

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 \times 12 months \times 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/FDIs⁴⁸⁶ 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 reject⁴⁹⁰), 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.