parties

666. AT&T[1711] argues that the Bureau should decline to establish the wholesale discount in the arbitration.[1712] Instead, we should retain the discounts previously ordered by the Virginia Commission until the Commission conducts a rulemaking to revise its rules for determining the wholesale discount.[1713] Only through a rulemaking will the Commission receive input from the entire industry before first interpreting the Eighth Circuit's opinion.[1714] Moreover, lowering the discount rate would destroy the already anemic level of resale competition.[1715]

667. Verizon objects to retaining the discount rates previously established by the Virginia Commission.[1716] First, Verizon argues that because the current wholesale discount rates were established pursuant to the Commission's now vacated wholesale discount standards, these discount rates may not be perpetuated.[1717] Second, Verizon claims that the Eighth Circuit set forth a clear standard and that Verizon's avoided cost study complies with this standard.[1718] Finally, the job of the Bureau is to apply the statute, not to ensure that the discount is high enough to guarantee that resale is a profitable means of entry for individual competitors.[1719]

2. Discussion

668. We agree with Verizon and will establish wholesale discount rates in this arbitration. As we stated in the *Non-Cost Arbitration Order*, we are required under the 1996 Act

---

[1711] All resale issues in this arbitration are between Verizon and AT&T only. WorldCom neither took any position on wholesale discount issues nor sponsored any witness on this subject.

[1712] AT&T Ex. 14 (Kirchberger Rebuttal), at 2, 14; Tr. at 3702-03, 3740-42; *see also* AT&T/WorldCom Initial Cost Brief at 238-40.

[1713] AT&T Ex. 14, at 4, 14; Tr. at 3702-03, 3740-42; *see also* AT&T/WorldCom Initial Cost Brief at 238-39.

[1714] AT&T Ex. 14, at 2, 4; Tr. at 3702-03, 3740-42, 3750-51, 3753-54.

[1715] AT&T Ex. 14, at 2, 7-8; *see also* AT&T/WorldCom Initial Cost Brief at 239-40.

[1716] Verizon Ex. 121 (Minion Surrebuttal), at 2-4; *see also* Verizon Initial Cost Brief at 222.

[1717] Verizon Ex. 121, at 2-3; *see also* Verizon Initial Cost Brief at 222-23.

[1718] *See* Verizon Ex. 107, at 238; Verizon Ex. 121, at 1; Tr. at 3742; Verizon Initial Cost Brief at 223.

[1719] *See* Verizon Ex. 121, at 3-4; Verizon Initial Cost Brief at 228-29; *see also* Tr. at 3730, 3750-51; Verizon Reply Cost Brief at 192.

to decide all issues that are fairly presented to us.[1720] AT&T has not alleged that the issue of the wholesale discount was not properly raised by the parties. Rather, testimony was filed, cross-examination occurred during the hearing, and the issue was briefed.[1721] Verizon also correctly states that the wholesale discount rates previously established by the Virginia Commission were based on the Commission's now vacated rules. Accordingly, it would be improper for us to continue to apply these rates to continue prospectively. Rather, the record before us is sufficient for us to establish new discount rates under the Eighth Circuit's standard.

669. Establishing wholesale discount rates in this proceeding, of course, does not preclude the Commission from examining the issue later in a rulemaking proceeding.[1722] The rules that would result from any such proceeding would necessarily be based on the record compiled in that proceeding, and would not be prejudiced by any decision that we reach here.

670. Finally, we agree with Verizon that our role is to apply the statute in determining the appropriate discount.[1723] Once the discount rate is set through the proper application of the statute, it is then up to the market place to determine how much competition will develop via resale. Nowhere in section 252(d)(3) are we required, or even permitted, to adjust the discount to manipulate the level or profitability of resale market entry.[1724]

B. Wholesale Discount Standard

1. Positions of the Parties

671. Verizon claims that the Eighth Circuit clearly articulated the standard that must be used in an avoided cost study: the costs to be excluded in determining the wholesale discount are those costs, regardless of type (*e.g.*, marketing), that the incumbent LEC actually will avoid when providing services to resellers.[1725] Verizon argues that the appropriate starting point in making such a calculation is its determination of the costs that Verizon actually avoids today.[1726]

[1720] *Non-Cost Arbitration Order*, 17 FCC Rcd at 27043, para. 3 (citing 47 U.S.C. §§ 252(b)(4)(C), 252(c)).

[1721] *See, e.g.*, AT&T/WorldCom Initial Cost Brief at 232-40; Verizon Initial Cost Brief at 222-29.

[1722] *See* Verizon Initial Cost Brief at 223 ("The Commission may choose in the future to issue new rules interpreting section 252(d)(3).").

[1723] *See* Verizon Ex. 121, at 3.

[1724] *See* 47 U.S.C. § 252(d)(3).

[1725] Verizon Ex. 107, at 338; Verizon Ex. 121, at 1-3; *see also* Verizon Initial Cost Brief at 222-23; Verizon Reply Cost Brief at 188-89, 191.

[1726] Tr. at 3742-44, 3746-50 ("I [Verizon witness Minion] still firmly believe that the examination of our existing operations serves as the reasonable starting point to examine what functions will not be needed—which functions will truly be avoided going forward . . . but not going into the more hypothetical potentially avoided, what happens 10 years down the road when such-and-such may not occur." *Id.* at 3746-47); *see also* Verizon Ex. 107, at 334, 341-42; Verizon Reply Cost Brief at 190.

Verizon does not believe that there are additional costs that it will avoid in the foreseeable future, even if competitive entry reaches a level as high as forty percent.[1727]

672. AT&T posits that the statute mandates the exclusion of all marketing, billing, and collection costs when determining the wholesale discount.[1728] Any other costs that will be avoided by Verizon must also be excluded.[1729] AT&T further argues that a fully competitive local service market should be assumed when determining which costs will be avoided in the future.[1730] Verizon fails to make this assumption, as it fails to take into account costs that would be avoided as competition increases in the future.[1731]

2. Discussion

673. We find that the legal standard advocated by Verizon more closely tracks the statutory language (as interpreted by the Eighth Circuit) than does that advocated by AT&T. As explained by the Eighth Circuit, the costs that must be excluded are those that Verizon, due to its activities as a wholesaler, "will actually avoid incurring in the future."[1732] Although section 252(d)(3) identifies marketing, billing, and collection costs as categories of costs that *may* need to be excluded if they are avoided, it does not require the exclusion of all such costs. Grammatically, the dependent clause "that will be avoided" modifies the noun "costs." Similarly, the adjectives "marketing," "billing," "collection," and "other" all modify "costs." Therefore, costs – whether marketing costs, billing costs, collection costs, or other costs – must be excluded only if they actually "will be avoided." Accordingly, we disagree with AT&T that *all* marketing costs, billing costs, and collection costs must be excluded. Rather, such costs must be excluded *only if* they are now, or will be in the future, avoided by Verizon in its provision of wholesale services.

674. Because we must assess the costs that will be avoided, it is reasonable to begin by analyzing the costs that Verizon avoids today in providing wholesale services to AT&T for resale. We are troubled, however, that Verizon, after conceding that the legal standard is the costs it will avoid in the future, claims that it can identify no additional costs that it anticipates it will avoid in providing wholesale services in the foreseeable future. In fact, Verizon claims that it could lose up to forty percent of its market share without avoiding any additional costs.[1733]

[1727] Tr. at 3754-55.

[1728] AT&T Ex. 14, at 3; *see also* AT&T/WorldCom Initial Cost Brief at 233-34.

[1729] AT&T Ex. 14, at 3; *see also* AT&T/WorldCom Initial Cost Brief at 234.

[1730] AT&T Ex. 14, at 5-6; *see also* AT&T/WorldCom Initial Cost Brief at 234.

[1731] AT&T Ex. 14, at 3, 5-7; *see also* AT&T/WorldCom Initial Cost Brief at 234-35.

[1732] *Iowa Utilities II*, 219 F.3d at 755.

[1733] *See* Tr. at 3754-55.

Nevertheless, AT&T fails to identify any additional costs that Verizon will be able to avoid in the future. Instead, AT&T simply claims that the starting point for an avoided cost study should be the assumption of a fully competitive market. This is not supported by section 252(d)(3) or by the Eighth Circuit's decision.[1734] Although assumptions about the existence of a competitive market are relevant to UNE pricing under section 252(d)(1) and the Commission's rules implementing that section, nothing in section 252(d)(3) calls for such assumptions in determining the wholesale discount. Notably, section 252(d)(1) specifically requires the determination of UNE rates "without reference to a rate-based proceeding," whereas section 251(d)(3) requires the determination of the wholesale discount "on the basis of retail rates charged to subscribers."[1735] Moreover, even were we to accept AT&T's assumption, AT&T fails to present any evidence showing the costs that Verizon would avoid if operating in such a market place. Indeed, AT&T fails to identify with specificity any cost that Verizon will avoid in the future beyond those Verizon avoids today.[1736] Consequently, based on the record before us, we will establish wholesale discount rates based on those costs that a party shows Verizon actually avoids in providing services to resellers.

C. Vertical Features / Stand-Alone Services

1. Positions of the Parties

675. Verizon claims that the wholesale discount should not apply to vertical features as stand-alone services because it does not offer vertical features at retail on a stand-alone basis.[1737] Alternatively, Verizon argues that, if it is required to offer vertical features subject to the wholesale discount, a different discount rate should apply because Verizon would avoid different costs if it were providing only vertical services at wholesale to AT&T, while continuing to provide dial tone to the retail end-user.[1738] For example, Verizon would not avoid billing functions because it would continue to send a bill to the end-user.[1739] Verizon did not propose separate discount rates for vertical features offered as stand-alone services.[1740]

[1734] *See* 47 U.S.C. § 252(d)(3); *Iowa Utilities II*, 219 F.3d at 755-56.

[1735] *Compare* 47 U.S.C. § 252(d)(1), *with* 47 U.S.C. § 252(d)(3). Indeed, in comparing the UNE pricing standard to retail rate setting, the Supreme Court found that the UNE pricing standard "appears to be an explicit disavowal of the public-utility model of rate regulation . . . for retail sales . . . in favor of novel ratesetting." *Verizon v. FCC*, 535 U.S. at 489.

[1736] Specific disagreements between the parties regarding the costs that should be considered avoided today are discussed *infra* in section XII(D).

[1737] *See* Verizon Ex. 121, at 11-13; Tr. at 3714.

[1738] Tr. at 3714; *see also* Verizon Ex. 121, at 12; Verizon Reply Cost Brief at 193.

[1739] Tr. at 3715; *see also* Verizon Ex. 121, at 12; Verizon Reply Cost Brief at 193-94.

[1740] Tr. at 3714-16; *see also* AT&T/WorldCom Initial Cost Brief at 238.

676. AT&T argues that it should be able to purchase vertical services, and other services, on a stand-alone basis, even if Verizon does not offer them at retail to end-users.[1741] AT&T reasons that it should not be required to purchase a service that it does not want (*e.g.*, dial tone) in order to purchase a service that it does want (*e.g.*, vertical features).[1742] AT&T further argues that the same wholesale discount should apply to vertical features that applies to any other service.[1743] AT&T explains that, although Verizon would avoid substantially fewer costs with respect to the end-user to which it continues to provide dial tone, Verizon would also recover its full retail costs from that end-user.[1744] Thus, in that scenario, the costs of providing dial tone to the Verizon retail customer would be irrelevant to the analysis.[1745] Rather, the avoided costs would be those avoided when examining only the vertical service.[1746] Therefore, the same wholesale discount should apply.[1747]

2. Discussion

677. We decline to establish wholesale discount rates for vertical features or other stand-alone services. In the *Non-Cost Arbitration Order*, we found that Verizon is not obligated to offer for resale more discrete services than it offers to its retail customers.[1748] Further, AT&T fails to challenge Verizon's statements that Verizon does not offer vertical features on a stand-alone basis. Therefore, we found that it was not necessary to calculate a separate wholesale discount for vertical features.[1749] AT&T offers no additional reasons here for us to depart from our conclusion in the *Non-Cost Arbitration Order*. We, therefore, reiterate that Verizon does not, nor is it required to, offer vertical services on a stand-alone basis for resale. Accordingly, we do not require separate wholesale discounts for vertical features or other stand-alone services.

[1741] *See* AT&T Ex. 14, at 12-13.

[1742] *See id.*

[1743] *See id.*; AT&T/WorldCom Initial Cost Brief at 237-38.

[1744] *See* AT&T Ex. 14, at 12-13; AT&T/WorldCom Initial Cost Brief at 238.

[1745] *See* AT&T Ex. 14, at 12-13; AT&T/WorldCom Initial Cost Brief at 238.

[1746] *See* AT&T Ex. 14, at 12-13; AT&T/WorldCom Initial Cost Brief at 238.

[1747] *See* AT&T Ex. 14, at 12-13; AT&T/WorldCom Initial Cost Brief at 238.

[1748] *Non-Cost Arbitration Order*, 17 FCC Rcd at 27351, para. 642 (citing *Local Competition First Report and Order*, 11 FCC Rcd at 15924, 15936, paras. 872, 877); 47 U.S.C. § 251(c)(4) (Verizon must offer at resale only those "telecommunications service[s] that the carrier provides at retail to subscribers who are not telecommunications carriers").

[1749] *Non-Cost Arbitration Order*, 17 FCC Rcd at 27351, para. 642.

D. Avoided Costs

1. Introduction

678. Verizon is the only party that submitted an avoided cost study. Verizon calculated wholesale discounts for two scenarios:

14.68 percent – Reseller using own operator services and directory assistance (OS/DA)[1750]

13.06 percent – Reseller using Verizon's OS/DA[1751]

679. To determine its proposed discount rates, Verizon analyzed its expenses by function codes, using information from its 1999 functional accounting data to determine the costs that it will actually avoid in providing wholesale services.[1752] In addition to excluding direct avoided costs, Verizon excluded "those indirect expenses that vary with the level of retail output."[1753] To determine the applicable discount when the reseller does not use Verizon's OS/DA, Verizon removed the expenses associated with the Call Completion/Number Services and Operator Services accounts.[1754]

680. AT&T challenge Verizon's determinations regarding which expenses will be avoided.[1755] We address these claims in the following subsections.

2. Direct Expenses

a. Product Advertising

(i) Positions of the Parties

681. AT&T claims that Product Advertising (Account 6613) should be treated as an avoided cost.[1756] AT&T alleges that, as Verizon loses market share, Verizon will decrease its

[1750] Verizon Ex. 139 (Errata to Exhibits 100 and 107); Tr. at 3710-12; *see also* Verizon Ex. 121, at 1; Verizon Reply Cost Brief at 181.

[1751] *See* Verizon Ex. 121, at 1; Verizon Reply Cost Brief at 182; Verizon Ex. 107, at 340-41; *see also* Verizon Ex. 100P, Vol. VIII, Part F-6, Tab 1 at 1 (confidential version).

[1752] Verizon Ex. 107, at 337, 339-55; *see also* Tr. at 3696-700; Verizon Initial Cost Brief at 225-26. The accounting data is contained in Verizon's books maintained according to the uniform system of accounts.

[1753] Verizon Ex. 107, at 341; *see also id*. at 345, 358-60.

[1754] *Id.* at 340.

[1755] *See* AT&T Ex. 14, at 8-12; AT&T/WorldCom Initial Cost Brief at 233, 235-37.

[1756] AT&T Ex. 14, at 9-10; *see also* AT&T/WorldCom Initial Cost Brief at 233, 235-37.

advertising budget.[1757] AT&T also contends that, because competitive LECs must pay for their own advertising, they should not also have to pay for Verizon's advertising by including these costs in wholesale rates.[1758]

682. Verizon claims that Product Advertising is not an avoided cost.[1759] Instead, Verizon contends that it would likely increase rather than decrease its advertising expenses if it lost considerable market share.[1760] Indeed, Verizon asserts that AT&T's advertising expenses increased after divestiture while AT&T lost market share in the long distance market place.[1761] Verizon also claims that its advertising would generally lead to greater total market penetration for all telecommunications services purchased by end-users, including some services that would be purchased from resellers, such as AT&T, rather than from Verizon.[1762] AT&T and other resellers, therefore, would benefit from Verizon's advertising expenses.[1763]

683. AT&T rebuts Verizon's claims regarding AT&T's post-divestiture advertising expenses, asserting that, following divestiture, AT&T's advertising expenses reflected a generally consistent percentage of revenues.[1764] AT&T also contends that it will not gain resale end-user customers as a result of Verizon's advertising.[1765]

(ii) Discussion

684. We agree with Verizon. Neither party presented convincing evidence showing that there is an expected trend in advertising expenses as market share declines. Nevertheless, we credit Verizon's claim that it would respond to losses in its local retail business to competitive LECs by increasing its advertising both to retain and to win back customers. To the extent that AT&T proposes that all advertising costs be avoided, moreover, AT&T undermined its position with its claim that its advertising costs remained constant as a percentage of revenues

[1757] AT&T Ex. 14, at 9.

[1758] *Id.* at 9-10.

[1759] Verizon Ex. 107, at 346-47; Verizon Ex. 121, at 9; Tr. at 3716-18; *see also* Verizon Initial Cost Brief at 226-27; Verizon Reply Cost Brief at 191-92.

[1760] Verizon Ex. 121, at 5-6; Tr. at 3717-18; *see also* Verizon Initial Cost Brief at 226.

[1761] Verizon Ex. 121, at 6; Tr. at 3721; *see also* Verizon Initial Cost Brief at 226.

[1762] Verizon Ex. 107, at 347; Verizon Ex. 121, at 5-6; Tr. at 3718-19; *see also* Verizon Initial Cost Brief at 227.

[1763] *See* Verizon Ex. 107, at 347; Verizon Ex. 121, at 5-6; Tr. at 3718-19; Verizon Initial Cost Brief at 227.

[1764] *See* Verizon Ex. 121, at Attach. A (AT&T/WorldCom Response to Verizon Data Request 13-10); Tr. at 3722-23.

[1765] *See* AT&T/WorldCom Initial Cost Brief at 236.

post-divestiture at the same time that its market share declined.[1766] Thus, although AT&T may have avoided some of its advertising costs as competition increased, it certainly did not avoid all of its costs. AT&T did not offer evidence that Verizon might avoid only a percentage of its advertising expenses. Between the proposals before us, therefore, we find for Verizon and do not require Verizon to treat its product advertising expenses as avoided.

b. Call Completion and Number Services

(i) Positions of the Parties

685. AT&T claims that Verizon errs by not treating as avoided any of the costs associated with Call Completion (Account 6621) and Number Services (Account 6622).[1767] AT&T claims that these costs will be avoided if a competitive LEC is providing its own operator services and directory assistance.[1768]

686. Verizon offers two different wholesale discount rates, one where the competitive LEC uses Verizon's OS/DA and one where the competitive LEC does not use Verizon's OS/DA.[1769] In calculating the wholesale discount when the competitive LEC does not use Verizon's OS/DA, Verizon excluded both the retail revenues from these services and the expenses associated with providing these services in determining the discount rate.[1770]

(ii) Discussion

687. We agree with Verizon on this issue. Call Completion and Number Services expenses should be excluded from the discount rate calculations when a competitive LEC does not use Verizon's OS/DA, but should included when a competitive LEC uses Verizon's OS/DA. Verizon properly excludes both revenues and expenses associated with its OS/DA when calculating the wholesale discount for competitive LECs that use their own OS/DA.[1771] Similarly, Verizon properly includes both revenues and expenses associated with its OS/DA when calculating the wholesale discount for competitive LECs that use Verizon's OS/DA.[1772]

[1766] *See* Verizon Ex. 121, at Attach. A; Tr. at 3722-23.

[1767] AT&T Ex. 14, at 10.

[1768] *Id.*

[1769] Verizon Ex. 107, at 340, 357-58; Verizon Ex. 121, at 7-8.

[1770] Verizon Ex. 121, at 7-8; *see also* Verizon Initial Cost Brief at 227.

[1771] *See* Verizon Ex. 121, at 7-8.

[1772] *See id.*

3. Indirect Expenses

a. Information Management

(i) Positions of the Parties

688. AT&T claims that Information Management (Account 6724) includes costs that will be avoided just as General Purpose Computers (Account 6124) does.[1773] Verizon's avoided cost study identifies 45.38 percent of costs in the General Purpose Computers account as avoided.[1774] AT&T contends that, if the computer expenses are avoided, then the associated indirect information system programming and maintenance expenses that are in the Information Management would also be avoided.[1775]

689. Verizon explains that AT&T confuses the expenses included in the General Purpose Computer and the Information Management accounts.[1776] The General Purpose Computers account expenses are mainly those associated with physical computer hardware.[1777] When Verizon treats the work of a specific functional group (*e.g.*, product management) as avoided, then the computer hardware expenses associated with that group are similarly avoided.[1778] Information Management expenses are distinct from the expenses included in the General Purpose Computers account.[1779] Specifically, Information Management expenses relate to the databases and software applications used in Verizon's data centers.[1780] Unlike General Purpose Computers expenses, there is no correlation between Information Management expenses and the work groups whose expenses are avoided (*e.g.*, product management).[1781] Verizon provides the following example to explain AT&T's error:

> [A] program that is run to update Verizon VA plant in-service records pursuant to recent service orders – which would be charged to the Information Management account – is not avoided simply because an end-user takes service from a reseller

[1773] AT&T Ex. 14, at 11-12.

[1774] *See id.* at 11.

[1775] *Id.* at 11-12.

[1776] Verizon Ex. 121, at 9-10; *see also* Verizon Initial Cost Brief at 227-28 n.267.

[1777] Verizon Ex. 121, at 9.

[1778] *Id.*

[1779] *Id.* at 10.

[1780] *Id.*

[1781] *Id.*

rather than Verizon VA retail.[1782]

(ii) Discussion

690. We agree with Verizon because, as Verizon explains, the expenses identified in the two accounts do not have the same correlation to accounts that contain expenses for avoided costs. We decline, therefore, based on the record before us, to require Verizon to exclude costs from its Information Management Account when calculating the wholesale discount rates.

b. Office Equipment and Human Resources

(i) Positions of the Parties

691. AT&T claims that, just as Verizon identifies 100 percent of the expenses associated with Sales (Account 6612) as expenses that are avoided, all of the costs associated with the people who perform the sales functions – *e.g.*, their salaries, office equipment, office space, and the human resources support to hire and fire them – should be avoided. These indirect expenses are reflected in the Office Equipment and the Human Resources accounts (Accounts 6123 and 6723).[1783]

692. Verizon claims that AT&T is wrong for two reasons.[1784] First, 100 percent of sales activities are not avoided.[1785] Rather, the percentage of sales expenses that will be avoided will equal the percentage of lines that switch to resellers.[1786] Second, any decline in the amount of retail sales activity probably will not lead to a direct, linear decline in the amount of indirect avoided costs.[1787] For example, a ten percent decline in retail sales activity likely will not lead to a ten percent decline in sales office copier expenses or other indirect expenses.[1788]

(ii) Discussion

693. We agree with AT&T. Verizon's avoided cost study identifies 100 percent of the Sales account (6612) as avoided.[1789] The Verizon surrebuttal testimony thus mischaracterizes

---

[1782] *Id.*

[1783] AT&T Ex. 14, at 10-11.

[1784] Verizon Ex. 121, at 10-11.

[1785] *Id.* at 11; *see also* Verizon Initial Cost Brief at 227-28 n.267.

[1786] *See* Verizon Ex. 121, at 11.

[1787] *See id*.

[1788] *See id.*

[1789] Verizon Ex. 100, Part F-6 at 1, line 2; Verizon Ex. 107, at 346; Tr. at 3759.

Verizon's own study.[1790] We therefore require Verizon to re-run its avoided cost study, removing the appropriate percentage of expenses from accounts 6123 and 6723 that are associated with expenses in account 6612.

XIII. RATES AND COMPLIANCE FILING

694. As we explain in detail herein, in this order we establish recurring rates for all loop types presented by the parties. Appendix E contains a list of the ordered loop rates. In particular, we set basic 2-wire and 4-wire loop rates based on the MSM (as modified by this order) filed by AT&T/WorldCom. The component loop output costs from the MSM are attached to this order at Appendix F, and the input files containing all of the modifications we are making to the AT&T/WorldCom submission are attached at Appendix G.[1791]

695. To establish recurring rates for all other UNEs (*i.e.*, non-loops), we adopt Verizon's recurring cost studies, subject to the modifications that we require herein. We direct Verizon to resubmit its recurring costs studies, modifying them to reflect the changes – and only those changes – set forth herein. Along with its cost studies, we require Verizon to submit testimony, workpapers, and/or other filings that explain in detail the specific changes it makes to its studies to implement the changes required by this order. Verizon shall file its cost studies, along with any necessary supporting documentation, within 60 days from the date of release of this order. AT&T and WorldCom may file rebuttal testimony, along with any necessary supporting documentation, within 81 from the date of release of this order.

696. We adopt the AT&T/WorldCom non-recurring cost study to establish NRCs. We direct AT&T/WorldCom to resubmit the non-recurring cost study, modified to reflect the changes – and only those changes – set forth in this order, including the requirement that AT&T/WorldCom generate NRCs for additional UNEs beyond those contained in AT&T/WorldCom's submission. Along with their revised cost study, we require AT&T/WorldCom to submit testimony, workpapers, and/or other filings that explain in detail the specific changes they make to their study to implement the changes required by this order. AT&T/WorldCom shall file their cost study, along with any necessary supporting documentation, within 60 days from the date of release of this order. Verizon may file rebuttal testimony, along with any necessary supporting documentation, within 81 days from the date of release of this order.

697. We adopt the Verizon avoided cost study to establish wholesale discounts. We direct Verizon to resubmit its avoided cost study, modified to reflect the change – and only the change – set forth in this order. Along with its cost studies, we require Verizon to submit testimony, workpapers, and/or other filings that explain in detail the specific changes it makes to its study to implement the change required by this order. Verizon shall file its cost study, along

[1790] *See* Verizon Ex. 121, at 11.

[1791] All appendices attached to this order are hereby incorporated into this order by this reference.

with any necessary supporting documentation, within 60 days from the date of release of this order. AT&T and WorldCom may file rebuttal testimony, along with any necessary supporting documentation, within 81 days from the date of release of this order.

698. We direct the parties to apply the rates that we order in this proceeding, except as otherwise required by the true-up provisions discussed above, in the manner and time frame required by the terms of the parties' interconnection agreements, or in no case later than the effective date of the Bureau's forthcoming order addressing the parties' compliance filings for recurring charges for non-loop UNEs and for all NRCs. We note, however, that as part of its application for section 271 authority in Virginia, Verizon stated that it would make the switching rates established in this proceeding effective as of August 1, 2002.[1792] We expect Verizon to abide by this commitment. Except as specified above, this order is effective immediately.

XIV. ORDERING CLAUSES

699. Accordingly, IT IS ORDERED that, pursuant to Section 252 of the Communications Act of 1934, as amended, and Sections 0.91, 0.291 and 51.807 of the Commission's rules, 47 U.S.C. § 252 and 47 C.F.R. §§ 0.91, 0.291, 51.807, the issues presented for arbitration are determined as set forth in this Order, effective as specified *supra* in section XIII.

700. IT IS FURTHER ORDERED that the Verizon NRCM Motion is hereby GRANTED; the Verizon New Evidence Filing is hereby DENIED; the Verizon Motion to Re-open the Record is hereby DENIED; and the Verizon Supplemental Proffer is hereby DENIED.

701. IT IS FURTHER ORDERED that Verizon Virginia, Inc. SHALL SUBMIT a compliance filing consistent with paragraphs 695 and 697 of this Order, and that AT&T Communications of Virginia, Inc. and WorldCom, Inc. MAY SUBMIT a rebuttal filing consistent with paragraphs 695 and 697 of this Order.

702. IT IS FURTHER ORDERED that AT&T Communications of Virginia, Inc. and WorldCom, Inc. SHALL SUBMIT a compliance filing consistent with paragraph 696 of this

[1792] *Application by Verizon Virginia Inc., Verizon Long Distance Virginia, Inc., Verizon Enterprise Solutions Virginia Inc., Verizon Global Networks Inc., and Verizon Select Services of Virginia Inc., for Authorization to Provide In-Region, InterLATA Services in Virginia*, WC 02-214, Memorandum Opinion and Order, 17 FCC Rcd 21880 at 21945-46, para. 114 (2002) ("Verizon states that it has agreed to make any switching rates set during the Virginia Arbitration Proceeding effective as of August 1, 2002, the date of its Virginia section 271 application.").

Order, and that Verizon Virginia, Inc. MAY SUBMIT a rebuttal filing consistent with paragraph 696 of this Order.

By Order of the Bureau,

_____
William F. Maher, Jr.
Chief, Wireline Competition Bureau