TAB E

Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
	)	
Qwest Communications International Inc., Consolidated Application for Authority to Provide In-Region, InterLATA Services in Colorado, Idaho, Iowa, Nebraska and North Dakota	)	WC Docket No. 02-148
	)	

JOINT DECLARATION OF RICHARD CHANDLER AND ROBERT MERCER ON BEHALF OF AT&T CORP.

I. BACKGROUND AND QUALIFICATIONS.

1. **Richard Chandler.** My name is Richard A. Chandler. I am Senior Vice President at HAI Consulting, Inc. I was also Senior Vice President at HAI Consulting, Inc.'s predecessor, Hatfield Associates, Inc.

2. I received BSEE and MSEE degrees from the University of Missouri in 1970 and 1971, respectively, and an MBA from the University of Denver in 1983. I also have completed additional graduate study in electrical engineering at the University of Colorado.

3. I have substantial experience in the telecommunications industry. I began my career as an electronic engineer at the Institute for Telecommunication Sciences studying microwave and optical propagation and analyzing radar systems. I then worked at Bell Laboratories in the exploratory development of customer switching systems. While at Bell Labs,

I worked extensively on packet switching and circuit switching technologies. I then transferred to AT&T, where I was a product manager. My responsibilities at AT&T included, among other things, developing an deploying product strategies for packet and other switching systems. I then joined a startup mobile satellite company as vice president of network engineering. In that role, I developed the ground system network architecture for the proposed system.

4. At HAI (and Hatfield Associates, Inc.), I was (and continue to be) the principal developer of the Hatfield/HAI cost models. In addition, I analyze a wide range of telecommunications technologies and systems for a number of clients.

5. Throughout my career, I have taught graduate-level telecommunications technology courses in digital switching and other digital communications technologies, including transmission and packet switching, basic telephony, and cellular and wireless communications, at the University of Colorado, the University of Denver, and Pace University.

6. I have filed numerous affidavits and declarations concerned with telecommunications technology before this Commission, state regulatory agencies, and in Federal court cases.

7. **Robert Mercer.** My name is Robert A. Mercer. I am the President of BroadView Telecommunications, LLC ("BVT"), a consulting firm specializing in analyses of the telecommunications infrastructures. The address of the firm is 5201 Holmes Place, Boulder, Colorado, 80303.

8. I received a Bachelor of Science degree in Physics from Carnegie Institute of Technology (now Carnegie - Mellon University) in 1964, and a Ph.D. in Physics from Johns

Hopkins University in 1969. After receiving my Ph.D. in Physics from Johns Hopkins University, I was an Assistant Professor of Physics at Indiana University from 1970 until 1973.

9. I then joined Bell Telephone Laboratories. Over the next eleven years, I held a variety of positions in the Network Planning organizations at Bell Labs and AT&T General Departments. My final position at Bell Labs was Director of the Network Architecture Planning Center, where I managed an organization that was responsible for early Bell System planning of the Integrated Services Digital Network (ISDN), as well as systems engineering for new data services being planned by AT&T.

10. I joined Bell Communications Research (Bellcore, now Telcordia Technologies) in January, 1984, where I was Assistant Vice President of Network Compatibility Planning. Among other responsibilities, I directed Bellcore's technology analysis of various legal and regulatory proceedings at the federal and state levels. I also coordinated and provided direction to Bellcore's activities in domestic and international standards activities, and served as a member of the Board of Directors of the American National Standards Institute.

11. After leaving Bellcore in late 1985, I held positions with BDM Corporation and AT&T Bell Laboratories before joining Hatfield Associates, Inc., in early 1987. I held the positions of Senior Consultant, Senior Vice President, and President of the firm. On October 1, 1997, the former principals and employees of Hatfield Associates, Inc., formed HAI Consulting, Inc., and I became the President of that firm. At Hatfield Associates and HAI, I was extensively involved in the development of the various versions of the HAI Model. I also presented testimony on and defended the model in a large number of regulatory proceedings pertaining to the cost of Unbundled Network Elements and Universal Service.

12. In March of 2000, I left HAI to form BroadView Telecommunications. The firm provides strategic planning, education, and expert services related to public and private telecommunications infrastructures, dealing specifically with network architectures, technologies, services, and service providers. At BroadView, I have continued to present and defend the HAI Model in numerous regulatory proceedings.

13. I also hold an adjunct faculty position in the Interdisciplinary Telecommunications Program at the University of Colorado in Boulder, where I am developing an executive seminar on telecommunications developments, teach a course on telecommunications technology, and serve on Masters thesis committees. I have previously taught a course on advanced data communications and computer networking for several years. I have taught many other courses and seminars as well for other organizations and institutions, in the areas of the telecommunications infrastructure, network technologies, broadband networks, data and voice communications, computer networking, and network management.

II. PURPOSE AND SUMMARY.

14. The purpose of our testimony is to demonstrate that the unbundled network element ("UNE") switching rates adopted by the Colorado Public Utilities Commission ("CPUC") are vastly inflated by clear TELRIC errors. As explained below, the Colorado Commission initially adopted switching rates that were based on a cost study conducted years ago, and that all parties, including the CPUCs own staff, recognized were inflated far above the level that any reasonable application of TELRIC principles would produce. Qwest recognized that these inflated switching rates would not pass muster in a Section 271 proceeding. Accordingly, Qwest urged CPUC to adopt new switching rates below the rates initially adopted by CPUC, but which were far above the TELRIC-compliant switching rates supported by other

parties in that proceeding. Qwest's newly proposed rates were based on the same cost study (HAI 5.2a) supported by the CLECs in that proceeding, using non-TELRIC input assumptions. CPUC never addressed the changed inputs offered by Qwest. Instead, CPUC simply adopted Qwest's proposed switching rates because they were lower than the rates initially adopted by CPUC.

15. A model is only is good as the input assumptions used – an appropriately designed forward-looking cost model will not produce forward-looking cost estimates if it is not populated with forward-looking inputs.[1] And, as explained below, many of the key input values used by Qwest to compute its proposed switching rates violate fundamental TELRIC principles. Because the Colorado PUC failed to adopt TELRIC-compliant inputs, Qwest's rates are vastly overstated.

In Part III of this declaration, we summarize the Colorado PUC proceedings that resulted in the UNE switching rates in Qwest's SGAT. In Part IV of this declaration, we identify several of the non-TELRIC inputs used to compute Qwest's switching rates. First, we demonstrate that Qwest's switching cost studies improperly reduced the switching "fill factor" used in the HAI 5.2a Model from 94% down to 82.5%. We show that a 94% fill factor is more than sufficient to account for administrative functions and unexpected increases in demand. Second, we show that the input assumptions for the switch port/usage fractions used by Qwest to compute its costs are not forward-looking, and substantially inflate Qwest's switching usage costs. Third, we demonstrate that Qwest's switching port rates double count the costs of vertical

[1] *See, e.g., Colorado Pricing Order* at 40 (recognizing that "input assumptions constitute the main difference in the results of the cost models").

features. Those costs are recovered once in the recurring switching rate, and again in the port rate.

III. SUMMARY OF COLORADO PRICING PROCEEDINGS.

16. Qwest's Colorado interconnection and UNE switching rates are based on the results of two separate Colorado proceedings. The Colorado PUC initially set permanent Colorado interconnection and UNE rates in a July 28, 1997 order, Docket No. 96S-331T ("*331T Order*").[2] Almost one and a half years later, on November 30, 1999, Qwest (then U S WEST Communications, Inc.) filed a proposed Statement of Generally Available Terms and Conditions ("SGAT") with the Colorado PUC pursuant to 47 U.S.C. § 252(f).[3] Qwest's SGAT contained the rates set in the 1997 *331T Order*, and numerous new rates that had never been reviewed by the Colorado PUC. In response, the Colorado PUC opened Docket No. 99A-577T ("577T Proceeding"), and ordered Qwest to notify all CLECs in Colorado of its new rates. Numerous CLECs, as well as the Colorado Office of the Consumer Counsel ("Colorado OCC") and the Colorado PUC's own staff ("CPUC Staff") intervened in the SGAT proceeding seeking review of the rates set in the *331T Order*. These parties pointed out that that the rates in the *331T Order* – and hence the rates in Qwest's proposed SGAT – were outdated, and fail to reflect changes in technology, changes in the regulatory field, and the merger of U S West with Qwest. These parties also showed that the rates in the *331T Order* were substantially inflated by other clear TELRIC errors, and that many of the rates in Qwest's SGAT were never even reviewed by the

[2] *See* Qwest Application, Attachment 5, Appendix C.

[3] 47 U.S.C. § 252(f).

Colorado PUC.[4] Accordingly, the Colorado PUC released a Procedural Order, on December 29, 2000, in the 577T Proceeding, to review the rates in the *331T Order*.

17. On January 16, 2001, Qwest filed cost studies purporting to support the *331T* rates, and the numerous new rates contained in the SGAT. Qwest supplemented that testimony on April 23, 2001. During June and July of 2001, the CLECs, the Colorado OCC, and the CPUC Staff filed testimony showing that the rates in Qwest's SGAT were, in fact, vastly inflated above TELRIC levels. During that time, the CLECs also submitted new cost studies and new TELRIC-compliant UNE rates based on those cost studies. In particular, AT&T and XO Colorado, Inc. ("XO") filed a recurring cost study that develops recurring rates (including loop and switching rates) using a cost model called HAI Model, Release 5.2a ("HAI 5.2a" or "HAI Model"), and a non-recurring cost study that develops non-recurring charges ("NRCs") using a cost model call NRCM (which stands for "non-recurring cost model"). In late July 2001, only two weeks before the scheduled August hearings, Qwest filed a switching cost study for the first time. The Colorado PUC refused to consider that late filed cost study.[5]

18. On December 21, 2001, the Colorado PUC issued the *Colorado Pricing Order*. In that order, the Colorado Commission recognized that the rates in the *331T Order* were stale, and did not reflect did not reflect "the changes in technology, the regulatory field, or the merger of U S WEST with Qwest."[6] However, the Colorado PUC ignored the substantial

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[4] *See, e.g.,* Before the Public Utilities Commission, State of Colorado, Docket No. 99A-577T, Application of Staff for Reconsideration, Reargument, or Rehearing of Decision No. C01-1302 (January 30, 2002) ("*CPUC Staff RRR*")

[5] Before the Public Utilities Commission of the State of Colorado, Commission Order, Docket No. 99A-577T, at 38 (Mailed December 21, 2001) ("*Colorado Pricing Order*"). This order is attached to Qwest's Application at Attachment 5, Appendix C.

[6] *See Colorado Pricing Order* at 25-26.

evidence submitted by AT&T and other LECs identifying TELRIC-compliant switching rates, and said only that "[t]he record of the 99A-577T does not support a determination by the Commission of final local switching rates. The Colorado PUC did not explain why AT&T's proposed switching rates – which are based on the same cost model that the Colorado PUC adopted to compute loop rates – constituted "insufficient" evidence. Based on these "findings," the Colorado PUC left the inflated rates set in the 1997 *331T Proceeding* in place on an interim basis.

19. Of course, even Qwest recognized that the 331T rates were massively overstated and would not pass muster in a federal Section 271 proceeding. Accordingly, Qwest instituted a sequence of two voluntary rate reductions to those rates. Qwest computed those mew rates using different inputs to the same HAI 5.2a cost model submitted by AT&T and other CLECs in the 577T Proceeding. Because Qwest changed the HAI 5.2a inputs, the new rates proposed by Qwest – although lower than the 331T rates – were substantially higher than those proposed by AT&T and other parties in the 577T Proceeding. The Colorado PUC never investigated whether Qwest's input changes were TELRIC-compliant. Instead, the Colorado PUC simply adopted Qwest's proposed switching rates, stating that Qwest's proposed switching rates were lower than the stale 331T switching rates that the Colorado PUC adopted in the *Colorado Pricing Order*, and that lower rates "benefit CLECs."[7]

IV. QWEST'S COLORADO SWITCHING RATES ARE NOT REMOTELY TELRIC COMPLIANT.

20. As noted above, the Colorado PUC approved Qwest's current switching rates solely on the grounds that they are lower than the 331T rates. The fundamental problem

[7] *Colorado Reconsideration Pricing Order* at 7.

with the switching rates adopted by the Colorado PUC in the 1997 *331T Order* is that they are not remotely TELRIC-compliant. As pointed out by the CPUC Staff, the "record in [the 577T docket] . . . establishes that Qwest's proposed prices [*i.e.*, the 331T rates] were overstated through inappropriate cost factor calculations, use of incorrect productivity and inflation factors, and lack of inclusion of merger savings, technology improvements and business improvements."[8] The structure of Qwest's switching rates "have not had a comprehensive review for over 11 years."[9] And Qwest's switching rates are based on "historical costs."[10]

21. Indeed, the 331T rates are based on Qwest's Switching Cost Model ("SCM"), which does not model forward-looking costs. On the contrary, the SCM produces costs for the *existing* switches in Qwest's network, and thus reflects the costs of demonstrably non-forward-looking network designs. As one example, the SCM reflects the fact that Qwest's embedded network has remote switches in the same location as host or standalone switches.[11] The problem with that assumption is that, in a forward-looking network, there is no need to collocate remotes switches with host or standalone switches. ILECs typically install remotes to replace older switches in lightly-populated remote areas or to serve subscribers in newly-developing wire centers. ILECs may occasionally deploy a remote switch alongside an older switch in an existing wire center to provide advanced features that the older machine may not be capable of supporting. However, in a forward-looking network, there is no need for such

[8] CPUC Staff RRR at 3.

[9] CPUC Staff RRR at 5.

[10] CPUC Staff RRR at 5. *see also id.* at 4 ("The Qwest approach ignores the most fundamental TELRIC principle: Existing costs should not be included in wholesale price calculations").

[11] For example, Qwest's embedded network operates a Nortel DMS-100 standalone switch and Lucent 5ESS remote switch in its Denver Capital Hill wire center. *See* Qwest ICONN database ("ICONN database"), available at http://www.qwest.com/cgi-bin/iconn/iconn_centraloffice.pl.

collocation of switches because all of the switches installed in a forward-looking network would include the most advanced technology that is available today, and would be properly sized to reflect the total switching demand that exists in that wire center.

22. As noted above, AT&T and other parties submitted updated TELRIC-compliant switching cost studies, and showed that proper forward-looking TELRIC rates are much lower than Qwest's 331T rates. AT&T's cost study showed that the 331T rates for switching, was inflated by 277%. Even the cost model submitted by Qwest with its rebuttal testimony in the 577T Proceeding, showed that its switching costs had declined compared to its 331T rates.[12] Thus, there is no question that the 331T switching rates are massively overstated and plainly fall outside the range of rates that any reasonable application of TELRIC principles would produce.

23. Because there is no reasonable basis on which to conclude that Qwest's 331T rates are TELRIC-compliant, Qwest's newly implemented switching rates cannot be justified merely on the grounds that those rates are lower than its 331T rates. Qwest has not shown that its new rates are TELRIC-compliant. As we discuss below, these rates are based on demonstrably non-TELRIC-compliant assumptions.

24. Qwest developed its new Colorado switching rates by changing critical inputs to the switching cost study (HAI 5.2a) submitted by AT&T and other CLECs in the 577T Proceeding. As we demonstrate below, Qwest's changes to the HAI 5.2a switching cost study

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[12] *See* Rebuttal Testimony of Robert Brigham, Colorado PUC Docket No. 99A-577T, Exhibit RHB-2 (July 20, 2001). Because Qwest provided its switching cost study so late in the 577T Proceeding, the Colorado PUC did not "rely on the [Qwest] switching model" to set switching rates." *Colorado Pricing Order* at 38.

violate fundamental TELRIC principles, and have never been reviewed – let alone approved – by the Colorado Commission. Thus, even though Qwest's new switching rates are lower than its 331T rates, those new switching rates are still substantially inflated above TELRIC levels.

A. Qwest's Recurring Switching Rates Are Inflated By The Use Of An Understated Fill Factor.

25. Qwest's switching cost studies also improperly reduce the switching "fill factor" used in the HAI 5.2a Model from 94% down to 82.5%. The end-office switch fill factor represents the amount of capacity that the cost model assumes will be used by the switch. In the HAI Model, the fill factor determines the number of spare line port interfaces the Model will equip in a given switch.[13] The difference between the fill factor and 100% represents spare capacity that can be used to serve current and future demand for switched service. Because a small amount of spare capacity is required for administrative and other purposes, the HAI Model's default administrative port fill factor is 94% for end office switches.

26. Qwest claims that it is necessary to assume more spare capacity (*i.e.*, lower the fill factor) because a 94% fill factor is insufficient to cover increases in demand. *See* Thompson Decl. ¶¶ 59-61. That argument is baseless. As noted above, today's switches are easily expandable. Therefore, a proper forward-looking cost model would not invest in more switching and line port investment than is required to have sufficient capacity to meet small unexpected increases in demand and any necessary administrative functions. Beyond that, as demand grows, it is a simple matter to install additional line port interface circuit boards to serve

[13] The "line port" is the interface between a loop connection and the switch. One line port is required per subscriber line. A line port circuit board serves a small number of subscribers, typically four to sixteen, depending on the switch vendor.

new subscribers.[14] Thus, Qwest's assertions that investment in massive amounts of spare switching and line port capacity is necessary in a forward-looking network does not withstand scrutiny.

27. In fact, the HAI Model is conservatively designed to provide a more than "reasonable" amount of growth. It includes an implicit fill factor (which is considerably lower than Qwest's 82.5%) on the end-office switch fixed investment. This leads to substantial excess common-equipment capacity that can accommodate the additional line ports required to address the reasonable growth in Qwest's network.

28. Today's modern switches can serve more than 100,000 lines (although ILECS are typically reluctant to deploy switches larger than around 100,000 lines). In Colorado, for example, Qwest operates end office switches that approach this line size: Qwest's Colorado Springs Main wire center serves more than 91,000 lines from a single 5ESS switch, according to Qwest's records.[15] The HAI Model, however, uses end office inputs that include a default maximum line size, 80,000, that is considerably smaller than the maximum value Qwest obviously applies to its embedded network. When the model encounters a wire center serving more than 75,200 business and residential lines (the product of 80,000 x .94), the model adds the investment for as many additional switches as are required and distributes demand equally

[14] Switches consist of a sizable set of "getting-started" components, often known as "common equipment," that include processors, power system, the switch matrix or fabric (required for making the physical connections between ports), and ancillary equipment. The fixed investment in the HAI and Synthesis Models represents such equipment. Beyond the common equipment, a carrier must add line port circuits to the switch to serve individual subscribers. The variable investment in the Models represents this per-subscriber interface equipment.

[15] *See* ICONN Database at http://www.qwest.com/cgi-bin/iconn/iconn_centraloffice.pl.

among the equipped switches.[16] Thus, the HAI Model contains an implicit fill factor of 72.5% on common equipment investment – it includes the fixed investment for a switch that could serve at least 100,000 lines, but limits the actual line size to 72,500. Since it is straightforward to add line cards to switches that already have sufficient common equipment, the model then appropriately applies a 94% fill factor to calculate the investment in required line cards.

29. For these reasons, Qwest's claim that a 94% fill factor is not sufficient to account for a reasonable increase in demand is baseless. Qwest's decreased fill factor inflates its recurring switching rates above forward-looking levels by providing an excessive number of extra line cards to cover an excessive amount of growth. Thus, the Colorado PUC committed a clear error when it arbitrarily lowered the fill factor in response to Qwest's claims. Qwest's 82.5% fill factor results in an 8.6% inflation of end office switching costs when it is substituted in the HAI Model for the default value of 94%.

B. Qwest's Switching Rates Reflect A Non-TELRIC-Compatible Port To Usage Cost Ratio.

30. Switch rate design has traditionally allocated a portion of switch costs to the fixed line port element and a portion to rates based on minutes of use. In accordance with TELRIC and the FCC's *Local Competition Order*, rates for unbundled network elements are to be established on a "cost causative basis" and "must recover costs in the manner that reflects the way they were incurred."[17] Under these cost causation principles, the portion of the switch costs that are non-usage-sensitive should be assigned to the flat-rated or fixed line port charge, and the

[16] For the Colorado Springs example, the Model would "install" two switches in the wire center and compute the appropriate fixed and variable (per-line) investments for both switches.

[17] *Local Competition Order* ¶ 741.

portion of the switch costs that are usage-sensitive should be allocated to the minute-of-use rate element.

31. The Commission' Synthesis Model (which is based on an older version of the HAI Model, version 5.0(a), originally developed in 1997) used a 30/70 port/usage percentage split. The 30/70 split was based on the telecommunications data that was available at that time. As AT&T and other CLECs demonstrated in the 577T proceeding, however, the 30/70 port to usage split established several years ago is not appropriate for developing rates today, because that distribution of costs does not accurately reflect switch cost causation required by TELRIC principles.

32. The control structure of a modern end-office or tandem switch is a specialized computer or set of computers. Switching systems have benefited from the same profound improvements in processor performance that have been observed over the past decade in personal computers. As a result, the principal limit to the capacity of today's digital switches is not processing capacity, but rather the number of ports. Given the substantial increases in capacity of today's switches, increased minutes-of-use does not result in increased switching costs.

33. Indeed, a large portion of the total cost of a switch is associated with memory, processors, administrative and maintenance equipment and is incurred at the time a switch is placed in operation. These "getting started" costs do not vary with usage and accordingly should be assigned to the fixed port rate element. If a switch does exhaust its port capacity, then a wire center must incur the cost of a second switch. The exhaustion of the first switch's ports is the primary cause for incurring the "getting started" costs for the second switch,

and these costs should also be assigned to the port. Thus, the majority of the cost of today's generation of digital switches is driven by ports, not by usage, and should be recovered in the fixed port rate element.

34. The HAI Model submitted by AT&T in Colorado addressed these issues by updating the model to reflect a more realistic 60/40 port/usage split. The allocation of switch costs between fixed and minute-of-use rate elements was specifically addressed by the New York Public Service Commission in the recent UNE Decision. In that proceeding, Verizon argued for a ratio of 36% fixed/64% usage-sensitive claiming that its proposal was based on cost causation and consistent with its general practices. The Commission rejected Verizon's arguments and ruled that only 34% of switch costs were usage sensitive and that the remaining 66% should be treated as fixed.[18] The Illinois Commission also has recognized the largely fixed nature of switching costs and has established a 100% flat-rated switch rate with no minute of use element.[19]

35. The switching rates recommended by Qwest in its rehearing, reargument or reconsideration petition, and adopted by the Colorado PUC, do not reflect these TELRIC-compatible port/usage ratios. Qwest's switching rates reflect the old 30/70 port/usage ratio of costs. Qwest provides no legitimate evidence that such a split is appropriate for Colorado. As explained above, the state record shows that the appropriate port/usage split is 60/40.

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[18] Proceeding on Motion of the Commission to Examine New York Telephone Company's Rates for Unbundled Network Elements, Case No. 98-C-1357, Order on Unbundled Network Element Rates, Before the NYPSC, at 34-36 (January 28, 2002).

[19] Investigation Into Forward Looking Cost Studies and Rates of Ameritech Illinois for Interconnection, Network Elements, Transport, Termination of Traffic, Docket Nos. 96-0486 & 96-0569 (con.), 1998 Ill. PUC LEXIS 109 (Ill. Commerce Commission) (Feb. 17, 1998).

36. In fact, the *only evidence* offered by Qwest in support of that ratio is that the Commission's old Synthesis Cost Model for computing USF support uses that ratio. But as explained above, the 30/70 port-usage split is outdated and is not supported by the record. Moreover, the Colorado PUC has made no finding that Qwest's 30/70 port/usage split is appropriate for Colorado. Rather, the Colorado PUC adopted Qwest's rates on the ground that Qwest's rates – which reflect the 30/70 split – were lower than the massively overstated 331T rates.

37. Qwest's misallocation of port to switching costs overstates Qwest's switching usage costs by 75%. This error can have a profound impact on the economic feasibility of competitive entry in a particular state, thereby creating an insurmountable barrier to local telephone entry. The misallocation causes CLECs' switching costs to increase with increased usage, while ILECs' costs increase at a much lower rate because their actual switching costs are relatively insensitive to usage, as explained above. In addition, the flat rates for residential service act as a cap on the amount that a CLEC can charge for the UNE-P service, and the inflated minute-of-use rate element deters CLECs from serving high-use residential customers whose usage levels lead to higher costs for CLECs (without no corresponding increase in ILEC costs). High-use customers are a desired portion of the market, but the inflated minute-of-use rates undercuts their attractiveness by inappropriately reducing the margins available to CLECs using UNE-P service to serve those customers. As a result, this cost structure serves as a significant barrier to entry for CLECs seeking to serve residential customers with UNE-P by artificially reducing the attractiveness of the high-end customers due to their higher usage costs and the cap of flat residential rates.

38. An additional problem is that the inflated minute-of-use rate allows Qwest to over-recover its costs. As usage increases, Qwest receives additional revenues even though it has not incurred corresponding costs associated with that usage. Growth in usage demand will add to this cost over-recovery. As rates remain in effect for a number of years between ratemaking proceedings, increases in usage during the pendancy of the rates increase Qwest's over-recovery and progressively reduce any margins for CLECs.

C. Qwest's Recurring Switching Rates Double Count The Costs Of Vertical Features Software.

39. Qwest's switching port rates also reflect a bogus $0.38 add-on cost for vertical feature software.[20] The HAI Model uses switching investments developed by the Commission, and include, among other costs, the costs of vertical features software. Thus, there is no question that investment in vertical features software is built into the HAI Model's switching investment input. And because the switch costs used in the HAI Model reflect ILECs' actual switch costs, and because those switch costs reflect the cost of vertical feature software, it is wrong to also include the cost of the switching features *again* to compute ILECs' switching costs.[21]

40. Simply put, Qwest's switching rates contain a clear TELRIC error because those rates double count the costs of vertical features software. By adding that the $0.38 vertical features software costs to the port rates computed by the HAI Model ($1.15), Qwest is inflating the switching port rate by 33%.

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[20] Vertical features are additional telephone related services such as Caller ID, Call Waiting, Call Forwarding, voice mail, and so on.

[21] Qwest made no attempt to adjust the HAI Model's switching investment inputs to avoid this double counting.

V. CONCLUSION

41. For the foregoing reasons, there is no question that Qwest's recurring switching rates are inflated by clear TELRIC errors.

VERIFICATION PAGE

I declare under penalty of perjury that the foregoing Declaration is true and correct.

/s/ Richard Chandler

Richard Chandler

Executed on: July 2, 2002

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I declare under penalty of perjury that the foregoing Declaration is true and correct.

/s/ Robert Mercer

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TAB F

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JOINT DECLARATION OF DEAN FASSETT AND ROBERT MERCER ON BEHALF OF AT&T CORP.

I. BACKGROUND AND QUALIFICATIONS.

1. **Dean Fassett.** My name is Dean Fassett. I am the owner of Adirondack Telecom Associates, a consulting firm that provides expert engineering, economic modeling, and other technical assistance to telecommunications companies. My current address is 141 Juniper Drive, Ballston Spa, New York, 12020.

2. I graduated from the State University of New York at Cobleskill in 1967 with an AAS degree. From 1970 through 1996 I worked at New York Telephone (NYNEX), where I held positions as an Outside Plant Engineer, an Engineering Manager, and as an Area Construction/Engineering Operations Manager. In that capacity, I oversaw outside plant construction for the Adirondack District, covering 43 wire centers with a customer base of approximately 188,000 access lines. I supervised 14 first level management and 71 craft personnel responsible for designing and building outside plant facilities.

3. In 1996, I joined Frontier Communications of Ausable Valley, as a Contract Outside Plant Engineer and Construction Coordinator. In 1998 I joined Frontier Communications of Ausable Valley as a full time Contract Operations Manager and Engineer, where I was responsible for all aspects of company operations within my service area. In 1996, I founded Adirondack Telecom Associates, where I have worked as a consultant providing expert advice and analysis to telecommunications firms throughout the country.

4. I have provided outside plant local loop expert advice to AT&T and MCI relating the development of the HAI Model. I also have testified in 14 state jurisdictions on behalf of AT&T and MCI as an expert outside plant engineer and construction witness.

5. **Robert Mercer.** My name is Robert A. Mercer. I am the President of BroadView Telecommunications, LLC ("BVT"), a consulting firm specializing in analyses of the telecommunications infrastructure. The address of the firm is 5201 Holmes Place, Boulder, Colorado, 80303.

6. I received a Bachelor of Science degree in Physics from Carnegie Institute of Technology (now Carnegie - Mellon University) in 1964, and a Ph.D. in Physics from Johns Hopkins University in 1969. After receiving my Ph.D., I was an Assistant Professor of Physics at Indiana University from 1970 until 1973.

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the Integrated Services Digital Network (ISDN), as well as systems engineering for new data services being planned by AT&T.

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9. After leaving Bellcore in late 1985, I held positions with BDM Corporation and AT&T Bell Laboratories before joining Hatfield Associates, Inc., in early 1987. I held the positions of Senior Consultant, Senior Vice President, and President of the firm. On October 1, 1997, the former principals and employees of Hatfield Associates, Inc., formed HAI Consulting, Inc., and I became the President of that firm. At Hatfield Associates and HAI, I was extensively involved in the development of the various versions of the HAI Model. I also presented testimony on and defended the model in a large number of regulatory proceedings pertaining to the cost of Unbundled Network Elements and Universal Service.

10. In March of 2000, I left HAI to form BroadView Telecommunications. The firm provides strategic planning, education, and expert services related to public and private telecommunications infrastructure, dealing specifically with network architectures, technologies, services, and service providers. At BroadView, I have continued to present and defend the HAI Model in numerous regulatory proceedings, as well as working with HAI to further evolve the HAI Model as appropriate.

11. I also hold an adjunct faculty position in the Interdisciplinary Telecommunications Program at the University of Colorado in Boulder, where I am developing an executive seminar on telecommunications developments, teach a course on telecommunications technology, and serve on Masters thesis committees. I have previously taught a course on advanced data communications and computer networking for several years. I have taught many other courses and seminars as well for other organizations and institutions, in the areas of the telecommunications infrastructure, network technologies, broadband networks, data and voice communications, computer networking, and network management.

II. PURPOSE AND SUMMARY.

12. The purpose of our testimony is to demonstrate that the unbundled network element ("UNE") loop rates adopted by the Colorado Public Utilities Commission ("PUC") are substantially inflated by clear TELRIC errors. The Colorado PUC correctly recognized that the cost model advanced by AT&T – the HAI 5.2a cost model ("HAI Model") – is capable of producing TELRIC-compliant UNE loop rates. Accordingly, the Colorado PUC stated that it would "look primarily to the HAI Model" to set Qwest's Colorado UNE loop rates. See Colorado Pricing Order at 38.

13. A model is only is good as the input assumptions used, however – an appropriately designed forward-looking cost model will not produce forward-looking cost estimates if it is not populated with forward-looking inputs.[1] And many of the key input values approved by the Colorado PUC, often with little or no explanation, were based upon Qwest proposals that violate fundamental TELRIC principles. As the Colorado Staff explained, "[t]he

[1] *See, e.g., Colorado Pricing Order* at 40 (recognizing that "input assumptions constitute the main difference in the results of the cost models").

Qwest approach ignores the most fundamental TELRIC Principle: Existing costs should not be included in wholesale price calculations. Qwest includes these costs, in toto, then uses anti-competitive adjustments as a means of transforming historical costs into future costs."[2] Because the Colorado PUC failed to adopt TELRIC-compliant inputs, Qwest's rates are vastly overstated. This is a classic case of garbage in, garbage out.

14. In Part III of this declaration, we summarize the Colorado PUC proceedings that resulted in the UNE loop rates in Qwest's SGAT. In Part IV of this declaration, we identify several of the non-TELRIC inputs adopted by the Commission at Qwest's behest, which substantially inflate Qwest's UNE loop rates. First, we show that the Colorado PUC clearly erred in adopting a split-the-baby approach to computing the mix of aerial and underground cable input. AT&T and other CLECs provided substantial evidence that a proper forward-looking percent of aerial cable would be less than 30 percent. Qwest, on the other hand, urged the Colorado PUC to use the portion of aerial cable that exists in its current (embedded) network. The Colorado PUC failed to set a TELRIC-compatible input and simply chose an arbitrary number that is closer to the portion of aerial cable that exists in Qwest's embedded network that it is to any reasonable forward-looking level.

15. Second, we demonstrate that the Colorado PUC adopted vastly overstated plowing costs, which are the costs for plowing the earth for the purpose of burying cable. Although the CLECs supported a TELRIC-compliant rate based on experience of professional engineers, and that was supported by a survey of plowing prices, the Colorado PUC adopted a rate that is more than 60% higher than those TELRIC levels.

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[2] *See CPUC Staff RRR* at 4.

16. Third, we demonstrate that the Commission improperly turned off a critical component of the HAI Model which is used to ensure that the distribution route distance calculated by the model in a given serving area matches the amount of distribution route distance required to connect the actual customer locations in that serving area. Turning off that portion of the model substantially inflates the rates produced by the HAI Model.

17. Fourth, we show that the input adopted by the Colorado PUC for average drop lengths in Colorado also is not TELRIC-compliant. The drop length adopted by the Colorado PUC is based on the average drop length in Qwest's embedded network. And although the Colorado PUC admitted that it could not fix all of the TELRIC errors in Qwest's drop length estimate, it nevertheless adopted a drop length based on Qwest's proposal.

18. Fifth, we demonstrate that the Colorado PUC erred when it adopted a network operations expense factor based on Qwest's embedded network operations, without making any forward-looking adjustments to account for the cost savings associated with a TELRIC-compliant network.

III. THE COLORADO PRICING PROCEEDINGS.

19. Qwest's Colorado interconnection and UNE rates are based on the results of two separate Colorado proceedings. The Colorado PUC initially set permanent Colorado interconnection and UNE rates in a July 28, 1997 order, Docket No. 96S-331T ("331T Order").[3] Almost one and a half years later, on November 30, 1999, Qwest (then U S WEST Communications, Inc.) filed a proposed Statement of Generally Available Terms and Conditions

[3] *See* Qwest Application, Attachment 5, Appendix C.

("SGAT") with the Colorado PUC pursuant to 47 U.S.C. § 252(f).[4] Qwest's SGAT contained the rates set in the 1997 331T Order, and numerous new rates that had never been reviewed by the Colorado PUC. In response, the Colorado PUC opened Docket No. 99A-577T ("577T Proceeding"), and ordered Qwest to notify all CLECs in Colorado of its new rates. Numerous CLECs, as well as the Colorado Office of the Consumer Counsel ("Colorado OCC") and the Colorado PUC's own staff ("CPUC Staff") intervened in the SGAT proceeding seeking review of the rates set in the 331T Order. These parties pointed out that that the rates in the 331T Order – and hence the rates in Qwest's proposed SGAT – were outdated, and fail to reflect changes in technology, changes in the regulatory field, and the merger of U S West with Qwest. These parties also showed that the rates in the 331T Order are substantially inflated by clear TELRIC errors, and that many of the rates in Qwest's SGAT were never even reviewed by the Colorado PUC.[5] Accordingly, the Colorado PUC released a Procedural Order, on December 29, 2000, in the 577T Proceeding, to review the rates in the 331T Order.

20. On January 16, 2001, Qwest filed cost studies purporting to support the 331T rates, and the numerous new rates contained in the SGAT. Qwest supplemented that testimony on April 23, 2001. During June and July of 2001, the CLECs, the Colorado OCC, and the CPUC Staff filed testimony showing that the rates in Qwest's SGAT were, in fact, vastly inflated above TELRIC levels. During that time, the CLECs also submitted new cost studies and new TELRIC-compliant UNE rates based on those cost studies. In particular, AT&T and XO Colorado, Inc. ("XO") filed a recurring cost study that develops recurring rates (including loop and switching

[4] 47 U.S.C. § 252(f).

[5] *See, e.g.,* Before the Public Utilities Commission, State of Colorado, Docket No. 99A-577T, Application of Staff for Reconsideration, Reargument, or Rehearing of Decision No. C01-1302 (January 30, 2002) ("*CPUC Staff RRR*")

rates) using a cost model called HAI Model, Version 5.2a ("HAI 5.2a"), and a non-recurring cost study that develops non-recurring charges ("NRCs") using a cost model call NRCM (which stands for "non-recurring cost model").

21. In late July, only two weeks before the scheduled August hearings, Qwest filed a new loop cost study, based on its LoopMod cost model, and urged the Commission to adopt loop rates based on that new cost study or, in the alternative, to incorporate the inputs from that cost study into the HAI 5.2 cost models proposed by the CLECs. The CLECs opposed Qwest's 11th hour filing of an entirely new cost study months after initiation of the proceeding, and only days before the start of hearings. CLECs noted that they could not possibly conduct sufficient discovery to fully analyze and assess Qwest's newly submitted loop cost study. The CLECs also sought to, at least, file rebuttal testimony showing that the new inputs proposed by Qwest – again for the first time in its rebuttal testimony – were not TELRIC-compliant, and should not be incorporated into the HAI 5.2 cost model. The Colorado PUC denied both CLEC requests and chose to consider Qwest's new evidence without allowing CLECs to file rebuttal testimony responding to the new evidence submitted by Qwest. The Colorado PUC held hearings from August 6 through August 17, 2001, and the parties filed closing Statements of Position on September 12, 2001.

22. On December 21, 2001, the Colorado PUC issued the Colorado Pricing Order.[6] In that order, the Colorado Commission recognized that the rates in the 331T Order were stale, and did not reflect "the changes in technology, the regulatory field, or the merger of U S WEST

[6] Before the Public Utilities Commission of the State of Colorado, Commission Order, Docket No. 99A-577T (Mailed December 21, 2001) ("*Colorado Pricing Order*"). This order is attached to Qwest's Application at Attachment 5, Appendix C.

with Qwest."[7] Accordingly, the Colorado PUC adopted new UNE rates. However, the Colorado Pricing Order contained numerous inconsistencies. For example, the body of the order often listed rates that differed from the rates in the list attached to the order. The reasoning in the order was also flawed. Thus, numerous CLECs, the Colorado Staff, and Qwest sought reconsideration of the order.

23. With respect to loop rates, the Colorado Pricing Order adopted the HAI 5.2a cost model proposed by the CLECs, but changed many inputs in the cost model based on evidence from the LoopMod cost study that Qwest filed at the last minute – and to which other parties were not afforded an opportunity to respond.[8] The Colorado Staff summarized the problem with the Qwest inputs: "The Qwest approach ignores the most fundamental TELRIC Principle: Existing costs should not be included in wholesale price calculations. Qwest includes these costs, in toto, then uses anti-competitive adjustments as a means of transforming historical costs into future costs."[9]

24. In the Colorado Pricing Reconsideration Order,[10] the Colorado PUC recognized the serious inconsistencies in its initial order and fixed those inconsistencies. However, the Colorado PUC fixed only a small portion of the serious clear TELRIC issues in the rates that rely on evidence from the LoopMod, and in some cases actually increased those rates in response to Qwest's reconsideration application. On May 7, 2002, AT&T, XO and Covad filed applications

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[7] *See Colorado Pricing Order* at 25-26.

[8] The problems with Qwest's switching rates are discussed in the Joint Declaration of Robert Mercer and Richard Chandler, attached to AT&T's Comments.

[9] *See CPUC Staff RRR* at 4.

[10] The *Colorado Reconsideration Order* is attached to Qwest's Application, Attachment 5, Appendix C.

for reconsideration of the Colorado Pricing Reconsideration Order, and Qwest filed its reconsideration application on May 8, 2002. The Colorado PUC rejected the loop-related claims of the CLECs.[11]

25. As we demonstrate below, the Colorado PUC's adoption of certain loop-related inputs, which are based at least in part either on Qwest's old 331T rates or on Qwest's last minute LoopMod submission, are not TELRIC-complaint, and substantially inflate Qwest's Colorado UNE loop rates.

IV. QWEST'S COLORADO UNE LOOP RATES ARE SUBSTANTIALLY INFLATED BY CLEAR TELRIC ERRORS.

26. Qwest's UNE loop rates are based on a TELRIC-compliant cost model, the HAI Model. However, as noted above (and as explained in detail below), the Colorado PUC adopted non-TELRIC-compliant inputs to use with the HAI Model. This is a classic case of garbage in, garbage out.

A. Plant Cable Mix.

27. HAI Model includes as inputs the percentage structure mix of four categories of outside plant – distribution cable, copper feeder cable, fiber feeder cable, and interoffice cable. These feeder, distribution, and interoffice facilities may be placed on aerial structures (*e.g.*, supported on telephone poles), underground (placed in conduit that is trenched underground), or buried in trenches (trenched directly into the ground). As a general matter, aerial cable placement is the least expensive – and thus would be used by an efficient competitor wherever possible – followed by buried cable. Generally the most expensive cable placement method is

[11] The *Colorado Further Reconsideration Order* is attached to Qwest's Application, Attachment 5, Appendix C.

underground cable. The model's structure percentage inputs have been set taking placement costs and lifetime operations costs into account, and represent the recommendations of the Model's outside plant engineering team as to the most efficient configuration.[12]

28. An efficient Colorado network owner would deploy about 30 percent aerial cable (and likely more). AT&T's run of the HAI Model for Colorado assumes that 28.2 percent of distribution cable deployed in Colorado is aerial cable and that 20.2 percent of copper feeder cable deployed in Colorado is aerial cable. The total aerial copper cable for Colorado is 28.1 percent. The HAI 5.2a model applies the appropriate percentage of percentage of aerial, buried and underground cable by density zone. In distribution plant the percent of aerial cable ranges from 25 percent in the lowest three density zones to 85 percent in the highest density zone. For feeder cable the HAI 5.2a model also utilizes varying percentages of aerial plant by density zones. In the three lowest density zones the model appropriately assumes 50 percent of the feeder plant will be aerial. In the higher density zones the model appropriately decreases the percentage of aerial feeder plant and only 5 percent of the feeder plant in the highest density zone is aerial.

29. Qwest, however, provided flawed evidence in the 557T proceeding that the percentage of aerial cable in Qwest's forward-looking network should be much lower. In particular, Qwest adjusted the aerial structure percentages accepted by the FCC in its Inputs Order and substantially reduced those inputs to match the aerial sheath mileage percentage

[12] If abnormal local soil texture conditions are encountered, the model has the ability to shift the plant type between aerial and buried placement to maintain the most efficient configuration for those conditions.

shown in an August 2000 "internal Qwest report."[13] Qwest then ran the HAI Model using that data, and concluded that the total aerial percentage in the HAI Model run should be reduced to 12.3% – an amount that happens to be exactly equal to the amount of aerial cable in Qwest's embedded network.[14] According to Qwest, a lower percentage of aerial cable reflects "the public's aesthetic preferences for burial."[15]

30. Qwest's analysis is flawed and does not produce TELRIC-compliant results. Most fundamentally, Qwest's analysis is based on Qwest's embedded network. In a forward-looking network, Qwest would use far more than 12.3% aerial cable. Qwest's embedded outside plant network in Colorado is a network that has evolved over many years. Qwest has continuously grown its network by adding lines to its existing structure in a piecemeal fashion over time. This augmentation process has been most prevalent in the underground and buried structure types because that avoided pole congestion from multiple cables and pole loading limitations (and thus the need to replace or add poles). As a result of this augmentation process, Qwest's embedded network uses substantially more underground and buried cable relative to aerial cable than would be used in a forward-looking network.

31. An efficiently designed forward-looking network, the number of multiple cables required within a route is greatly reduced. For example, all loops that extend beyond a 9,000 foot feeder segment would be provisioned over fiber-fed next generation digital loop carrier ("NGDLC"), eliminating the need for large numbers of multiple cables and, thereby, eliminating the preference for underground and buried plant structure type. Rather the single cable would

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[13] *See* AT&T Closing Argument at 19.

[14] *See Colorado Pricing Order* at 45 ("Qwest uses aerial facilities for 12.3% of its cable").

[15] *Colorado Reconsideration Pricing Order* at 31.

be placed on the less expensive aerial plant, and would result in a network with a much higher percentage of aerial plant compared to Qwest's embedded outside plant network.

32. Despite the clear evidence that Qwest's analysis of the appropriate cable plant mix was backward-looking, the Colorado PUC adopted a "split the baby" approach, and adopted an aerial plant percentage of only 20% – 8.1 percentage points lower than AT&T's proposal and 7.7 percentage points higher than Qwest's proposal. The Colorado PUC offered no reason for arbitrarily choosing a percentage plant closer to the non-TELRIC value proposed by Qwest. In fact, the Colorado PUC did not identify any particular flaw in the 28.1 percent value submitted by AT&T. Rather the Colorado PUC simply asserts, with no explanation that "HAI uses an inflated estimate of the forward-looking percentage of aerial plant."[16] But as explained above, that statement is false. The plant mix default values in the HAI Model are appropriate for both the distribution and feeder segments of a forward looking network by density zones.

33. As explained above, and as AT&T and other CLECs demonstrated in the 577T Proceeding, a TELRIC-compatible percentage of aerial cable in Colorado is at least 28.1%. The Colorado PUC's decision to lower that percentage nearer to a value that even the Colorado PUC has determined to be non-TELRIC-compatible is a clear TELRIC error. As a result of that TELRIC error, Qwest's UNE loop rates are inflated by at least $0.80 per month.

34. There also is a second and independent flaw with the plant mix adopted by the Colorado PUC. As explained above, the Colorado PUC improperly reduced the percentage of aerial plant used in the HAI 5.2a cost model from 28.1% to 20%. That left 8.1% of all cable unallocated. Qwest argued that the unallocated plant should be split equally between buried

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[16] *Colorado Pricing Order* at 56.

plant and the most expensive structure, underground plant,[17] and the Colorado PUC agreed.[18] Even if there was some basis for reducing aerial plant below 30 percent, there is no possible basis for substituting a substantial amount of underground plant; rather, any such substitution would be to the next cheapest solution, buried plant. Thus, at the same time that the Colorado PUC arbitrarily lowered the percentage of aerial cable plant, it arbitrarily raised the percentage of expensive underground cable plant. Given the high cost of underground cable compared to buried cable, increasing the percentage of underground cable without basis clearly violates TELRIC-principles.

35. As explained above, the Colorado PUC violated TELRIC principles by lowering the percent of aerial plant from 28.1% to 20%. But once the Colorado PUC did so, it at least should have reallocated all of the remaining plant to buried cable. By not doing so, the Colorado PUC committed a clear error that inflates Qwest's UNE loop rates by an additional $0.48.

B. Structure Placement Costs.

36. As explained by the Colorado PUC, "[p]lacement costs are those associated with placing cable, including costs for trenching or boring, and the frequency that those placement methods will be used in placing buried cable."[19] One of the costs associated with placing buried cable is that for "plowing." AT&T and other CLECs demonstrated that the costs of plowing would not exceed $0.80 per foot in the lowest density zones. The Colorado PUC agreed and set the rate at $0.80 per foot.[20]

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[17] *See Qwest RRR Request* at 19-20.

[18] *See Colorado Reconsideration Pricing Order* at 32.

[19] *Colorado Pricing Order* at 44.

[20] *Colorado Pricing Order* at .

37. In its first request for reconsideration of the *Colorado Pricing Order*, Qwest argued that plowing costs would be much higher, $1.44 per foot (the same amount used by Qwest's LoopMod). Qwest offered evidence that a survey conducted by Dean Fassett (one of the authors of this declaration), showed that plowing costs are actually much higher than $0.80 in rural areas.[21] According to Qwest, that analysis shows that plowing costs in rural zones are $1.44 per foot.

38. Based on this evidence the Colorado PUC reversed its prior finding that $0.80 is a TELRIC-compatible cost, and increased the rate to $1.30 – which amounts to total plowing costs of $1.44 after accounting for the surface texture difficulty multiplier in the HAI cost study. The HAI 5.2a model applies both surface texture and bedrock multipliers as factors to the cost for the placement of buried and underground facilities in order to recognize the increased costs associated with certain types of surface and bedrock conditions. Within the cost study, 258 various soil textures have been identified and each has a default difficulty factor for the particular soil type. These difficulty factors range from 1.00, or no additional effect, to as high as 4.0, corresponding to a cost 300% percent higher than the normal placement cost. In the real world, engineers would try to modify their design plans to avoid the difficult soil textures and bedrock conditions that exist. Conservatively, however, the HAI 5.2a has assumed the difficult placement factors would apply to the entire cluster, or 100% of the buried and underground cable in the cluster . If the model is run using a $ 1.30 per foot for normal placement in Colorado, the overall plowing cost, accounting for more difficult placement, is $ 1.44.

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[21] *See Qwest RRR* at 19-20.

39. Qwest's characterization of the cost study that I (Dean Fassett) conducted during 1996 and 1997 is wrong, and cannot be used to justify a higher plowing rate in lower density zones. It is true that my survey, as interpreted by Qwest, showed that the *average* per foot plowing cost bid by contractors was $1.44 per foot. That is based on observed maximum charges of $ 2.50 per foot and a minimum charge of $0.90 per foot. However the contractor costs used by Qwest in its calculations to determine the average cost failed to include some lower contractor cost of the survey and also included cost for more difficult placement. Based on my analysis of that survey, I concluded that the best estimate of per foot plowing costs in Colorado is $0.80 per foot.

40. To understand my conclusions, it is helpful to understand the study. The default input values for placement costs in the HAI Model cost model are based upon the many years of collective knowledge and experience of the HAI engineering team in actually preparing and awarding competitively bid contracts for placement activities in the construction of outside plant networks. I personally have over 31 years in the engineering and construction of these networks and awarding of construction contracts. In an effort to validate the reasonableness of placement costs in the HAI model, I contacted many contractors, including national contractors and contractors working for US West and other RBOCs. During this validation process I received plowing estimates as low as $0.40 per foot and as high as $7.00 per foot (but that $7.00 estimate is based on very rocky soil and a plowing depth that substantially exceeds average levels). Based on that evidence, I concluded that the input values of HAI model were well within the range of reasonableness. Qwest's reliance on a short-hand average of all estimates in my survey is specious.

41. In the real world competitive business environment it is not appropriate to award placement contracts to the *average* contract bidder instead of the lowest contract bidder. Any placement costs that are based upon average pricing instead of competitively bid prices would not be representative of the good business practices in the construction of an efficient OSP network and therefore not in accordance with TELRIC principles.

42. Moreover, plowing or placement cost should be based upon large volume lump sum contracts of at least $50,000 or more as the FCC's *Inputs Order* states.[22] Qwest has not presented any competitively-bid lump sum or similar outside plant placing contracts to support their placing costs assumptions, but has relied only upon inefficient and costly unit price contracts which overstate TELRIC costs. Unit contracts, however, are typically limited to projects involving a relatively low amount of total expenditures over relatively short time frames, and are not appropriate for measuring costs that are TELRIC-compliant.

43. The purpose for entering into such contracts is to avoid the usual red tape involved with securing approvals from higher levels in the organization so as to allow construction to begin on routine projects without undue delay. The contracts serve both parties well. However, management recognizes that some premium cost is attached to the contractor's agreement to be available on short notice to meet a specific completion date. In contrast, when large construction projects are implemented, the construction contracting procedures are quite different, and typically involve competitive bidding and selecting a construction contractor based on the bid responses. In these cases, management expects and receives significant savings in unit costs of construction activities relative to the unit costs involved with routine contracts.

44. TELRIC requires that Qwest's entire network be reconstructed given the existing locations of its wire centers. Therefore, the appropriate approach to computing plowing costs is to model costs based upon what an efficient company would incur on a large-scale project, not on individual small-volume contracts. Thus, all legitimate evidence shows that a proper TELRIC estimate of plowing costs is $0.80, and that Qwest's short-cut averaging process is not TELRIC-compliant. This clear TELRIC-error overstates Qwest's loop costs by at least $0.09 per month.

C. Strand Distance

45. The HAI Model uses a measure called "strand distance" to ensure the distribution route distance calculated by the model in a given serving area matches the amount of distribution route distance actually required to connect the actual customer locations in that serving area. The strand distance is an output of the same independent[23] process that creates the customer clusters that are used in the HAI Model. The strand distance is based on graph theory, where it would be described as the Minimum Spanning Tree ("MST") of the points that represent the customer locations.[24]

46. In particular, when the strand distance normalization option in turned on in the Model, the Model first calculates the total route distance in a given serving area by summing all

[22] *See Federal-State Joint Board on Universal Service*, Tenth Report and Order, CC Docket Nos. 96-45 & 97-160, FCC 99-304, ¶ 109 (released November 2, 1999) ("*Inputs Order*").

[23] The process of defining serving areas and determining the strand distance in each is done independently of the model calculations themselves, by a third-party company, Taylor Nelson Sofres Telecoms (TNS), whose expertise lies in creating demographic data bases.

[24] Unlike a true MST, however, which would connect individual nodes (premises) using direct "as the crow flies" routing between them, the strand distance is calculated assuming a longer right angle route between points, in order to more realistically reflect the way routing of distribution cable is done in the local exchange network.

of the outside plant components in that serving area.[25] This total distance is referred to as the Distribution Route Distance ("DRD"). It then calculates the ratio of the independently-determined strand distance to the DRD. Finally, it applies that ratio to each component of outside plant cable. This process ensures that when the route distance associated with all the outside plant components in that serving area are summed, the sum matches the independent measure of required strand distance. The strand distance normalization process is a mechanism similar to the MST approach utilized by the FCC SynMod.

47. The outside plant produced by this process is TELRIC-compliant because it is the amount needed to serve the full increment of demand. However, when the strand distance normalization option is not used, the HAI Model produces too much route distance in all but the most rural areas. This happens because with normalization turned off, the model conservatively assumes customers are spread uniformly throughout each cluster, and deploys enough cable to reach those uniformly-situated customer locations. In reality, though, customer locations are most often concentrated in parts of a cluster. In suburban areas, for instance, such concentration occurs due to parks, schools, and other open areas, or just because not all portions of the available land have been developed. In more urban areas, it occurs because there are unoccupied streets, plazas, parking garages, and the like.[26] Since, for the vast majority of clusters, the model conservatively overestimates the amount of distribution cable required if the stand normalization option is turned off, it thereby produces inflated loop rates

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[25] These components include the connecting cable, if any, between the main feeder termination and DLC RTs in the main cluster, the distribution backbone and branch cables in main clusters, the cables connecting outlier clusters to main clusters, and the distribution cable within the outlier clusters

48. The Colorado PUC chose to allow Qwest to compute loop rates with the strand distance normalization turned off. As a result, the UNE-loop rates produced by Qwest are not TELRIC-compliant. The difference in the results produced by the model with normalization turned off or on is significant. In Colorado, the overall state-wide average loop rate decreases by $0.62 per month when strand normalization is turned on compared to the results from the Colorado PUC run of the model.

D. Drop Length

49. The "drop length" is the length of the wire that extends from the loop distribution cable termination to the actual customer network interface device or NID, which is typically located in or on the building to which telephone service is being provided. In layman's terms, the drop length is the length of wire from a pole-mounted terminal or buried pedestal to the customer's premises. AT&T submitted detailed cost studies showing that the forward-looking average state-wide drop length in Colorado would not exceed 69 feet.

50. There is no question that the average drop length of 69 feet computed by the HAI Model is TELRIC-compliant. This Colorado-specific state-wide drop length estimate of 69 feet is based on the actual number of drop wires per density zone and the estimated length of the average drop within each density zone. To estimate the number of drop wires, the HAI Model uses Colorado-specific geocoded information, which identifies the actual locations of customers. This geocoded information enables the model to determine the appropriate density and lot sizes for the cluster in which the customer is located and to apply the correct drop length The HAI

[26] In clusters with very few customer locations, which typically occurs in very rural areas, the model's algorithms may sometimes underestimate the amount of cable required to reach the assumed lot frontages.

Model assumes that each lot is twice as deep as it is wide, and that structures (to which drops run) are placed towards the front of the lot.[27] Based on this analysis, the average loop length using the default drop lengths by density zone is 69 feet for Colorado.

51. This estimate is consistent with the average loop length estimates produced by a 1983 Bellcore study (that is the most recent study by Bellcore). In that study, Bellcore analyzed the RBOCs' (including US WESTs') distribution facilities to measure, among other things, average drop lengths. That study showed the national average drop length to be 73 feet.[28] Since 1983, the average size of new lots has decreased, as land values have increased. For example, during my field review of off site premises facilities in Colorado, I (Dean Fassett) observed zoning ordinances in cities (e.g., Boulder, Colorado) that have minimum lot sizes of 7,000 square feet and 25 foot setbacks for a typical residential lot, a lot size that translates into a 37 foot drop length.[29] Thus, it is hardly surprising that average drop lengths today are slightly lower than those in 1983.

52. Despite all of the evidence supporting a 69 foot drop length, the Colorado PUC rejected the 69 foot state-wide average drop length on the sole grounds that it "is not well supported by Colorado specific data."[30] But as explained above, the record in that proceeding

[27] Qwest's witness agrees that this assumption is appropriate. *See* Fitzsimmons Testimony, Colorado Docket 577T, page 85, line 8 (agreeing that "houses tend to be closer to the front of lots").

[28] *See* Telcordia Notes on Networks, Issue 4, October 2000, section 12.3.1.

[29] The drop length for a 7000 foot lot with a 30 foot setback would be 42 feet. Larger lots also have drop lengths that are considerably shorter than those proposed by Qwest. A 10,000 square foot lot with a 30 foot setback would have a drop length of 43 feet 2 inches. A 12,000 square foot lot would typically require a drop of 45 feet in length.

[30] *Colorado Pricing Order* at 43.

clearly showed that – using Colorado-specific data – the average drop length in Colorado is 69 feet.

53. After dismissing the average drop length submitted by the CLECs, the Colorado PUC inexplicably adopted an "adjusted" version of the Qwest drop length proposal – which was based on Qwest's embedded loop statistics.[31] On that basis alone, Qwest's drop length estimate must be rejected. Moreover, the Colorado PUC itself conceded that there are other serious TELRIC errors in Qwest's drop length estimate. The Colorado PUC noted that Qwest's estimate was fundamentally flawed because it "excludes multi-tenant dwellings, exaggerating the average drop length" and because "some of Qwest's estimates are questionable, e.g., some of the estimated drop length are equal to the circumference of [the] entire lot."[32] In addition, AT&T demonstrated that Qwest's embedded network drop study was based on a biased sampling of Colorado end-user customers, which considered only residences that required a technician's visit, which creates a substantial bias in the sample because residences that require a technician's visit often have longer drops.[33]

[31] *See Colorado Pricing Order* at 43 (noting that the adopted drop length "is supported as a forward looking . . . figure by taking into account Qwest's *current* state-wide average drop length, and then accounting for the effect of multi-tenant units") (emphasis added). Qwest's embedded network includes drops and NIDs with inefficiently long drops. In a forward-looking network, the newly installed drops and NIDs would be placed efficiently, thereby substantially decreasing drop lengths.

[32] *Colorado Pricing Order* at 43.

[33] Drops of longer lengths are more susceptible to trouble reports because the greater length creates more physical stress at the points of connection at the pole and customer residence attachment. Also, longer aerial drops have greater exposure to elements including wind, ice/snow, lightning and rodent (usually squirrels) damage. Buried drops of greater length are exposed to greater damage from accidental "dig-ups" and rodent damage.

54. Recognizing these serious problems with Qwest's drop length estimates, the Colorado PUC adopted a lower drop length of 75 feet. However, in adopting that drop length, the Colorado PUC purported to fix only a subset of the serious TELRIC errors that inflated Qwest's initial estimates. In particular, the Colorado PUC adopted a drop length based on Qwest's flawed estimates that purportedly adjusted for Qwest's failure to account for multi-tenant buildings, but did not account for the serious measurement errors in Qwest's drop length estimates (e.g., that some drop lengths in Qwest's analysis actually span the entire circumference of the lot), or the fact that Qwest's estimate is based on its embedded network.[34] Thus, by the Colorado PUC's own admission, the 75 foot drop length that it initially adopted was still inflated by serious TELRIC errors.

55. Amazingly, the Colorado Commission, in response to a Qwest motion for rehearing, reargument or reconsideration, further increased the drop lengths used to compute Qwest's UNE loop rates by an additional 16% to 87.2 feet. According to the Colorado PUC, its initial drop length failed to consider that "[i]n more rural areas, drop lengths will be longer" and that "in more urban areas, the average drop length will decrease."[35] The Colorado PUC, therefore, offered a new set of drop lengths that resulted in a state-wide average drop length of 87.2 feet.

56. The Colorado PUC's explanation for further increasing the already overstated average drop length is factually inaccurate. As noted above, the Colorado PUC's initial drop length estimate of 75 feet was based on Qwest's initial proposal of 136 feet, after adjusting for the fact that Qwest's initial proposal failed to account for multi-tenant buildings. And there is no

[34] *See Colorado Pricing Order* at 43.

evidence in the record that Qwest's initial proposal did not already account for differences in drop lengths between urban and rural areas. On the contrary, to the extent that Qwest's initial drop length estimate was based on its embedded network, the adjusted drop length of 75 feet adopted by the Colorado PUC did, in fact, account for those differences. In fact, the Colorado PUC actually justified its decision to increase drop lengths on the grounds that Qwest's input model does account for those differences.[36] Thus, the Colorado's decision to tack on additional drop length to Qwest's initial study is a clear error that results in double counting the effect of differing drop lengths between urban and rural areas.

57. The additional increase in drop lengths further overstates Qwest's loop rates. The increase in loop rates from 75 feet (which is already overstated) to 87.2 feet inflates Qwest's loop rates by an additional $0.07 per month. Thus, accounting for all of the TELRIC errors that inflate the drop lengths – from 69 feet to 87.2 feet – used to compute Qwest in Qwest's loop rates, Qwest' loop rates are overstated by $0.10 per month.

E. Network Operations Expenses.

58. Network operations expenses represent Qwest's costs associated with specific operations activities identified below in accounts 65XX. The network operations expense factor input to the model is used to reduce the current level of network operations expenses in order to recognize TELRIC-compliant forward-looking savings Qwest is able to experience in these operations categories. The Colorado PUC committed a clear error when it adopted Qwest's 100% network operations factor, which assumes that Qwest will achieve no reduction in network operations expense on a forward-looking basis. Indeed, it is beyond both common sense and

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[35] *See Colorado PUC Reconsideration Order* at 41-42.

economic sense to assume that the deployment of more efficient technology in place of outdated technology would not reduce network operations expenses.

59. The deployment of forward-looking technologies will necessarily lead to expense reductions. For example, the deployment of SONET-based transport lessens the likelihood of outages, which in turn lessens network administration expenses. In fact, these forward-looking technologies are often deployed for the very reason that they will produce significant operational savings.

60. The proponents of the HAI Model inputs demonstrated in the 577T proceeding that an appropriate forward-looking reduction in the network operations expense factor would be 50%. That adjustment is consistent with the estimates used by other cost models to measure the savings that would be realized by operating a TELRIC-compliant network. The Benchmark Cost Proxy Model ("BCPM"), for example, which was sponsored by Sprint, US WEST, and at various times, New York Telephone, Pacific Bell, and BellSouth, calculates a level of network operations expense below those currently captured in ARMIS data. Thus, HAI Model's adjustment to embedded networks operations expenses is appropriate and may even then yield cost estimates that are conservatively high. Moreover, there are numerous examples of Qwest network operations accounts that should achieve significant cost savings in the future.

61. Testing, Account 6533. With the elimination of high maintenance plant, testing requirements will be greatly reduced. The utilization of fiber fed NGDLC systems in the feeder portion in a forward looking efficient network greatly reduce trouble reports and the associated testing activities required. Reductions in this account also reflect the growing tendency for

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[36] *See Colorado Further Reconsideration Order* at 9.

testing activities to be taken over by contractors, resulting in lower labor costs for ILECs. Finally, as noted above, the testing account includes expenses relating to retail activities that must be performed by the CLEC rather than the ILEC.

62. *Plant operations administration, Account 6524.* Reductions in this category reflect the fact that a forward-looking network will require fewer supervisory personnel, and that equipment vendors will take over many of the installation and maintenance functions. It has been my experience (Dean Fassett) as an Operations Manager that the elimination of out-dated, high-maintenance plant greatly reduces plant operations administration expenses.

63. *Engineering, Account 6535.* Engineering is a work group that is adversely affected by maintenance problems associated with antiquated plant networks. Outside plant engineers simply spend less time maintaining modern networks than they do outdated networks.

64. *Provisioning, Account 6512.* Reduced frequency of network failures will reduce expenses associated with replenishing, stocking, warehousing and transporting equipment and other materials.

65. Thus, there is no question that Qwest's embedded network operations expense should be reduced substantially to reflect forward-looking costs. Accounting for these forward-looking cost savings, Qwest's UNE loop rates would fall substantially, as would Qwest's other UNE rates.

V. CONCLUSION

66. For the foregoing reasons, the Colorado PUC committed numerous clear errors in adopting the non-TELRIC inputs advocated by Qwest.

VERIFICATION PAGE

I declare under penalty of perjury that the foregoing Declaration is true and correct.

/s/ Dean Fassett

Dean Fassett

Executed on: July 2, 2002

VERIFICATION PAGE

I declare under penalty of perjury that the foregoing Declaration is true and correct.

/s/ Robert Mercer

Robert Mercer

Executed on: July 2, 2002