First, standard industry practice designates the reservation of only one spare maintenance duct for the entire conduit section. Should a cable failure occur in a conduit section with one spare maintenance duct, a new piece of cable can be pulled into the spare duct, working lines can be thrown into the new piece of cable, and the defective piece of cable can be removed to once again regain one maintenance spare duct. Verizon's utilization factor assumes much more than one spare duct is needed.

Second, Verizon's conduit costs already include spare innerducts, providing for additional spare capacity for fiber cable. Because every 4-inch conduit pipe can hold three of four fiber cables, frequently three or four innerducts are placed within a 4-inch conduit pipe between manholes, each of which can hold one fiber cable. Verizon's cost study assumes that every 4-inch conduit pipe has one spare innerduct for every two in use.[43] Because a typical duct contains three-to-four innerducts, each capable of accommodating a fiber cable, there is ample space for additional fiber if demand warrants – without the need for any spare ducts.

Third, the cables traversing the conduit already include a substantial allowance for spare capacity through the application of cable utilization factors discussed previously. To include additional conduit capacity in the unlikely event the cable capacity is exhausted overstates properly developed TELRIC costs.

---

[42] 4.12 Loop Study Formulas.Doc.

[43] *Id.*

Fourth, the utilization of fiber in conduit can be improved to accommodate additional demand by upgrading the electronics at each end of the fiber strand without consuming additional conduit space. In other words, the throughput capacity of the fiber within the conduit can be improved through upgrading the multiplexers, without requiring additional conduit. Thus, Verizon has modeled excessive conduit capacity by applying its conduit fill factor.

Because conduit will not be built unless a foreseeable demand for it exists, at most, one spare maintenance duct is needed per conduit section. Rather than attempting to provide for such a spare through a utilization factor, we conservatively made two adjustments to Verizon's conduit utilization. First, we eliminated Verizon's application of a **[BEGIN VERIZON PROPRIETARY]** *** **[END VERIZON PROPRIETARY]** conduit utilization. Second, to be safe, we provided for an additional spare 4-inch duct for each foot of installed conduit by adding $0.72 per foot to Verizon's conduit cost. The $0.72 is the material cost per duct foot from the FCC's Synthesis Model. With these adjustments, the forward-looking conduit investment includes adequate capacity to serve anticipated demand.

Q. ARE THERE OTHER PROBLEMS RELATING TO VERIZON'S DEVELOPMENT OF CONDUIT INVESTMENT?

A. Yes. Verizon likely overstates the amount of underground plant in its network as compared to aerial or buried cable and thus likely overstates the amount of conduit needed. Verizon determines the overall cost of conduit by developing a unit cost and applying that cost to the number of conduit feet produced by the

UAAA Model. The UAAA assumptions relating to the mix of the outside plant structure among aerial, buried, and underground plant were based on a survey performed by Verizon engineers and were not carefully scrutinized in the UNE proceeding and thus were not reviewed by the Virginia SCC. Indeed, the LCAM model included with Verizon's 1997 study included over **[BEGIN PROPRIETARY] *** [END PROPRIETARY]** of the distribution plant as underground. Yet, in a recent hearing in New Jersey, Verizon witness Donald Albert explained that there is "very, very little" underground cable in the distribution portion of the plant.[44] This further suggests that Verizon's conduit investment figures are overstated. We have not attempted to adjust for this problem, however.

E. EF&I FACTORS

Q. WHAT ARE EF&I FACTORS?

A. EF&I stands for engineer, furnish and install and represents the costs associated with installing materials in the forward-looking network. Verizon includes EF&I costs in its forward-looking cost study based on its recent experience installing material in its embedded network.

---

[44] New Jersey Board of Public Utilities Docket No. TO00060356; January 3, 2001 transcript of Marsha S. Prosini and Donald E. Albert at page 2162.

Q. DOES VERIZON'S COST STUDY CORRECTLY APPLY FORWARD-LOOKING EF&I FACTORS?

A. No. Verizon has made no attempt to establish that its historical experience is at all reflective of the EF&I costs likely to be needed in a forward-looking environment. In fact, because costs actually incurred by Verizon for EF&I investment often involve removal of older equipment along with costs for reconfiguring existing office space, the costs would not and could not reflect the forward-looking efficiencies of a new installation in a new building designed specifically for the equipment. We asked Verizon for details data underlying the loop electronics EF&I factors in an effort to evaluate Verizon's position. To date, Verizon has refused to provide the detailed data.

Q. WHERE HAS VERIZON APPLIED EF&I LOADINGS IN ITS LOOP COSTS?

A. Verizon applies EF&I loadings to its digital loop carrier equipment costs in its loop study. Verizon's DLC unit prices include a combination of prices, some of which already include EF&I costs and others that do not. None of the plug-in investment unit costs in the cost study already include an EF&I factor. Thus each piece of plug-in equipment investment is increased by **[BEGIN VERIZON PROPRIETARY] *** [END VERIZON PROPRIETARY]** for installation. That figure is computed by Verizon based on the ratio of 1998 actual total installed digital circuit equipment investment (both plug-in and hardwire) (FRC Account 257C) to digital circuit material investment (both plug-in and hardwire). By combining plug-in and hardwire equipment to develop its EF&I factor, Verizon masks the fact that the EF&I for plug-in equipment is minimal.

Q. WHY IS THE FACT THAT THE PLUG-IN EQUIPMENT EF&I IS MINIMAL MATTER IN VERIZON'S COST STUDY?

A. Installation of plug-in equipment is a simple matter of snapping the plug-in card into the appropriate slot. A more appropriate EF&I for plug-in equipment is the plug-in only factor from Verizon's historical data. According to Verizon's documents, this factor is **[Begin Verizon Proprietary] *** [End Verizon Proprietary]**. We have applied this factor to plug-in investment in our restatement of Verizon's costs.

F. STRUCTURE SHARING

Q. HOW DO UTILITIES TYPICALLY REDUCE THE COST OF STRUCTURE?

A. Telephone networks typically include aerial cable that is attached to poles, buried cable that travels through trenches, and underground cable that travels through conduits. Because structure represents a significant portion of cost associated with constructing plant, engineers welcome the opportunity to participate in structure sharing arrangements.

Q. DOES VERIZON'S COST STUDY PROPERLY REFLECT SAVINGS ASSOCIATED WITH SHARING OF STRUCTURE?

A. No. Although Verizon's cost study takes into account some sharing of poles,[45] it does not properly account for sharing of buried trenches or conduits. Verizon does not provide for any sharing of the buried trench facility and provides for only *de minimis* sharing of conduit.

Q. IS VERIZON'S APPROACH TO SHARING OF BURIED TRENCHES REASONABLE?

A. No. Verizon's failure to account for any sharing of trenches is a significant omission. Such structure sharing arrangements yield significant cost savings. Joint buried agreements that set forth the terms and conditions for joint buried operations are common in the industry. Typically, the "lead" company (*e.g.,* power company) will notify the participating partners of its intent to open a trench on a certain date. Each of the partners will then ready its respective plant items for inclusion in the trench; and the "lead" company will handle the closing of the trench and any necessary restoration. The cost of the operation may be shared as a billed cost. It is reasonable to estimate that on average there will be at least 3-way sharing of the trench. Opportunities for joint buried operations include utilities (such as Power, Gas, CATV and Telco) and municipal services (Water, Fire/Police Communications). In new building construction, builders are usually amenable to burying Telco plant, provided the material is supplied in advance. When house services (*e.g.,* Water, Gas and Electric) are buried, the cable plant is placed in a common trench by the building contractor at no additional cost. It is therefore reasonable to conclude that the Verizon cost study should be adjusted to reflect the three-way sharing of the trenching operation associated with buried plant.

---

[45] Verizon Cost Panel Testimony at 120.

Q. IS VERIZON'S ASSUMPTION OF ONLY DE MINIMIS SHARING OF TRENCHES IN UNDERGROUND PLANT REASONABLE?

A. No. Like buried plant, underground plant requires trenches but also includes conduit through which the cables run. While the conduit may not be shared, the trenches can be shared, just as they can for buried plant.

Underground structure is typically found in more densely populated areas. Municipal regulations generally discourage the indiscriminate opening of streets and sidewalks. Moreover, for safety reasons, it is not unusual for municipalities to prohibit street openings during holidays and inclement weather. Many local municipalities also require that opened streets must be completely repaved, rather than patched. As a result, when streets are opened, restoration costs can be quite high. For these and other reasons, companies look for structure-sharing opportunities. Certainly, the sharing of the trench into which conduits are placed is one such opportunity. Frequently, when roads are widened facilities are removed from the overhead pole line and placed underground. While the construction is in progress, the participants jointly share the open street for placement of conduits and manholes. Although the number of available partners for sharing trenches for underground plant is smaller than for buried plant, it is reasonable to conclude, at a minimum, that the cost of the trench itself can be shared by two partners. This would result in a 50% sharing factor adjustment to the Verizon cost study.

Q. DID THE FCC INCLUDE ANY ADJUSTMENTS FOR SHARING OF TRENCHES IN ITS SYNTHESIS MODEL?

A. Yes. The FCC, in developing the inputs to the Synthesis Model, recognizes that a firm entering the market today would take full advantage of structure-sharing opportunities. Overall, just as we have here, the Synthesis Model assumes that the new telephone entrant would bear 33% of the cost of the buried cable trench and 50% of the underground conduit plant. The difference would be paid by other utilities with which the facilities would be shared.

G. GROWTH

Q. DOES THE VERIZON MODEL PROPERLY HANDLE GROWTH?

A. No. Although the Verizon cost study's input assumptions provide for a large amount of spare capacity in the forward-looking outside plant, Verizon's cost study fails to reflect that as this spare capacity is consumed by new customers in the future, the average cost per line will decline because the initial investment cost will be spread over more lines.

Q. HAVE YOU CORRECTED VERIZON'S STUDY TO PROPERLY ACCOUNT FOR FUTURE ANTICIPATED GROWTH?

A. Yes. The modifications we have made to Verizon's cost study inputs still provide for substantial spare capacity. Thus, unit costs will decrease with future growth. As a result, we have included in our restatement of Verizon's cost studies a **[BEGIN VERIZON PROPRIETARY] *** [END VERIZON PROPRIETARY]** estimate of annual growth. This approximates the average growth in the number of working lines Verizon has experienced in Virginia over the last three years, based on the Loop Analysis Reporting and Tracking (LART)

1 information provided in discovery. It is also consistent with the average growth
2 assumptions used by Verizon's outside plant engineers in projecting repair and
3 maintenance expense savings to be produced by the replacement of cable
4 facilities. We modified the VCost module of the cost studies to compute the
5 present value of 5 years of growth at the forecasted rate. The method we used
6 properly reflects that the cost per unit (i.e., line) will decrease as additional
7 demand units materialize.

8 **H. FORWARD-LOOKING NETWORK ADJUSTMENT FACTOR**

9 **Q. WHAT IS THE FORWARD-LOOKING-TO-CURRENT FACTOR**
10 **INCLUDED BY VERIZON IN ITS COST STUDY?**

11 A. The forward-looking-to-current ("FLC") adjustment is an adjustment factor
12 proposed by Verizon to allegedly compensate for its method of calculating
13 expenses which ostensibly reduces these expenses inappropriately in a forward-
14 looking network. Because Verizon calculates expenses based on the ratio of
15 investment to expenses, expenses will automatically be projected to decrease
16 when investment decreases in a forward-looking network. Verizon therefore
17 adjusts its expenses based on the relationship of forward-looking investment to
18 embedded investment observed by Verizon in the recent New York proceeding.
19 Verizon estimates that an FLC of 80% is needed to properly recover forward-
20 looking expenses.[46]

---

[46] *See* Panel Testimony at 75.

1 **Q. HOW IS THE FLC APPLIED IN VERIZON'S STUDY?**

2 A. Verizon multiplies its historical investments by 80% before computing its
3 expense-to-investment ratios, thereby decreasing the investment base and
4 increasing the resulting ratio. This, in turn, increases its forward-looking costs.

5 **Q. IS VERIZON'S FORWARD-LOOKING-TO-CURRENT FACTOR**
6 **CONSISTENT WITH TELRIC PRINCIPLES?**

7 A. No. Verizon's forward-looking-to-current factor is a thinly veiled attempt to
8 recoup the operating costs of its embedded, inefficient network. It should be
9 rejected.

10 **Q. VERIZON ARGUES THAT SUCH AN ADJUSTMENT IS NECESSARY**
11 **BECAUSE THE EXPENSE FACTORS ARE BASED ON CURRENT**
12 **EXPENSE-TO-INVESTMENT RATIOS AND, ON THAT BASIS, LOWER**
13 **TELRIC INVESTMENT LEVELS WILL EFFECTIVELY PRODUCE A**
14 **WINDFALL REDUCTION IN EXPENSES. DO YOU AGREE?**

15 A. Absolutely not. Rather than remaining constant as Verizon suggests, expenses
16 will decrease in a forward-looking network. This is so for two reasons. First,
17 productivity is improving over time and Verizon does not take this into account.
18 In other proceedings in which Verizon has introduced a FLC, it first adjusts
19 embedded expenses to make them "forward-looking" by applying a productivity
20 adjustment, absorbing inflation, and making certain other forward-looking
21 adjustments. No such adjustments are made to expenses by Verizon in Virginia.
22 Second, many of the embedded Verizon inefficiencies produced by labor-
23 intensive efforts to use technologically obsolete equipment to serve increasing
24 demand will not exist in the forward-looking environment. Moreover, as
25 telephone technology improves and equipment becomes more sophisticated, it

1 also becomes less labor-intensive and more "user-friendly" to operate and
2 maintain. In contrast to Verizon's embedded cost approach, these facts support a
3 forward-looking network adjustment factor that reduces forward-looking
4 operating expenses, and does not increase them, as Verizon proposes.

5 **Q. COULD YOU FURTHER EXPLAIN WHY AN FLC IS NOT NEEDED?**

6 A. Yes, Verizon claims that the use of ACFs to reflect the expense of providing UNEs
7 results in purchasers of UNEs realizing expense savings that have not been
8 identified or ascribed to any actual cost-cutting initiative. Verizon attributes these
9 alleged savings to a TELRIC construct which generally results in reduced levels of
10 investment compared with the embedded investment used to produce the ACF
11 ratios. Missing from Verizon's discussion is an acknowledgement that, in addition
12 to TELRIC investment being generally lower than the investment in the existing
13 network, the mix of assets in the forward-looking network is also different than the
14 embedded mix. The forward-looking TELRIC construct allows for the construction
15 of an all-new facility using the most efficient assets available. Typically, more
16 efficient assets are those that are less expensive to operate and maintain that will, in
17 turn, result in lower overall expenses.

18 **Q. CAN YOU PROVIDE AN EXAMPLE OF A SHIFT IN THE ASSET MIX**
19 **THAT WILL RESULT IN LOWER OVERALL FORWARD-LOOKING**
20 **EXPENSES ABSENT ANY DIRECT LINK TO VERIZON COST-**
21 **CUTTING INITIATIVES?**

22 A. Yes. The shift in the forward-looking network to more fiber in the feeder facility is
23 a perfect example. The Verizon cost study assumes that fiber will be used in place
24 of copper beyond certain thresholds in the forward-looking feeder network. Because

of this assumption, there are more fiber-based feeder facilities in the forward-looking network than in the embedded network. In addition to the fact that fiber cable is less expensive on a per circuit basis than most copper cable, the cost of maintaining fiber is considerably less than that of copper cable. Verizon's own cost study shows a network expense ratio for aerial fiber cable of **[BEGIN VERIZON PROPRIETARY]** *** **[END VERIZON PROPRIETARY]**, less than one-eighth of the **[BEGIN VERIZON PROPRIETARY]** *** **[END VERIZON PROPRIETARY]** factor for aerial metallic cable.[47] Table 3 below demonstrates that even if one were to assume that cable investment costs for fiber and copper were equal, the forward-looking network would enjoy lower expenses then the embedded network.

[BEGIN VERIZON PROPRIETARY]

***

[END VERIZON PROPRIETARY]

As Table 3 demonstrates, a shift in the design of the forward-looking network from less-efficient copper feeder to more-efficient fiber feeder produces an 88% reduction in operating expenses, even before the lower investment costs of fiber are taken into account. Thus, the phenomenon of lower forward-looking expenses that prompted Verizon to create the FLC adjustment factor is nothing more than what should be reasonably expected by a shift to a more modern, efficient, forward-looking asset base.

---

[47] *See* Verizon Cost Study Section 3.9 – Annual Cost Factors.

1 **Q. DOES VERIZON'S ARGUMENT ABOUT DISCOUNTS DEMONSTRATE**
2 **THAT AN FLC IS APPROPRIATE?**

3 A. No. Verizon argues that one reason for an FLC is that in a TELRIC network, new
4 entrants will be able to purchase the *same* equipment as Verizon uses in its
5 embedded network at steep discounts but there will be no reduction in expenses
6 with this equipment.[48] Verizon's argument ignores the expense reductions that
7 will occur based on more efficient equipment. Moreover Verizon has not
8 provided any information that suggests that the discounts new entrants would be
9 able to achieve in a TELRIC network are more aggressive or favorable than those
10 that Verizon has been able to achieve in building its embedded network. Without
11 such information on the relative discount levels in the embedded and forward-
12 looking investments, no FLC or reverse FLC can be meaningfully applied.

13 **Q. HAVE YOU MODIFIED VERIZON'S FLC IN YOUR RESTATEMENT?**

14 A. Yes. We have eliminated Verizon's FLC from our restatement of Verizon's
15 forward-looking costs.

16 **I. CC/BC RATIO**

17 **Q. DOES VERIZON APPLY A CURRENT-COST-TO-BOOK-COST RATIO**
18 **TO ITS EMBEDDED INVESTMENTS TO BRING THEM TO CURRENT**
19 **LEVELS BEFORE COMPUTING ITS EMBEDDED EXPENSE RATIOS?**

20 A. No. In its cost study, Verizon has abandoned the standard application of a
21 current-cost-to-book-cost ("CC/BC") ratio to bring its embedded investments to

---

48 *See* Panel Testimony at 71.

1 1999 levels before computing the expense ratios. Verizon provides no
2 explanation of why this adjustment was eliminated from its cost study.

3 **Q. WHAT IS A CC/BC RATIO?**

4 A. A CC/BC ratio, as the name suggests, is a composite inflation index used to
5 inflate booked telephone plant investment to current price levels. It is typically
6 developed by asset account and is weighted by the relative amount of booked
7 investment placed in each year.

8 **Q. WHY IS THE APPLICATION OF A CC/BC RATIO NECESSARY?**

9 A. In Verizon's cost study, forward-looking expenses are estimated based on the ratio
10 of embedded expenses to investments. The calculated ratio is then applied to
11 estimated forward-looking investments. Application of the CC/BC ratio brings
12 Verizon's embedded investments, which are recorded on the books at the time of
13 acquisition, to a consistent basis with the operating expenses by accounting for
14 inflation that has occurred from the time the investments were placed on
15 Verizon's books through 1999 when the expenses were incurred. This step is
16 critical because the forward-looking investments to which the expense ratios are
17 applied also include all of the effects of inflation up through the time they are
18 assumed to be installed.

19 **Q. HOW DID YOU DEVELOP THE CC/BC RATIOS USED IN YOUR**
20 **RESTATEMENT?**

21 A. AT&T and WorldCom filed a discovery request to Verizon seeking the CC/BC
22 ratios necessary to bring Verizon's booked investment to 1999 levels. To date,
23 Verizon has not responded to this request. In our restatement, we used the CC/BC

1 ratios originally used by Verizon in the first UNE proceeding before the Virginia
2 SCC.

3 **J. ASSET LIVES**

4 **Q. HAVE YOU MADE CHANGES TO THE ASSET LIVES AND NET**
5 **SALVAGE VALUES USED BY VERIZON?**

6 A. We adjusted the Verizon asset lives and net salvage values to those most recently
7 prescribed for Verizon by the FCC as presented in the testimony of Mr. Lee.

8 **K. COST OF CAPITAL**

9 **Q. HAVE YOU MADE CHANGES TO THE COST OF CAPITAL AND**
10 **CAPITAL STRUCTURE THAT VERIZON USES IN ITS STUDY?**

11 A. Yes. Consistent with Mr. Hirshleifer's testimony, we adjusted the Verizon cost of
12 debt, cost of equity, and capital structure to be used in developing Verizon's
13 forward-looking economic costs to provide UNEs.

14 **L. MERGER SAVINGS**

15 **Q. DOES VERIZON INCLUDE AN ADJUSTMENT IN ORDER TO**
16 **REFLECT THE ANTICIPATED FUTURE SAVINGS RESULTING FROM**
17 **THE BA/NYNEX AND VERIZON/GTE MERGERS?**

18 A. Verizon failed to include a specific adjustment to reflect the anticipated future
19 savings associated with either the Bell Atlantic/NYNEX or Verizon/GTE mergers.
20 The UNE operating expenses presented by Verizon are developed based on the
21 ratio of 1999 operating expenses to 1999 investment.[49] To the extent that the
22 embedded inefficiencies have not yet been removed from the 1999 operating

---

[49] *See* Verizon Cost Study Part 2-Network Factors.

1 expenses and Verizon has already quantified the level of merger savings, those
2 merger savings must be reflected on a forward-looking basis. Indeed, the merger
3 savings projected to result from the Bell Atlantic/NYNEX merger were not
4 anticipated to be fully achieved until well after 1999, and the savings from the
5 Verizon/GTE mergers obviously were not included at that time.

6 **Q. HOW SHOULD THE COMMISSION TREAT COST SAVINGS THAT**
7 **WILL RESULT FROM THE RECENT MERGERS?**

8 A. The development of UNE rates in this proceeding must consider the forward-
9 looking cost savings resulting from the efficiencies produced by the recent
10 mergers. To reflect these anticipated savings, Verizon's joint and common cost
11 factor should be reduced by the amount of the anticipated savings.

12 **Q. HOW SHOULD THE LEVEL OF SUCH SAVINGS BE ESTIMATED?**

13 A. In its recent filings in New York, Verizon incorporated the impact of anticipated
14 merger savings by reducing the joint and common cost factor by a combined 2.6
15 percentage points (1.6% for the Bell Atlantic/NYNEX merger and 0.97% for the
16 Verizon/GTE merger).[50] While there were inconsistencies in the way Verizon
17 calculated each of the percentages that resulted in an understatement of the
18 amount of the reduction, we believe a 2.6 percentage point reduction from
19 Verizon Virginia's joint and common overhead cost percentage will produce a

---

[50] Verizon New York Filing Workpaper Part H, Section 3.11, Pages 5 and 5.1 of 5.

reasonable, albeit conservative, estimate of the amount of merger savings attributable to UNEs in Virginia.

M. REPAIR AND MAINTENANCE EXPENSES

Q. HAVE YOU REVIEWED VERIZON'S DEVELOPMENT OF ITS FORWARD-LOOKING CABLE REPAIR AND MAINTENANCE EXPENSES?

A. Yes. Verizon computes the maintenance and repair expense for metallic cable based on the embedded relationship of its current metallic cable repair and maintenance expenditures to its embedded metallic cable investment.[51] Before computing the ratio, however, Verizon adjusts the actual repair expenses by reducing them by five percent for "Latest Design Standards." Verizon provides no explanation for this adjustment, which we believe falls short of the actual adjustment required to capture the maintenance and repair benefits of an all new metallic cable facility. When the new forward-looking plant specifically designed to serve current demand is installed, both repair expenditures associated with defective pairs and rearrangement expenses will decline from their historic levels. As we explain below, a conservative adjustment is a 30% reduction to repair and maintenance expenses, which we have incorporated in our restatement.

---

[51] *See* Verizon Cost Study Part 2 – Network Factors.

Q. DOES VERIZON'S STUDY INCLUDE SUFFICIENT ADJUSTMENTS TO ITS CABLE REPAIR AND MAINTENANCE EXPENSES FOR THE FORWARD-LOOKING PLANT?

A. No. Verizon's cost study reflects a five percent reduction in its actual repair expenses to account for the reduced maintenance and repair expenses associated with a new metallic cable facility. This is far too low. A conservative estimate of savings would be 30%.

Q. WHAT IS THE PROCESS THAT CAUSES THE "M & R" DOLLARS TO BE EXPENDED IN DISTRIBUTION AREAS?

A. Verizon's cost study bases its maintenance and repair costs on the high costs in its embedded plant. But the reason that Verizon's costs are so high is because of the age of its plant and its process for repairing that plant. As copper plant ages, the cumulative effects of work activities and environment lead to an increase in customer trouble reports. In addition, the cost of responding to each report increases as plant ages. In the cable plant, trouble reports are typically cleared by a line and station transfer in which a new wire pair is assigned to the customer without fixing the original problem or even determining the root cause. This cause may eventually result in a problem on the new line as well. For example, water that affected the first wire pair may eventually affect the second wire pair. As the plant ages, the reassignment of wire pairs to clear troubles reduces the available spare facilities. Eventually, even new service installation requires facility modifications to provision services. If, for example, there are no more spare cables at a telephone pole that can be assigned to a customer, a drop wire

must be put in place from a nearby pole. This significantly increases the cost of installing the new line or clearing the trouble.

Q. WHAT CORRECTIVE ACTION DOES VERIZON TAKE TO ADDRESS THOSE ISSUES?

A. When Verizon determines that the cost of maintenance and repair in a particular area of the plant has become too high, it will then rehabilitate or stabilize the plant. Verizon determines where to conduct such rehabilitation and stabilization through a Facility Analysis Plan. The Facility Analysis Plan includes an assessment of expenses associated with facility modifications. The Facility Analysis Plan also includes an evaluation of the average time to perform certain tasks; the number of craft personnel who are needed to complete the job; and the average wages that must be paid to these personnel. The location of the plant is reported to a tracking unit, and the plant is ranked according to total reported "M & R" expenses. Based on this information, an engineer then proceeds to rehabilitate or stabilize the high cost areas of the plant. Upon completion of the work, the cable is tracked to ensure that the trouble reports and facility modifications have been eliminated or sharply curtailed.

Q. HAS VERIZON PRODUCED DOCUMENTS THAT WOULD INDICATE ANY PROJECTED SAVINGS FROM REHABILITATION WORK ACTIVITIES?

A. Yes, documents that Verizon-Maryland produced in discovery in the related Maryland UNE proceeding indicate that Verizon-Maryland engineers anticipate achieving a 90% reduction in maintenance expenses when they rehabilitate areas of plant. Although we have asked in discovery in this proceeding for Verizon's

outside plant estimate cases for recent distribution relief jobs, Verizon has not yet provided these documents. We believe these documents will show that Verizon expects in excess of a 90% reduction in maintenance expenses after new distribution cable replaces older, deteriorated plant – as was the case in Maryland.

Q. HAS VERIZON-VIRGINIA SUBMITTED DATA IN THIS PROCEEDING THAT WOULD GIVE AN INDICATION OF THE NATURE OF THE CONDITION OF THE PLANT IN VIRGINIA?

A. Yes. As noted above, information extracted from the LART data submitted in this case indicates that 6.3% of all available lines in Verizon-Virginia distribution areas across the state are defective. This percentage of defective pairs suggests that there are ample opportunities for rehabilitation of the plant. Rehabilitation of plant in high cost areas – or introduction of new plant in those areas as would occur in a reconstructed network – should yield a substantial reduction in maintenance and repair expenses in the future.

Q. GIVEN THAT VERIZON-MARYLAND ANTICIPATES A 90% MAINTENANCE SAVINGS GOING FORWARD AS A RESULT OF PLANT REHABILITATION, WHAT HAS VERIZON-VIRGINIA PROJECTED WITH RESPECT TO "M AND R EXPENSES?"

A. Verizon makes only a 5% downward adjustment to the "R" dollars for copper and drop-wire, and no additional adjustments to "M" dollars.

Q. ARE VERIZON-VIRGINIA'S "M & R" DOLLAR ADJUSTMENTS REASONABLE?

A. No. Mr. Riolo's extensive experience in rehabilitating distribution plant comports with savings projected by Verizon-MD of 90% going forward. With so many opportunities available to Verizon-Virginia for plant rehabilitation and

1 stabilization, a very conservative, reasonable savings of 30% in "M & R" dollars
2 is achievable through rehabilitation. Even greater savings would be achieved in a
3 reconstructed network with entirely new plant throughout the network.

4 **N. Y2K EXPENSES**

5 **Q. DOES VERIZON INCLUDE YEAR 2000 COMPLIANCE EXPENSES IN**
6 **ITS FORWARD-LOOKING COST STUDY?**

7 A. Verizon bases the forward-looking operating expenses in its cost study on its
8 actual expenditures for 1999. During 1999, substantial efforts were underway at
9 most companies, including Verizon, to ensure that computer systems were year
10 2000 compliant. These one-time expenditures to ensure compliance will not be
11 incurred by Verizon or any entrant into the local telephone market that enters after
12 2000. As such, these expenditures should be excluded from Verizon's studies.
13 We removed these "Y2K" related expenditures in our restatement of Verizon's
14 study.

15 **O. ADVERTISING EXPENSES**

16 **Q. PLEASE EXPLAIN WHAT AMOUNT OF VERIZON'S ADVERTISING**
17 **EXPENSES SHOULD BE INCLUDED IN ITS FORWARD-LOOKING**
18 **COSTS?**

19 A. Verizon's cost study attempts to charge CLECs for Verizon's <u>retail</u> advertising.
20 All of Verizon's advertising expenses should be considered retail avoided and thus
21 removed in their entirety from Verizon's forward-looking costs. Verizon's
22 proposal to include any advertising expenses in the development of its claimed
23 UNE costs is absurd and should be rejected outright. Effectively, Verizon would
24 like its competitors to pay for Verizon's advertisements for a network that its

1 competitors will not be able to lease through UNEs, and which may be more cost-
2 effective than the network construct used to set UNE rates. In short, Verizon's
3 inclusion of advertising expenses – which have historically been spent on
4 advertising for retail services – for the development of its forward-looking
5 economic costs to provide UNEs must be rejected.

6 **P. NON-RECURRING AND OTHER SUPPORT FACTOR**
7 **ADJUSTMENTS**

8 **Q. PLEASE DESCRIBE THE NON-RECURRING ADJUSTMENT.**

9 A. In its cost study, Verizon reduces its 1999 operating expenses by the amount of
10 non-recurring provisioning revenue it received in 1999 in an effort to avoid
11 recovering these costs both as part of the recurring rates and again as part of the
12 non-recurring rates. As Mr. Walsh describes in his testimony, Verizon's proposed
13 adjustment falls wide of the mark. Because many of Verizon's daily maintenance
14 and rearrangement activities involve tasks identical to those Verizon claims
15 should be the subject of a non-recurring charge, most of Verizon's "non-
16 recurring" activities are already being recovered in the recurring rates and should
17 thus not be recovered as a separate charge. However, in order to avoid an under-
18 recovery of these recurring expenses, it is necessary to reverse Verizon's removal
19 of non-recurring provisioning revenues from 1999 expense. We have done so in
20 our restatement.

21 **Q. PLEASE DESCRIBE THE OTHER SUPPORT FACTOR ADJUSTMENTS**
22 **YOU MADE.**

23 A. Similar to the non-recurring adjustment, Verizon makes an adjustment in its other
24 support factor calculations to remove recurring OSS charges which Verizon

asserts should be covered by a separate OSS charge. As Terry Murray explains, the costs Verizon seeks to recover through the separate OSS charge are already being recovered through recurring charges and Verizon's proposed charge should be rejected. However, to avoid an under-recovery by Verizon, we have eliminated Verizon's adjustment to its other support factor.

Q. SUMMARY OF LOOP COST RESTATEMENT

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR RESTATEMENT OF VERIZON'S CLAIMED LOOP COSTS.

A. We have restated Verizon's loop cost study incorporating all of the modifications we discuss above. Table 4 summarizes our results by density zone and statewide for the two-wire loop and compares them to Verizon's results.

Table 4

Summary of Restated Two Wire Loop Results

Density Zone	Verizon	Restated Verizon
2-Wire Loop Dens Cell 1	$19.49	$5.13
2-Wire Loop Dens Cell 2	$29.69	$7.54
2-Wire Loop Dens Cell 3	$48.93	$12.07
2-Wire Loop Statewide	$25.12	$6.46

As we discussed previously, these loop results are very close to those produced by the Synthesis Model, however, for all the reasons stated above, these restated Verizon rates are not TELRIC.

Details of our calculations are included as part of our electronic workpapers. Because these workpapers are restated versions of electronic models filed and deemed proprietary by Verizon, our electronic workpapers must also be treated as proprietary. Our workpapers are being provided on a CD-ROM to the

1 Commission, Verizon, and other parties that have signed Verizon's protective
2 agreement.

3 **R. RESTATEMENT OF OTHER UNES**

4 **Q. DID YOU RESTATE OTHER OF VERIZON'S UNE COSTS IN**
5 **ADDITION TO THE TWO WIRE LOOPS?**

6 A. Yes. For many of the other UNEs for which Verizon has developed costs, we
7 have restated Verizon's results by applying, where appropriate, the relevant
8 adjustment from our two-wire loop restatement discussed above. In addition, we
9 have been provided restated investments for certain of Verizon's proposed UNEs
10 from other AT&T/WorldCom witnesses. We have processed these restated
11 investments through the Verizon cost models to produce revised recurring UNE
12 rates. A complete summary of all of the restated recurring rates is included as
13 Exhibit 1 to this testimony. Details of all of our calculations are included in our
14 workpapers.

15 **IV. <u>SWITCH COSTS</u>**

16 **A. INTRODUCTION AND SUMMARY OF TESTIMONY**

17 **Q. WHAT IS THE PURPOSE OF THIS SECTION OF THE PANEL**
18 **TESTIMONY?**

19 A. This part of the testimony demonstrates that Verizon's claimed switch UNE costs
20 substantially exceed forward-looking economic costs and should be rejected.
21 Specifically, Verizon's methodological approach to developing its costs for
22 switching violates long-run forward-looking economic cost principles.

First, Verizon's cost study does not assume the purchase of new digital switches at new switch prices (with new switch price discounts) available from Verizon's switch vendors. Thus, the study does not satisfy basic TELRIC principles for modeling a reconstructed local network. Instead of using the new switch purchase discounts offered by its vendors, Verizon relied solely on the smaller "growth" discounts – available for adding-on capacity to existing switches – thereby substantially inflating its claimed switch costs.

Second, Verizon's proposed switch engineering and installation factors are overstated and must be adjusted to reflect the costs of an efficient company operating in a competitive environment.

Third, Verizon has misallocated substantial costs to the usage-related UNE elements, thereby overstating the UNE minute-of-use elements.

There are numerous additional deficiencies in the study including understated amounts of IDLC, inappropriate line and trunk port utilization factors, and incorrect and unsubstantiated input data used in feature cost development and Right-to-Use ("RTU") costs.

This testimony also demonstrates that the methodology Verizon proposes for development of the switch portion of the reciprocal compensation rates should be rejected. Verizon seeks to treat switch costs for UNEs and reciprocal compensation in fundamentally different ways. This is inappropriate. The switch UNE rates – after making the required corrections to Verizon's cost study – should serve as the switch component in the reciprocal compensation rate.

AT&T/WorldCom has restated Verizon's proposed switch UNE rates and reciprocal compensation rates in Attachment 1 to this testimony.

B. VERIZON ERRED IN ITS USE OF GROWTH-ONLY SWITCH PRICES

Q. PLEASE EXPLAIN HOW VERIZON DEVELOPED ITS CLAIMED SWITCH UNE COSTS.

A. Verizon used the Telcordia SCIS models to develop claimed port, port additives, and usage investments. Multiple loadings were added for power, engineering, installation, etc. and then annual cost factors were applied to convert the investments to monthly costs and expenses were added to develop the purported TELRIC cost. Finally, various overhead loadings were added to calculate proposed prices.

Because the starting point for Verizon's cost study is switching investment, if Verizon's investment inputs are wrong, as they clearly are, then Verizon's claimed costs and ultimately its proposed switch UNE prices likewise will be wrong – as they are by a wide margin.

Q. PLEASE EXPLAIN THE ROLE OF SWITCH PRICES AND SWITCH DISCOUNTS IN VERIZON'S COST STUDY.

A. The SCIS model has only the list prices for switches in its databases. In the real world, Verizon and all other large telephone companies never pay the list price, but instead receive substantial discounts off the list price from the switching vendors. Thus, in order for SCIS to compute a net price, discount inputs must be entered into the program.

1 **Q. PLEASE DEFINE "NEW" AND "GROWTH" SWITCH DISCOUNTS.**

2 A. Switch manufacturers typically provide a larger discount for purchasing a new
3 switch and a lower discount for purchasing add-on growth equipment to an
4 existing switch.

5 **Q. WHICH SWITCH PRICES AND DISCOUNTS DID VERIZON USE?**

6 A. Verizon used growth discounts in calculating its switch prices.

7 **Q. WHY IS IT INCORRECT FOR VERIZON TO USE GROWTH**
8 **DISCOUNTS IN THE COST STUDY?**

9 A. The use of growth-only prices violates long-run, forward-looking economic cost
10 methodology, which requires use of new switch prices. In fact, Verizon's
11 methodology inappropriately mixes and matches different, and conflicting,
12 methodologies in the same study.

13 Moreover, it is simply incorrect to use a growth discount as an input to
14 SCIS because SCIS is designed to compute the cost of a new switch. Each of
15 these issues is addressed in more detail below.

16 **Q. DID VERIZON FOLLOW TELRIC IN USING GROWTH-ONLY PRICES?**

17 A. No. Verizon does not take a long-run view that assumes the entire switch's
18 forward-looking replacement cost must be used but instead takes a short-run view
19 that it has named "actual." Consistent with this view, Verizon declares that it has
20 no definitive plans to purchase new digital switches[52] and claims that the only

---

[52] Verizon response to AT&T Data Request Number 9 – Request 30.

1 relevant cost is the price of growth equipment being added to existing switches.
2 In Verizon's words, the forward-looking switching technology (and associated
3 switching cost) "represents the mixture of switching equipment components
4 Verizon is purchasing incrementally to upgrade and expand its switch network, on
5 a forward-looking basis."[53] This is directly contrary to TELRIC principles.

6 **Q. DOES VERIZON APPLY THIS SHORT-RUN APPROACH**
7 **CONSISTENTLY IN ITS SWITCH COST STUDY?**

8 A. No. Verizon uses this assumption only to determine what price discount to use.
9 Verizon then applies the growth price discount to all switch equipment, not just
10 the add-on equipment. Verizon thus includes the entire cost of a new switch in its
11 cost study, but priced at higher short-run marginal pricing structures that do not
12 reflect the discounts available for a new switch.

13 **Q. WHAT APPROACH IS MANDATED BY THE FCC RULES?**

14 A. The FCC's TELRIC rules assume the long-run in which all investments are
15 avoidable – thus leading to the FCC rule that a new network be built using the
16 existing wire center locations, to serve all reasonably foreseeable demand, as
17 described in more detail in Ms. Murray's testimony.

18 **Q. DID VERIZON FOLLOW THIS APPROACH?**

19 A. No. Verizon confuses these straightforward principles when it states that it
20 applies discounts it "actually receives" in the future for equipment it will be

---

[53] *See* Panel Testimony at 189.

1 "purchasing incrementally to upgrade and expand its switch network, on a
2 forward-looking basis".[54] Verizon claims it is using forward-looking
3 assumptions, but fails to consider the long-run when calculating its costs.[55]

4 **Q. HOW DID VERIZON DETERMINE ITS SWITCH DISCOUNT INPUTS**
5 **IN THIS CASE?**

6 A. Verizon studied actual Lucent and Siemens equipment purchases for one year and
7 compared the list price with the net price to determine its growth discount
8 inputs.[56] Even if it were correct to use growth prices in a TELRIC study, which it
9 is not, Verizon's claim that one year's worth of purchases could accurately reflect
10 the type and amounts of switch equipment purchases it expects to make in the
11 future is incorrect.

12 Indeed, Verizon has admitted that the purchase information it used to
13 develop the discounts is not appropriate for determining the price of a new
14 switch.[57]

15 **Q. DOES VERIZON'S APPROACH CORRECTLY CALCULATE TELRIC**
16 **BASED COSTS?**

17 A. No. Verizon is assuming the discounted price structure of incrementally growing
18 its existing switches, not the discounted price structure for newly constructed

---

54 *Id.* at 188-189

55 A glaring omission of references to the long-run is evident in the Cost Panel Testimony at 188-189.

56 Panel Testimony at 190-193

1 switches that can serve the entire demand. It combines a short-run approach to
2 prices (which are higher than long-run new switch prices) with a long-run
3 approach of including the total cost of the switch (which is higher than the short-
4 run incremental cost of including just the growth equipment), thereby selectively
5 mixing methodologies and inappropriately inflating UNE costs. Verizon's mixed
6 approach directly violates the FCC's rules requiring prices based on the cost of a
7 reconstructed network that will serve the entire quantity of the network element
8 provided.

9 **Q. CAN SCIS BE USED TO PRODUCE A CORRECT SWITCH PRICE**
10 **USING ONLY GROWTH DISCOUNTS?**

11 A. No. SCIS is a "static" model and is designed to estimate the price of a new
12 switch.[58] SCIS was not designed to model dynamically a switch that grows over
13 time.[59] Verizon's input of only growth discounts is a misuse of the SCIS model.
14 A significant portion of the SCIS-derived price for a switch is for the "getting

---

57 Verizon responses to AT&T Data Requests 9-33, 34 and 35 state that the existing contracts that were used to develop the Verizon discounts "would not control the price of a new switch" and they "cover only additions to existing switches."

58 A Telcordia letter, dated July 30, 2001 to Mr. Bob Beyer in Verizon's Boston, MA, office, discussing SCIS explicitly states: "These prices reflect the cost to purchase a *new* 5ESS switching system." The letter was provided by Verizon in discovery as an attachment to Verizon Response to ATT Data Request 9-2 (emphasis added).

59 Performing a dynamic cost study is extremely difficult, requires extensive demand analysis, and has not been used, to our knowledge, in the telephone industry for determining the costs of retail services or wholesale elements. SCIS was designed and developed, along with all other engineering economic cost models of which I am aware, to perform a "static" analysis.

1 started" equipment, or first cost of the switch.[60] This equipment is purchased with
2 the initial installation and would receive a new switch discount. In addition, all
3 lines and trunks purchased at the initial installation of a new switch (and usually
4 lines and trunks purchased for a number of years afterward) would also receive
5 the new switch discount.[61]

6 Verizon improperly used the growth switch discount in running the SCIS
7 model, and the model applied that discount uniformly across all switch
8 components, including the large "getting started" cost and all the lines and trunks
9 purchased as part of a new switch. This results in a serious overstatement of the
10 total switch investment. It is incorrect to enter the "growth" discount into SCIS
11 when the program will ultimately apply that lower growth discount to equipment
12 that Telcordia itself states is intended to model a new switch purchase with a
13 higher new switch discount.

14 **Q. HAS A COURT ADDRESSED THIS ISSUE?**

15 A. Yes, last year, the United States District Court for the District of Delaware
16 explicitly rejected as contrary to TELRIC Verizon's no new digital switch
17 argument and its attempt to avoid larger new switch purchase discounts.[62]

---

60 **[BEGIN VERIZON PROPRIETARY] *** [END VERIZON PROPRIETARY]**

61 Most new switches are replacing an existing switch that was already serving the wire center. In such a case, all replacement lines and trunks purchased as part of the new switch would receive the new switch discount.

62 *Bell Atlantic-Delaware, Inc. v. McMahon*, 80 F. Supp. 2d 218, 236-239 (D. Del. 2000).

1 **Q. WHAT NEW SWITCH PRICE SHOULD VERIZON USE?**

2 A. The cost study should be long-run. The cost of a *new* digital switch is an
3 appropriate estimate for the next generation of switch technology and should be
4 used in the cost study.

5 **Q. WOULDN'T PACKET SWITCHES BE EVEN MORE EFFICIENT?**

6 A. No. At some future date, packet-based switches will probably be the primary
7 switching vehicle in the network, but at present, it is premature to assume a
8 network using packet technology for voice transmission. Efficient companies will
9 replace digital switches with packet switches only when they are at least
10 functionally equivalent and cheaper on a unit basis than purchasing or growing
11 digital switches.

12 **Q. HOW SHOULD THE PRICE FOR A NEW SWITCH BE DETERMINED?**

13 A. There are two primary sources for identifying the cost of a new switch:
14 competitive bids and switch manufacturer contracts.[63] Verizon states that the
15 purchasing unit of Verizon Communications, Inc. uses a competitive bid
16 procedure for the purchase of new switches. The fact that Verizon uses
17 competitive bidding procedures to purchase new switches, however, does not
18 necessarily mean the contract prices are not available – only that the contract

---

[63] The switch manufacturers typically maintain long-term baseline contracts that include terms, conditions and prices for switch purchases with their customers. These contracts are often updated via amendments, etc. to reflect special short-term conditions, such as special negotiations on high-volume growth equipment, for example. When referring to
(footnote continued)

prices would be the maximum price that Verizon would pay for a new switch. AT&T/WorldCom's restated rates are based on information provided by Verizon regarding its available discounts for replacing or purchasing a new digital switch.[64] The relevant information is provided in Attachment 3

C. IDLC

Q. WHAT IS IDLC AND WHAT IS ITS IMPACT ON UNE SWITCH PRICES?

A. Subscribers' lines are copper loops. Cooper loops can either be connected directly to the switch at analog ports, or, using digital loop carrier ("DLC") technology, be aggregated at a remote terminal and brought to the wire center on fiber feeder. In the latter scenario, the fiber feeder in the wire center is then typically converted to copper DS1s and brought directly into the switch.

TR-008, a particular type of IDLC, has been deployed in telephone networks for many years. This older technology used small-sized remote terminals and had limited capability to engineer and concentrate subscriber traffic. Verizon continues to rely on TR-008 in its cost study.

The newer IDLC technology is called GR-303 (formerly TR303) and is often called Next Generation Integrated Digital Loop Carrier (NGDLC). This technology can concentrate more traffic on fewer DS1s. The number of DS1s

---

contracts in this testimony, we are referring to these baseline contracts and their amendments, even though a competitive bid may also result in a "contract."

[64] Verizon provided this information in the New Jersey BPU Docket No. TO00060356 in response to AT&T Requests AT&T 13, 16, and 74.

from the remote terminal to the switch is engineered based on the number of subscriber lines served by the remote terminal and the amount of usage at the remote terminal. As set forth in this Panel's testimony on IDLC, a 4:1 line concentration ratio is appropriate for GR-303, meaning four subscriber lines can share one DS0 channel on the DS1. This would allow 96 subscriber lines to be provisioned on one DS1.[65] This is the most efficient and cost effective technology available today.

Proper modeling and appropriate engineering data inputs for IDLC are important in determining correct switch port prices. Verizon has used inappropriate model assumptions and inputs in determining costs for IDLC.

Q. HOW MUCH IDLC HAS VERIZON ASSUMED IN ITS SWITCH STUDY?

A. Verizon has assumed that 10% of the lines are on GR-303 integrated digital loop carrier and that 47.6% lines are on the old technology, TR-008 Mode I IDLC.[66]

Q. SHOULD VERIZON ASSUME ALL INTEGRATED DIGITAL LOOP CARRIER IS GR-303?

A. Yes. Verizon's own 1999 Network Planning Guidelines[67] acknowledge that GR-303 is the successor to TR-008 and is the forward-looking technology that is currently available and being deployed today. As already explained above, the

---

[65] This is calculated by taking 24 channels per DS1 times 4 subscribers per channel (24 * 4 = 96).

[66] Verizon Panel Testimony at 183.

[67] Verizon's Network Planning Guidelines, April, 1999 was provided in response to AT&T Data Request 9-52.