1 incur on behalf of its competitors and to inflate the actual costs of many UNEs.
2 The Commission should scrutinize carefully every one of Verizon's assumptions
3 to ensure that the adopted UNE prices do not exceed true forward-looking
4 economic costs and forestall local competition in Virginia, especially for
5 residential and small business customers.

6 **Q. PLEASE PROVIDE SOME EXAMPLES OF HOW VERIZON'S**
7 **ERRONEOUS ASSUMPTIONS LEAD VERIZON TO OVERSTATE**
8 **RECURRING COSTS.**

9 A. The AT&T/WorldCom Recurring Cost Panel Rebuttal Testimony provides many
10 illustrations of Verizon's failure to incorporate efficient, forward-looking
11 assumptions into its cost studies. For example:

12 • *Verizon's cost studies do not reflect the most efficient mix of technology.*
13 As I have discussed briefly above, an egregious instance in which
14 Verizon's cost studies assume a less-than-efficient technology mix is the
15 case of DLC equipment. In its recurring cost studies, Verizon assumes that
16 it will provision 30% of its fiber-fed loops[32] via UDLC and the remaining
17 70% of its fiber-fed loops over some form of IDLC. Verizon further
18 assumes that it will provision 10% of *all* loops over DLC that complies
19 with the next generation Telcordia GR-303 standard. Verizon assumes
20 that it will provision the remaining IDLC loops over DLC that complies

with the older TR-008 standard. The mix of UDLC and IDLC reflects Verizon's installations over the *past* three years; the mix of GR-303 vs. TR-008 IDLC purportedly reflects the incremental mix of loop technologies that Verizon expects to deploy over a three-year "forward-looking" planning horizon.[33]

Verizon does not even pretend that this mix of DLC technologies is the one that it would deploy if it rebuilt its network from scratch today. Instead, the Verizon Cost Panel implicitly acknowledges that GR-303-compliant DLC would be the most cost-effective technology for a reconstructed local network, but defends the high proportion of TR-008 IDLC (47.6% of all loops) assumed in its cost studies on the ground that:

> It was necessary to define a new set of OSS capabilities and operational methods to support GR-303 IDLC. GR-303 IDLC also requires a new type of digital switch port. Thus, the huge existing investment in modern digital switch ports that support TR-008 IDLC would have to be replaced and stranded to deploy the GR-303 interface widely.[34]

---

32 Overall, Verizon's recurring cost studies assume a mix of 17.7% all-copper loops and 82.3% fiber-fed loops. Verizon Cost Panel Direct at 98.

33 Verizon Cost Panel Direct at 98-99. The Verizon Cost Panel's allegation concerning the company's expected technology deployment over the planning horizon is questionable. Verizon's own network planning guidelines, produced in response to Question 53 of AT&T's Ninth Set of Data Requests, state that **BEGIN VERIZON PROPRIETARY** *** **END VERIZON PROPRIETARY** Network Planning Guideline, NP-G-97-027, Issue 1, Page 4; *see also* Issue 1 Page 20.

34 Verizon Cost Panel Direct at 91.

1 The high cost to replace existing digital switch ports and to deploy new
2 OSS functionality are legitimate factors for Verizon to consider as it
3 decides when, and to what extent, to upgrade its existing network with
4 GR-303-compliant technology. But they are irrelevant in considering the
5 TELRIC costs of the network. A competitor building an efficient network
6 today would not be bound by the limitations of Verizon's existing plant
7 and, without such a constraint, would only use switches that are
8 compatible with GR-303. As a result, the *economic value* of Verizon's
9 existing outside plant and its existing digital switches, which deploy less-
10 efficient TR-008 interfaces, is reduced to the extent that this existing plant
11 is more costly to operate than modern, GR-303-compliant plant. I noted
12 above that Dr. Shelanski acknowledges this point conceptually, but both
13 he and Dr. Gordon fail to follow through on this economic logic in their
14 review and endorsement of the Verizon cost studies.
15 Verizon's assumption of less-efficient TR-008 IDLC also affects
16 its assumption concerning the forward-looking mix of UDLC vs. IDLC. I
17 have already explained that Verizon based this assumption on a *backward-*
18 *looking* analysis of the loop plant placed over the past three years.[35] The

---

[35] Verizon Cost Panel Direct at 98-99. In concurrently filed rebuttal testimony, the AT&T/WorldCom Recurring Cost Panel explains that Verizon's technical claims concerning the feasibility of unbundling individual loops via GR-303-compliant IDLC are incorrect.

1 company also admits that its existing loop plant does not include *any* GR-
2 303-compliant DLC;[36] therefore, the mix of UDLC and *TR-008* IDLC that
3 Verizon has deployed over the past three years does not in any way reflect
4 the economic choices that an efficient carrier would make on a going-
5 forward basis to provision the total current and reasonably foreseeable
6 demand for loops and loop-based services.

7 The AT&T/WorldCom Recurring Cost Panel and Non-Recurring
8 Cost and Advanced Services Panel both address the numerous and severe
9 cost consequences of Verizon's backward-looking assumption of 30%
10 UDLC. To summarize their rebuttal testimonies, this single assumption:
11 (1) doubles the cost of line cards and adds an analog line card to the digital
12 switch, which effectively includes three analog-to-digital conversions; (2)
13 increases the cost of line port terminations at the switch; and (3) artificially
14 inflates the need for manual central office frame wiring. As the Recurring
15 Cost Panel explains, these cost consequences are in many ways
16 attributable to Verizon's assuming that its IDLC plant will be largely TR-
17 008, rather than GR-303, technology. Use of TR-008 IDLC prevents
18 Verizon from provisioning unbundled loops over IDLC and thus drives up

---

[36] Verizon Cost Panel Direct at 91.

the assumed percentage of costly UDLC.[37] If modeled correctly, TR-008 IDLC switch interfaces are also more costly than GR-303 interfaces. Verizon's short-run network architecture and technology assumptions produce higher costs than would result from assumptions that comport with the TELRIC methodology and with long-run costing principles in general.

- *The outside plant configuration that Verizon has modeled does not reflect an efficient, forward-looking network architecture.* Unlike the loop module of the FCC's Synthesis Model, Verizon's loop cost study treats as fixed the company's existing feeder and distribution routes, its embedded assignment of customers to existing distribution areas, and, with minimal exception, its existing trench and conduit architecture (in which trenches and conduits are not shared). Verizon's loop cost study bases its analysis of network architecture on the results of a survey of Bell Atlantic outside plant engineers taken in the early 1990s. The results of this survey may be an accurate description of Bell Atlantic's embedded outside plant characteristics in the early 1990s, but they certainly do not reflect appropriate engineering judgments concerning the most efficient network

---

[37] Verizon Cost Panel Direct at 92-93.

architecture to serve Verizon's existing and reasonably foreseeable demand given the technology choices available in 2001.

The only factors that Verizon should have treated as fixed in determining the appropriate forward-looking network architecture for its outside plant are its current wire-center locations and the locations of customer demand. That is the approach that AT&T and WorldCom have employed in this proceeding, using the loop module of the Commission's Synthesis Model as the basis for determining the optimal outside plant configuration.

The outside plant network configuration on which Verizon based its recurring cost study, in contrast, differs in several respects from the network architecture that an efficient carrier would deploy if it were to reconstruct Verizon's outside plant today, using the most efficient technology available to meet current and reasonably foreseeable demand. The AT&T/WorldCom Recurring Cost Panel explains in concurrently filed rebuttal testimony that Verizon's use of a backward-looking outside plant configuration does not take into account the cost savings achievable through more efficient routing and more efficient groupings of customers into distribution areas and thus overstates the costs that a TELRIC-compliant cost study would produce. In addition, Verizon has not assumed any sharing of the buried facility trench and allows only a token adjustment for sharing of conduit through its application of the conduit

1 utilization factor. An efficient firm entering the market today would take
2 full advantage of opportunities to share structure, and hence structure
3 costs, with other providers and to use the same structure for both its own
4 loop plant and its interoffice facilities. The AT&T/WorldCom Recurring
5 Cost Panel elaborates on this point and identifies other aspects of the
6 Verizon loop cost study assumptions that differ from the long-run
7 assumptions appropriate for a TELRIC cost study.

8 • *Verizon's cost studies reflect lower levels of plant utilization and higher*
9 *unit costs than an efficient carrier would achieve on a forward-looking*
10 *basis.* Verizon claims to have modeled sufficient plant to serve all current
11 and reasonably foreseeable demand.[38] In reality, as the AT&T/WorldCom
12 Recurring Cost Panel demonstrates with respect to loop plant, Verizon has
13 modeled far more capacity than necessary to serve that demand because
14 the company has incorrectly assumed that its current, relatively low
15 utilization factors for facilities such as distribution cable represent a
16 reasonable estimate of forward-looking plant utilization.[39]

17 Verizon asserts without further explanation or proof that "there is
18 no basis to anticipate that it [the company's experienced utilization of

---

38 *See, e.g.*, Verizon's discussion of utilization factors , Verizon Cost Panel Direct at 37-38.

39 "In most cases, based on the judgment of its engineers, Verizon VA determined that its forward-looking utilization levels should be the same as Verizon VA's current actual utilization levels." Verizon Cost Panel Direct at 39.

1 distribution plant] will change significantly in the future based on present
2 or future technological improvements, efficiency gains, or other forward-
3 looking factors."[40] The Commission should not accept such an
4 unsubstantiated claim with respect to the **BEGIN VERIZON**
5 **PROPRIETARY *** END VERIZON PROPRIETARY** distribution
6 fill,[41] or any of the other fill factors included in Verizon's study. Verizon
7 has not provided the kind of state-specific justification for such low fill
8 factors that the Commission has indicated in its *Massachusetts 271 Order*
9 would be necessary. In discussing the Verizon Massachusetts Section 271
10 application, the Commission observed:

11 In addition, commenters have pointed out that
12 Massachusetts used substantially lower fill factors
13 in calculating its UNE-loop rates than this
14 Commission has used in its USF cost model. For
15 copper distribution cable, which affects loop rates,
16 Verizon used a fill factor of 40 percent for metro,
17 urban, and suburban zones. In the *SWBT*
18 *Kansas/Oklahoma Order*, the Commission found
19 that a fill factor of 30 percent for distribution cable
20 was too low because it assumed that too large a
21 percentage of capacity would be idle for an
22 indefinite time, contrary to TELRIC's presumption
23 of an efficient network. The Commission noted that
24 it adopted fill factors ranging from 50 to 75 percent
25 for the USF cost model, that the Kansas
26 Commission adopted a 53 percent distribution cable
27 fill factor, and that the New York Commission

---

40 Verizon Cost Panel Direct at 115.

41 Verizon Cost Panel Direct at 111.

> adopted a 50 percent distribution cable fill factor. We question whether the low fill factor used in Massachusetts is appropriate without a state-specific justification.[42]

As the AT&T/WorldCom Recurring Cost Panel notes in concurrently filed rebuttal testimony, Verizon's proposed Virginia distribution fill factor is also "too low because it assume[s] that too large a percentage of capacity would be idle for an indefinite time, contrary to TELRIC's presumption of an efficient network."[43]

Verizon compounds the error of modeling too much plant to meet demand by spreading the costs of that plant over too little demand. That is, Verizon has modeled plant to meet future demand as well as current demand, but the company has calculated unit costs using only current demand in the denominator of the calculation. As I explained in my direct testimony, a cost study that comports with TELRIC principles should capture the economies of scale and scope associated with building the most efficient network to serve both current and reasonably foreseeable demand, but should then calculate the unit costs for each UNE based on the *total* quantity of both current and (reasonably foreseeable) future

---

[42] Memorandum Opinion and Order in Verizon Massachusetts application for 271 relief, CC Docket No. 01-9, FCC 01-130, rel. April 16, 2001, ("*Massachusetts 271 Order*") at ¶ 39.

[43] *Id.*

demand. The AT&T/WorldCom Recurring Cost Panel presents further detail concerning this modeling error in concurrently filed rebuttal testimony.

- *The discount factor that Verizon uses to calculate the cost of digital switches does not reflect the price that Verizon would pay to reconstruct its network with new switches that would meet the entire current and reasonably foreseeable switching demand.* Verizon calculated switch investments using Telcordia's SCIS model. Built into this model is the manufacturer's list price for the entire range of switching components that might be purchased in conjunction with the purchase of a new digital switch. Switch purchasers do not actually pay "list price"; therefore, the SCIS model allows the user to input a "discount factor" that is intended to transform list prices into the prices that the purchaser actually pays for new switches. Verizon used a snapshot of recent switching purchases to determine this discount factor input. According to the Verizon Cost Panel:

> Verizon asked each of its switching vendors to provide a detailed list of all switching equipment (hardware) purchases Verizon made during the past year (2000), and to include actual quantities, list prices, and prices Verizon paid for the equipment. From this information, Verizon calculated an overall effective discount it actually received during the timeframe the purchases were made, by

> comparing the total list price of all purchases made versus the actual total price paid.[44]

The Verizon Cost Panel freely admits that the mix of switching components that Verizon purchased in 2000

> represents the mixture of switching equipment components Verizon is purchasing incrementally to upgrade and expand its switching network, on a forward-looking basis.[45]

Thus, as the AT&T/WorldCom Recurring Cost Panel explains in concurrently filed rebuttal testimony, the discount that Verizon calculated applies only to equipment purchased to *grow* an existing switch. Yet Verizon has applied this discount in the SCIS model to all of the components of the switch, including the "getting started" costs of a switch processor, which Verizon would only purchase at the time that it buys a new switch. Switch vendors provide higher discounts for the purchase of new switches than for the expansion of existing switches. Therefore, the discount factor that Verizon has applied is much lower than the one that would apply if Verizon were to replace, *e.g.*, its existing switch processors with new, forward-looking processors. The economic value of the embedded base of Verizon switching components, and hence the forward-looking cost of those switch components, is constrained by the price that

---

[44] Verizon Cost Panel Direct at 191.

[45] Verizon Cost Panel Direct at 189.

1 Verizon would pay for new switch components that provide equivalent
2 functionality. Hence, the methodology that Verizon has used to calculate
3 the switch discount input for SCIS overstates the forward-looking cost of
4 its existing switches.[46]

5 • *Verizon's cost results include all, or nearly all, of the company's*
6 *embedded expenses (e.g., network, marketing and overhead expenses) and*
7 *do not reflect known or reasonably foreseeable efficiency gains.* Verizon
8 specifically adjusts its projection of forward-looking expenses to make
9 them equal to its current expenses. Without such an adjustment, Verizon's
10 method of calculating expenses would automatically lead it to project a

---

[46] The Commission need not be concerned that the TELRIC approach of using the new switch price provides Verizon with insufficient compensation for its switching costs. The net present value ("NPV") of purchasing a new switch to meet current and reasonably foreseeable demand over the economic life of that switch places an upper bound on the forward-looking economic cost of that switch. An efficient firm would choose between buying a larger switch at the new switch price or buying a smaller switch initially and then adding components to the switch at the growth price based on the NPV of the expected stream of costs associated with each option. "Growing" a switch is a rational choice if and only if that option is less expensive, on an expected NPV basis, than purchasing sufficient capacity up-front to meet the total expected demand over the life of the switch. Verizon's costing methodology erroneously treats the growth price as the price that the firm must pay upfront to purchase the entire switch. In reality, the costs that Verizon incurred in 2000 to expand existing digital switches are the equivalent of costs that the company would incur several years into the future if it reconstructed its local network today and employed its historical strategy of buying smaller switches initially and then "growing" those switches with incremental capital investments in later years. Had Verizon calculated the NPV of those incremental capital investments properly, it should have discovered that the effective cost was even lower than the price it would pay upfront to buy spare capacity to meet future demand. Hence, costs based on the new switch discount are the highest costs, on an expected NPV basis, that Verizon should incur to provision switching efficiently.

1 decrease in expenses. Verizon's cost methodology computes the expenses
2 included in its recurring cost estimates by using expense-to-investment
3 ratios. Using this method, projected expenses will automatically decrease
4 when investment decreases, as it would in a forward-looking network (or
5 even in Verizon's partially forward-looking network), so that the expense-
6 to-investment ratio remains constant. To short-circuit this implicit
7 forecast of greater efficiency on a forward-looking basis, Verizon has
8 applied what it calls a "forward-looking-to-current adjustment" that is
9 designed to increase its investment ratios in an attempt to recover its
10 embedded expenses.[47] In other words, Verizon applies an adjustment
11 based on a simple presumption that forward-looking expenses will be
12 identical to current expenses.
13 Verizon's methodology fails to recognize that the very purpose
14 behind many of the investments that differentiate a forward-looking

---

[47] I note that Verizon economic witness Dr. Shelanski appears to be unaware of this effect of the forward-looking-to-current adjustment factor applied in Verizon's cost studies. Dr. Shelanski states that Verizon's cost study "assumes full deployment of the best available loop technology over the planning cycle. The model thus likely generates forward-looking operating and maintenance costs that, when adjusted for changes in quality and quantity of services, are lower than those that will actually exist." Shelanski Direct at 23. Dr. Shelanski's supposition is incorrect. For example, as the AT&T/WorldCom Recurring Cost Panel shows in concurrently filed rebuttal testimony, Verizon computes the maintenance and repair expense for metallic cable based on the embedded relationship of its current metallic cable repair and maintenance expenditures, and thus fails to capture the maintenance and repair savings of an all-new metallic cable facility.

1 network architecture and technology mix from the company's embedded
2 plant and facilities is the reduction of operating expenses. Other
3 incumbent local exchange carriers have publicly touted the substantial cost
4 savings associated with increasing deployment of fiber feeder and GR-
5 303-compliant DLC in their loop plant, for example. SBC
6 Communications, Inc., ("SBC"), for one, has indicated that the expected
7 savings associated with "Project Pronto" are sufficient to fund the
8 company's $6 billion investment in what is in large part an upgrade from
9 an existing network architecture that relies primarily on older, all-copper
10 plant to one that deploys a more forward-looking level of fiber and GR-
11 303-compliant DLC.[48] Verizon's cost studies do not reflect these kind of
12 operational savings, even though the forward-looking percentage of fiber
13 feeder assumed in its recurring cost studies (83.3%) is substantially higher
14 than the approximately 23% incidence of fiber feeder in Verizon VA's
15 current network architecture.[49] The AT&T/WorldCom Recurring Cost

---

48 The SBC Investor Briefing emphasizes that "SBC's new network investments will have a profound impact on its cost structure; in fact, the efficiencies SBC expects to gain will pay for the cost of the deployment on an NPV basis. These efficiencies are conservatively targeted to yield annual savings of about $1.5 billion by 2004 ($850 million in cash operating expense and $600 million in capital expenditures)." SBC *Investor Briefing*, "SBC Announces Sweeping Broadband Initiative," October 18, 1999, at 7.

49 These facility mixes appear in the Verizon Cost Panel Direct at 98 ("forward-looking" mix for recurring cost studies) and 328 (embedded mix).

1 Panel Rebuttal Testimony provides further details on likely decreases in
2 expenses in a forward-looking network.
3 In addition, as the AT&T/WorldCom Recurring Cost Panel
4 Rebuttal Testimony also explains, Verizon's cost studies fail to reflect the
5 full expected savings on which the company relied to obtain regulatory
6 approval of the mergers between Bell Atlantic Corporation and NYNEX
7 Corporation and the post-NYNEX-merger of Bell Atlantic with GTE
8 Corporation. Verizon bases its calculation of forward-looking expenses
9 on its embedded expenses. Yet expenses will decrease as a result of the
10 mergers. Verizon certainly did not indicate to this Commission or to state
11 regulators (or even the investing public) that it believed the expected cost
12 savings from economies of scale and scope were too speculative to form
13 the basis for merger approval. Thus, it would be extremely disingenuous
14 for Verizon now to claim that the same cost savings are too speculative to
15 form the basis for pricing UNEs and interconnection.

16 **Q. PLEASE BRIEFLY SUMMARIZE YOUR CRITICISMS OF**
17 **VERIZON'S RECURRING COST STUDIES.**

18 A. Verizon's cost studies base recurring charges on the technology that it will
19 incrementally deploy over the next three years, or in some cases, on technology
20 and network architecture it has already deployed. That is inconsistent with the
21 Commission's TELRIC principles and leads to an artificial inflation of Verizon's
22 recurring costs.

Q. ARE VERIZON'S NON-RECURRING COST STUDIES SUBJECT TO THE SAME CRITICISMS AS VERIZON'S RECURRING COST STUDIES?

A. Yes. In fact, the recurring cost criticisms apply even more strongly to Verizon's non-recurring cost studies. As I explained above, while Verizon bases its recurring cost studies on the incremental mix of technologies that the company expects to deploy over the next three years, Verizon bases its non-recurring cost studies upon the network that it expects to be in place at the *end* of a three-year planning horizon. The result is a network architecture that is even less forward-looking than the one used in Verizon's recurring cost studies—a network architecture with far more all-copper loops (approximately 63%) than the percentage of all-copper loops that Verizon modeled in its recurring cost studies (17.7%) and far less IDLC (26% as compared with 57%), for example.[50] This is because *the mix of technology that will be in place in three years is significantly dependent on the technology already in place* today.

As the AT&T/WorldCom Non-Recurring Cost and Advanced Services Panel explains in concurrently filed rebuttal testimony, the network architecture that Verizon modeled in its non-recurring cost studies requires significantly different tasks to provision UNEs than would be required in a forward-looking environment. Verizon appears to concede this point, at least with respect to the UNE-P combination that competitors such as AT&T and WorldCom typically rely

1 upon to provision local exchange services to residential and many small business
2 customers. According to Verizon's Cost Panel:

> 3 For example, since a UNE-P can be provided on
> 4 copper, UDLC, or IDLC, and since Central Office
> 5 wiring is not required on an IDLC-provided UNE-P,
> 6 the non-recurring CO wiring costs associated with
> 7 provisioning UNE-P would reflect a 26% reduction
> 8 if the non-recurring network assumption were
> 9 applied. The 26% reflects the percentage of IDLC
> 10 that should exist in the actual forward-looking loop
> 11 plant at the end of the planning period. If the CO
> 12 wiring rate were instead based on the hypothetical
> 13 recurring network construct, however, a reduction
> 14 of 56% would apply.[51]

15 Of course, such a reduction is not only entirely appropriate, but also understated.
16 Indeed, a reduction of *more* than 56% is appropriate because an efficient
17 competitor constructing a new network would use even more IDLC than Verizon
18 has assumed in its recurring cost studies.[52]

---

50 Verizon Cost Panel Direct at 328.

51 Verizon Cost Panel Direct at 326-7. Verizon also concedes that it would not incur various loop "conditioning" non-recurring costs if Verizon deployed the technology assumed in its recurring cost study. The network Verizon assumed in its recurring cost study is designed to meet Carrier Serving Area ("CSA") guidelines. A network built to CSA guidelines does not include inhibitors such as load coils and excessive bridged taps that require loops to be "de-conditioned" before they can be used to provide DSL-based services.

52 As I explained above, Verizon would deploy IDLC instead of the 30% UDLC it has assumed in its recurring cost studies.

1 **Q. IS THERE ANYTHING ELSE WRONG WITH VERIZON'S METHOD**
2 **OF CALCULATING NON-RECURRING COSTS?**

3 A. Yes. Verizon's decision to calculate non-recurring costs using different
4 assumptions from the ones that it employs to calculate recurring costs further
5 distorts its cost results. I explained in my direct testimony why a TELRIC study
6 should employ the same network architecture assumptions to calculate both
7 recurring and non-recurring costs. To recap, the Commission's TELRIC pricing
8 rules make no distinction between recurring and non-recurring costs in discussing
9 the appropriate technology and network configuration to assume in a forward-
10 looking economic cost study. Under the Commission's rules, the total of
11 recurring and non-recurring charges for a given network element may not exceed
12 the total forward-looking economic cost for that element.[53] It is much more
13 difficult to test whether a cost study complies with this rule if the cost study
14 assumes one network design in computing recurring costs for an element and a
15 completely different network design in computing non-recurring costs.

---

[53] 47 C.F.R. § 51.507(e).

Q. DRS. GORDON AND SHELANSKI ARGUE THAT IT IS ENTIRELY APPROPRIATE FOR A TELRIC STUDY TO ASSUME DIFFERENT NETWORK ARCHITECTURES IN CALCULATING RECURRING AND NON-RECURRING COSTS.[54] WHY DO YOU DISAGREE WITH THEIR CONCLUSION?

A. I disagree with their conclusion for the reasons explained above and because I disagree with the rationale that Dr. Shelanski has advanced in an attempt to justify using different network architecture assumptions in recurring and non-recurring cost studies. Dr. Shelanski asserts that:

> More importantly and fundamentally, the mere existence of new technology that might reduce or eliminate the labor time needed for non-recurring activities (but that was not otherwise efficient to deploy for reasons already discussed) would not affect the costs of performing those activities on existing plant. This is a key distinction from recurring costs, where the *mere existence* of more efficient technology may reduce the economic value of existing facilities and hence reduce the forward-looking costs of those facilities. It does so by reducing the capital costs of the existing facilities (by reducing the opportunity costs of using it rather than selling it) and by reducing the necessary depreciation allowances (because the value of the facilities to be recovered is lower than before the new technology came along). Neither of these effects on the network elements used to provide recurring functions has any impact on non-recurring costs. Reduced capital value does not reduce or eliminate the labor time needed to perform non-recurring activities on existing plant. And so long as it is efficient going forward for the firm to be using that existing plant instead of replacing it, the non-recurring cost estimates should reflect the

---

[54] Gordon Direct at 29-31; Shelanski Direct at 33-35.

> actual mix of existing facilities expected to be used over the planning period. That is what Verizon VA's non-recurring cost model does.[55]

Dr. Shelanski's argument presumes that it is appropriate to calculate costs based on the costs Verizon incurs in using its existing network, discounted by the diminution in the value of existing plant caused by the existence of new technology. But even if it were appropriate to use this method—and it is not for the reasons I have explained previously—Verizon would have adjust these costs by recognizing the decreased value of its existing plant caused by the added non-recurring costs associated with use of that plant as opposed to newer, more efficient plant. Verizon does not do so. Instead, Dr. Shelanski suggests that the value of existing plant is not reduced by such efficiencies. This is wrong.

Any piece of existing equipment "is valuable only to the extent that the firm incurs lower costs over time in keeping it rather than replacing it," to use Dr. Shelanski's phrase.[56] A rational firm evaluating whether to replace existing plant would consider *all* of the operating savings achievable with new, more efficient facilities, whether those operating savings affect the costs for ongoing maintenance activities that Verizon treats as recurring costs or the costs for other activities that Verizon treats as non-recurring costs. The firm would make this comparison on an expected net present value ("NPV") basis, as Dr. Gordon

---

[55] Shelanski Direct at 34-35.

[56] Shelanski Direct at 11.

1 describes in his direct testimony: "Firms necessarily compare the expected net
2 present value of the costs of continuing to use some or all of the their current
3 facilities with the expected net present value of the costs of deploying and
4 operating new equipment."[57]

5 Consider the example of a Main Distribution Frame ("MDF"). The time
6 to perform work on older MDFs appears to be reflected in the task time estimates
7 on which Verizon based its non-recurring cost studies, although it should take
8 only a fraction of the time to run a jumper on a modern frame as it does on some
9 of the older MDFs that incumbents such as Verizon employ. The same technician
10 may require a small fraction of that task time to run a jumper on a modern low-
11 profile MDF, such as the frames that the developers of the AT&T/WorldCom
12 Non-Recurring Cost Model ("NRCM") assumed in deriving their estimates of
13 forward-looking times for running jumpers. Technicians perform the task of
14 running jumpers on an MDF thousands of times every day. Any decision about
15 whether to replace an older MDF with a more efficient, modern frame would have
16 to take into account the higher time, and therefore cost, of running jumpers on the
17 older frame.

18 The important implication of this analysis is that efficiencies associated
19 with non-recurring activities have the same effect on the economic value of

---

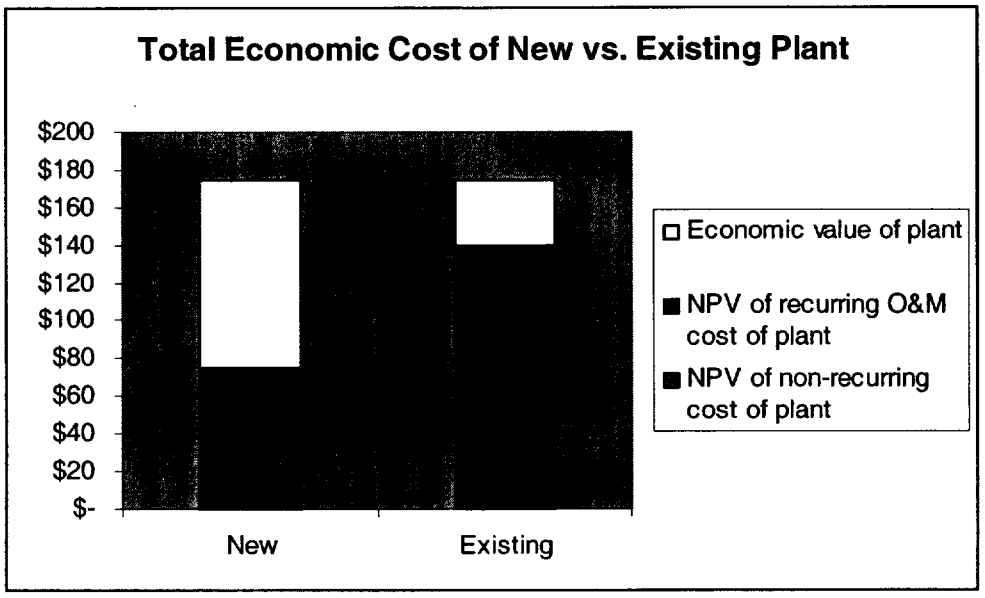
[57] Gordon Direct at 14.

existing plant as do efficiencies associated with ongoing maintenance activities. That is, the difference in market values between existing plant and newly constructed, efficient plant reflect the NPV of all of the operating savings, both recurring and non-recurring in nature, associated with deploying the efficient plant. Therefore, the most straightforward way to approximate the total forward-looking economic cost of using existing plant is to calculate the total forward-looking economic cost (both recurring and non-recurring) of deploying the most efficient technology currently available for purchase.

Q. CAN YOU PROVIDE AN EXAMPLE OF THE PROBLEM WITH USING DIFFERENT APPROACHES TO CALCULATING RECURRING AND NON-RECURRING COSTS?

A. A simple numerical example illustrates the point. Assume that the incumbent can purchase a piece of modern, efficient equipment for $100. Further assume that the expected NPV of all the recurring operating and maintenance ("O&M") costs over the economic life of that equipment is $50 and the expected NPV of all the costs for "non-recurring" activities over the life of that equipment is $25. Then, the expected NPV of all the operating costs for this piece of equipment is $75. Now assume that the incumbent has an existing piece of equipment that performs the same functions. The expected value of the recurring O&M costs of the existing equipment over the same period as the economic life of the new equipment is $95 and the expected NPV for "non-recurring" activities over that same time horizon is $45, for a total of $140. Because the existing equipment costs $65 more to operate than the new equipment to perform the same task, its economic value is

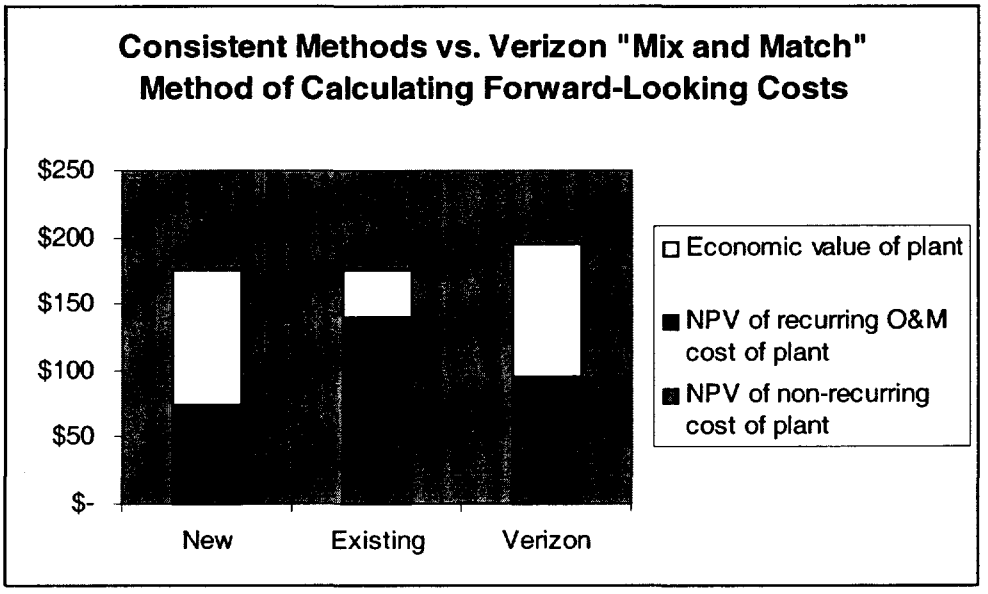
$65 less than that of the new equipment—or $35. The chart below graphically depicts this valuation.



Thus, the total forward-looking cost of the existing plant is the same as that of new plant with the higher recurring and non-recurring charges of the existing equipment offset by the lower cost for the equipment itself.

As the graph makes clear, the forward-looking cost of the existing equipment can be calculated either from the price, recurring and non-recurring charges of the new equipment or from the recurring and non-recurring charges of the existing equipment, combined with an assessment of the value of the existing equipment that relies on the price and recurring and non-recurring charges of the new equipment. The Commission appropriately has chosen the former approach which is more straightforward. Verizon's method deviates from that approach, however. Verizon's method also mixes elements of both other methods, which results in a higher total cost than both other methods.

1 Under Verizon's approach, the incumbent would impose recurring charges
2 based on the economic costs of the new piece of equipment and non-recurring
3 charges based on the costs of the existing piece of equipment. The following
4 chart illustrates the total forward-looking economic costs that would result from
5 application of the Verizon cost methodology to my numerical example, as
6 compared to the costs that result from either of the economically correct
7 approaches. As the chart shows, the methodology that Drs. Gordon and Shelanski
8 have endorsed systematically overstates total forward-looking economic costs.

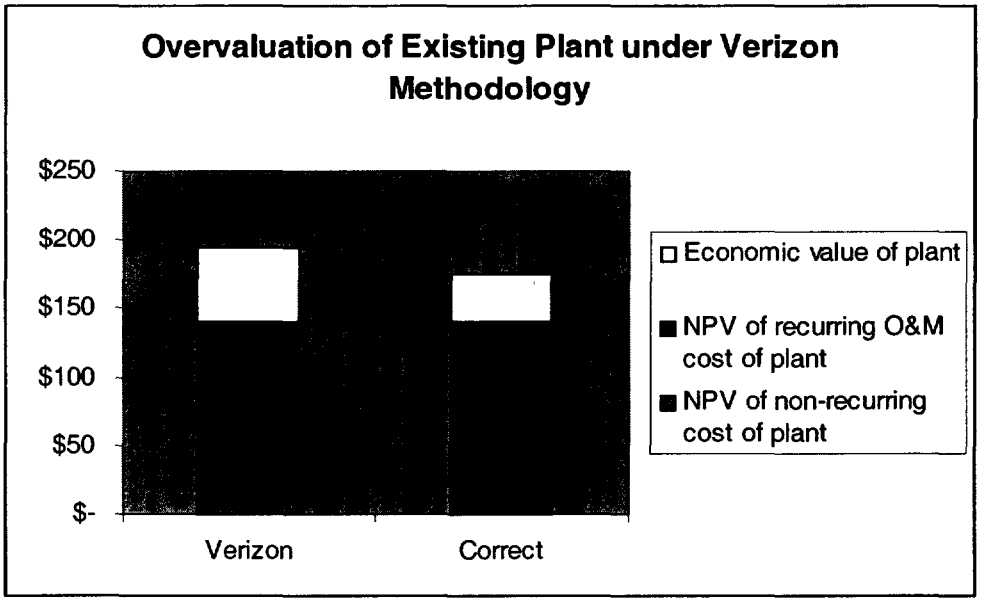


9

10 As compared with a TELRIC methodology that relies on reconstructed plant, the
11 Verizon methodology would overstate non-recurring charges by $20.

12 As compared with a method that relies on existing plant, Verizon
13 overstates the value of its plant by $20 – similarly leading to a $20 inflation in
14 overall costs. The Verizon cost methodology, which Drs. Gordon and Shelanski
15 have endorsed, is the equivalent of estimating *total* forward-looking economic

cost based on the costs associated with existing plant, but only considering the decrease in economic value of the existing plant attributable to the higher expected *recurring* O&M costs. In my simple numerical example, the Gordon-Shelanski methodology would have the same effect as placing a value of $55 on the existing plant (the $100 cost of the new equipment minus the $45 expected NPV difference in recurring O&M costs between the existing vs. new equipment [$95 - $50]). Thus, their proposal implicitly overvalues the existing plant by an amount equal to the extent to which the expected NPV of the cost of non-recurring activities for the older equipment exceeds the expected NPV of the cost of the non-recurring activities for the new equipment. In my numerical example, this difference is $20 (the $45 expected NPV of non-recurring costs for the existing equipment minus the $25 expected NPV of non-recurring costs for the new equipment). The following chart illustrates this overvaluation of existing plant under the Gordon-Shelanski methodology.



As this example illustrates, the Gordon-Shelanski methodology that Verizon appears to have implemented in its recurring and non-recurring cost studies has the effect of allowing Verizon to recover more than its total forward-looking economic cost. The non-recurring cost methodology advocated by Verizon's economic witnesses is thus inconsistent with a plain reading of 47 C.F.R. § 51.507(e). *Verizon uses the recurring capital and operating costs of new plant to estimate the recurring component of the forward-looking economic cost of continuing to use its existing plant; therefore, to be consistent, Verizon must also use the non-recurring costs associated with efficient, new plant to estimate the non-recurring component of the forward-looking economic cost of continuing to use its existing plant.*

Q. BOTH DR. GORDON AND DR. SHELANSKI EMPHASIZE THAT FIRMS IN THE "REAL WORLD" DO NOT AND SHOULD NOT INSTANTANEOUSLY REPLACE THEIR NETWORKS OVERNIGHT WITH THE MOST EFFICIENT TECHNOLOGY AVAILABLE FOR PURCHASE.[58] TO WHAT DEGREE SHOULD THIS OBSERVATION INFLUENCE THE COMMISSION'S PRICING DECISIONS IN THIS ARBITRATION?

A. Not at all. As Dr. Shelanski has effectively admitted, it is appropriate to base prices for use of Verizon's existing network on the cost of deploying the most efficient technology available for purchase even if Verizon does not fully deploy the forward-looking technology mix at any given point in time. To recap the discussion above, the *mere existence* of more efficient technology depresses the economic value of Verizon's existing facilities to a degree that exactly offsets the higher operating costs (recurring and non-recurring) of those existing facilities.

The only difference of opinion between Dr. Shelanski and me on this issue appears to be whether to measure forward-looking non-recurring costs based on full deployment of the forward-looking network architecture identified in the recurring cost studies or on the network architecture that Verizon asserts will be in place at the end of its three-year study period. For all of the reasons that I explained above, the correct answer—that is, the approach that yields the correct *total* forward-looking economic costs—is to make the same network architecture assumptions when calculating both recurring and non-recurring costs.

---

[58] *See, e.g.,* Gordon Direct at 10; Shelanski Direct at 9.

Q. HAVE YOU ADDRESSED ALL OF THE AREAS IN WHICH VERIZON'S COST STUDIES AND/OR THE RECOMMENDATIONS OF DRS. GORDON AND SHELANSKI DEPART FROM YOUR UNDERSTANDING OF TELRIC PRINCIPLES?

A. No. There are many other respects in which the Verizon cost studies endorsed by Drs. Gordon and Shelanski depart from my understanding of TELRIC principles. In the interest of conciseness, I have not discussed each and every one of those TELRIC violations here. The AT&T/WorldCom Recurring Cost Panel and Non-Recurring and Advanced Services Cost Panel have identified several other departures from proper forward-looking economic cost principles in their rebuttal testimonies. In addition, AT&T/WorldCom witnesses Mr. Lee and Mr. Hirschleifer explain the reasons that depreciation and cost of capital assumptions, respectively, in Verizon's cost studies do not reflect Verizon's true forward-looking economic costs for providing UNEs and interconnection, contrary to the claims of Drs. Gordon and Shelanski.

Q. DOES THAT CONCLUDE YOUR TESTIMONY AT THIS TIME?

A. Yes.

I, Terry L. Murray, hereby swear and affirm that the foregoing rebuttal testimony was prepared by me or under my direct supervision or control and is true and accurate to the best of my knowledge and belief.

Signed:

Terry L. Murray