BEFORE THE STATE OF SOUTH DAKOTA

PUBLIC UTILITIES COMMISSION

IN THE MATTER OF THE PETITION OF ALLIANCE COMMUNICATIONS COOPERATIVE, INC., BERESFORD MUNICIPAL TELEPHONE COMPANY, KENNEBEC TELEPHONE COMPANY, MCCOOK COOPERATIVE TELEPHONE COMPANY, SANTEL COMMUNICATIONS COOPERATIVE, INC., AND WEST RIVER COOPERATIVE TELEPHONE COMPANY FOR ARBITRATION PURSUANT TO THE TELECOMMUNICATIONS ACT OF 1996 TO RESOLVE ISSUES RELATING TO AN INTERCONNECTION AGREEMENT WITH ALLTEL COMMUNICATIONS, LLC.	)	Docket Nos. TC 07-111 TC 07-112 TC 07-113 TC 07-114 TC 07-115 TC 07-116

PUBLIC

CONFIDENTIAL INFORMATION REDACTED

DIRECT TESTIMONY OF W. CRAIG CONWELL

ON BEHALF OF ALLTEL COMMUNICATIONS, LLC.

March 24, 2008

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INTRODUCTION AND QUALIFICATIONS

Q. Please state your name, business address and employer.

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

Q. On whose behalf are you testifying in this case?

A. I am testifying as the cost witness for Alltel Communications, LLC. ("Alltel").

Q. Please describe your educational background.

A. I have a Bachelors degree (1972) and Master of Science degree (1974) in Industrial Engineering from Auburn University in Auburn, Alabama.

Q. Please also describe your work background.

A. I have included as Exhibit WCC-1 a copy of my current resume. I have over 30 years of experience in the telecommunications industry, with a broad background in telecommunications costs analysis as an employee of the Bell System, with Arthur Andersen & Co. in its telecommunications consulting practice, and for the past eleven years as an independent consultant.

In recent years, I have been extensively involved in negotiations and arbitrations of reciprocal compensation rates between incumbent local exchange carriers (ILECs) and wireless carriers. I have analyzed numerous

ILEC cost studies for compliance with the FCC rules for Total Element Long Run Incremental Costs (TELRIC), and I have testified as an expert cost witness on behalf of wireless carriers in one or more arbitrations in eight states. I also was involved on behalf of the AT&T local exchange carriers in the arbitrations establishing rates for unbundled network elements and collocation. I have provided expert testimony on one or more occasions in 15 states. Over the years, I have developed cost models, participated in the design of telecommunications cost accounting systems, performed cost studies of various types, and taught service cost courses for the United States Telephone Association and telephone company staffs. In addition, I have held management positions in corporate planning, financial management and marketing.

Q. What are the other arbitrations between ILECs and wireless carriers in which you participated?

A. I was the cost witness for wireless carriers in California, Michigan, Mississippi, Missouri, North Carolina, Oklahoma, South Dakota and Tennessee. Exhibit WCC-2 lists the arbitrations in which I have participated. In each arbitration (other than those in North Carolina), my role has been to review ILEC cost studies and their results to determine whether they met the FCC requirements for establishing reciprocal compensation rates. In the North Carolina arbitrations, I reviewed cost studies for compliance with cost study guidelines established by the NC Utilities Commission in Docket No. P-

100, Sub 159. These guidelines require cost methods and input data similar to TELRIC studies, except the ILECs were permitted to use surrogate cost data to reduce the effort to perform cost studies.

Q. What is your consulting engagement with Alltel in this proceeding?

A. Alltel engaged me to serve as their cost expert. I was asked to review the cost studies, testimony and other documentation produced by the rural local exchange carriers (RLECs) in this arbitration as the basis for their proposed transport and termination rates and to determine whether the cost studies and their results comply with the FCC requirements for forward-looking economic cost studies.[1] In addition, I was asked to correct the RLEC cost studies, if they failed to meet the FCC requirements, and to produce appropriate transport and termination rates.

SUMMARY OF TESTIMONY AND RECOMMENDATIONS

Q. Please summarize the main points of your testimony.

A. Following is a summary of my testimony.

- The RLECs have produced studies to determine the costs and rates for transporting and terminating telecommunications traffic originated by Alltel customers – that is, mobile-to-land traffic. The cost model used to determine these costs, along with some documentation, have been

[1] The RLECs in this arbitration include Alliance Communications Cooperative, Inc., Beresford Municipal Telephone Company, Kennebec Telephone Company, McCook Cooperative Telephone Company, Santel Communications Cooperative, Inc., and West River Cooperative Telephone Company.

provided to Alltel for its review. The RLECs consider these studies to be in compliance with the FCC rules for establishing cost-based reciprocal compensation rates in 47 C.F.R. 51.705(a)(1), 51.505 and 51.511.

- The results of the RLEC cost studies (*i.e.*, estimates of forward-looking economic costs) are shown in Exhibit WCC-4. Transport and termination costs range from [redacted] to [redacted] per minute. I have reviewed the RLEC cost studies and found that they do not comply with the FCC rules for determining forward-looking economic costs. Costs in the range of [redacted] to [redacted] cents per minute are too high.
- The RLECs have failed to comply with FCC's requirement to provide sufficient documentation to evaluate specifics about the forward-looking networks reflected in their cost studies and how the associated costs are developed.[2] This is a prerequisite to an evaluation of a cost study. Furthermore, the South Dakota Public Utilities Commission (the "Commission") will find this information is necessary to address issues they will be asked to decide (see below). Alltel has issued a first set of interrogatories and requests for production of documents, and the RLECs have not produced key information about plant investments, capacities and utilization levels reflected in their cost studies. I understand Alltel also has filed motions to compel the production of this key information. It is important that this information be produced prior to rebuttal testimony.

[2] *Local Competition Order*, 11 FCC Rcd at 15850 ¶ 691 and 15847 ¶ 680.

- I have identified 18 cost-related issues for consideration by the Commission. These are shown in the table below. I recommend that each issue be decided. Then, the RLEC cost studies should be re-run to produce corrected forward-looking economic costs in compliance with the FCC rules. I have estimated the effect on RLEC costs of adopting Alltel's recommendation on each issue.
- Based on these recommendations, the RLEC forward-looking economic costs after the cost studies are re-run are expected to be no more than $[redacted] per minute for switching, $[redacted] for transport electronics and $[redacted] for transport outside plant. This would make the maximum transport and termination rate no more than [redacted] per minute, with each RLEC's rate reflecting its company-specific costs.

Q. How is the remainder of your testimony organized?

A. I begin by describing the FCC requirements for establishing cost-based reciprocal compensation rates and cost studies used to determine these rates. Reciprocal compensation rates are intended to recover RLEC costs for two network elements – transport and termination. So, I describe these two elements and the types of costs that may and may not be included in them according to FCC rules. Finally, I describe my findings from reviewing the RLEC cost studies and the issues that I recommend be addressed by the Commission.

Cost Issues to be Decided for RLEC Cost Studies

Cost Issue	Issue	Recommendation
1.1	What switch investments (by switch category and exchange) should be used in the RLEC cost studies?	The RLECs should provide sufficient documentation to review switch investments, including types of equipment, quantities of equipment based on capacities and demand, and unit costs (*e.g.* material prices). This information should be used to compute switch investments with consideration given to specific questions that determine appropriate investments to be included in the cost studies. (See section of testimony for this cost issue.)
1.2	What switching annual cost factors should be used?	McCook, Santel and West River should use their current switching ACFs ([redacted]). Alliance, Beresford and Kennebec should recompute ACFs. The ACFs should be no greater than [redacted]. This allows approximately [redacted] percent for the capital cost factor, [redacted] percent for direct switching expenses, [redacted] percent for other operating expenses and [redacted] percent as the corporate operations expenses loading.
1.3	What percentage or portion of the switch investments is usage-sensitive and recoverable in transport and termination rates?	RLEC trunk card investment per line, after adjustments for Cost Issue 1.1, should be used to compute switching costs per minute. Unless the RLECs demonstrate that the common category of equipment for the switch technology reflected in their cost studies is exhausted by usage, common switch investment should not be included in transport and termination costs.
1.4	What annual minutes per switch trunk card should be used?	Per Issue 1.3, the switching cost calculation should be modified to compute costs per minute based on switch trunk card annual costs per trunk and annual minutes per voice trunk. The recommended annual minutes per voice trunk are given below for Issue 2.6.
1.5	What are the forward-looking economic costs per minute for switching?	Forward-looking economic costs per minute for switching are expected to be [redacted] or less, assuming only trunk card equipment is usage-sensitive. (The cost per minute of $[redacted] is based on the highest switching costs of the RLECs ([redacted]) after excluding common switch costs and adjusting annual cost factor to [redacted] percent, as necessary. See Exhibit WCC-5.5.)

Cost Issue	Issue	Recommendation
2.1	What transport electronics base, line and tributary investments should be used in the RLEC cost studies?	The RLECs should provide sufficient documentation on transport electronics investments, including types of equipment, quantities of equipment based on capacities and demand, and unit costs. This information should be used to compute investments reflecting efficient configuration of transport electronics.
2.2	Should forward-looking economic costs per unit be based on total equivalent DS-1 circuits?	Yes. The use by the RLECs of "paths" to measure transport demand overstates the costs of voice trunks and transport costs per minute. Equivalent DS-1 circuits are a better measure of transport equipment capacity consumption and cost causation.
2.3	Should transit circuits be included in total demand for transport?	Yes. FCC Rule §51.511 requires that forward-looking economic costs per unit be based on total demand, and transit circuits are part of total demand for transport electronics base and line equipment. The RLECs already include transit circuits in the calculation of transport outside plant costs.
2.4	What equivalent DS-1 circuits should be used for the RLEC's own voice trunks and special circuits, and transit circuits?	The equivalent DS-1 circuits for the RLEC's own voice trunks and special circuits are [redacted]. The additional equivalent DS-1 circuits for transit are [redacted] Additional information is required to compute other RLEC equivalent DS-1 circuits for transit.
2.5	What transport electronics annual cost factors should be used?	McCook and Santel should use their current transport electronics ACFs ([redacted]). Alliance, Beresford, Kennebec and West River should recompute ACFs. The ACFs should be no greater than [redacted] percent. This allows approximately [redacted] percent for the capital cost factor, [redacted] percent for direct switching expenses, [redacted] percent for other operating expenses and [redacted] percent as the corporate operations expenses loading.
2.6	What annual minutes per voice trunk should be used?	Annual minutes per voice trunk should be established consistent with FCC Rule §51.513(c)(4). This rule specifies 108,000 annual minutes per voice circuit. After adjusting for a minute of traffic taking either one or two voice circuits for termination, the recommended minutes per voice trunk are [redacted]

Cost Issue	Issue	Recommendation
		[redacted]
2.7	What are the forward-looking economic costs per minute for transport electronics?	McCook and West River costs per minute are [redacted] and [redacted] respectively. The costs of the other RLECs after adjustments for the issues above are expected to be [redacted] per minute, or less.
3.1	What interoffice mileages should be used in the RLEC cost studies?	Existing mileages of interoffice cable routes used to transport Alltel traffic should be used, unless the RLECs can prove that longer mileages over different cable routes are more efficient.
3.2	What transport outside plant annual cost factors should be used?	Santel and West River should use their current transport outside plant ACFs [redacted]. Beresford should use a [redacted] percent factor. Alliance, Kennebec and McCook should recompute ACFs. The ACFs should be no greater than [redacted] percent. This allows approximately [redacted] percent for the capital cost factor, [redacted] percent for direct transport outside plant expenses, [redacted] percent for other operating expenses and [redacted] percent as the corporate operations expenses loading.
3.3	Should transport outside plant cost calculations be modified to be based on equivalent DS-1 circuits?	Yes, equivalent DS-1 circuits should be used as in the recommendation for Cost Issue 2.2. Equivalent DS-1 circuit quantities should be the same as those for the RLEC's own voice trunks and special circuits, and transit circuits as given in the recommendation for Cost Issue 2.4.
3.4	What annual minutes per voice trunk should be used?	The annual minutes per voice trunk recommended for Cost Issue 2.6 should be used.
3.5	What are the forward-looking economic costs per minute for transport outside plant?	McCook and West River costs per minute are [redacted] and [redacted] respectively. The costs of the other RLECs after adjustments for the issues above are expected to be [redacted] per minute, or less.
4	What are the forward-looking economic costs per minute for transport and termination?	Total transport and termination costs, based on costs per minute recommended for Cost Issues 1.5, 2.7 and 3.5, are expected to be [redacted] per minute or less.

BACKGROUND

FCC Requirements for Establishing Transport and Termination Rates

Q. What are the FCC requirements for cost-based transport and termination rates?

A. FCC Rule §51.705(a)(1) specifies that an "incumbent LEC's rates for transport and termination of telecommunications traffic shall be established" on the basis of the "forward-looking economic costs of such offerings, using a cost study pursuant to Sec. 51.505 and 51.511." FCC Rule §51.505(e), in turn, states:

> An incumbent LEC must prove to the state commission that the rates for each element it offers do not exceed the forward-looking economic cost per unit of providing the element, using a cost study that complies with the methodology set forth in this section and Sec. 51.511.

Q. Are there parts of these rules that merit emphasis?

A. Yes. First, the FCC does not permit an incumbent LEC's transport and termination rate to exceed its forward-looking economic costs. The FCC defines forward-looking economic costs in §51.505(a) as the sum of "the total element long-run incremental cost of the element" ("TELRIC") and "a reasonable allocation of forward-looking common costs."

Second, it is the incumbent LEC's obligation to prove that its rates do not exceed these costs. The incumbent LEC must demonstrate that the cost study used to determine costs complies with the methodology set forth in §51.505 and §51.511.

Q. Do FCC rules require local exchange carriers to file their cost studies in the record?

A. Yes, FCC Rule §51.505(e)(2) states: "The record of any state proceeding in which a state commission considers a cost study for purposes of establishing rates under this section shall include any such cost study."

Q. Have the RLECs filed their cost studies?

A. It is my understanding that the RLECs have not yet filed their cost studies with the Commission. Witnesses for the RLECs may file these studies with their direct testimony.

Q. Have the RLECs provided their cost studies to Alltel?

A. Copies of the RLEC cost models and some supporting cost study documentation have been provided to Alltel. Alltel issued a first set of interrogatories to the RLECs to obtain additional information necessary to review the cost studies, and partial responses have been provided. Certain key information was not produced, and Alltel has filed motions to compel the RLECs to produce this information. As I describe the RLEC cost studies, I will discuss the need for this information.

Q. What documentation must an incumbent LEC include in its cost study?

A. The FCC has held that an incumbent LEC cost study "must explain with specificity why and how specific functions are necessary to provide network elements and how the associated costs are developed."[3] An incumbent LEC "must prove to the state commission the nature and magnitude of any forward-looking costs that it seeks to recover in the prices of interconnection and unbundled network elements."[4]

Q. What are the Commission's obligations in establishing a rate for transport and termination?

A. As noted above, FCC Rule §51.505(e) requires that an incumbent LEC's reciprocal compensation rate may "not exceed" its forward-looking economic costs of transport and termination. In addition, FCC Rule §51.505(e)(2) specifies that the Commission shall create "a written factual record that is sufficient for purposes of review" – that is, to assure rates do not exceed costs.

Therefore, in addition to the fundamental obligation of assuring that rates do not exceed forward-looking economic costs, the Commission has an obligation to require adequate cost study documentation for the Commission and Alltel to verify that the cost studies and their results comply with §51.505 and §51.511. This documentation must show that certain requirements are met – namely, costs are company-specific and forward-looking, that they are

[3] *Local Competition Order*, 11 FCC Rcd at 15850 ¶ 691.

representative of current technology and efficient plant utilization, that only the direct costs of transport and termination are included, and that a reasonable allocation of common costs is included.

Description of Transport and Termination

Q. Please define transport and termination.

A. The FCC defines transport in §51.701(c) as "the transmission and any necessary tandem switching of telecommunications traffic subject to section 251(b)(5) of the Act from the interconnection point between the two carriers to the terminating carrier's end office that directly serves the called party, or equivalent facility provided by a carrier other than an incumbent LEC." Exhibit WCC-3 illustrates the RLEC network elements typically required for transport and termination.

Q. Please describe the flow of a mobile-to-land call in Exhibit WCC-3 and the network elements involved in transport.

A. With a few exceptions, the networks of the RLECs and Alltel do not directly connect with one another. Instead, the network of a transit carrier, such as Qwest, is used to indirectly connect the networks. Telecommunications traffic originated by an Alltel customer is routed through the transit carrier's network, and then to the RLEC network.

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[4] *Id.* at 15847 ¶ 680. *See also id.* at 15852 ¶ 695 ("[I]n the arbitration process, incumbent LECs shall have the burden to prove the specific nature and magnitude of these forward-looking common costs.").

In Exhibit WCC-3 a mobile-to-land call reaches the RLEC network by traveling over fiber optic cable from the transit carrier switch to a switch belonging to the RLEC. The RLEC switch to which mobile-to-land traffic first connects is a host switch. There is a "meet point" located between the transit carrier switch and the RLEC switch where the carriers' cables connect.[5] In Exhibit WCC-3, the RLEC owns the cable to the right of the meet point, and the transit carrier owns the cable to the left. The costs of transit carrier's cable would not be part of the RLEC's transport costs.

Transport includes the RLEC's cable from the meet point to the host switch. In addition, transport includes transmission equipment located at the end of the fiber cable, which is used to "multiplex" or combine electrical circuits and to convert electrical signals to optical signals for transmission over the fiber cable. Together the fiber cable and transmission equipment provide transport for voice traffic and special circuits between the transit carrier and RLEC.[6]

Exhibit WCC-3 illustrates an RLEC network with a host switch and a subtending remote switch. When a mobile-to-land call is destined for RLEC customer 'A', the call is switched from the transport system (from the transit

[5] In South Dakota, other RLECs also may provide for the transit of traffic to the terminating RLEC.

[6] A special circuit is a dedicated channel on the interoffice transport system of a particular bandwidth. Special circuits are used for private lines, special access circuits, circuits for frame relay service and others.

carrier) directly to the customer's access line or loop. The host switch is not part of the transport function, but rather termination. The customer access line or loop also is not part of transport. Transport for a mobile-to-land call to customer 'A' involves the fiber cable from the meet point to the host end office switch and the transmission equipment at the end of the fiber.

When a mobile-to-land call is destined for RLEC customer 'B', the call is switched by the host switch from the transport system (from the transit carrier) to an interoffice voice trunk connecting to the remote switch. The interoffice trunk is carried by a transport system, again consisting of fiber cable and transmission equipment. In this case, transport includes the additional fiber cable connecting host-remote switches and the transmission equipment at each end.

Q. How is termination defined?

A. The FCC defines termination in §51.701(d) as "the switching of telecommunications traffic at the terminating carrier's end office switch, or equivalent facility, and delivery of such traffic to the called party's premises." However, Congress specified that ILECs may recover in their transport and termination rates only "the additional costs of terminating such calls."[7] The FCC has interpreted this "additional cost" standard as limiting recovery to

[7] 47 U.S.C. § 252(d)(2)(A)(ii) (emphasis added).

usage-sensitive costs.[8] Specifically, the FCC has stated that "usage-based charges should be limited to situations where costs are usage sensitive."[9]

Thus, according to the Act and FCC rules the portions of switch costs that are not usage-sensitive are not recoverable in transport and termination rates. The RLEC must recover these non-usage sensitive switch costs from other sources (*e.g.*, switched access charges, Universal Service Fund Local Switching Support, local exchange rates and others). In addition, the costs of loop plant from the end office to a customer's premises are not usage-sensitive and therefore are not recoverable in reciprocal compensation.[10]

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[8] Usage-sensitive costs refer to the costs of components of plant (*e.g.*, switches, cables, *etc.*) whose capacity is exhausted by the volume of traffic handled by the plant component. Traffic volume is measured in terms of the number of telephone calls, the minutes of use, *etc.* If the capacity of a plant component is exhausted as the volume of traffic increases to its capacity limit, traffic volume drives the need for additional capacity and affects costs. On the other hand, if a plant component is not exhausted by traffic volumes, or is exhausted by another measure of use, such as the quantity of access lines, the plant component and its costs are not usage-sensitive. The "additional cost" standard requires that transport and termination rates recover only an RLEC's costs that are caused by handling mobile-to-land traffic (minutes of use); *i.e.*, usage-sensitive costs.

[9] *In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, First Report and Order, FCC Rcd. 15,499, para. 1063 (rel. Aug.8, 1996) ("First Report and Order").

[10] Loop plant capacity and costs are determined by the number of access lines or other local channels required for connections between customer premises and serving wire centers. Loop costs are not caused by the traffic volumes – the number of calls or minutes of use – over the loop. Thus, the FCC has ruled: "The costs of local loops and line ports associated with local switches do not vary in proportion to the number of calls terminated over these facilities. We conclude that such non-traffic sensitive costs should not be considered 'additional costs' when a LEC terminates a call that originated on the network of a competing carrier. For the purposes of setting rates under section 252(d)(2), only that portion of the forward-looking, economic cost of end-office switching that is recovered on a usage-sensitive basis constitutes an 'additional cost' to be recovered through termination charges." First Report and Order, para. 1057.

Q. Please describe termination using the diagram in Exhibit WCC-3.

A. When a mobile-to-land call is destined for RLEC customer 'A', termination simply involves the usage-sensitive portion of the host switch. When a mobile-to-land call is destined for RLEC customer 'B', the call is switched at the host switch and the remote switch. In this case, termination involves the usage-sensitive portion of the two switches.

Q. Is Exhibit WCC-3 representative of the RLECs' networks in this arbitration?

A. The basic network elements (switches, transport fiber cable and transport transmission equipment) shown in Exhibit WCC-3 and their functions should be representative of the RLEC networks. However, the RLEC cost study documentation indicates that packet switching technology is reflected in their cost studies and that they utilize integrated digital loop carrier (DLC) systems to provide customer loops. Alltel asked in interrogatories the RLECs to provide details on the development of switching investments in their cost studies (equipment items, quantities, *etc.*), and they have not yet adequately responded. Depending on the specific types of switch equipment, and importantly whether DLC system equipment is appropriately included or excluded from switching will determine whether the RLEC networks are significantly different from Exhibit WCC-3. These details also will reveal whether the RLEC cost studies are consistent with the FCC's definitions of transport and termination.

REVIEW OF THE RLEC COST STUDIES

Q. Do you have any preliminary comments regarding your review?

A. The purpose of my review was to determine whether the forward-looking economic costs determined by the RLEC cost studies comply with FCC Rules §51.505 and §51.511. The review and my findings at this point are based on the FLEC models, cost study documentation and the limited responses of the RLECs to Alltel's cost-related interrogatories. In some cases, I have identified significant issues in the cost studies in which they clearly do not comply with FCC rules. In other cases, I raise questions about cost study methods and cost data that appear to be inappropriate or invalid, and I describe additional information needed to resolve issues with these methods or cost data.

As I describe the cost studies, I will identify specific issues, which I recommend be decided by the Commission. Once all issues have been decided, it will be necessary for the RLECs to re-run their cost studies. It is clear at this point, though, that the cost studies do not fully comply with FCC Rules §51.505 and §51.511. The forward-looking economic costs estimated by the studies are substantially overstated, and rates cannot be set at the level of these costs.

Q. What are the forward-looking economic costs estimated by the RLECs?

A. Exhibit WCC-4 contains the results of the RLEC cost studies. Estimates of forward-looking economic costs for transport and termination range from [redacted] per minute, or [redacted] cents per minute. The costs consist of three components - switching, transport electronics and transport outside plant.[11] Let's begin with switching costs.

SWITCHING COSTS

Q. What is "switching" as represented in the RLEC cost studies?

A. Traditionally, RLEC switching included end office and remote switching systems used to terminate subscriber access lines and to provide connections to other lines or interoffice trunks for local or interexchange calling. In the past, these switches were based on *circuit switching technology*. A typical switch used by RLECs was the Nortel DMS 10 digital electronic switch.

A forward-looking economic cost study is intended to be "based on the use of the most efficient telecommunications technology currently available and the lowest cost network configuration;" therefore, it would not be inappropriate for the RLECs to reflect a current switching technology different from traditional circuit switching, as long as the technology is currently available and representative of the lowest cost network configuration. The RLECs have assumed "softswitching technologies" or *packet switching technology* in their studies, based on responses to Alltel interrogatories; but little, if any,

[11] Transport electronics is the terminology used by the RLECs for the transport transmission equipment in Exhibit WCC-3. Transport outside plant is the transport fiber cable.

information has been provided about the types of switching equipment actually reflected in the studies. Nor is there any evidence that the RLEC proposed packet switching network represents a more efficient configuration.

The RLECs provided a generic switching network diagram, a copy of which is included as Exhibit WCC-5.1. This diagram suggests that the cost studies assume host switches connected to end-users via integrated digital loop carrier systems, and connected to remote switching systems of some sort, although it is not clear whether these "remotes" are indeed switches or remote terminals for DLC systems. The distinction between switching and DLC systems is very important, because DLC systems are used to provide loops, the costs of which are not recoverable in transport and termination rates. Suffice it to say that the lack of documentation regarding switching plant creates uncertainty about switching costs.

Q. What values were computed by the RLECs for switching costs?

A. RLEC switching costs are shown in Exhibit WCC-4. They range from [redacted] per minute, or approximately [redacted] cents per minute. Kennebec had the highest cost and Alliance the lowest cost. This is a very wide range in costs for the usage-sensitive portion of switch plant.

Q. How were these costs calculated?

A. The FLEC model used by the RLECs contains a series of spreadsheets used to calculate switching costs. It's possible to trace the calculations from model input to results; however, the model layout is not very conducive to understanding the nature of switching costs and the key cost data affecting the results. For this reason, I prepared Exhibit WCC-5.2. It shows the following equation for computing the switching cost per minute based on key cost data in the RLEC cost studies.

Cost/minute = (Switch investment/line X annual cost factor (ACF)
X % switch processor) / switched minutes/line

+ (Switch investment/line X ACF X % switch trunk)
/ (switched minutes/line X % interoffice traffic)

Q. Please use Alliance as an example to show how switching costs are calculated.

A. The RLEC cost studies categorize switch investment in four groups - *common*, *line card*, *line interface* and *trunk card*. Input values to the FLEC model are total investment amounts for each of the four categories. For Alliance, the input values are [redacted] common, [redacted] line card, [redacted] line interface and $[redacted] trunk card. This is a total of [redacted]. Alliance has [redacted] lines in the six exchanges that it serves, so its switch investment per line is [redacted]. This is the value that appears in cell B9 of Exhibit WCC-5.2.

Q. Does Alliance or any of the other RLECs provide details on the basis for the investment amounts for the four categories?

A. The cost study documentation provides the investment amounts by exchange, but otherwise there are no substantive details on the make-up of the investments. Alltel requested copies of any documentation that would show the types of equipment, equipment quantities and unit investments, capacities, *etc.* underlying the investments, but the RLECs have not yet provided this information. This information is essential. The purchase of a switch is analogous to purchasing a personal computer. The RLECs' cost study documentation refers to aggregate switch investments, similar to a single price for a personal computer without any details on the processor speed, random access memory, hard drive size, whether it includes a monitor, keyboard or mouse, *etc.*

Q. What is the annual cost factor shown in Exhibit WCC-5.2?

A. The annual cost factor (ACF) is a percentage that is multiplied times the switch investment per line to compute annual switching capital costs and operating expenses per line in service. Capital costs include annual depreciation expenses for the recovery of plant investment, the cost of money invested in the plant, and income taxes, if applicable to the RLEC.[12] Operating expenses include switching direct expenses for the maintenance and

[12] Only one of the RLECs, Kennebec, is subject to income taxes.

repair of switches and other operating expenses.[13] The annual cost factor also includes corporate operations expenses common to all RLEC services. Corporate operations expenses are for functions such as executive, legal, finance, human resources and other general and administrative functions.

Alliance's switching ACF is [redacted] percent (cell C9 in Exhibit WCC-5.2). This percentage is multiplied times [redacted] to compute total switching annual costs per line of [redacted]

Q. What is the significance of the values for % switch processor and % switch trunk?

A. The RLECs include investment and annual costs for the common and trunk card categories in transport and termination costs. Investment and annual costs for line interface and line cards are not included, presumably because these categories of equipment are considered to be non-usage sensitive and therefore not recoverable in the rate. As I explained earlier, termination costs are limited to usage-sensitive switching costs.

The [redacted] percent for switch processor (cell D9) is the ratio of common investment to total switch investment [redacted], and the [redacted] percent for trunk cards (cell E9) is the ratio of trunk card investment to total

[13] Other operating expenses include expenses for land, buildings and other assets supporting switching, and expenses for a variety of RLEC functions indirectly attributable to switching, such as plant operations, testing, wholesale marketing and customer services, *etc.*

switch investment ([redacted]). This implies that [redacted] percent of Alliance's switching plant investment is variable with usage; *i.e.*, investment would increase in connection with an increase in the total number of call attempts or minutes of use. In the equation above, these percentages are multiplied times the [redacted] total switching annual costs to determine the portions of costs associated with the switch processor and trunk cards.

Q. Please describe the last step in the switching cost calculation.

A. In the last step, total switched minutes per line are divided into the switch processor annual cost per line, and interoffice minutes per line are divided into trunk card annual costs per line. The two costs per minute are added and result in the switching cost per minute of [redacted] shown in cell H9. Trunk cards are used for interoffice traffic as opposed to traffic routed from one line on a switch to another (intraoffice traffic), so the interoffice fraction of total switched minutes is used to compute the trunk card cost per minute.[14]

Q. Can values for these key cost data be used to explain the wide variation in RLEC switching costs and to evaluate the reasonableness of switching costs?

A. Yes. Kennebec has the highest switching cost per minute (cell H11 in Exhibit WCC-5.2) because of very high switch investment per line ([redacted] in cell B11) and ACF ([redacted] in cell C11). Alliance's switching costs are the lowest

[14] [redacted]

because of several factors – lower switch investment per line and somewhat higher total and interoffice minutes per line.

Even without having sufficient documentation on the types of switching equipment represented in the RLEC cost studies and details about the calculation of total switch investments, it is apparent that switch investments per line are high. Annual cost factors for Alliance, Beresford and Kennebec are high. And, there is a fundamental question as to whether portions or all switch processor costs are usage-sensitive, depending on the switch technology.

Cost Issue 1.1 – What switch investments (by switch category and exchange) should be used in the RLEC cost studies?

Q. What factors contribute to the variance in switch investments per line across the RLECs?

A. It's possible to answer this question at a high level, given the limited information provided by the RLECs about switching equipment and investment. Exhibit WCC-5.3 shows total and per-line switch investments for each RLEC exchange. Exchanges are shown separately for host switches and what the RLECs refer to as "non-host switches." Their reason for referring to the latter as "non-host switches" rather than remotes is not clear. Within the two groups, the exchanges are ranked in descending order by lines in service (column C).

Alltel has not been provided details on the equipment items, capacities, quantities and unit equipment costs (*e.g.*, material prices) for the amounts shown in columns D, F, G and H. Consequently, it is not possible for Alltel or the Commission to verify that (1) investment amounts represent only switching equipment (rather than, for example, digital loop carrier system equipment), (2) quantities of equipment are efficient given their capacity versus expected demand, and (3) equipment costs are representative of those that would be incurred by the RLEC.

For host switches, the common investment per exchange (column D) ranges from [redacted] The investments decline in steps. Three of the exchanges serve as intermediate tandem switches (Brandon, Woonsocket and Bison). This is important for two reasons. First, the investments for these switches may be higher than other hosts of comparable size to provide tandem switch functions and additional trunks; and second, in the cases of Santel and West River, Alltel meet points with Qwest, which I understand is the transit provider for mobile-to-land traffic, are at switches other than Woonsocket and Bison. This means that incremental tandem switch investments for these RLECs are likely not direct costs of termination. If so, the tandem switch portion of investments should be removed.

Three of the host switches have lines in service of [redacted] lines or less. They have high common investments, and their line interface and trunk card investments remain constant.[15] As a result, these host switches have high switch investments per line (cells J13-J15), contributing to higher overall RLEC switch investments per line (cells B11, B13 and B14 in Exhibit WCC-5.2). It is important that the investment amounts reflect efficient utilization levels, particularly for the line and trunk equipment, which are volume-sensitive.

Similarly, there are a large number of non-host switches with small line sizes ([redacted] lines or less). Common investment remains constant at [redacted] for switches with [redacted] to [redacted] lines, then drops to [redacted]. Line interface and trunk card investments remain almost constant across all exchanges, from Crooks with [redacted] lines to Winfred with less than [redacted] the lines of Crooks. As a result, non-host switch investments per line range from [redacted] at Crooks to [redacted] at Winfred.

Alltel asked Kennebec, the RLEC with the highest overall switch investment per line [redacted] in cell B11 of Exhibit WCC-5.2), whether there are other available technologies or network configurations that would lower switch investment per line. Kennebec indicated that the technology and network configuration reflected in its cost study "is believed to be an economical

[15] Woonsocket has additional trunk card investment because it serves as an intermediate tandem.

solution that would meet Kennebec's technical requirements and is currently being deployed in similar circumstances." This is not sufficient evidence to meet the FCC requirement that Kennebec "explain with specificity why and how specific functions are necessary to provide network elements and how the associated costs are developed," or that Kennebec "must prove to the state commission the nature and magnitude of any forward-looking costs that it seeks to recover in the prices of interconnection and unbundled network elements." In other words, Kennebec should show that there are no technically feasible alternatives but to spend [redacted] for common equipment, line interfaces and line cards for a switch with [redacted] lines in service.[16]

Q. Should switch investments used in the RLEC cost studies be addressed by the Commission as an issue?

A. Yes. Switch investment amounts by switch category (common, line card, *etc.*) and exchange affect each RLEC's total switch investment per line. This, in turn, affects switching costs per minute in Exhibit WCC-5.2. The Commission should decide switch investments by switch category and exchange, if necessary. If the RLECs produce information describing the development of switch investments, determining appropriate investments for each exchange may be a matter of deciding proper values for the underlying equipment costs and utilization levels used to calculate investments. The

[16] [redacted] (Exhibit WCC-5.3, cells D15, G15 and H15)

RLECs, though, must first reveal the details of the switch investment calculations.

Q. Are there certain questions the Commission should consider in deciding switch investments in compliance with FCC rules?

A. Yes, the following questions are important:

- Are all components of switch investment indeed for switching equipment, as opposed to DLC systems, interoffice transport systems or other? As I have described, DLC investment is part of loop plant and not included in transport and termination. Investment in interoffice transport systems should be part of transport and not termination.
- Do switch investments include investment for tandem switching? If so, does mobile-to-land traffic require RLEC tandem switching? If mobile-to-land traffic does not require RLEC tandem switching, tandem switching costs are not direct costs of transport and termination, and should be removed.
- Are the quantities of equipment items included in switch investments sized as efficiently as possible based on expected demand and the capacities of equipment?
- Are equipment unit costs or material prices from valid sources and representative of the current costs to purchase and install switching equipment?

- Are there alternative technologies or network configurations that would be more efficient, particularly for small host and "non-host switches?"
- Finally, are the "non-host switches" actually switches according to the FCC definition of termination, as opposed to DLC terminals, remote loop concentrators, *etc.*?

These questions underlie decisions with respect to Cost Issue 1.1.

Q. Are there any other points before moving to the switching annual cost factors?

A. Yes, the determination of overall switch investments is important, but in a sense it is "a means to an end." The important factor affecting switching costs and the transport and termination rate is the portion of switch investment and costs that are caused by mobile-to-land traffic – the usage-sensitive costs of switching or the "additional costs" of termination. The RLECs include in termination the investment and costs in the common and trunk card categories. After discussing the switching annual cost factor, I will describe the usage-sensitive portion of switching plant.

Cost Issue 1.2: What switching annual cost factors should be used?

Q. Are the switching annual cost factors used in the RLEC cost studies reasonable?

A. The switching annual cost factors are shown in Exhibit WCC-5.2, column C. In the aggregate, the ACFs for McCook, Santel and West River are reasonable. The ACFs for the other three RLECs are high.

Q. Why do you consider the ACFs for Alliance, Beresford and Kennebec to be high?

A. Exhibit WCC-5.4 shows the components of the RLEC annual cost factors. These include the capital cost factor, direct expense factor, other operating expense factor and the loading for corporate operations expenses.[17] Alliance's annual cost factor ([redacted] percent) is high due to a high other operating expense factor and corporate operations expense loading. Beresford's ACF ([redacted] percent) is somewhat high because of its direct expense factor and a high corporate operations expense loading. Kennebec's ACF ([redacted] percent) is extraordinarily high due to its capital cost factor, direct expense factor and other operating expense factor. Although McCook's overall ACF is reasonable, its corporate operations expense loading is high.

Q. Why is Kennebec's capital cost factor high?

[17] The first three factors are expense-to-investment ratios using expenses contained in the "Results Logic" spreadsheet of the FLEC model. The capital cost factor is based on "Direct Invest" costs for switching. The direct expense factor is based on "Direct Expenses" and includes expenses charged to account 6212. The other operating expense factor is based on "COE Invest" costs, "COE Expense," "Common Invest" costs, "Common Expense," "Plant Expense," "Marketing Whlsale," and "Cust Svc Whlsale." This factor includes expenses charged to multiple accounts. The corporate operations expense loading is based on the ratio of "Corp Op Expenses" to "Total" less "Corp Op Expenses."

A. The capital cost factor for computing depreciation, the cost of money and income taxes is [redacted] percent for all RLECs, except Kennebec. Kennebec's capital cost factor is [redacted] percent. Based on their FLEC models, RLECs other than Kennebec do not pay income taxes, so their factors include only depreciation and the cost of money. There are several general issues with the capital cost factors, though, only Kennebec's factor is significantly affected. These issues include the following:

- The RLECs assume no debt and 100 percent equity in their forward-looking capital structures. In addition, they assume [redacted] percent as the cost of equity. Without the lower cost debt in their capital mix, this causes the costs of capital to be high. Kennebec's 2006 report to the Rural Utility Service (RUS) indicated that it had [redacted] in long-term debt and [redacted] in stockholders equity.[18] This equates to a [redacted] percent debt ratio. Almost the entire amount of long-term debt consisted of mortgage notes to the RUS at interest rates of [redacted] and [redacted] percent. Also, at the end of 2006, Kennebec was approved by the RUS for an additional [redacted] million in long-term debt.[19] The interest rate on this debt was not given.
- Kennebec pays income taxes, so its capital cost factor ([redacted] percent) includes income taxes. By assuming no debt in its capital structure, there are no interest deductions for tax purposes, and income taxes are inflated relative to those Kennebec would pay with a mix of debt and equity capital. In 2006, Kennebec actually had [redacted] in interest on debt,

[18] "South Dakota 536 Kennebec," for years ended December 31, 2006 and 2005, p.4

which represented an expense deduction equal to [redacted] percent of its operating income [redacted].[20]

- Kennebec also defers income taxes through accelerated tax depreciation. Deferred income taxes normally are used by telephone companies for capital investment, thus reducing their need for investor-supplied capital and lowering the cost of money. The method used by Kennebec to compute the cost of money does not take this effect into consideration.

Given that the RLECs other than Kennebec do not pay income taxes, their cost of capital factors would not be substantially affected by introducing some debt in their forward-looking capital structures.[21] Kennebec's capital cost factor should be recomputed assuming a mix of debt and equity, in particular to reduce the income tax component of the capital cost factor, and its cost of money should be computed reflecting the benefits of deferred income taxes. These adjustments are expected to reduce Kennebec's capital cost factor to approximately [redacted] percent or less.[22]

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[19] *id.*, p. 12.

[20] *id.*, p. 5.

[21] For example, if the RLEC cost studies assumed a forward-looking debt ratio of 40 percent, a seven percent cost of debt and 12 percent cost of equity, the weighted average cost of capital would be 10 percent (40% X 7% + (1 – 40%) X 12%). The resulting switching capital cost factor based on the FLEC model methodology for the RLECs, other than Kennebec, would be [redacted] percent versus [redacted] percent in the studies. Kennebec's capital cost factor, before reflecting deferred income taxes, would be [redacted] percent versus [redacted] percent in its study.

[22] The cost of money and income tax portions of Kennebec's capital cost factor of 17.2 percent (above) would be reduced by introducing forward-looking deferred income taxes. This change is expected to further reduce Kennebec's capital cost factor from [redacted] percent to [redacted] percent or less.

Q. Why do the direct expense factors of Beresford and Kennebec appear to be high?

A. The direct expense factors for Alliance, McCook, Santel and West River range from [redacted] to [redacted] percent of switch investment. Having reviewed numerous financial statements of small and large telephone companies, I have found six percent to be the upper limit for a reasonable direct expense factor for switching. The factors for these RLECs fall below this upper limit. Beresford and Kennebec factors do not.

Switching direct expense factors should be based on the portion of expenses charge to account 6212 for maintenance and repair of switches. This account also may include charges for non-recurring rearrangements of switch equipment, including work to perform connections of lines for retail, local exchange service. The account also may include charges for non-recurring software expenditures that are expensed.

In response to an Alltel data request, Beresford indicated that the switching expense on which it based its factor ([redacted]) included [redacted] for a new release of switch software. This is 31 percent of switching expenses. Beresford also stated that "none of the software is believed to be used for retail services."

The software expenditure is a non-recurring expense for a resource that will be utilized over more than one year. Typically in cost studies, software expenses are amortized over a period of years (often three years) to reflect this. If the [redacted] is amortized over three years, Beresford's expense factor would be based on $[redacted]. This is [redacted] percent of the original switching direct expense. Multiplying [redacted] percent times the original factor of [redacted] percent (cell C8, Exhibit WCC-5.4) results in a factor of [redacted] percent. [redacted] percent should be used as Beresford's direct expense factor for switching.

Kennebec's switching direct expense factor ([redacted] is too high to represent just recurring maintenance and repair of a modern switch. It is more than twice the level of factors for the other RLECs (range [redacted] percent). Alltel requested account-level expense details for years 2005 to 2007 to determine whether the 2006 expenses on which the Kennebec factor is based were unusual. This information has not yet been provided. Unless Kennebec can demonstrate that recurring switch maintenance and repair runs at [redacted] percent of investment, it should use no more than a six percent factor in its cost study.

Q. Why are the other operating expense factors for Alliance and Kennebec so much higher than the other RLECs?

A. Alliance and Kennebec have significantly higher "common" plant capital costs and operating expenses per dollar of switching investment than the other RLECs. These include costs for motor vehicles, other work equipment, common buildings, furniture, office equipment and general computers. These costs reflect the RLECs' *embedded* investments in these support assets, and their investments in existing support assets are proportionately high compared to those of Beresfored, McCook, Santel and West River. Kennebec also has much higher central office capital costs and operating expenses for land, building, power and common central office equipment. Again, its embedded investment in these assets is proportionately greater than the other RLECs.

Q. What do you recommend for the switching other operating expense factor?

A. FCC rules require that this and other factors be forward-looking. Even though the other operating expense factors of all the RLECs reflect embedded investments, four of them have factors in the range of [redacted] percent. A factor of six percent, therefore, seems reasonable, certainly on a forward-looking basis.

Q. What is a reasonable value for the corporate operations expense loading?

A. FCC Rule §51.51.505(a) permits forward-looking economic costs to include "a reasonable allocation of forward-looking common costs." In section 51.505(c) these costs are defined as "economic costs efficiently incurred in

providing a group of elements or services (which may include all elements or services provided by the incumbent LEC) that cannot be attributed directly to individual elements or services."

Some of the RLEC common costs are included in other operating expenses; *i.e.*, capital costs and operating expenses for "common" plant (motor vehicles, other work equipment, common buildings, *etc.* The remaining common costs are in corporate operations expenses.[23] I have shown these expenses as a loading factor in Exhibit WCC-5.4 that is multiplied times the sum of the capital cost, direct expense and other operating expense factors. These loadings range from [redacted] percent to [redacted] percent.

In the most recent arbitration to address this issue, in which I have been involved, the Arbitrator for the California Public Utilities Commission adopted a common cost loading of 10.4 percent. This is the default input value in the HAI 5.3 model, which was used by the RLECs in that case to produce their transport and termination cost studies.[24] The corporate operations expense loadings for Santel and West River are in line with 10.4 percent. Exhibit WCC-5.4 shows their loadings to be [redacted] and [redacted] percent

[23] Corporate operations expenses are those expenses charged to accounts 6710 – Executive & Planning and 6720 – General & Administrative.

[24] "Draft Arbitrator's Report (DAR)," California PUC, Docket A.06-02-028 et al., March 8, 2007, p. 10, "Respondents' position that the HAI default value of 10.4% should be used is adopted." The Respondents were Cingular Wireless (AT&T Mobility) and T-Mobile USA.

(cells E11 and E12). The loadings for the four other RLECs are well above 10.4 percent ([redacted] percent).

Q. What do you recommend for the corporate operations expense loading?

A. The loading should be limited to 12 percent. This is greater than the loadings for Santel and West River, which also had capital cost, direct expense and other operating expense factors at or below my other recommendations. Otherwise, the RLECs must prove that loadings greater than 12 percent are necessary for costs that are (1) indeed common to all network elements and services and (2) efficiently incurred.

Q. What is your recommendation with regard to switching annual cost factors used in the RLEC cost studies?

A. McCook, Santel and West River should use their current factors shown in Exhibit WCC-5.4. They range from [redacted] to [redacted] percent. The other three RLECs should use an ACF of 31 percent. This allows 15 percent for capital costs, six percent for direct expenses, six percent for other operating expenses and a corporate operations expense loading of twelve percent.[25]

Cost Issue 1.3: What percentage or portion of the switch investments is usage-sensitive and recoverable in transport and termination rates?

[25] 31 percent is approximately (15% capital costs + 6% direct expenses + 6% other operating expenses) X (1 + 12% corporate operations expense loading).

Q. What portion of switch investments do the RLECs include in transport and termination costs?

A. The RLECs include investments in the common and trunk card categories of switch plant. The percentages of switch investment represented by these categories are shown in Exhibit WCC-5.2, columns D and E. The combined percentages range from [redacted] percent for Alliance to [redacted] percent for Kennebec.

Q. Have the RLECs explained the rationale for including these common and trunk card investments in transport and termination?

A. No, presumably it is because they consider line interface and line card investments to be *non-usage sensitive*, and therefore not part of the "additional costs" of terminating mobile-to-land traffic, while they consider common and trunk card plant to be *usage-sensitive*.

Q. What does it mean to say that a category of switch plant is usage-sensitive?

A. It means that the amount of investment in the plant is affected by usage – that is, the volume of calls or minutes of use handled by the plant. Components of switch plant may have limited capacity depending on the manufacturer's design and provisioning of the components. Line cards are considered to have limits in terms of the number of subscriber lines that they can terminate. Trunk cards have capacity limits in terms of the number of voice trunks that

they can terminate.[26] As demand for lines and voice trunks increase, additional capacity and investment are required. Consequently, the investment in these switch components is volume-sensitive. Line card investment is sensitive to the volume of lines, irrespective of the usage on the lines. Trunk card investment is sensitive to the volume of voice trunks, which are affected by the amount of interoffice traffic (interoffice minutes of use).

Q. So, do you agree with the RLECs exclusion of line card (and line interface) investment and inclusion of trunk card investment in transport and termination costs?

A. As I stated previously, the RLECs have provided little information about the switch technology, switch equipment configurations and capacities reflected in their cost studies. Nevertheless, the exclusion of the two line investment categories and inclusion of trunk card investment is reasonable.

Q. Do you agree with including switch common investments in transport and termination costs?

A. This depends on whether switch common investments for the technology reflected in the RLEC cost studies are indeed driven by usage – total peak or busy hour call attempts or minutes of use given the relevant range of forward looking demand for each switch. If they are not, then there are "no additional costs" caused by handling mobile-to-land traffic, and the portion of switch

[26] Voice trunks are limited, in turn, by the number of peak or busy hour (BH) minutes of use that they can carry. Thus, trunk cards are usage-sensitive.

investments represented by common switch equipment, or the "switch processor," shown in column D of Exhibit WCC-5.2 should be removed from the determination of termination costs.

Q. Did Alltel request information to evaluate the capacities of common switch plant and whether the utilization levels of the RLECs might exhaust this plant?

A. Yes. Alltel requested in its interrogatories vendor or other documentation describing the engineering of "switch processor" hardware and software components (the common category). The request asked for information on whether components are volume-sensitive, whether usage is the capacity driver, what the maximum usage capacity is, and the utilization expected by the RLECs (to determine whether exhaust might occur).

Q. Did the RLECs provide sufficient information in response to Alltel's request?

A. No. Beresford is perhaps the simplest situation, since it has one switch with a total investment of [redacted] (WCC-5.3, cells D8, F8, G8 and H8). Of this investment, [redacted] is for common equipment or the "switch processor." Beresford stated the following in its response to Alltel's interrogatory:

> (a) The capacity of the switch processor components is volume-sensitive.
> (b) Multiple volume-sensitive variables may be limiting factors that can exhaust the capacity of the switch processor function.

These variables include concurrent calls and Busy Hour Call Attempts (BHCA).
(c) Softswitching technologies as assumed for this network utilize distributed processing that increases processing capabilities as demand increases. For the host site, [redacted] to [redacted] concurrent calls can be processed depending on traffic patterns. This capacity can be increased with additional investment.
(d) Each of the components are utilized in the FLEC model.[27]

Beresford has a total of [redacted] lines in service. Based on its statement in paragraph item (c) all or most of its subscribers would have to be placing or receiving at the same time to exhaust the switch processor. This seems highly unlikely. Beresford's response in item (d) was to the question, what is "the utilization of the component (switch processor components) for each RLEC inherent in its FLEC Model." The question was asking what portion of switch processor capacity is expected to be used by Beresford's [redacted] lines in service. Beresford's response did not address the question.

Q. Is the situation similar for other RLEC switches?

A. Yes. Exhibit WCC-5.3 (column D) shows that there are [redacted] other host switches (out of a total of [redacted] hosts) that have lines in service less than Beresford. The RLECs all stated that host switches could handle [redacted] to [redacted] concurrent calls. Recall that Kennebec has the highest switch investment per line. Its Kennebec host has [redacted] lines in service, with a switch processor capable of handling at least [redacted] concurrent calls.

[27] "Beresford Municipal Telephone Company's Responses to Alltel's Interrogatories and Requests for Production of Documents," Docket No. TC 07-113, February 29, 2008, pp. 4-5.

The situation is likely similar for the "non-host switches" shown in Exhibit WCC-5.3. The RLEC responses to Alltel's interrogatory indicated that remote sites can handle [redacted] to [redacted] concurrent calls depending on traffic patterns. [redacted] remote sites have a constant [redacted] common investment and lines in service ranging from only [redacted] lines.

Q. Based on this information, does it appear that usage exhausts the capacity of the RLEC switch processors, such that there are additional costs caused by usage?

A. No, not based on the limited information provided by the RLECs.

Q. Have other regulators excluded investments and costs from transport and termination rates similar to those in the RLEC common or switch processor category?

A. Yes, in recent arbitrations in California and Missouri in which I was the wireless carriers' cost expert the Arbitrators found that only trunk card investment and costs are usage-sensitive and should be recovered in transport and termination rates. In the current arbitration before the North Carolina Utilities Commission, the Commission in its pending Recommended Arbitration Order has maintained its previous position with respect to Bellsouth switching costs, that usage-sensitive switching investment includes equipment comparable to the RLECs common and trunk card categories. However, the NCUC required the RLECs to determine their actual usage-

sensitive percentages based on their continuing property records, and these percentages are significantly below those of the RLECs in this arbitration. The FCC Common Carrier Bureau and other State commissions have also found that little, or no, switching investment is usage-sensitive.[28]

Q. What is your recommendation for the percentage or portion of switch investments that are usage-sensitive and recoverable in transport and termination rates?

A. RLEC trunk card investment per line should be used as the usage-sensitive investments for the RLECs. This is after any adjustments required in trunk card investment per Cost Issue 1.1. Otherwise, the RLECs must produce evidence to prove that the capacities of the equipment components included in the switch common category are exhaustible by expected usage demand for each of the switches shown in Exhibit WCC-5.3.

Q. What are the RLEC switching costs with only trunk card investment and costs included?

[28] California: "Draft Arbitrator's Report," California PUC, Docket No. A.06-020028 *et al.*, March 8, 2007. Missouri: *BPS Telephone Company/Cingular Wireless/T-Mobile Arbitration Order*, Case No. TO-2006-1047, March 23, 2006. FCC Common Carrier Bureau: *Virginia Arbitration Cost Order*, 18 FCC Rcd at 17722, 17871 n.988 (2003), 17903-04 ¶463, 17877-78 ¶391, and 17904 ¶465. Minnesota Public Utililites Commission: *Investigation into Reciprocal Compensation Rates*, Docket No. P-421/CI-03-384, 2003 Minn. PUC LEXIS 99 (Sept. 24, 2003) *See also id.*, 2003 Minn. PUC LEXIS 144 (Dec. 24, 2003). Illinois: *Hamilton County Telephone Co-op/Verizon Wireless Arbitration Order*, Docket 05-644 *et. al*, at 38, 2006I11, PUC LEXIS 5 *94-95 (Jan. 25, 2006) North Carolina: "Order Adopting Permanent Unbundled Network Element Rates for Bellsouth Telecommunications, Inc.," Docket No. P-100, Sub 133d, December 30, 2003, pp. 91-97.

A. Exhibit WCC-5.5 shows these costs. The ACFs for Alliance, Beresford and Kennebec also have been set at 31 percent. Switching costs per minute range from [redacted] to [redacted] per minute. Assuming the RLECs offer no substantive proof that the switch technology and capacities reflected in their cost studies are exhausted by the RLECs' expected levels of usage, these costs are consistent with FCC's position that I quoted earlier that "usage-based charges should be limited to situations where costs are usage sensitive."

Cost Issue 1.4: What annual minutes per trunk card should be used?

Q. Is there an issue with the minutes of use in the RLEC switching cost calculations?

A. Exhibit WCC-5.2 shows that RLEC annual switched minutes per line range from approximately [redacted] minutes. This is quite a wide range for what are likely similarly situated companies. The RLEC cost studies do not provide information that would show the underlying reasons for such differences.

Nevertheless, if the Commission decides Cost Issue 1.3 as recommended by Alltel – that is, include only trunk card investment and costs in the studies – then the important measure is the number of annual minutes per switch trunk card, rather than per line. Later, in describing the RLECs' transport electronics cost calculations, I will show that the minutes per voice trunk reflected in the studies are low and do not represent efficient utilization.

Therefore, instead of using switch trunk investment per line and minutes per line as shown in Exhibit WCC-5.2, the calculations should simply be modified to use switch trunk investment per trunk and the minutes per trunk that I recommend for transport. These minutes are provided in the recommendation for Cost Issue 2.6.

Cost Issue 1.5: What are the forward-looking economic costs per minute for switching?

Q. If the Commission adopts your recommendations for Cost Issues 1.1-1.4, what do you expect switching costs per minute will be?

A. As shown in Exhibit WCC-5.5, the forward-looking economic costs for switching for the RLECs will be $[redacted] per minute or less, or no more than [redacted] cent per minute. I expect these costs to be somewhat lower when adjusted for efficient levels of annual minutes per voice trunk per Cost Issue 2.6. If the Commission decides not to adopt one or more of the recommendations, the RLEC switching costs still can be modified accordingly, either by re-running the FLEC model or simply substituting appropriate values for the key cost data shown in Exhibit WCC-5.5.

TRANSPORT ELECTRONICS COSTS

Q. What are transport electronics costs?

A. Transport electronics includes transmission equipment located in RLEC central offices used to add circuits to a SONET fiber ring or to drop circuits

from the ring.[29] The SONET fiber ring is used for interexchange transport of voice trunks and special circuits. Transport electronics also include transmission equipment used to pass circuits through the ring. The RLECs divide this equipment among three categories – *base, line* and *tributary*. The cost studies assume an OC-192 transport system in the future for inter-exchange transport

Base equipment includes the SONET equipment chassis, timing and synchronization cards, switch fabric cards, processor cards, power supplies, cooling fan assemblies and other equipment necessary to establish a network node on a SONET ring.[30] Line equipment includes OC-192 circuit interface cards and associated miscellaneous materials that provide an optical connection with interoffice fiber cables and provide for transmission through the ring. Tributary equipment includes circuit interface cards used to provide "ports" for adding and dropping interoffice circuits at network nodes. Transport electronics costs include the capital costs (depreciation, cost of money, and income taxes, if applicable to the RLEC) and operating expenses associated with this plant.

Q. What values were computed by the RLECs for transport electronics costs?

[29] SONET – Synchronous optical network.

[30] The RLECs described the transmission equipment included in each category in response to Alltel interrogatories.

A. RLEC transport electronics costs are shown in Exhibit WCC-4. They range from [redacted] per minute, or approximately [redacted] cents per minute. Kennebec had the highest cost and Alliance the lowest cost.

Q. How were these costs calculated?

A. Exhibit WCC-6.1 replicates the RLEC calculations of transport electronics in terms of key cost data based on the following equation:

Cost/minute = Transport electronics investment/path X annual cost factor (ACF) / minutes/voice trunk

In this equation, the RLEC's investment in transport electronics equipment per path is multiplied times an annual cost factor. This determines the annual costs per path. A "path" as used in the RLEC cost studies is one transport circuit, irrespective of the circuit bandwidth. The use of paths as the measure of transport demand is an important issue, and I later discuss this in more detail. The annual costs per path are divided by annual minutes per voice trunk to compute the per-minute cost.

As shown in the second equation in Exhibit WCC-6.1, the transport electronics investment per path includes unit investments in the base, line and tributary equipment. The third equation shows that the annual cost factor includes capital costs, direct expenses (for transmission equipment

maintenance and repair), other operating expenses and a loading for corporate operations expenses.[31]

The table in Exhibit WCC-6.1 contains values for the key cost data reflected in the RLEC cost studies. By comparing these data across the RLECs, reasons for differences in transport electronics costs can be identified. For example, Beresford has very high unit investments (cells B13-E13) compared to other RLECs, while Alliance's unit investments (cells B12-E12) are substantially lower than others. As a result, Beresford has the second highest transport electronics cost per minute, while Alliance has the lowest.

Q. Please describe the calculations of transport electronics costs for Kennebec and Alliance – the RLECs with the highest and lowest costs.

A. Kennebec and Alliance costs per minutes are calculated as follows:

[redacted]

Kennebec's transport electronics cost per minute is the highest among the RLECs due to its extraordinarily high annual cost factor ([redacted] in cell J14).

[31] Other operating expenses include the following expenses in the FLEC model's "Results Logic" spreadsheet: COE investment costs, COE expenses, Plant expenses, Marketing Wholesale expenses and Customer Services Wholesale expenses.

This is just one issue underlying the RLEC transport electronics costs. Unit investments for base, line and tributary equipment (columns B, C and D) are overstated for all RLECs and do not comply with FCC Rule §51.511. Components of the annual cost factors of some RLECs (columns F-I) are too high and inconsistent with FCC Rule §51.505. And, the minutes per voice trunk are too low for all RLECs. The minutes per trunk do not represent efficient utilization as required by FCC Rule §51.505. As result, the transport electronics costs per minute for all RLECs are much too high

Cost Issue 2.1: What transport electronics base, line and tributary investments should be used in the RLEC cost studies?

Q. How were the base, line and tributary investments per path determined?

A. The RLECs have not produced adequate documentation to explain the development of transport electronics investments. Alltel asked that each RLEC provide the complete cost models, cost schedules, work papers or other documentation underlying transport electronics investment by exchange and for the three equipment categories. The RLECs were asked to show the composition of investment in terms of equipment items, quantities and unit investments, and the basis for equipment quantities in terms of total demand and the engineering parameters used to determine quantities needed to serve total demand. This information has not yet been provided.

Investments per path were determined based on high-level information in RLEC cost study documentation, the FLEC models and responses to other Alltel interrogatories. Exhibit WCC-6.2 shows the calculation of the unit investments for each company. Rows 6-12 show the total investments in base, line and tributary equipment; rows 16-23 show the path quantities; and, rows 27-33 show the unit investments.

For example, Alliance has six local exchanges with a switch in each, plus its cost study assumes it will place transport electronics at a South Dakota Network (SDN) location in Sioux Falls. This totals seven "exchanges" where transport electronics equipment is placed by Alliance. The investment necessary for base equipment at a network node – the equipment chassis, timing and synchronization cards, switch fabric cards, *etc.* – is [redacted].[32] This results in [redacted] in base equipment investment ([redacted] in cell D7 of Exhibit WCC-6.2). The investment necessary for line equipment at a network node is [redacted].[33] The FLEC model includes [redacted] in line equipment investment ([redacted] in cell F7).

The derivation of the FLEC model's tributary investment is not at all clear. It varies by exchange possibly depending on the number of DS-1 and DS-3 ports

[32] The cost study documentation does not identify the equipment items, quantities and unit investments underlying the $[redacted] investment figure.

[33] Cost study documentation does not identify equipment items, quantities and unit investments. Importantly, the documentation does not identify the equipped capacity of the OC-192 transport system so that its utilization can be evaluated.

required at each location. Alliance's tributary investment is shown in Exhibit WCC-6.2 as [redacted] (cell G7). The calculation of tributary investment for the other RLECs also is unclear.

Alliance's investments in base, line and tributary equipment (cells D7, F7 and G7) are divided by [redacted] paths (cell G18) to calculate the three investments per path. The total paths consist of [redacted] voice trunks (cell B18) and [redacted] special circuits (cells C-18 through F18). Alltel requested a breakdown of the special circuits, and Alliance indicated these include [redacted]. This information will be important later in calculating unit investments on the basis of equivalent DS-1 circuits, instead of paths. The resulting base, line and tributary investments per path are [redacted] respectively (cells B28-D28). The sum of these is [redacted] in transport electronics investment per path.

Q. Were unit investments for the other five RLECs determined in the same way?

A. The simple division of base, line and tributary investments (columns D, F and G) by paths is the same, but the RLEC estimates of the investment amounts are different.

- *Beresford.* Beresford has one exchange and one switch. Its FLEC model includes unexplained base, line and tributary investments of [redacted], respectively. Since Beresford has only [redacted] paths

in service (cell G19), this results in extraordinarily high unit investments (cells B29-E29). It is very important to understand the basis for Beresford's investment amounts.

- *Kennebec.* Kennebec has two exchanges and a switch in each. The FLEC model includes base and line investment for each exchange at [redacted], respectively. Unlike Alliance and Beresford, there are no additional base or line investments for SDN nodes.
- *McCook.* McCook has six exchanges and a switch in each. The FLEC model includes base and line investment for each exchange at the same [redacted], respectively. The same investment amounts also are included for the "Salem Hut," which is not identified as a McCook switch, but based on its network diagram appears to be the physical location for meet points with SDN and Qwest.
- *Santel.* Santel has ten exchanges and a switch in each. The FLEC model includes base and line investments for the ten exchanges. However, it also adds an additional [redacted] in base investment and [redacted] in line investment for the Mt. Vernon/SDN network node. Alltel mobile-to-land traffic is passed from Qwest at a meet point other from Mt. Vernon/SDN; therefore, portions of the Mt. Vernon/SDN transport electronics investment likely should be removed from transport and termination costs.
- *West River.* West River has eight exchanges and a switch in each. The FLEC model includes base and line investments based on the same per-exchange investments as the other RLECs. In addition, it includes base

and line investments for three other network nodes (Maurine, Regen Hut and Reva) and for the Bison/SDN node. The Qwest meet point (for Alltel mobile-to-land traffic) is at Maurine, so portions of the investments at Regen Hut, Reva and the Bison/SDN node likely should be removed from transport and termination costs.

Q. Should the Commission decide amounts for transport electronics base, line and tributary investments for each RLEC?

A. Yes. Exhibits WCC-6.1 and 6.2 show that base, line and tributary investment estimates are very important in the determination of transport electronics costs and ultimately transport and termination rates. There is a wide variation in unit investments among the RLECs. The fact that the investments are not adequately documented is an issue. In addition, there likely are issues with the dollar amounts of transport electronics investment included in the RLEC cost studies, such as the inclusion of transport electronics investment that may not be utilized for transport and termination of mobile-to-land traffic and utilization levels underlying equipment quantities.

The Commission should require that adequate documentation be produced to evaluate transport electronics investments by exchange and by equipment category and then appropriate values be should be determined for the amounts in columns D, F and G of Exhibit WCC-6.2.

Cost Issue 2.2: Should forward-looking economic costs per unit be based on total equivalent DS-1 circuits?

Q. Please further describe the RLEC path quantities?

A. A "path" is one interoffice circuit, regardless of the bandwidth of the circuit. A path may be one voice trunk, which is a 64 Kbps channel in a DS-1 circuit; or, it may be a special circuit, which is a dedicated transport circuit between two wire centers. Special circuits have varying bandwidths including DS-0 level, DS-1, DS-3 and OC-3. A DS-1 equals 24 DS-0 circuits; a DS-3 equals 28 DS-1s; and, an OC-3 equals 84 DS-1s.

Q. Please give an example of how paths are determined.

A. As shown in Exhibit WCC-6.2, Alliance has [redacted] voice trunks (cell B18). This includes trunks for toll service, Extended Area Service (EAS), operator services, 911 and others. Alliance counts these as [redacted] paths on its transport system. Alliance also had [redacted] special circuits – [redacted] (cells C18-E18). Each of these is counted as one path. The result is a total of [redacted] paths (cellG18).

Q. Why is the measure of demand for interoffice transport important?

A. The measure of demand affects forward-looking economic costs per unit and ultimately the transport and termination rates charged by the RLECs. FCC Rule §51.511 specifies the method for computing forward-looking economic costs per unit.

> The forward-looking economic cost per unit of an element equals the forward-looking economic cost of the element, as defined in Sec. 51.505, divided by a reasonable projection of the sum of the total number of units of the element that the incumbent LEC is likely to provide to requesting telecommunications carriers and the total number of units of the element that the incumbent LEC is likely to use in offering its own services, during a reasonable measuring period.

The capacity and investment in transport electronics equipment are determined not just by the quantity of circuits, but also their bandwidth. Exhibit WCC-6.3 shows three types of circuit interface cards used by Alltel. The investment in this equipment would be included in tributary investment.

The first card (row 7) provides capacity to add or drop 28 DS-1 circuits to a fiber ring. The DS-1 circuits may be providing a single special circuit or up to 24 DS-0 special circuits or voice trunks. Each DS-1 consumes 1/28th of the card capacity, and each voice trunk consumes 1/672nd of capacity (1 / 28 DS-1s X 24 DS-0s/DS-1). As a result, unit investments are [redacted] for a DS-1 (cell H7) and [redacted] for a voice trunk (cell G7). Measuring circuit interface card demand in terms of paths regardless of bandwidth fails to recognize this important difference in unit investments.

In addition, circuit quantities and bandwidth determine the capacity consumption of base and line equipment and therefore their unit investments. For example, a 28 port DS-1 card consumes one slot on a transport system shelf. Each DS-1 circuit causes 1/28th of the per-slot investment in the shelf

and related equipment. A voice trunk causes 1/672nd of the per-slot investment. Measuring base and line equipment unit investments strictly in terms of the quantity of circuits or paths also fails to recognize the influence of bandwidth on these investments.

Q. What proportions of transport electronics investment were allocated to voice trunks versus special circuits based on paths?

A. Exhibit WCC-6.2 shows that [redacted] to [redacted] percent of transport electronics investment was allocated to voice trunks (cells H18-H23) using the path method, and only [redacted] to [redacted] percent of investment allocated to special circuits. This means that voice trunks, carrying Alltel's mobile-to-land traffic, have been allocated an inordinate amount of investment, causing the transport electronics cost per minute to be high.

Q. How should forward-looking economic costs per unit be calculated for transport electronics?

A. There are two approaches. The first is to determine unit investments for base, line and tributary equipment based on the proper measure of capacity consumption for each. The second is to use the method inherent in the RLEC FLEC model, but instead of paths, the measure should be equivalent DS-1 circuits in service.[34]

[34] The term "equivalent" is used to indicate that the quantity of DS-0, DS-3 or higher bandwidth circuits would be expressed in terms of the equivalent number of DS-1 circuits. A DS-0 circuit would be equivalent to 1/24th of a DS-1; a DS-3 would be equivalent to 28 DS-1s; and, an OC-3 would be equivalent to 84 DS-1s.

Q. Please briefly describe the first approach.

A. This approach recognizes that the transport electronics equipment categories – base, line and tributary – have somewhat different measures of capacity consumption and cost causation. In my experience, the base and line equipment are grouped together as "common equipment" for the transport system. This common equipment supports the tributary equipment installed at the network node and interfaces to the transport system. The equipment includes one or more shelves in which circuit interface cards are inserted in slots on the shelves. Shelf slots are limited and are used as the measure of capacity consumption for common equipment. Tributary equipment represents the circuit interface cards used to add or drop circuits of various bandwidths. Their capacity is determined by the number of ports or circuits of a particular bandwidth that can be terminated on a card.

Q. Will the transport electronics unit investments for voice trunks using this approach be higher or lower than the unit investments in the RLEC cost studies?

A. The revised unit investments for voice trunks will be significantly lower.

Q. Did Alltel request information that would permit unit investments for transport electronics to be calculated using this approach?

A. Yes. In addition to the request for cost models, work papers, *etc.* used to develop transport electronics investments, Alltel asked for information on the capacity of plug-ins (tributary circuit interface cards) and common equipment (base and line equipment) consumed by circuits of various bandwidths. Information also was requested on expected utilization of the OC-192 transport system, and current utilization levels in terms of voice trunks per DS-1 circuit and annual minutes per voice trunk. This information has not been provided. Had the information been provided, it would be possible to compute unit investments using the approach I described.

Q. Please describe the second approach for computing transport electronics unit investments.

A. In the second approach, the unit investments for base, line and tributary equipment shown in Exhibit WCC-6.1 would be computed using the quantity of DS-1s and equivalent DS-1s in service on the transport system, rather than paths. The resulting unit investment per DS-1 would be divided by the quantity of voice trunks per DS-1 to determine the unit investments now shown in columns B – D of Exhibit WCC-6.1.

Tributary equipment for the transport system is capable of adding or dropping DS-1, DS-3 and higher bandwidth circuits.[35] Thus, the minimum bandwidth for a physical termination is a DS-1 circuit. Voice trunks actually are

[35] The RLEC cost studies do not show any circuits with bandwidth greater than DS-3.

combined on a DS-1 circuit and would not have physical terminations on the transport system. Once the unit investment of a DS-1 circuit is determined, the unit investment of a voice trunk is calculated by dividing the DS-1 unit investment by the quantity of voice trunks per DS-1, reflecting efficient utilization.

Using equivalent DS-1 circuits as the measure of transport electronics demand provides a better indication of capacity consumption and cost causation than using paths.

Q. Please give an example of this approach.

A. Beresford indicated that it has [redacted] voice trunks (Exhibit WCC-6.2, cell B19). In its cost study documentation, Beresford showed that these voice trunks are carried on [redacted] DS-1 circuits.[36] This means there would be [redacted] DS-1 circuits on the transport system required for voice trunks. In addition, Beresford has [redacted] DS-0 special circuits. These presumably would be combined on a DS-1 circuit. Beresford has [redacted] DS-1 special circuits. [redacted]

Consequently, Beresford's total demand (excluding transit circuits) is approximately [redacted] This is the proper measure of total demand to use in

[36] [redacted] voice trunks are carried on [redacted] DS-1 toll circuits to SDN, [redacted] voice trunks on [redacted] DS-1 toll circuit to Qwest, [redacted] voice trunks on [redacted] DS-1 EAS circuit; and [redacted] voice trunks on [redacted] DS-1 for other trunks.

computing Beresford's transport electronics costs. Beresford's current transport system also is carrying an additional [redacted] transiting circuits.[37] These transit circuits also consume capacity on Beresford's base and line equipment and should be included in the calculation of unit investments.

Using the second approach, Beresford's transport electronics unit investment per DS-1 would be [redacted] from Exhibit WCC-6.2, cell H8 divided by [redacted] DS-1s). The unit investment per voice trunk would be [redacted] versus the cost study value of [redacted] based on the "path" method (cell E29).[38] Before other corrections to Beresford's cost study, this reduces transport electronics cost per minute from [redacted] to [redacted]

Beresford's [redacted] in transport electronics investment includes [redacted] in base equipment and [redacted] in line equipment (Exhibit WCC-6.2 cells D8 and F8). If this equipment is being utilized to transport Beresford's [redacted] DS-1s and [redacted] transiting circuits, its unit investment per voice trunk may be substantially lower than [redacted] resulting in a cost per minute lower than [redacted]

Q. What is the effect of using equivalent DS-1s to compute transport electronics costs for the other RLECs?

[37] Alltel asked in interrogatories for Beresford to specify the bandwidth of the [redacted] transiting circuits. Beresford has not provided this information.

A. Exhibit WCC-6.4 computes transport electronics costs per minute using DS-1 equivalents rather than paths. The range of costs is [redacted] per minute, or [redacted] cents per minute. This compares to a range of [redacted] cents per minute in the RLEC cost studies.

Cost Issue 2.3: Should transit circuits be included in total demand for transport?

Q. Please describe the issue of whether transit circuits should be included in total demand?

A. Beresford, Kennebec, McCook and West River indicated in their cost study documentation that their transport systems carry circuits for other carriers – transit circuits.[39] These transit circuits would be part of the total demand utilizing at least the base and line equipment of transport electronics. However, the RLEC cost studies do not include transit circuits in the path counts or allocate any transport electronics investment to transit circuits. This is inconsistent with §51.511. It's also inconsistent with cost method used by the RLECs to compute transport outside plant costs.

38 [redacted]

39 [redacted] If these RLECs have transit circuits, the quantities and bandwidths of transit circuits should be provided to Alltel and reflected in revised cost studies depending on the Commission's decision on Cost Issue 2.3.

Q. How is this inconsistent with the calculation of transport outside plant costs?

A. When the RLECs compute transport outside plant costs, or the costs of interoffice cables connecting switches, they allocate a portion of cable costs to their own demand for circuits and a portion to the transit circuits of other carriers. Even though they incorrectly base the proportions on paths, they correctly recognize that both their own circuits and transit circuits are users of cable plant.

The RLECs do not apply this same reasoning to the OC-192 line circuit cards and fiber patch cables at the ends of the interoffice cables, as they should. They also do not allocate a portion of the base equipment investment to transit circuits. With all transport electronics costs being borne by the RLEC's own voice trunks and special circuits, it causes higher transport electronics unit investments and costs per minute. Presumably Beresford with only [redacted] DS-1 circuits for voice trunks and [redacted] DS-1 special circuits (the equivalent of [redacted] DS-3) would not install an OC-192 transport system (capable of handling 192 DS-3s) unless it carried transit traffic. Beresford carries [redacted] transit circuits (of unspecified bandwidth).

Q. What is the effect of including transit circuits in total demand for transport electronics?

A. To introduce transit circuits into the cost calculations requires knowing the quantity of circuits and their bandwidth. Alltel requested in interrogatories the bandwidth breakdown of transit circuits, but four of the RLECs have not provided this information. Cost study documentation for McCook and West River provided transit circuit quantities and bandwidths. Costs can be computed for these two RLECs.

Exhibit WCC-6.5 shows the calculation of McCook and West River transport electronics costs per minute after including equivalent DS-1 transit circuits. McCook's original cost study result was [redacted] per minute. When equivalent DS-1 circuits are used as the measure of demand and transit circuits are included, the cost is [redacted] per minute. West River's original cost study result was [redacted] per minute, compared to [redacted] after the two adjustments.

Cost Issue 2.4: What equivalent DS-1 circuits should be used for the RLEC's own voice trunks and special circuits, and transit circuits?

Q. What values do you recommend for equivalent DS-1 circuits to be used in the RLEC cost studies?

A. The equivalent DS-1 circuits for the RLEC's own voice trunks and special circuits are shown in column I of Exhibit WCC-6.4. The equivalent DS-1s for both the RLEC's own voice trunks and special circuits, and the transit circuits, are shown for McCook and West River in column O of Exhibit WCC-6.5.

The equivalent DS-1s for transit circuits for the other RLECs can be computed when they provide the breakdown of their transit circuits by bandwidth.

Q. Are there other requirements in deciding appropriate values for RLEC and transit equivalent DS-1 circuits?

A. Yes. FCC Rule §51.511 requires that forward-looking economic costs per unit be determined using "a reasonable projection ... during a reasonable measuring period," and FCC Rule §51.505(b)(1) requires an efficient configuration of the transport system.

The RLECs calculated transport costs assuming an OC-192 transport system, which is a system with substantial capacity. Nominally, it has the capacity for 5,376 DS-1 circuits (192 DS-3 X 28 DS-1s/DS-3). Based on their cost study documentation, it appears the RLECs measured voice trunk, special circuit and transit circuit demand in the recent past, rather than basing the demand on "a reasonable projection." To the extent interoffice demand is growing, as would be expected, total demand should be measured during a future, "reasonable measuring period" when utilization of the OC-192 system is fairly efficient.

For example, referring to Exhibit WCC-6.5, McCook's total demand is [redacted] DS-1 equivalents (cell O10) or [redacted] percent of the nominal capacity of the OC-192 system. West River's [redacted] DS-1 equivalents (cell O12) would be [redacted]

percent of nominal capacity. Therefore, in deciding Cost Issue 2.4 the Commission should require (1) that demand be based on a projection over a reasonable period and (2) if total demand during this period does not warrant an OC-192 system, consideration should be given to basing transport costs on a smaller system, such as an OC-48 or OC-12 transport system. The RLECs have the obligation to demonstrate that an OC-192 represents an efficient network configuration and to establish transport and termination rates accordingly. To the extent they demonstrate such demand, transport utilization needs to be allocated among the different services responsible for the demand.

Cost Issue 2.5: What transport electronics annual cost factors should be used?

Q. What are the RLEC annual cost factors for transport electronics?

A. Exhibit WCC-6.1 (columns F-I) shows the components of the RLEC annual cost factors and the total ACF (column J). These factors are multiplied times unit investments to compute annual costs, including capital costs, operating expenses and an allocation of corporate operations expenses (common costs). The ACFs range from [redacted] percent.

Q. What transport electronics annual cost factors are reasonable?

A. Earlier, I described issues affecting the RLECs switching annual cost factors. These issues also affect the transport electronics annual cost factors. Kennebec's capital cost factor should be reduced from [redacted] percent (cell F14)

to [redacted] percent to reflect a mix of debt and equity capital and the effect of deferred income taxes from accelerated tax depreciation. Direct expense factors should be limited to six percent. [redacted] RLECs have factors below this level. Other operating expense factors should be no more than six percent, and the corporate operations expense loading should be twelve percent. These factors result in a maximum ACF of 32.5 percent.[40] [redacted]

[redacted]

Cost Issue 2.6: What annual minutes per voice trunk should be used?

Q. What are the RLEC annual minutes per voice trunk?

A. Exhibit WCC-6.1 (column K) shows RLEC annual minutes per voice trunk ranging from [redacted] minutes. Annual minutes per voice trunk represents average utilization level of a trunk. The utilization levels vary widely among the RLECs. They also are low, resulting in high transport electronics costs per minute.

Q. How were annual minutes per voice trunk calculated?

A. The RLEC FLEC models contain input values for annual minutes of Local, EAS and Toll traffic ("Demand Inputs" spreadsheet of FLEC model). EAS and Toll minutes are carried by voice trunks and are used in the numerator of the minutes per trunk measure. The models also contain input values for

[40] 32.5% = (17% capital costs + 6% direct expenses + 6% other operating expenses) X (1 + 12 percent corporate operations expense loading).

switch trunks. Annual minutes per voice trunk were computed based on the ratio of these input values.

Q. Why do you say trunk usage in the range of [redacted] annual minutes is low?

A. I base this on two benchmarks. First, in Rule §51.513, the FCC established proxies for forward-looking economic costs, including in section 51.513(c)(4) a method for computing proxy costs for shared transmission facilities between tandem switches and end offices. These are similar to the RLEC voice trunks. The FCC rule requires that the per-minute cost be computed using 9,000 minutes per month per voice-grade circuit. This equates to 108,000 annual minutes per voice trunk.

Second, there are common trunk engineering parameters that can be used for comparison. I obtained values for these parameters from the HAI 5.0a model, a publicly available cost model used to determine incumbent LEC local exchange costs.[41] They indicate approximately 120,500 annual minutes per voice trunk.

120,528 annual minutes =
(365.25 days/year X 24 hours/day X 60 minutes/hour)
X (27.5 BH CCS maximum trunk occupancy / 36 BH CCS)

[41] See "HAI Model Release 5.0a," Inputs Portfolio, HAI Consulting, Inc., January 27, 1998, sections 4.5.3 and 5.5.16.

X 30% 24-hour average utilization of an interoffice trunk[42]

These two sources suggest that voice trunk usage should be in the range of 108,000 to 120,500 annual minutes.

The ratios of RLEC minutes to voice trunks are not directly comparable to these benchmarks, so the benchmarks must be adjusted. The reason is that a minute of EAS and Toll interoffice traffic may pass over one voice trunk from the tandem switch to a terminating host switch, or it may also pass over a second voice trunk from the host switch to a terminating remote switch. In the second case, a minute of traffic is divided by two trunks.

Exhibit WCC-6.6 adjusts the benchmarks for this. The average number of voice trunks utilized in transporting a mobile-to-land call is calculated based on the percentages of RLEC end-user lines served by host and remote switches. A call to a host switch is assumed to require one voice trunk, and a call to a remote requires two voice trunks. Beresford has a single switch, so a mobile-to-land call would require one trunk. Mobile-to-land calls for the other RLECs require [redacted] trunks of transport. The lower annual minutes per trunk required by FCC Rule §51.513(c)(4) is divided by the trunks per call to compute adjusted annual minutes per trunk that can be compared to the RLEC cost study values. Column I shows that trunk usage

[42] BH CCS – Busy hour 100 call seconds. An hour has 3,600 seconds, which equals 36 CCS.

levels range from only [redacted] percent of the FCC requirement. These low utilization levels inherent in the RLEC networks cause transport costs per minute to be high.

Q. What is the effect on transport electronics costs from using annual minutes per voice trunk at the efficiency level required by the FCC?

A. Exhibit WCC-6.7 shows transport electronics costs for McCook and West River with the previous corrections to the studies, plus using annual minutes per voice trunk consistent with the FCC requirement of 108,000 annual minutes per trunk. McCook and West River costs per minute are [redacted] and [redacted] per minute. No adjustment was made to their annual cost factors ([redacted] respectively). I recommend that the values computed in Exhibit WCC-6.6 (column G) be used to compute RLEC transport costs.

Cost Issue 2.7: What are the forward-looking economic costs per minute for transport electronics?

Q. If the Commission adopts Alltel's recommendations for the transport electronics cost issues, what do you expect the RLEC costs per minute to be?

A. Transport electronics costs per minute for McCook and West River after adjustments are [redacted] per minute, or less than [redacted] cent per minute. I would expect the costs of the other RLECs to be in the range of [redacted] cent or less.

TRANSPORT OUTSIDE PLANT COSTS

Q. What are transport outside plant costs?

A. Transport outside plant is the interoffice fiber cable connecting RLEC switches and connecting their host switches to meet points with other carriers. The cost studies assume all 48-fiber interoffice cable. The costs of transport outside plant include the capital costs on cable investment, operating expenses and an allocation of corporate operations expenses. Exhibit WCC-4 shows these costs range from [redacted] cents per minute, with Beresford having the lowest cost and McCook the highest cost.

Q. Have you developed an equation that replicates the RLEC cost calculations and identifies key cost data underlying transport outside plant costs?

A. Exhibit WCC-7.1 provides an equation for computing these costs and the table contains key cost data for the RLECs.

Q. Please describe the calculation of transport outside plant costs for Beresford?

A. Beresford's [redacted] per minute is computed as follows:

[redacted]

[redacted]

Beresford's single switch is [redacted] miles from the meet point with SDN, and even though its cable investment per foot is high [redacted] compared to the other RLECs (because the cable is in-town rather than in a rural area), its total interoffice cable investment [redacted] is modest compared to the other RLECs. The cable investment is multiplied times a [redacted] percent annual cost factor to compute annual capital costs and operating expenses for the cable.

The benefits of sharing a network element become apparent in the next step. Currently, fibers in Beresford's interoffice cables are shared by the transport system carrying voice traffic and special circuits, and fibers used by CATV and other special uses. Based on fiber-miles used by each, Beresford allocates [redacted] percent of interoffice cable costs to the transport system and the remaining [redacted] percent to the other uses. In addition, as described earlier, the transport system carries [redacted] "paths" for Beresford's own voice trunks and special circuits and [redacted] paths for transit circuits. The proportions are [redacted] percent for Beresford's own paths and [redacted] percent for transit paths. Beresford then allocates to its operations [redacted] percent of the [redacted] percent of interoffice cable costs assigned to the transport system. Overall, [redacted] percent of total interoffice cable costs are allocated to Beresford paths. The sharing of fibers in the interoffice cable and sharing of the transport system by Beresford voice trunks and special circuits, and transit circuits, results in low unit costs,

consistent with FCC Rule §51.511. Cost Issue 2.3 calls for the same method to be used in computing transport electronics base and line costs.[43] The annual costs attributable to Beresford's voice trunks and special circuits is divided by [redacted] paths, and then divided by [redacted] minutes per voice trunk to produce [redacted] per minute in transport outside plant costs.

Q. Why are McCook's transport outside plant costs much higher than those of Beresford?

A. McCook has much more interoffice cable mileage connecting its six switches than Beresford ([redacted] miles in cell B12). Since the cable is largely in rural areas, the investment per foot is [redacted] (cell D12). Still the long interoffice cable results in approximately [redacted] in cable investment compared to Beresford's [redacted] cable investment. McCook's annual cost factor also is higher. Only [redacted] percent (1 – [redacted] percent in cell F12) of its cable costs are attributed to either other users of cable fibers or transit circuits. Finally, McCook's trunk utilization (minutes per voice trunk) is lower than Beresford. These factors combine to produce a high cost of [redacted] per minute.

Q. Are there issues underlying the RLEC calculations of transport outside plant costs?

[43] Beresford's calculations must be corrected to use equivalent DS-1 circuits rather than paths. The resulting percentage of interoffice cable costs allocated to Beresford's voice trunks and special circuits will be lower than 15.6 percent.

A. Yes, the use of paths as the measure of demand is again an issue. The annual minutes per voice trunk are low, as they were in the transport electronics cost calculations. In addition, there are issues related to cable mileages and annual cost factors.

Cost Issue 3.1: What interoffice mileages should be used in the RLEC cost studies?

Q. What concerns do you have with regard to the interoffice mileages used in the RLEC cost studies?

A. There are two concerns. First, the RLECs stated in their cost study documentation that "projected cable placements are based on the most probable and direct routes." The cable mileages used in the cost study for five companies are significantly longer than current interoffice mileages.[44]

- Alliance has [redacted] miles of cable in its cost study (cell B9, Exhibit WCC-7.1), and its transport system currently utilizes [redacted] miles of interoffice cable.
- Kennebec's cost study assumes [redacted] miles of cable. It presently has cable routes utilized by its transport system with [redacted] miles of cable.
- McCook's study assumes [redacted] miles, while its existing cable length is [redacted] miles.
- Santel has [redacted] miles of cable in its study versus [redacted] actual miles of cable for transport.

[44] Actual interoffice cable mileages used by the transport system were obtained from the "Fiber Table" contained in each RLEC's cost study documentation. For example, McCook's Fiber Table shows [redacted] cable links, of which the transport system uses fibers on [redacted] links. The cable mileage for these [redacted] miles.

- West River's study assumes [redacted] miles of cable – its actual cable mileage is [redacted] miles.

Q. Is it not possible for a forward-looking cost study to have more cable mileage than its current network?

A. If the number and location of switches and other network nodes are the same in the cost study as the current network, the interoffice cable mileages would not be expected to be greater than current distances. However, if the cable layout on a forward looking basis is different resulting in greater cable distances, this layout would have to be more efficient than the current layout per FCC Rule §51.505(b)(1). Since the cable investment would be greater, the efficiency improvement would come from greater utilization of the cable fibers or circuits on the transport system. It is analogous to having an existing car pool with three riders who drive a total of 20 miles to work each morning. The decision is made to add another rider, which will add two miles to their commute. Before the miles per rider were 6.67 miles, and on a forward-looking basis the miles per rider are 5.5 miles (20 miles / three riders versus 22 miles / four riders).

Q. Did the RLECs reflect greater utilization of cable fibers or circuits?

A. No, actually the RLECs reflected lower utilization of cable fibers in their cost studies. In the current networks, cable fibers are utilized by DLC systems to provide loops. In the forward-looking cost studies, the RLECs assume that

DLC systems will no longer share cables with the transport system – so fiber utilization is decreased.

In addition, the cost studies base transport utilization, particularly transit circuit quantities, on the current network layout and recent demand. To the extent the forward-looking network design is intended to achieve greater utilization of transport systems, this does not appear to be reflected in the cost studies.

Q. What is the second concern with respect to interoffice mileages in the studies?

A. Three of the RLECs, Kennebec, Santel and West River, include mileages in their cost studies for cable links that do not appear to be used by Alltel's mobile-to-land traffic. For example, Kennebec includes [redacted] feet of cable in the Presho exchange with an investment of [redacted] that does not appear to be used in transporting Alltel traffic. Kennebec also includes cable mileages and investments for cable links to Vivian Telephone that would not be used in transporting Alltel traffic to the Kennebec or Presho switches. Consequently, these are not direct costs of transport and should be removed per §51.505.

Q. What interoffice mileages do you recommend be used in the RLEC cost studies?

A. The existing interoffice mileages of cable routes used by the transport system carrying Alltel traffic should be used, unless the RLEC can prove that longer cable mileages are more efficient. These mileages should exclude cable routes not used in transporting Alltel traffic to RLEC terminating switches.

Cost Issue 3.2: What transport outside plant annual cost factors should be used?

Q. What annual cost factors were used to compute transport outside plant costs?

A. The annual cost factors are shown in Exhibit WCC-7.1. They range from [redacted] percent to [redacted] percent (column E). The components of each RLEC annual cost factor are shown in Exhibit WCC-7.2.

Q. Do the annual cost factors appear to be reasonable?

A. The ACFs, in total, for Santel and West River are reasonable at [redacted] and [redacted] percent respectively. Beresford's capital cost, direct expense and other operating expense factors also are reasonable, but its [redacted] percent corporate operations expense loading is too high. If the loading is limited to 12 percent as previously recommended, its ACF would be [redacted] percent. The ACFs for the other three RLECs are high.

Q. What do you recommend as the annual cost factors for transport outside plant?

A. Kennebec's capital cost factor is high for the reasons previously described for its switching annual cost factor. When its factor is adjusted to reflect a mix of debt and equity capital and the effects of accelerated tax depreciation, Kennebec's capital cost factor will be approximately [redacted] percent.

The RLECs have assumed buried fiber cable as their forward looking cable type. Maintenance and repair expenses of buried fiber cable as a percentage of investment normally are low. McCook's direct expense factor of [redacted] percent is unusually high. A direct expense factor of five percent falls in the range of the other RLECs and should be used as a maximum value.

Six percent and 12 percent should be used for other operating expenses and the corporate operations expense loading, respectively, as for switching and transport electronics. The combination of these factors yields a maximum ACF of 27 percent.[45] Santel and West River should use their existing annual cost factors. Beresford should use a [redacted] percent factor, reflecting 12 percent as the corporate operations expense loading. The other three RLECs should use 27 percent as their annual cost factors.

Cost Issue 3.3: Should transport outside plant cost calculations be modified to be based on equivalent DS-1 circuits?

[45] 27% = (13% capital costs + 5% direct expense + 6% other operating expenses) X (1 + 12% corporate operations expense loading)

Q. Should equivalent DS-1 circuits be used instead of paths in calculating transport outside plant costs?

A. Yes. Base and line equipment of transport electronics are connected to fibers in interoffice cables. Together, these plant components create a network resource used to carry voice trunks and special circuits from one network node to another. This combined resource is consumed based on the number of circuits and bandwidth of these circuits, as I described previously. Equivalent DS-1 circuits provide a better measure of resource capacity consumption and, more importantly, produce a more accurate measure of the cost of voice trunks than the path method. The quantity of equivalent DS-1s used in the transport outside plant cost calculations should be the sum of DS-1 equivalents for the RLEC's own voice trunks and special circuits, and DS-1 equivalents for transit circuits.

Cost Issue 3.4: What annual minutes per voice trunk should be used?

Q. Should the annual minutes per voice trunk used in the transport electronics cost calculation be used in this case?

A. Yes, the annual minutes per voice trunk shown in column G of Exhibit WCC-6.6 should be used. These are based on the FCC's requirement of 9,000 monthly minutes per voice-grade circuit, or 108,000 minutes per year, adjusted to recognize that mobile-to-land calls involve a mix of one and two voice trunks for transport.

Cost Issue 3.5: What are the forward-looking economic costs per minute for transport outside plant?

Q. Are you able to estimate the effect of modifying the RLEC cost studies for the recommendations that you have made for transport outside plant costs?

A. Costs can be estimated for McCook and West River, because these companies provided a breakdown of their transit circuits by bandwidth. The cost calculations are shown in Exhibit WCC-7.3.

Each RLEC's current interoffice mileage for cable routes used by the transport system is entered in column B. I removed from West River's current mileage [redacted] miles of cable to McIntosh. McIntosh is not a West River switch. Alltel asked West River whether this cable route is used to transport its traffic, and it indicated the cable route is used to provide terminating traffic from its access tandem provider (*i.e.*, terminating switched access). Qwest which I understand is the transit carrier handling Alltel traffic has a different meet point with West River's network, so it appears that the cable to McIntosh is not part of transport for mobile-to-land traffic. If West River shows that the McIntosh cable is used for mobile-to-land traffic, its interoffice mileage can be increased accordingly.

McCook's annual cost factor was lowered from [redacted] percent to [redacted] percent. West River's annual cost factor remained as [redacted] percent.

The percentage of fiber-miles attributable to the transport system was increased to reflect only the split of cable investment and costs between fibers used for the transport system versus other uses (column F). Based on the changes above, annual costs for the portion of the interoffice cable attributable to the transport system were calculated in column G. These costs are then divided by the quantities of equivalent DS-1 circuits, voice trunks per DS-1 and annual minutes per voice trunk that were used in Exhibit WCC-6.7 for transport electronics cost calculations.

Q. What are the resulting costs per minute, and how do they compare with those in the RLEC cost studies?

A. McCook's transport outside plant cost was [redacted] per minute in its cost study. After the adjustments, its cost is [redacted] per minute. The drop in costs is due to shorter interoffice cable mileage, the lower annual cost factor, properly recognizing bandwidth as a driver of capacity consumption and costs, and reflecting the trunk utilization level required by the FCC. West River's cost per minute decreased from [redacted] per minute. West River has considerably more cable mileage than McCook, and it does not have as high transport system utilization as McCook.

Q. Would you expect the transport outside plants of the other RLECs to be similar to these?

A. Yes, Beresford's cost per minute already is low due to its short cable distance. The costs of the other RLECs should be near West River's cost of [redacted] per minute.

CONCLUSION

Cost Issue 4: What are the forward-looking economic costs per minute for transport and termination?

Q. How should forward-looking economic costs for the RLECs now be determined?

A. The Commission should address each of the 17 preceding cost issues and decide appropriate values for the key cost data to be used in the cost studies. Then, the studies should be re-run to determine costs that comply with the FCC rules. Once this is done, proper rates can be established.

Q. What do you expect transport and termination costs to be?

A. Transport and termination costs will vary by RLEC and, of course, will depend on how each issue is decided. If Alltel's position on the issues is adopted, transport and termination costs are expected to be approximately [redacted] per minute or less. This figure consists of [redacted] per minute for switching, transport electronics and transport outside plant, respectively.

Q. Does this conclude your direct testimony?

A. Yes.