

FILED

AUG 18 2005

**Missouri Public
Service Commission**

Exhibit No.:
Issue: Costs/Rates
Witness: W. Craig Conwell
Type of Exhibit: Direct
Case No.: IO-2005-0468
Date Testimony Prepared:
July 21, 2005

**BEFORE THE PUBLIC SERVICE COMMISSION
STATE OF MISSOURI**

In the matter of Petition of Alma Telephone)	
Company for Arbitration of Unresolved Issues)	
Pertaining to a Section 251(b)(5) Agreement)	Case No. IO-2005-0468, et al
With T-Mobile USA, Inc.)	Consolidated

**DIRECT TESTIMONY
OF
W. CRAIG CONWELL
ON BEHALF OF T-MOBILE USA, INC.**

JULY 21, 2005

Exhibit No. 12
Date 8/11/08 Case No. IO-2005-0468
Reporter SUKM

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TESTIMONY OF W. CRAIG CONWELL

ON BEHALF OF T-MOBILE USA

INTRODUCTION

Q1. PLEASE STATE YOUR NAME, BUSINESS ADDRESS AND EMPLOYER.

A1. My name is W. Craig Conwell. My business address is 405 Hammett Road, Greer, South Carolina. I am an independent consultant, specializing in telecommunications cost analysis.

Q2. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS CASE?

A2. I am testifying as the cost witness for T-Mobile USA ("T-Mobile").

Q3. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND.

A3. I have a Bachelors degree and Master of Science degree in Industrial Engineering from Auburn University in Auburn, Alabama.

Q4. PLEASE DESCRIBE YOUR WORK BACKGROUND.

A4. I have thirty years of experience in the telecommunications industry. From 1974 to 1979, I was with South Central Bell Telephone Company, now part of BellSouth. I also worked for AT&T from 1979 to 1987. During this period, I had a variety of assignments, ranging from performing service cost studies early in my career to serving as a division manager in planning, financial management and marketing assignments.

1
2 From 1988 to 1996, I was with Arthur Andersen & Co. in its telecommunications
3 consulting practice in New York and Atlanta. I served as a firm-wide expert in
4 telecommunications cost accounting and managed or provided advice on domestic and
5 international consulting projects for telephone companies. These projects included:

- 6
- 7 • Performing cost studies for pricing telecommunications services.
 - 8 • Designing cost accounting systems and databases for measuring service costs.
 - 9 • Developing cost performance measures for cellular and wireline carriers.
 - 10 • Performing reviews of cost models for regulators.
 - 11 • Benchmarking service costs among telephone companies.

12

13 I managed two important cost reviews for regulators while with Arthur Andersen. One
14 was a comparison of U.S. and Canadian toll costs for the Canadian Radio-television and
15 Telecommunications Commission (CRTC), and the other was a review of Bellcore's
16 Switching Cost Information System (SCIS) for the Federal Communication Commission.

17

18 While with Arthur Andersen, I developed and taught for several years a course in service
19 costing for the United States Telephone Association (USTA) given to telephone company
20 employees, regulatory staff and others.

1 **Q5. PLEASE DESCRIBE YOUR WORK AS AN INDEPENDENT CONSULTANT.**

2 A5. Beginning in 1997, much of my work as an independent consultant has been in assisting
3 the SBC local exchange companies – Southwestern Bell, Pacific Bell, Nevada Bell and
4 Ameritech – in developing and supporting cost studies for unbundled network elements,
5 collocation and reciprocal compensation. My role was to analyze cost models produced
6 by competitive local exchange carriers, to perform ad hoc analyses to address specific
7 cost issues and to assist in cost model development. In recent years, I have developed
8 cost models for new data services, including digital subscriber line (DSL) service, Voice
9 over Internet Protocol (VoIP) and others. I also review for Commercial Mobile Radio
10 Service (CMRS) Providers the cost studies of independent telephone companies
11 underlying proposed rates for reciprocal compensation and assist them in negotiations or
12 arbitrations of these rates. I have testified as a cost witness in California, Nevada, Texas,
13 Arkansas, Kansas, Oklahoma, Missouri, Ohio, Wisconsin and Tennessee on UNE
14 costing, collocation costs or costs for reciprocal compensation.

15
16 **Q6. HAVE YOU PARTICIPATED IN OTHER ARBITRATIONS BETWEEN**
17 **INCUMBENT LOCAL EXCHANGE CARRIERS (ILECS) AND CMRS**
18 **PROVIDERS?**

19 A6. Yes, I was the cost witness for the CMRS Providers in cases in Oklahoma and Tennessee.
20 The Oklahoma cases were Cause Nos. PUD 200200150 and PUD 200300771, and in
21 Tennessee, the case was Docket No. 03-00585.

1 Q7. WHAT IS YOUR CONSULTING ENGAGEMENT WITH T-MOBILE IN THIS
2 CASE?

3 A7. I was engaged by T-Mobile to review the transport and termination cost studies produced
4 by the four ILECs in this arbitration – Alma Telephone Co., Chariton Valley Telephone
5 Co., Mid-Missouri Telephone Co. and Northeast Missouri Rural Tel. Co. The purpose of
6 the review is to determine whether the studies meet the FCC requirements for
7 establishing transport and termination rates. The review also is to determine whether the
8 study results fairly represent the companies' *forward-looking economic costs* to transport
9 and terminate telecommunications traffic originated by T-Mobile customers.

10
11 SUMMARY OF TESTIMONY

12
13 Q8. PLEASE SUMMARIZE THE MAIN POINTS OF YOUR TESTIMONY?

14 A8. My testimony addresses the following points:

- 15
- 16 • The FCC rules implementing the Telecommunications Act of 1996 require the ILECs
17 to establish transport and termination rates *not to exceed* their forward-looking
18 economic costs. The companies are required to produce cost studies consistent with
19 the FCC definition of these costs and provide study documentation sufficient for a
20 thorough review.

21
22 *The four ILECs in this case have not met the FCC requirements. Issue 7 addresses*
23 *the transport and termination rate to be incorporated in the Traffic Termination*

Agreement. In their proposal for Appendix 1 of the Agreement, the ILECs have proposed a transport and termination rate of \$0.035 per minute, which they contend does not exceed their forward-looking economic costs based on studies indicating costs of \$0.**** to \$0.**** per minute. However, the studies on which they rely do not comply with the FCC methodology for forward-looking economic costs. More importantly, the studies substantially overstate the costs of transporting and terminating telecommunications traffic originated by T-Mobile customers. This is clear based on the limited documentation provided by the ILECs and publicly available information.

- Given the studies fail to satisfy the FCC rules, I have corrected them for the major errors I have been able to identify, given the limited documentation. *The corrected average transport and termination cost is \$0.0074 per minute. A rate at this level meets the FCC requirements for transport and termination.*

THE FCC REQUIREMENTS FOR TRANSPORT AND TERMINATION RATES

Q9. WHAT ARE THE REQUIREMENTS FOR TRANSPORT AND TERMINATION RATES?

A9. ILECs are permitted by the FCC to charge reciprocal compensation to recover costs for transporting and terminating traffic from other carriers. The rules for ILEC transport and termination rates are provided at 47 CFR § 51.705 (a).

1 (a) An incumbent LEC's rates for transport and termination of local
2 telecommunications traffic shall be established, at the election of the state
3 commission, on the basis of:

4 (1) the forward-looking economic costs of such offerings, using a cost
5 study pursuant to §§51.505 and 51.511;

6
7 (2) default proxies, as provided in §51.707; or

8
9 (3) a bill-and-keep arrangement, as provided in §51.713.
10

11 Transport and termination rates, if cost-based, are to be based on *forward-looking*
12 *economic costs*, which the FCC defines in §51.505 as the sum of *total element long-run*
13 *incremental cost* (TELRIC) and a reasonable allocation of *forward-looking common*
14 *costs*. In §51.505 (e), the FCC states that rates shall not exceed the forward-looking
15 economic costs.

16
17 (e) Cost study requirements. An incumbent LEC must prove to the state
18 commission that the rates for each element it offers do not exceed the
19 forward-looking economic cost per unit of providing the element, using a cost
20 study that complies with the methodology set forth in this section and
21 §51.511 of this part.
22

23 From the point of view of determining who must bear the burden of proving
24 compliance with the cost study requirements, it is the incumbent LEC which must do
25 so, not the party which will be charged the transport and termination rates imposed by
26 the ILEC.

27 **Q10. HOW ARE TRANSPORT AND TERMINATION DEFINED?**

28 A10. The FCC in §51.701 (c) defines transport as "the transmission and any necessary tandem
29 switching of local telecommunications traffic subject to section 251 (b)(5) of the Act
30 from the interconnection point between the two carriers to the terminating carrier's end
31

1 office that directly serves the called party, or equivalent facility provided by a carrier
2 other than an incumbent LEC.”

3
4 Termination is defined in §51.701 (d) as “the switching of local telecommunications
5 traffic at the terminating carrier’s end office switch, or equivalent facility, and delivery of
6 such traffic to the called party’s premises.” *Termination* is the usage sensitive portion of
7 the end office switch, excluding the line ports and other non-usage sensitive portions of
8 the switch. In addition, termination excludes the subscriber loop, which is non-usage
9 sensitive.

10
11 **Q11. WHAT ARE THE SPECIFIC REQUIREMENTS FOR DETERMINING THE**
12 **TELRIC OF TRANSPORT AND TERMINATION AND A REASONABLE**
13 **ALLOCATION OF FORWARD-LOOKING COMMON COSTS?**

14 A11. Section §51.505 (b) and (c) define total element long-run incremental cost and forward-
15 looking common costs. The FCC has described specific requirements related to
16 calculating transport and termination costs. Among these are the following:

- 17
18 • *Plant is to reflect forward-looking technology and costs.* The costs of switching,
19 transmission and cable plant are to reflect currently available equipment, at current
20 vendor prices and company-specific discounts. The FCC rules specifically prohibit
21 the use of embedded or historical costs.¹

¹ For example, the cost study should reflect today’s cost to construct a new end office switching system, representing the prices the ILEC would currently pay its switch vendor to engineer, furnish and install the new switch. The study should not reflect switch costs that are either outdated or based on the original cost of existing switches.

- *Plant capacity is to reflect an efficient network configuration.* The transport and termination technologies in the cost study should be the most efficient alternative available to the ILEC and its specific situation. In addition, the capacities of switching, transmission and cable plant in the study should be sized for efficient forward-looking utilization.²
- *Support asset costs and operating expenses are to be forward-looking, efficiently sized and directly attributable to transport and termination.* Support assets include land, buildings, power equipment and other plant used to house and operate switching systems and transport equipment. In a TELRIC study, these assets are to be sized to support today's technologies, rather than representing existing land, buildings and other assets acquired to support operations and plant in the past. At the same time, support asset costs are to reflect current, rather than embedded land, building and other costs. Similarly, operating expenses for repair and maintenance of switching and transport equipment, engineering, network administration, etc. are to reflect today's business processes, productivity and labor costs. To the extent support assets or various workgroups are employed in producing other products, their costs should be attributed to those products and not transport and termination.
- *Common costs allocated to transport and termination are to be forward-looking and costs that are efficiently incurred.* Common costs typically include executive, legal,

1 accounting and other general and administrative costs. These costs are shared among
2 all products and services. The FCC rules call for a reasonable allocation of these
3 costs to be added to the TELRIC of transport and termination in setting reciprocal
4 compensation rates.
5

6 **Q12. SHOULD TRANSPORT AND TERMINATION RATES REFLECT COMPANY-**
7 **SPECIFIC COSTS?**

8 A12. Yes, rates should be based on each ILEC's forward-looking economic costs, determined
9 by a company-specific cost study. The study should reflect its unique serving area,
10 forward-looking network architecture, business processes and current resource costs.
11

12 **Q13. WHAT DOCUMENTATION IS REQUIRED TO SUPPORT THE COST**
13 **STUDIES?**

14 A13. 47 CFR 51.505 (e) (2) specifically requires "a written factual record that is sufficient for
15 purposes of review". It requires a cost study be included in the record if the study is
16 considered by the Commission in establishing transport and termination rates, and that all
17 affected parties (here, T-Mobile) have the opportunity to review and comment on the
18 study. The cost study and its documentation must be sufficient for T-Mobile to verify
19 that the study results represent a company's forward-looking economic costs of transport
20 and termination. Consequently, the documentation must show that the requirements I
21 described earlier are met; i.e., costs are company-specific, forward-looking, reflective of

² Transmission equipment and cables used for interoffice transport, for example, should not be sized so large in the cost study as to produce excessive spare capacity and costs. This would cause transport costs to exceed forward-looking economic costs, which is prohibited by §51.505 (e).

1 current technology and efficient plant utilization, direct to transport and termination, and
2 include a reasonable allocation of common costs.
3

4 **THE ILEC COST STUDIES DO NOT MEET THE FCC'S REQUIREMENTS FOR**
5 **ESTABLISHING TRANSPORT AND TERMINATION RATES**
6

7 **Q14. PLEASE DESCRIBE THE COST STUDY DOCUMENTATION YOU REVIEWED**
8 **FOR THE FOUR ILECS?**

9 A14. The ILECs have not filed a cost study in this proceeding to date. T-Mobile was provided
10 with three items of cost support on July 1, 2005, pursuant to discovery requests sent to
11 counsel for the ILECs: a letter transmitting cost support dated April 28, 2005 from Bob
12 Schoonmaker, the ILEC's cost consultant, to Craig Johnson, counsel for the ILECs, an
13 Excel file summarizing costs for the ILECs, and Excel files containing the input and
14 output of the Hatfield model ("HAI model") used to compute each company's transport
15 and termination costs.^{3,4} The cost summary included costs for the four ILECs and two
16 others not involved in this arbitration (Choctaw Telephone Company and MoKan Dial
17 Inc. Missouri).
18

19 **Q15. DID THE ILECS SUBSEQUENTLY REVISE THIS COST SUPPORT?**

20 A15. Yes, on July 14, 2005, counsel for the ILECs produced revised Excel files containing the
21 summary of costs and the input / output of the HAI model for each company. Costs for

³ The three items of cost support were provided by the ILECs in response to T-Mobile's June 30, 2005 Discovery / Data Requests (requests 3, 4 and 5).

⁴ The ILEC cost studies were produced using the Hatfield model – version 5.0a (HAI 5.0a) developed by HAI Consulting, Inc., Boulder, CO, 1998.

1 Choctaw Telephone Company and MoKan Dial Inc. Missouri were removed in the
2 revised cost support.
3

4 **Q16. WERE THE REVISED TRANSPORT AND TERMINATION COSTS**
5 **SIGNIFICANTLY DIFFERENT FROM THE ORIGINAL COSTS PROVIDED TO**
6 **T-MOBILE?**

7 A16. Yes. Exhibit WCC-1 shows the transport and termination costs from the original and
8 revised cost studies. The ILECs reduced their cost estimates by ** to ** percent. A brief
9 explanation of the revisions was provided in an email from ILEC counsel:
10

11 "Bob Schoonmaker advises he has reviewed the cost study HAI assumptions
12 based upon updated data from 2003 for certain items. He will be modifying
13 the cost studies with respect to rate of return, central office switching expense
14 as a percentage of COE investment, and the percentage of intraLATA traffic
15 going through access tandems."⁵
16

17 This was a substantial change in the cost information T-Mobile had been provided in
18 support of the ILECs' proposed rate.
19

20 **Q17. HAVE YOU BASED YOUR REVIEW ON THE REVISED TRANSPORT AND**
21 **TERMINATION COSTS PROVIDED ON JULY 14TH?**

22 A17. Yes. I reviewed the revised Excel files containing the cost summary and input / output of
23 the HAI model. Copies of these files are included in Exhibit WCC-2.

⁵ Email from Mr. Johnson to Mark P. Johnson, attorney for T-Mobile, dated July 12, 2005.

Q18. DID T-MOBILE REQUEST ADDITIONAL COST SUPPORT?

A18. T-Mobile's June 30, 2005 data requests asked for additional cost support, including the following:

- A description of the basis of the proposed transport and termination rate of \$0.035 per minute.
- Citations to the FCC rules for which the proposed rate is in compliance.
- 2003 and 2004 financial statements.
- Operational data on switches, lines in service and, in particular, network diagrams showing interoffice transport mileages and transport systems, and points of interconnection with Southwestern Bell Telephone.
- Indication of switching, fiber cable and interoffice transport terminal equipment placements in the past three years and copies of related cost and capacity details.

Q19. DID THE ILECS DESCRIBE THE BASIS OF THE PROPOSED TRANSPORT AND TERMINATION RATE?

A19. No. In Mr. Schoonmaker's April 28th letter to Mr. Johnson transmitting the original cost support, he states the following:

"In approaching negotiations (*with US Cellular*), we are aware that the FCC has required that in arbitration that costs be developed on a forward-looking cost basis rather than on the basis of access rates. As a consequence we have produced forward-looking costs for each of the companies using the HAI model (version 5.0a). For most of the companies, the forward-looking cost results produce cost levels that are higher (sometimes substantially higher) than rates that we have proposed based on our agreements with other wireless carriers. While under the FCC's cost requirements, we could have pursued

1 these higher rates, we have chosen to request a more moderate rate level rather
2 than the higher HAI cost based rates.”⁶
3

4 This does not describe the basis of the \$0.035 per minute rate proposed in this arbitration.
5 Mr. Schoonmaker is referring to an unknown rate proposed to US Cellular and one based
6 on “agreements with other wireless carriers.” We do not know whether the rate is the
7 same \$0.035 per minute proposed to T-Mobile. More importantly, we do not know the
8 basis of the agreements with other wireless carriers. Consequently, we are left to infer
9 that because the \$0.035 per minute is below the HAI model results from the *original* cost
10 study, it is a reasonable rate.
11

12 **Q20. SHOULD T-MOBILE AND THE MISSOURI COMMISSION BE SATISFIED**
13 **THE PROPOSED RATE IS BELOW THE HAI MODEL RESULTS?**

14 A20. Absolutely not. I will describe how the HAI model results substantially overstate
15 forward-looking economic costs for transport and termination. The evidence available in
16 this case and on the public record indicates the proposed rate exceeds the costs of the four
17 ILECs, which is contrary to the FCC requirements for reciprocal compensation.
18

19 In addition, in a similar arbitration of transport and termination rates between rural ILECs
20 and CMRS Providers in Oklahoma the arbitrator was most critical of the HAI model. He
21 stated the following in his findings and conclusions for the case:
22

23 “The Arbitrator further finds that the Hatfield Model, which was utilized by
24 the RTCs herein, has already been found suspect by the Arbitrator in at least

⁶ Mr. Schoonmaker’s letter transmitted cost support for negotiations with US Cellular, rather than T-Mobile, and included costs for six ILECs, two of which are not involved in this arbitration.

1 one previous hearing due to the ability of persons using it to be able to
2 manipulate the inputs to reach about almost any imaginable result.”⁷
3

4 The substantial change in HAI model results from the original studies to the revised
5 studies – a reduction of ** to ** percent – shows how dramatically one can affect
6 estimates of transport and termination costs using the model. Neither T-Mobile nor the
7 Missouri Commission should be satisfied simply because the proposed rate is below the
8 HAI model results.
9

10 **Q21. ARE THERE OTHER ITEMS IN THE JUNE 30TH DATA REQUEST THAT**
11 **HAVE NOT YET BEEN PROVIDED?**

12 A21. Yes. T-Mobile has been provided only partial information describing the ILEC networks.
13 The network information furnished for Chariton Valley Telephone specifies interoffice
14 cable sizes, distances and embedded costs, but not transport systems. Information from
15 Mid-Missouri describes interoffice transport systems and distances, but not cable sizes.
16 And, the Northeast Missouri Rural information provided the day before the filing of
17 direct testimony (July 20th) specifies transport systems, but the interoffice distances and
18 cable sizes cannot be determined due to the poor quality of the .pdf image. This
19 information is important in making a complete review of the ILEC cost studies.
20

21 **Q22. DOES THE COST STUDY DOCUMENTATION PROVIDED BY THE ILECS**
22 **MEET THE FCC REQUIREMENTS OF 47 CFR § 51.505 (e) (2)?**

23 A22. No, it does not. The Excel files from the HAI model contain user-adjustable input data,
24 ARMIS financial data *from 1996* and summary-level output worksheets. The full HAI

⁷ “Arbitrator’s Finding of Fact and Conclusion of Law #11”, Oklahoma PUD 200200150.

1 model, which would show the underlying calculations for end office switching, signaling
2 and common transport costs, was not provided. In addition, the ILECs modified key
3 default input values in the HAI model, and little or no explanation for the new input
4 values was provided.

5
6 The ILECs have not completely described their networks. They have not provided the
7 costs of switching, transport and other plant they would expect to incur today based on
8 current material prices and other costs of construction. It is important to note that the
9 HAI 5.0a model was produced in 1998 and contains plant construction costs dating from
10 the mid- to early-1990s. It is unlikely the HAI 5.0a model results are representative of
11 the ILECs' forward-looking economic costs in 2005.

12
13 **Q23. ARE THE RESULTS OF THE ILEC COST STUDIES REASONABLE; *i.e.*, DO**
14 **THEY ACCURATELY REFLECT THE COMPANIES' FORWARD-LOOKING**
15 **ECONOMIC COSTS OF TRANSPORT AND TERMINATION?**

16 A23. No, the studies overstate the ILECs' forward-looking economic costs of each component
17 of transport and termination – end office switching, ISUP signaling and common
18 transport. I will describe the major errors for each component.

19
20 **Q24. PLEASE EXPLAIN HOW THE ILECS COMPUTED END OFFICE SWITCHING**
21 **COSTS.**

22 A24. I have replicated the calculations for each company in Exhibit WCC-3. The calculations
23 begin with investments per line for the end office switch, wirecenter and land (rows 8 –

1 10). Wirecenter includes the investment in building space and power equipment
2 supporting the switch. These figures are intended to represent the current cost to
3 construct digital switches, as well as the current cost of land, buildings and power
4 equipment.

5
6 Annual direct expense factors are shown for each type of plant on rows 14 – 16. These
7 are the capital costs (depreciation, cost of money and income taxes) and operating
8 expenses for plant expressed as a percentage of investment. The factors are multiplied
9 times the investments per line and the results summed to compute the direct expenses per
10 line on row 18. Note that the expense factors are the same for all four ILECs, rather than
11 being company-specific.

12
13 In rows 20 – 23, additional factors are added for support expenses, variable overheads
14 and other items. Variable overheads in the HAI model represent the common costs added
15 to TELRIC to determine forward-looking economic costs. Again, the same expense
16 factors are assumed for each company, with the exception of support expenses. These are
17 applied to the direct expenses per line to compute total end office switching costs per line
18 (row 24).

19
20 The next calculation is very important. Termination costs should only include the costs
21 of switch equipment components that are usage-sensitive. A factor is multiplied times
22 the total costs per line to compute the usage-sensitive portion of costs. This factor is
23 referred to as the *EO non-port fraction*, and the value assumed in each study is 70%.

1 Seventy percent of the total cost per line on row 24 is attributed to usage. The remaining
2 cost is assigned to equipment providing line terminations on the switch. The capacity of
3 line port equipment is determined by the number of lines, rather than the amount of
4 calling or minutes of use handled by the switch.⁸

5
6 After the non-line port or usage-sensitive cost per line is computed, the amount is
7 multiplied times the total switched lines (row 31) to calculate total usage-sensitive costs
8 (row 29). Usage-sensitive costs are then divided by total annual minutes of use to
9 calculate the end office switching cost per minute (row 37).

10
11 **Q25. WHAT ARE THE MAIN ERRORS IN THE END OFFICE SWITCHING COST**
12 **CALCULATIONS?**

13 A25. There are two predominant errors in the calculations.

- 14
15 • *First, the usage-sensitive portion of total switching costs is substantially overstated.*

16 The ILECs assume 70% of the end office switching costs are usage-sensitive. In
17 recent years, switch vendors have changed their pricing of digital switches so that
18 most switch costs now are driven by line capacity rather than usage. This shifts end
19 office switching costs to subscriber lines and reduces termination costs. The *EO non-*
20 *port fraction* in row 26 of WCC-3 should be less than ten percent.

21

⁸ Usage includes setting up calls and providing call connections or paths for the duration of calls.

- 1 • *Secondly, end office switching investments per line are high.* Row 8 of WCC-3
2 shows current digital switch investments for the ILECs of \$*** to \$*** per line. This
3 is unrealistic.

4
5 The HAI model computes the switching investment per line for *small* telcos using the
6 following equation:

7
8 Investment / line = -14.922 X Ln (number of lines) + \$416.11 / line
9

10 The investment per line begins at \$416.11 and decreases as switch size increases in
11 terms of lines.⁹ The parameters in the HAI equation are based on a study by Northern
12 Business Information *in 1996*. In each study, the ILECs substituted \$**** for the
13 \$416.11 per line. This is an increase of **%, with no explanation. The change is
14 counterintuitive. It is generally understood that digital switch prices have declined
15 over time.¹⁰ I expected the ILECs to have reduced the switching constant from its
16 value a decade ago, rather than increase it by **%.

17

⁹ The *constant EO switching term* of \$416.11 is for small telcos. The HAI model has a lower switching constant for large telcos of \$242.73.

¹⁰ For example, the Public Service Commission of Utah in a May, 2003 case regarding Qwest unbundled loop costs stated the following:

 "All parties agree that digital switching costs have dropped and continue to drop significantly over time. The issue then is to set a price that reflects current realities. We adopt AT&T's default inputs for the basic switch investment. We clarify that switching will be billed on a flat-rate basis, with no usage charges. We direct the Division to adjust its version of the HAI model to the AT&T default switching investment input of \$89.00, and to use the flat rate monthly price for switching developed by the HAI model as adjusted in this order."

 "In the Matter of the Determination of the Cost of the Unbundled Loop of QWEST Corporation," Docket No. 01-049-85, Report and Order, pp. 16-18.

1 I also compared the ILECs' embedded switching investments per line with
2 investments per line from the HAI model. This comparison is shown in Exhibit
3 WCC-4. The investments per line from the HAI model are greater than the embedded
4 investments in switching systems made by the ILECs at least ten years ago.¹¹ Again,
5 this is contrary to the downward trend in digital switching costs.
6

7 Finally, the ILEC switching investments per line are high compared to those I
8 calculated based on actual switch cost data from a 1997 study by the Rural Utility
9 Service (RUS).¹² The RUS cost data are shown in Exhibit WCC-5, and my
10 calculations of switching investments per line for the four ILECs are in Exhibit
11 WCC-6. The switching investments I calculated range from \$236 to \$364 per line,
12 compared to the ILEC study values of \$*** to \$*** per line.
13

14 There are other questionable elements in the ILEC studies of end office switching costs,
15 such as the debt ratio, cost of debt, cost of equity and investments in wirecenter and land.
16 However, the end office switching investment per line and 70% usage-sensitive
17 assumption are the dominant errors. These cause the switching costs to more closely
18 approximate embedded costs than forward-looking economic costs, which is not
19 permitted by the FCC rules.
20

¹¹ Note that the embedded investment per line is computed by dividing the actual book investment in accounts 2211 and 2212 (analog and digital electronic switching) by lines in service. If there is excess capacity in the existing switching plant, the embedded investment per line will be higher than it would be when the plant is efficiently sized. If this is the case, removing the investment in excess capacity would lower the embedded investment per line and make the ILEC estimates of current investments per line appear even higher.

1 **Q26. PLEASE EXPLAIN FURTHER WHY THE SEVENTY PERCENT USAGE-**
2 **SENSITIVE FACTOR IS TOO HIGH.**

3 A26. Until the late 1990's, ILECs purchased switches based on *component pricing*, in which
4 they specified the quantities of line and trunk equipment, switch processors, memory and
5 other switch components. The cost of the line equipment or ports was driven by
6 equipped lines; the cost of trunk equipment was driven by interoffice usage; and, the cost
7 of processors, memory, etc. was driven by calling, call duration, feature processing and
8 other measures of usage. Each component was priced separately. The quantity of line
9 ports on the switch that terminate end-user access lines were not usage sensitive, because
10 their quantity was independent of the amount of calling over them. Trunk equipment,
11 processors, memory and other components were categorized as usage-sensitive. HAI
12 5.0a assumes 70% of the total switch cost to be "non-line port" or usage-sensitive based
13 on the model developers' experience in the *mid-1990's*.

14
15 In recent years, switch vendors and telephone companies have moved to *per-line pricing*,
16 in which the predominant factor determining the total switch cost is the quantity of
17 equipped lines. Vendors charge a fixed "getting started cost" and a per-line price for the
18 number of equipped lines. Charges do not vary by usage, unless a high threshold of
19 usage per line is exceeded. The switch is provisioned with ample call and feature
20 processing capacity, such that usage does not trigger capacity additions or cause costs.
21 Trunk equipment, which depends on the amount of interoffice traffic, is priced
22 separately, and its costs are usage sensitive. Trunk equipment costs, though, are a

¹² The RUS produced a study of actual rural ILEC switch costs that it filed in "Comments of the Rural Utilities Service," In the Matter of Forward-Looking Mechanism for High Cost Support for Non-Rural LECs, CC Docket

1 relatively small portion of the total switch cost. As a result, the usage-sensitive portion of
2 switch costs has become small, much less than the traditional 70% assumed in the HAI
3 model.

4
5 Using the 70% usage-sensitive cost factor in the ILEC studies overstates end office
6 switching costs, assuming they purchase switches on a per-line basis rather than
7 component pricing.

8
9 **Q27. HAS THIS ISSUE BEEN ADDRESSED BY THE FCC?**

10 A27. Yes, the FCC addressed the question of whether end office switching costs are usage-
11 sensitive in a recent arbitration in Virginia. The FCC concluded that most, if not all,
12 switching costs should be recovered on a per-line port basis, rather than based on usage.
13 I have included excerpts of the FCC Order in Exhibit WCC-7.

14
15 **Q28. HAS THE HAI MODEL BEEN MODIFIED TO ASSIGN END OFFICE**
16 **SWITCHING COSTS TO LINES RATHER THAN USAGE?**

17 A28. A staff witness for the Washington Utilities and Transportation Commission in June,
18 2003 testimony indicated that a more recent version of the HAI model (HAI 5.3) assigns
19 to line-ports costs previously treated as usage-sensitive.¹³ Based on the testimony of this

No. 97-160, August 7, 1997.

¹³ The witness testified the follows in recommending switch port rates for Qwest and Verizon:

"Q. What rates do you propose for ports with local switching?

A. The proposed rates for ports including flat-rate local switching are as follows:

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Qwest	\$2.70	\$2.41	\$2.65	\$2.70	\$5.03

member of the Commission staff, the HAI model developers appear to have changed the default value from 70% to 0% usage-sensitive costs for end office switching.

Q29. HAVE YOU CORRECTED THE ILEC END OFFICE SWITCHING COSTS?

A29. Yes, in Exhibit WCC-8, I show corrected costs for each ILEC. These corrections reduce the average end office switching cost per minute from \$0.**** to \$0.****.

Q30. PLEASE DESCRIBE THE CORRECTIONS YOU MADE?

A30. First, I corrected the end office switching investments per line. As I described earlier, the corrected values are based on the August, 1997 RUS actual switch cost data shown in WCC-5, adjusted to reflect current switch costs. The calculations are shown in WCC-6.

I began with the average switch cost per line for host and remote switches (rows 6 and 7) and developed a weighted average of the two, recognizing each ILEC's proportion of lines served by remote switches. I added costs for engineering fees, the additional, higher cost of growth lines and the cost of software upgrades based on data in the RUS study. I adjusted the embedded switch cost on row 22 to a current cost assuming a 90% current-to-embedded cost ratio. This is a conservative estimate of the decline in switch costs

Verizon	\$2.65	\$2.84	\$2.84	\$3.54	\$7.83
---------	--------	--------	--------	--------	--------

The tariffed port rate is currently \$1.34 for both Qwest and Verizon. The reason for the increase in the port rate between this study and prior studies is that flat-rated usage is now included in the port rate in the HAI 5.3 model."

"Direct Testimony of Thomas L. Spinks," Staff of Washington UTC, Docket No. UT-023003, p. 8.

1 over the past decade.¹⁴ The results on row 25 show current end office switching
2 investments of \$236 to \$364 per line.

3
4 **Q31. DID YOU CORRECT THE PERCENTAGE OF END OFFICE SWITCHING**
5 **COSTS THAT ARE USAGE-SENSITIVE?**

6 A31. Yes. I assumed that if an ILEC places a new end office switch and the switch is priced
7 on a per-line basis, the cost of the switch includes (1) the getting started cost, (2) charges
8 based on the quantity of equipped lines multiplied times the per-line price, and (3)
9 charges for interoffice trunk equipment.¹⁵ The per-line price would be for a normal level
10 of busy hour usage per line, and the price would not vary with usage unless ILEC
11 subscribers have extremely high use.

12
13 The four ILECs do not appear to have extremely high usage per line. Their average
14 annual minutes per line are **** minutes (WCC-8, cell F33). I used common
15 assumptions regarding the peakedness of traffic and determined that busy hour usage for
16 a typical line would be about *** BH CCS per line.¹⁶ This is not an unusual or

¹⁴ In the July, 2004 arbitration of reciprocal compensation rates between rural ILECs and CMRS Providers in Tennessee, the cost witness for Sprint PCS gave the following testimony:

"Q. Are the TPI (Turner Price Index) index values for digital switching declining?

A. Yes. The index factors for digital switching for the past five years have declined by 12%. Over the past ten years they have declined 31%. This confirms that the forward-looking economic cost of switching would be less than embedded cost of switching."

"Supplemental Consolidated Direct and Rebuttal Testimony," Talmage O. Cox, III, Sprint PCS, Tennessee Regulatory Authority, Docket 03-00585, 07/27/04.

¹⁵ The cost of the switch may also include charges for software, ISDN lines, TR303 interfaces (for digital loop carrier systems), etc. These charges, though, are not usage-sensitive.

¹⁶ Dividing **** minutes by 250 business days and assuming 10% of daily traffic is in the busy hour yields busy hour usage of *** MOU or *** busy hour centi-call seconds (CCS).

1 extraordinary level of usage, so I would not expect the ILECs to have to pay per-line
2 prices for high use lines. Consequently, the cost of the new switch largely consists of the
3 getting started cost and charges based on equipped lines. The amount of calling, and in
4 particular the amount of traffic terminated from CMRS Providers, does not drive these
5 costs.

6
7 The charges for interoffice trunk equipment would be driven by interoffice usage.
8 Telecommunications traffic originated by CMRS Providers and terminated by the ILECs
9 would cause incremental trunk port requirements. So, it is appropriate to include costs
10 for trunk ports. To do this, I calculated the *EO non-port fraction* to reflect the amount of
11 the end office switching investment attributable to just interoffice trunk ports. These
12 calculations are shown in rows 41 through 68 of WCC-8.

13
14 I used the default value for trunk port investments from the HAI model (rows 42 – 44). I
15 also computed the number of lines that can be handled by a trunk port, based on the
16 interoffice usage per line for each ILEC and assumptions regarding interoffice traffic. I
17 assumed maximum usage of a trunk port of 27.5 BH CCS as in the HAI model and a
18 forward-looking average utilization level of 70%. The resulting lines per trunk port range
19 from ** to *** lines (row 62). I completed the calculations by dividing the investment
20 for two trunk ports (one per end) by the lines per port and computing a corrected *EO non-*
21 *port fraction* of ** to **% (row 68). These values are substituted on row 26 of the
22 spreadsheet, and the calculations are completed resulting in corrected end office

1 switching costs of \$0.**** to \$0.**** per minute, with an average of \$0.**** per
2 minute.

3
4 **Q32. WHAT WERE YOUR FINDINGS FROM REVIEWING ISUP SIGNALING**
5 **COSTS?**

6 A32. ISDN User Part (ISUP) signaling costs include the costs of 56 Kbps data links from ILEC
7 switches to Signal Transfer Points (STP) and ports on the STPs. These facilities are used
8 for interoffice call setup and other signaling functions. ISUP signaling costs normally are
9 minor portions of transport and termination costs. The ILEC cost studies estimated costs
10 of \$0.*** to \$0.**** per minute.

11
12 Exhibit WCC-14 shows the development of the costs. The key cost driver is the monthly
13 cost per 56 Kbps signaling link (row 7). This cost drives over ninety percent of the total
14 ISUP signaling cost. The cost of the STP port (row 14) is fairly minor.

15
16 Monthly costs for basically a voice grade channel in the range of \$*** to \$*** seem quite
17 high. The HAI model assumes the signaling links are carried on the ILEC's interoffice
18 rings. It appeared to me that one of the factors driving these high monthly costs is the
19 high interoffice cable costs per voice grade channel, which I describe shortly. Without
20 the details of the development of the signaling link investments and costs, I chose to
21 benchmark the costs against the Southwestern Bell unbundled signaling rates in Missouri,
22 as an efficient alternative.

1 Exhibit WCC-15 computes ISUP signaling costs using signaling rates from the Missouri
2 M2A (Schedule of Prices, 06-27-03). I included cross-connect charges (rows 29 and 30)
3 and the fixed and per-mile charges for a 56 Kbps signaling link. Since I did not know the
4 average distance from an ILEC switch to the STP, I assumed 200 miles. The resulting
5 calculations indicate that a CLEC purchasing a 56 Kbps signaling link at this distance
6 would pay approximately \$88.59 per month, rather than the \$*** to \$*** costs shown in
7 the ILEC studies.

8
9 I substituted the revised monthly cost in row 7 of WCC-15 and solved for the ISUP
10 signaling cost per minute. The result is an average cost of \$0.0012 per minute. I
11 recommend this value be used as a reasonable cost benchmark.

12
13 **Q33. HAVE YOU ALSO ANALYZED THE COMMON TRANSPORT COSTS IN THE**
14 **ILEC STUDIES?**

15 A33. I indicated earlier that the ILECs provided summary-level output from the HAI model.
16 In the case of end office switching, it is possible to readily identify the primary cost
17 drivers affecting switching costs – the end office investment per line, expense factors, the
18 EO non-line port fraction, etc. The summary-level output for common transport is
19 insufficient for a complete analysis of the underlying drivers of these costs. Common
20 transport costs are determined by interoffice route mileages among switches, the
21 bandwidth of the interoffice transport systems, forward-looking utilization levels, and
22 current cable and transmission equipment costs. Some values for these drivers can be

1 determined from the recent network diagrams provided by the ILECs, but as I mentioned
2 earlier, the information is incomplete.

3
4 I was able, though, to analyze common transport costs in enough detail to conclude that
5 the ILEC studies overstate these costs. Exhibit WCC-9 shows the makeup of common
6 transport costs based on the HAI model output.

7
8 **Q34. HAVE YOU COMPARED THE ILEC COMMON TRANSPORT COSTS WITH**
9 **UNE RATES OF OTHER TELCOS TO TEST THEIR REASONABLENESS?**

10 A34. Yes, Exhibit WCC-10 shows common transport rates for the Regional Bell Operating
11 Companies and large independent telephone companies across the U.S based on a
12 January, 2004 survey of unbundled network element rates by the West Virginia Public
13 Service Commission. It plots common transport costs for the four ILECs relative to these
14 rates and the rate of Southwestern Bell in Missouri.

15
16 I would expect a small rural ILEC to have higher common transport costs due to longer
17 distances among switches and transmission systems with less trunk capacity, but the
18 ILEC common transport costs are ** to ** times the highest common transport rate
19 (excluding Nevada), and their costs are *** to *** times the Southwestern Bell rate in
20 Missouri. This is an extraordinary difference.

21
22 **Q35. WHAT DRIVERS CAUSE ILEC COMMON TRANSPORT COSTS TO BE SO**
23 **HIGH?**

1 A35. Referring to WCC-9, you see that common transport costs consist of two elements - the
2 cost of fiber cables connecting switching systems and the cost of transmission equipment
3 for cross-connecting circuits, multiplexing the circuits and converting electrical signals to
4 optical signals for transmission across cable plant. The fiber cable cost per minute,
5 shown on row 39, ranges from \$0.*** to \$0.**** per minute. The transmission
6 equipment cost is shown on row 57 and ranges from \$0.**** to \$0.**** per minute.
7 Cable costs makeup **** to **** percent of the total common transport cost.

8
9 With regard to cable costs, the two key cost drivers are the cable investment / trunk
10 (DS0) on row 8 of WCC-9 and the actual annual minutes of common transport on row
11 38.¹⁷ The cable investments per trunk, which range from \$***** to \$***** are quite
12 high. This can be seen from Exhibit WCC-11, which develops buried fiber cable
13 investments per DS0 at varying interoffice mileages.

14
15 The calculations begin with the current cost per foot for buried fiber cable.¹⁸ I obtained
16 construction cost data for Missouri from a public website.¹⁹ The material cost for direct
17 burial of 50 micron, eight fiber cable is \$1.82 / foot. I selected eight fiber cable, because
18 this provides four fibers for a working transport system (two working and two backup),
19 with four additional fibers, if needed. The installation labor cost is \$1.50 / foot and
20 equipment costs are \$0.32 / foot assuming a line truck and small tools are required to
21 place the cable. This resulted in a buried cable cost per foot of \$3.64.

¹⁷ A DS0 is an interoffice channel with bandwidth of 64 kilobits / second; it represents one voice grade interoffice circuit.

¹⁸ Buried fiber cable is assumed to be the forward-looking cable type placed by the ILECs for interoffice transport.

1
2 Cost data from Chariton Valley's network diagram confirmed the reasonableness of the
3 \$3.64 cost per foot. Exhibit WCC-16 shows network information for Chariton Valley
4 and Mid-Missouri. The Chariton Valley data indicate it has an average embedded
5 investment per foot of \$*** for 28 and 32 fiber cable. My estimate of the current cost of
6 smaller, eight fiber cable is actually higher.

7
8 On WCC-11, I computed buried cable investments in fifty mile increments, beginning
9 with 50 miles and ending with 300 miles. I assumed the ILEC forward-looking
10 interoffice transport system would be an OC-3 system. Some of the ILECs may use
11 higher bandwidth systems, such as OC-12 or OC-48.²⁰ If so, this *reduces* the cable
12 investment per DS0. The system has a nominal capacity of 2,016 DS0s, and I assumed a
13 forward-looking average utilization of 70%, which allows for 30% spare capacity over a
14 future planning period. Dividing the total buried cable investments by *** DS0s yields
15 an average investment of \$*** per DS0 at 50 miles of interoffice transport and \$**** per
16 DS0 at 300 miles. These unit investments are well below the HAI model estimates
17 shown on row 8 of WCC-9. Unless the interoffice transport distances are much greater
18 than 300 miles or the transport utilization level is much lower than 70%, the cable
19 investments per DS0 from the HAI model are unrealistic.

20
21 Besides the high cable investments, the ILECs have used *actual* annual minutes of
22 common transport on row 38 of WCC-9 to compute cable costs per minute, rather than

¹⁹ The website address is www.get-a-quote.net. It provides construction cost data by state and for numerous types of construction, including telecommunications plant.

1 the estimate of minutes determined by the HAI model. The HAI model calculates the
2 number of common transport trunks required by the ILEC (rows 10 – 13), and then
3 computes the amount of traffic or minutes the trunks should handle. It bases this on an
4 assumption of 30% utilization of the maximum trunk usage. The ILEC actual utilization
5 is well below **%, ranging from ** – **%. Using the actual minutes further inflates the
6 common transport cable costs. Furthermore, this method is contrary to the FCC rules in
7 47 CFR §51.511, which require that unit costs be based on forward-looking average
8 utilization.

9
10 **Q36. HAVE YOU CORRECTED THE CABLE PORTION OF COMMON**
11 **TRANSPORT COSTS?**

12 A36. Yes, Exhibit WCC-12 shows the common transport cost calculations with corrections. I
13 was able to determine the interoffice cable mileages for Chariton Valley and Mid-
14 Missouri based on the network diagrams for these companies. Chariton Valley
15 apparently has a single fiber ring with a total length of *** miles (WCC-16, cell D32).
16 Mid-Missouri has two rings, and I computed the average length, including the link to the
17 Southwestern Bell point of interconnection, to be ** miles (WCC-16, cell D64). Usable
18 information has not been provided on the Alma and Northeast Missouri cable distances,
19 so I assumed distances of 75 and 100 miles, respectively.²¹ These interoffice distances
20 were used to compute cable investments per DS0 for each company in WCC-11. I
21 substituted these values in row 8 of WCC-12. I divided the total cable costs on row 24 by
22 the HAI model estimate of traffic carried by the trunks. I did this in order to base the

²⁰ The Northeast Missouri Rural network diagram shows it having OC-192 transport systems.

1 costs on forward-looking average utilization for efficiently sized trunks, rather than using
2 actual, current utilization. The change is consistent with the FCC rules at 47 CFR
3 §51.511. I have not modified the expense factors. The corrections lower the common
4 transport cable cost per minute to \$0.****.

5
6 **Q37. HAVE YOU ALSO CORRECTED THE TRANSMISSION EQUIPMENT**
7 **PORTION OF COMMON TRANSPORT COSTS?**

8 A37. Yes, the transmission equipment investments and costs per DS0 also appear to be quite
9 high. I believe this is due to the HAI model reflecting transport systems sized for large
10 telco networks. Initially, I attempted to develop a transmission equipment investment per
11 DS0 using the HAI model data for OC3 add / drop multiplexers, digital cross-connect
12 systems, etc.; however, these network elements, particularly the digital cross-connect
13 system, were too large to use in these circumstances. So, I developed an alternative
14 transmission equipment investment using the *equivalent terminal investment per DS0*
15 value in the HAI model, which is a surrogate for transmission equipment investment for a
16 small telco.²² These calculations are shown in Exhibit WCC-13.

17
18 This produced a transmission equipment investment per DS0 of \$***, which I substituted
19 in row 44 of WCC-12. After computing the annual costs associated with this plant, I
20 again divided by the HAI model value for common transport minutes. The corrected

²¹ Alma has a single switch, so its interoffice cable should only be to the Southwestern Bell point of interconnection.

²² The HAI 5.0a documentation describes this variable as, "The per-DS0 surrogate investment by a small ICO for terminal equipment used on dedicated circuits between an end office and tandem switch belonging to the BOC (or other large LEC) on which the ICO relies for interoffice connectivity."

transmission equipment costs are shown on row 57. The total common transport costs per minute, including cable and transmission equipment, equal \$0.**** to \$0.**** per minute, after the corrections. The average cost is \$0.**** per minute.

Q38. HOW DOES THIS COST COMPARE WITH THE RANGE OF UNBUNDLED COMMON TRANSPORT RATES IN WCC-10?

A38. It is four times higher than the highest common transport rate across the U.S., and 28 times higher than Southwestern Bell's common transport rate in Missouri. So, while the corrected common transport costs are significantly lower, they are still well above those of the RBOCs and major independent telcos.

Q39. WOULD YOU SUMMARIZE THE CORRECTIONS TO THE ILEC COST STUDIES AND THE RESULTING TRANSPORT AND TERMINATION COST?

A39. The following table summarizes the ILEC transport and termination costs, before and after corrections.

Average ILEC Transport and Termination Costs Per Minute

	Before Corrections	After Corrections
End office switching	*****	\$ 0.0007
ISUP signaling	*****	\$ 0.0012
Common transport	*****	\$ 0.0055
Total	*****	\$ 0.0074

The corrected costs more accurately represent forward-looking economic costs of transport and termination as required by the FCC rules. *The ILEC rate charged to T-*

1 *Mobile for terminating telecommunications traffic should be no greater than \$0.0074 per*
2 *minute.*

3
4 **Q40. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?**

5 **A40. Yes.**

STATE OF SOUTH CAROLINA)
) ss.
COUNTY OF GREENVILLE)

VERIFICATION

**EXECUTED VERIFICATION PAGE
IS BEING SENT AS A SEPARATE ATTACHMENT**

Exhibit WCC-1 – Comparison of Original and Revised Transport and Termination Costs
Provided by the ILECs to T-Mobile

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Exhibit WCC-2 – Revised Cost Support

Cost Summary – Transport and Termination Costs - Four ILECs.

PROPRIETARY

HAI Model – Input / Output

PROPRIETARY

Exhibit WCC-3 – ILEC End Office Switching Costs

PROPRIETARY

Exhibit WCC-4 – Comparison of ILEC Embedded Investments Per Line with HAI Model Results

PROPRIETARY

Exhibit WCC-5 – Rural Telco Actual Switch Costs

Rural Telephone Company Actual Switch Costs

Comments of the Rural Utilities Service

CC Docket No. 97-160

August 7, 1997

Host Switches				Remote Switches			
Number of Lines	Actual Cost	Cost / Line	Note	Number of Lines	Actual Cost	Cost / Line	
75	\$ 81,000	\$ 1,080		75	\$ 80,762	\$ 1,077	
120	\$ 115,589	\$ 963		120	\$ 46,328	\$ 386	
150	\$ 121,319	\$ 809		151	\$ 72,413	\$ 480	
253	\$ 1,540,904	\$ 6,091	*	250	\$ 109,381	\$ 438	
443	\$ 164,290	\$ 371		440	\$ 60,559	\$ 138	
460	\$ 354,675	\$ 771		460	\$ 98,249	\$ 214	
560	\$ 467,603	\$ 835		578	\$ 88,733	\$ 154	
598	\$ 329,951	\$ 552		600	\$ 104,276	\$ 174	
674	\$ 163,218	\$ 242		680	\$ 181,249	\$ 267	
684	\$ 315,709	\$ 462		688	\$ 256,750	\$ 373	
820	\$ 977,080	\$ 1,192	*	810	\$ 296,970	\$ 367	
850	\$ 620,200	\$ 730	*	865	\$ 117,218	\$ 136	
960	\$ 451,225	\$ 470		960	\$ 176,249	\$ 184	
1,412	\$ 526,088	\$ 373		1864	\$ 117,218	\$ 63	
1,779	\$ 429,417	\$ 241		1880	\$ 229,663	\$ 122	
2,100	\$ 766,053	\$ 365		2510	\$ 273,000	\$ 109	
2,615	\$ 490,666	\$ 188		2740	\$ 281,600	\$ 103	
2,714	\$ 526,839	\$ 194					
2,830	\$ 596,830	\$ 211					
3,810	\$ 1,243,673	\$ 326	*				
4,760	\$ 663,650	\$ 139					
Total	28,667	\$ 10,945,979	\$ 382	15671	\$ 2,590,618	\$ 165	

Total excluding
four switches (*)
constructed to
serve large
number of
remotes.

22,934 \$ 6,564,122 \$ 286

Exhibit WCC-6 – Corrected ILEC End Office Switching Investment Per Line

PROPRIETARY

Exhibit WCC-7 – FCC Position on Switch Costs – Virginia Arbitration, “Memorandum Opinion and Order,” CC Docket Nos. 00-218 & 00-251, 8/28/2003.

Arbitration Order ¶ 458 – 459.

The Commission’s general rate structure rules specify that UNE rates be structured consistently with the manner in which the costs of providing them are incurred. In other words, the basis on which the element is sold to the competitive LEC should reflect the basis on which the cost is incurred by the incumbent LEC. If, for example, the incumbent LEC were to pay the switch manufacturer a per line fee for some of the switch hardware or software, then the incumbent LEC should recover these switch costs from the competitive LEC on the same basis. If the incumbent LEC were to recover these costs on a per MOU basis, then this would provide the competitive LEC’s subscribers with an uneconomic incentive to reduce usage of this switch hardware or software.

The Commission’s general rate structure rules also specify that the costs of shared facilities should be recovered in a manner that efficiently apportions them among users, either through usage-sensitive charges or capacity-based flat-rated charges. That is, these costs should be allocated among subscribers on the basis of their causal responsibilities. The Commission’s specific rate structure rule for local switching specifies that costs for this element be recovered through a combination of a flat-rated charge for line ports and one or more flat-rated or per MOU charges for the switching matrix and trunk ports, but it does not specify a particular combination or means for determining the appropriate combination. *(footnotes omitted)*

Arbitration Order ¶ 463 – 465.

We find here that the “getting started” costs of the switch should be recovered on a per line port basis. “Getting started” costs are incurred for capacity that is shared among subscribers. Verizon incurs these costs to be ready to provide service upon demand. Given the record evidence that modern switches typically have large amounts of excess central processor and memory capacity, the usage by any one subscriber or group of subscribers is not expected to press so hard on processor or memory capacity at any one time as to cause call blockage, or a need for additional capacity to avoid such blockage ... Principles of cost causation, therefore, support a per line port cost recovery approach because, more than any other approach, it spreads getting started costs to carriers in a manner that treats equally all subscribers served by a switch.

The incumbent LEC’s central processor and memory costs do not vary with respect to whether a subscriber connected to its switch is a high or low volume user, a residential or business user, or a peak-period or off-peak-period user.

A per MOU price for the central processor and memory, in contrast to a per line port price, would not recover these costs on a competitively neutral basis ... Principles of cost causation do not, therefore, support a per MOU price. *(footnotes omitted)*

Exhibit WCC-8 – Corrected ILEC End Office Switching Costs

PROPRIETARY

Exhibit WCC-9 – ILEC Common Transport Costs

PROPRIETARY

Exhibit WCC-10 – Unbundled Common Transport Rates

PROPRIETARY

“A Survey of Unbundled Network Element Prices in the United States,” updated January, 2004, Consumer Advocate Division, Public Service Commission of West Virginia.

Exhibit WCC-11 – Fiber Cable Investment Per DS0

PROPRIETARY

Exhibit WCC-12 – Corrected ILEC Common Transport Costs

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Exhibit WCC-13 – Transmission Equipment Investment Per DS0

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Exhibit WCC-14 – ILEC ISUP Signaling Costs

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Exhibit WCC-15 – Corrected ILEC ISUP Signaling Costs

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Exhibit WCC-16 – ILEC Interoffice Network Data

PROPRIETARY

21234272

STATE OF SOUTH CAROLINA)

)

COUNTY OF GREENVILLE)

VERIFICATION

Comes now W. Craig Conwell, being of lawful age and duly sworn, and states that he has read the foregoing direct testimony, and that it is true and correct to the best of his knowledge and belief.

W. Craig Conwell

Sworn to and subscribed before me this 20th day of July, 2005

Nick W Adams
Notary Public

My commission expires:

November 5, 2013