ORIGINAL

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September 2, 1998

Mrs. Blanca S. Bayo
Director, Division of Records and Reporting
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, Florida 32399

RE: Docket No. 980696-TP

Dear Mrs. Bayo:

Enclosed for filing in the above referenced dockets on behalf of AT&T of the Southern States, Inc.'s (AT&T) and MCI Telecommunications Corporation is the Rebuttal Testimony of Catherine Petzinger, John Hirshleifer, Michael Majoros, Art Lerma, and Don Wood/Brian Pitkin. Please note that the Rebuttal Exhibit CEP-1 attached to Catherine Petzinger's Rebuttal Testimony may contain proprietary confidential business information and is being filed separately in accordance with Rule 25-24.006(5), Florida Administrative Code.

Copies of the foregoing are being served on all parties or record in accordance with the attached Certificate of Service. Thank you for your assistance in this matter.

Sincerely,

Tracy Hatch

Tracy Hatch

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CERTIFICATE OF SERVICE
DOCKET 980696-TP

I HEREBY CERTIFY that a true and correct copy of the foregoing was furnished via *hand delivery/**Federal Express and U.S. Mail to the following parties of record on this 2nd day of September, 1998:

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ORIGINAL

REBUTTAL TESTIMONY OF

CATHERINE E. PETZINGER

ON BEHALF OF AT&T COMMUNICATIONS

OF THE SOUTHERN STATES, INC.

BEFORE THE

FLORIDA PUBLIC SERVICE COMMISSION

Docket No. 980696-TP

September 2, 1998

REBUTTAL TESTIMONY OF

CATHERINE E. PETZINGER

ON BEHALF OF AT&T COMMUNICATIONS

OF THE SOUTHERN STATES, INC

DOCKET NO. 980696-TP

I. INTRODUCTION

Q. Please state your name, present position and business address

A. My name is Catherine E. Petzinger. I am a District Manager with AT&T Corp. in Regulatory and Legislative Affairs, 295 North Maple Avenue, Basking Ridge, New Jersey.

Q. Please describe your work experience and educational background

A. I have an MBA from Rutgers University, New Jersey, and have thirteen years of experience in the telecommunication industry building, and subsequently leading, a group that developed switching cost models, including the Switching Cost Information System ("SCIS"). My experience includes extensive consultation on the use of cost models in various cost studies in the United States and abroad.

Before joining AT&T in 1996, I worked at Bellcore for 13 years in the Cost Methods and Models organization. I was one of three individuals who designed the Bellcore SCIS feature model and implemented new incremental costing methodology into the program. I also was the lead subject matter expert on feature costing in general as well as a subject matter expert on 1ESS, 1A ESS and 5ESS switches. When I was promoted to lead the SCIS group of approximately 20 people, I had responsibility for the technical development, production, documentation, customer care and cost study consultation for the SCIS family of models.

Q. **Have you previously testified in regard to LEC cost models in general, and the Switching Cost Information (SCIS) in particular?**

A. Yes, I have presented expert testimony in numerous State proceedings dealing with switching unbundled element cost studies.

II. PURPOSE AND SUMMARY OF TESTIMONY

Q. **What is the purpose of your testimony?**

A The purpose of my testimony is to report my findings regarding the BCPM switch module methodology and the inputs used by BellSouth, GTE and Sprint.

Q. **Please summarize the main points of your testimony**

A. The BCPM switch model's methodology is deficient in the following major respects:

1. The BCPM model is dependent upon the embedded network configuration that does not represent an efficient forward-looking network. For example, BCPM uses the embedded host/remote and standalone configurations from the LERG, modified using undocumented assumptions.

2. The BCPM switch module is based on proprietary third-party models populated with undocumented input data. Using confidential models is neither necessary nor appropriate for determining USF and violates the FCC's USF Report and Order.

3. There are a number of model errors that cause overstated switch costs, such as the USF investment per line calculated by BCPM, when multiplied by the number of working lines exceeds the total amount of switch investment identified by BCPM as the total switch investment associated with USF.

4. Some of the inputs to the BCPM model by GTE, Sprint and BellSouth are incorrect and some are unjustifiably widely divergent. Most importantly, BellSouth, GTE and Sprint use incorrect switch price input data, which causes all the switch costs used to calculate the USF to be inflated.

III. OVERVIEW OF BCPM SWITCH MODULE

Q. Describe how BCPM determines the cost of switching for basic service.

A. BCPM uses three methods for determining the price of switches and disaggregating the total cost into subcategories, such as Processor, Port, Line Usage, and Trunk. These investments are then unitized (e.g., the cost per port or per minute) and the portion of the various subcategories used for basic service is then determined by multiplying the unit cost per switch subcategory multiplied by the basic service usage.

The investments for local telephone company installation and engineering and common equipment and power are then added through the use of factors entered into BCPM. The investments for land and building are then added, also through the use of factors entered into BCPM.

The total installed investment is converted to an annual cost, and switch related and other expenses are subsequently added to produce the switch cost.

Q. What are the three methods for populating BCPM with switch prices?

A. The three methods are:

1. BCPM default switch prices. BCPM uses outputs from proprietary models to develop regression coefficients that purportedly represent the

undiscounted price of switching by subcategory; for example, processor, port, line usage, trunk, etc. These undiscounted list prices are then adjusted by user-entered discounts. In addition, the discounts are adjusted further to account for variations in discount applicability to the different subcategories.

2. User-entered SCM or ALSM model outputs. BCPM allows the user to override the results of Method #1 with locally-derived switch prices by subcategory.

3. The last method allows the user to enter the total switch price and the BCPM logic will disaggregate the total investment into the subcategories.

Q. **What proprietary models are used by BCPM?**

A. The BCPM switch model uses Audited LEC Switch Models (ALSM). ALSM is just an "aka" for the Bellcore SCIS model and the SCM model from US West. Although these models are similar, there are significant differences. GTE apparently used Bellcore's SCIS and its own proprietary model, COSTMOD to develop the prices described in Method 2 that GTE used for some switches in its filing. At the time this testimony was prepared, GTE's responses had not been received, so we could not verify GTE's source of switch prices.

IV. BCPM'S MODELING METHODOLOGY IS NOT FORWARD-LOOKING

Q. Describe how BCPM uses an embedded host/remote network configuration.

A. BCPM requires the LERG to run. The LERG is a Bellcore database that identifies wire centers and the switches that are deployed in the wire centers. Each switch is identified as a host, remote, or standalone. A standalone switch has no remotes, while a host will have at least one remote. BCPM requires every switch to be identified as host, remote or standalone. BCPM apparently also uses the LERG to identify the host to which a remote belongs.[1]

Q. Why is the current host/remote network configuration not forward-looking?

A. The embedded host/remote/standalone configurations in the LERG are not forward-looking and do not represent an efficient network, primarily because there are many more types of remotes available today than existed in the recent past, and the capacities of remotes have increased compared to remotes of just a few years ago. BellSouth stated "BCPM 3.1 designs a modern network of digital host, remote and stand-alone switches based on the *actual in-place network*."[2] TELRIC cost methodology does not require using the in-place network; in fact, it only requires the wire center locations to be maintained and the methodology expects that a new, cost-effective network will be put in place. A network planner looking at the current demands for lines, trunks and traffic would definitely place a different mix of equipment, even assuming the same wire center locations. An example of a forward-looking change to the LERG mix of standalones and remotes can be found in BCPM's own documentation, which states: "Discussions with the sponsor companies' engineering subject matter experts indicate that few placements of *small standalone switches*, such as the Nortel DMS-10 are expected in the future. Most small exchanges will be served by 5ESS or DMS *remotes*."[3] It is unclear, however, how BCPM treats the DMS-10 switches. A network planner could optimize which wire centers were hosts vs. remotes given today's demands rather than being saddled with host placement decisions made many years ago.

Q. Why is it unclear how BCPM treats DMS-10s?

A. BCPM starts with data from the LERG. BCPM, however, appears to edit the LERG data so that only one switch is placed per wire center. AT&T has spent considerable time and effort reviewing equations and cell references in column after column of the switching module, but we have been unable to locate how the switches are translated from the LERG to BCPM. If the LERG shows multiple switches in a wire center, it has not been documented as to how BCPM chooses to identify the one switch it "keeps." Next, the switches that are "kept", are assigned to be either a Nortel DMS-100 or a

Lucent 5ESS, regardless of the manufacturer or technology of the actual switch. It is unclear whether a DMS-10 host or standalone switch is changed to a DMS-100 remote (as the developer suggests in the quote above) or whether the DMS-10 standalone or host is converted to a DMS-100 or 5ESS host or standalone switch.

Q. Is it wrong to assign all switches in Florida to be 5ESS or DMS 100s?

A. Yes. The 5ESS and DMS-100 are both large switches with huge capacities, and correspondingly large fixed costs. Many of the switches in Florida are small and forcing them to assume the pricing structure of a 5ESS or DMS-100 would seriously overstate the costs for these switches.

BCPM provides an optional small switch option that has been used by GTE and Sprint (but not BellSouth) that is an apparent effort to counteract BCPM's using data from the LERG and forcing all switches to be large 5ESS or DMS-100s.

Q. Does forcing all switches to be 5ESS or DMS-100 make the model forward-looking?

A. No. Although Lucent 5ESS and Nortel DMS-100 are market leaders for large switches, they are not the only suppliers of large switches. There are in Florida, for example, Siemans and Ericsson switches that can also be large switches. Even more importantly for Universal Service cost analyses are the critical assumptions about switches in more rural areas, where small switches may be the norm and there are a number of suppliers of these switches, including Siemans Stromberg-Carlson, Nortel, and many others.

Q. Why is it important to reflect the mixture of switch technologies and manufacturers?

A. The fixed costs are dramatically different for a small standalone switch compared to a large one. Equally important, however, is BCPM's disaggregation calculations assign switch investment to specific buckets based solely on 5ESS and DMS-100 switches. Therefore the costs assigned to port, and the multiple usage categories are not relevant for any switches other than a 5ESS and DMS-100. Therefore, not only is the total investment probably overstated in many cases, but the amount assigned to the subcategories, or buckets, is totally inappropriate for other switch technologies that would be considered forward-looking as well.

BCPM's small switch option has its own disaggregation percentages. The entire documentation for the development of these percentages is in the Switch Model Inputs, p. 39, "The default data was generated from a *typical* state run of the *large* switch model during BCPM model development." The documentation does not explain what a typical state run is, and so we cannot determine whether it has any relevance. What is clear, however, is that any run of the "large switch model" would certainly not generate relevant or correct percentages for small switches.

V. BCPM INAPPROPRIATELY RELIES ON CONFIDENTIAL MODELS AS THE FOUNDATION OF THE SWITCHING MODULE

Q. Why is it inappropriate to use closed, confidential models?

A. First of all, using closed models for determining USF violates the FCC's USF Report and Order.[4] Closed models make it excessively difficult, and usually impossible, to evaluate whether the models are valid and whether they were used appropriately in the context of USF. For example, what forward-looking assumptions were made about SS7 signaling, digital loop carrier, etc. In addition, the closed models use massive amounts of data that need to be examined for consistency and relevancy with other assumptions in the USF forward-looking cost study methodology. These difficulties have been showcased in this proceeding where the short timeframe between the submission of the hugely complex BCPM switch model, coupled with delays in providing a working BCPM model in the case of GTE and delays in responding to data requests, have made a comprehensive and accurate assessment of the BCPM switch model an impossible task.

Q. What inputs to the proprietary models can significantly affect BCPM's methodology?

A. The SCIS models are typically run for essentially every switch in the cost study area. For each switch, traffic levels and switch size are entered as office-specific inputs. Types and numbers of subscriber ports are entered; fill factors are inputs for both lines and trunks; types of remotes are entered (for example, copper-based, fiber based, etc.); and discounts are entered for various types of equipment. Without access to the underlying models, however, this is probably only a partial list of inputs that affect BCPM. Should additional information become available as data requests are received, this section will be revised or supplemented, if I have an opportunity to file additional testimony.

Q. Please provide some examples of how these inputs would affect BCPM?

A. BCPM and SCIS both use fill factor inputs. It appears at this point that at least one company has entered fill factors into both SCIS and BCPM.[5] The investments associated with the spare capacity defined by the fill factor inputs would therefore be double counted. For example, assuming a 95% SCIS fill factor and an 85% BCPM fill factor would result in an approximate 18% overstatement in the port investment.

The numbers and types of lines will cause volatile changes in the proprietary model outputs. The costs for different types of ports can vary dramatically, affecting both the overall investment levels as well as distorting the disaggregations. For example, Next Generation Digital Loop Carrier (NGDLC) costs are significantly less than either older Integrated Digital Loop Carrier (IDLC) or analog lines. From the data I have available at this point, it appears that NGDLC has not been entered into SCIS, therefore the port costs will be overstated. In addition, although no NGCLD is in the switch model, apparently NGDLC is assumed in the BCPM loop module, which raises critical questions of inconsistencies within BCPM itself.

This volatile differences in costs is also true for the types of remotes – copper-based remotes, for example, are tremendously more expensive than fiber-based. (The cost difference is mainly attributable to the large amount of dedicated equipment at the host that is necessary to terminate copper-based remotes compared to a totally different architecture that requires essentially no dedicated equipment for a fiber-based remote.) At the time of preparing this testimony, I do not have information to determine what types of remotes have been assumed. As this information is made available in data request responses, I will supplement this testimony accordingly.

The proprietary cost models for at least one of the sponsors used discount inputs. If we receive the necessary data request responses, this testimony will be supplemented with just such an analysis. The documentation indicates that the discounts "were mathematically eliminated from the results."[6] There are multiple discount inputs that can affect different outputs in a non-uniform manner and any process that "mathematically eliminated" these discounts would have to have been quite complicated. This mathematical process has not been documented nor explained in any way, and therefore it is highly questionable whether even the undiscounted prices for large switches are correct in BCPM.

Q. Are inputs to the proprietary cost models and inputs to BCPM consistent?

A. No one knows for sure. It is not clear that even Indetec, a BCPM developer, that purportedly reviewed all the *output* data to generate the regression analyses ever reviewed all of the *input* data used in the proprietary models. It is highly probable that data provided by three separate companies (and possibly multiple organizations within those companies) may not be consistent with the input data used in BCPM. For example, if the inputs to the proprietary models assumed an average line to trunk ratio of eight to one, in a 10,000 line switch, costs for 1,250 trunks would have been included in the BCPM default regression coefficients used by BellSouth, Sprint and GTE. In BCPM, the line to trunk ratio default (and used by BellSouth and Sprint) is fourteen to one, making 714 trunks for a 10,000 line switch. This would mean that the cost for 1,250 trunks included in the regression coefficients would essentially be spread over the 714 trunks calculated in BCPM, thereby overstating the cost by 75%.

These are only isolated examples of the potential problems that can exist between the proprietary model input data and BCPM. The bottom line is that without carefully reviewing the voluminous and confidential data inputs to the proprietary models, BCPM cannot be considered to be consistent or accurate and should be rejected.

Q. BCPM sponsors claim that other sources can be used for the BCPM switch price datA. Is this a viable alternative?

A. No. I know of no other switch models that use detailed engineering that would be consistent with the pre-defined output categories in BCPM other than the models used in this proceeding – all of which are proprietary. If Method #2 is used, then not only do the switch prices need to be entered for each switch, but the data must be broken down into the subcategories, or buckets used by BCPM. The only viable option for Method 2 is to use the same proprietary models used by the BCPM sponsors. Although it is also possible to override the default regression coefficients, the BCPM sponsors themselves caution: "The user can substitute other known relationships for the values in the coefficient matrix table. Caution is advised, however, as the investment results are highly sensitive to some of the coefficient values."

Method 3 appears to be more flexible because only the total switch investment needs to be entered. However, BCPM will disaggregate the total switch investment into the buckets using its internal logic, again based on proprietary models' data on only the 5ESS and DMS switches. In the end, BCPM is effectively tied to, and completely dependent upon, these proprietary models and the proprietary input data used to generate the proprietary results.

Q. Does the use of the proprietary models that produce highly granular cost outputs increase the accuracy of the switching costs assigned to USF?

A. No. Even if the BCPM proprietary model foundations were shown capable of generating accurate subcategory costs, the BCPM sponsors do not justify why their complicated and proprietary analysis, based on a more granular disaggregation of switch costs is any more accurate. Indeed, BellSouth's BCPM runs show that 38% of total switch investment is assigned to the port, whereas HAI uses a user-adjustable input of 37.2% for BellSouth.

Q. How does the structure of BCPM insure that the contents of the BCPM model must always be considered proprietary as well?

A. As BCPM starts with undiscounted switch prices (although even the undiscounted prices may not be correct, as discussed earlier), users must enter the highly proprietary switch discounts on a *manufacturer-specific basis*. The highly sensitive discount inputs guarantee that BCPM will be considered proprietary not only by the filing company, but by third party switch vendors, as well.

When Method #2 is utilized, the discounted switch prices *by switch manufacturer* are entered, which again would be considered proprietary by switch manufacturers.

VI. BCPM MODEL ERRORS

Q. Please identify the errors associated with BCPM's switch regression analysis.

A. BCPM's regression analysis, used to develop switch prices, purportedly used undiscounted list prices for switching. These prices must be subsequently discounted to reflect real prices paid for switching. The discounts, however, are not applicable uniformly to all of the investment buckets. Through an undocumented BellSouth "special study"[7] adjustment factors were developed that are applied to the discounts entered by the user to achieve purported *effective* discounts. The bottom line is that the regression analysis was performed on the incorrect undiscounted price data, instead of the real switch prices. Subsequent fudge factors, ranging between 62% and 99%, developed through an undocumented special study does not "fix" the incorrect regression coefficients that form the foundation of all the switch costs using BCPM default switch prices calculated in USF. BellSouth and Sprint used the default BCPM switch prices for all of their switches and GTE used the default BCPM for a large number of switches as well.[8]

Q. Please explain how BCPM's results overrecover BCPM's own identification of USF-related switch investments

A. Within the Main Logic spreadsheet, BCPM calculates the investment relevant to USF for each switch. In the same spreadsheet is the re-aggregation of the subcategories of investments into an investment per port and a usage per port that appear to be used to develop the final USF costs. The problem is that when the investment per port plus the usage per port is multiplied by the number of working lines, it *always* exceeds the total investment that BCPM started with as the USF-related total switch investment The actual overrecovery in Florida for each company is significant and is shown below:

Company	Over-recovery
BellSouth	$36,649,378
GTE	$13,464,022
Sprint	$6,012,629
Total	$56,126,029

In spite of an extensive review of how the port and usage columns are derived in an attempt to specifically identify what is causing the error, the equations are so complex that we have been unable to locate the precise problem. The fact remains, however, that the investment per port, including USF-related usage, far exceeds the amount BCPM has calculated to be the total USF switch investment.

Q. Please describe the error that causes inflated trunk investments in BCPM

A. BCPM uses a line to trunk ratio to calculate the number of trunks required for each switch, based on the number of lines calculated in the loop module and passed to the switch module. The engineered lines in a switch is the total number of lines that are equipped compared to the lesser number of these lines that are "working". The difference between the two is the utilization level (often referred to incorrectly as the fill factor).[9] The number of trunks required in a switch is engineered in the real world based on usage levels, not the number of lines. If the number of lines is used to generate a rough estimate of the number of trunks, the number of lines used should be the working lines that are actually generating traffic. In fact, BCPM's sponsors agree that the line to trunk ratio should be using working lines as stated in BCPM's definition of line to trunk ration: "The average number of *working* lines per local interoffice trunk terminated on the switch."[10] BCPM, however, is calculating the number of trunks based on the *engineered* lines, thereby overstating trunking costs by approximately 15%, assuming an 85% fill factor input.

Q. Please explain why the ALSM method used by GTE is faulty and why the default regression coefficients may have the same problem.

A. When BCPM "bundles" the ALSM outputs into categories, it makes numerous errors causing incorrect assignment of investments to cost categories. One example is a subcategory called "Terminating Call Cost." This subcategory of cost identifies the costs of equipment necessary to terminate a call. This cost is caused only when terminating a call and terminating calls are both intraswitch and interswitch. BCPM incorrectly adds the terminating call cost to the trunk usage cost. The trunk usage cost will then be applied to originating and terminating interoffice calls (i.e., incoming and outgoing calls), but not to calls that stay within the switch, which is simply wrong.

Another more egregious example is a little more complicated. BCPM asks users entering switch price data via the ALSM option in Method #2 to input investments as generated by SCIS for two subcategories for [1] usage to carry traffic from a remote to the host (umbilical CCS) and [2] usage within a multiple-remote complex. The two remote-related usage categories should be multiplied only by the number of remote calls and inter-remote calls, respectively. BCPM, however, adds all these usage costs together and multiplies times all local service calls. Since the total local calls is significantly higher than just the calls involving remotes, the total usage investment is significantly inflated.[11]

As these are the same categories of investment that SCIS generates, it is reasonable to assume that the same or similar errors may have been made in the development of the BCPM default regression coefficients prices used by BellSouth, GTE and Sprint.

If a user enters data via the SCM input process, as GTE has done, this bundling is not done. There is no explanation in the documentation. We assume it is because of the inherent, undefined and undocumented differences between SCM and SCIS. If the bundling is trying to make the SCIS coutputs conform to SCM outputs, that means that SCM, itself, may have these same errors within the model.

Q. **Please describe the error associated with the engineering and installation factor.**

A. BCPM's documentation defines the Telco E&I Factor as "The ratio of telephone company capitalized engineering and installation dollars to switch investment dollars."[12] Also, it states that "The investment function is: Telco E&I Investment = Telco E&I Loading * Vendor EF&I Switch Investment."[13] Vendor EF&I switch investment does not include common equipment and power. The BCPM model, however, applies this factor after the Common Equipment and Power Investment factor has increased the switch investment dollars. This results in overstated engineering and installation costs

VII. INPUT DATA ERRORS THAT GTE, SPRINT AND BELLSOUTH HAVE IN COMMON

Q. Have the Companies entered input data that reflects the forward-looking cost of switches?

A. No. They have used incorrect discount inputs to BCPM to modify the default undiscounted prices to forward-looking prices paid for switching.[14] The discount factors utilized for each switch type are of critical importance. If the discount factors do not reflect the actual forward-looking prices, the results produced by BCPM will misstate all of the switching investments used as the basis for USF.

Q. What are the discounted switch prices per line used in BCPM?

A. Total discounted switch investment divided by total lines is an industry standard of measure to evaluate and compare switch prices for end office switches. These prices are switch vendor engineered, furnished and installed (EF&I) investments and do not include local telephone company installation and engineering, power, land or building, but do include the main distributing frame (MDF) and protector. Sprint and BellSouth BCPM data allows us to compare these directly as shown in Table 1 in Rebuttal Exhibit CEP-1.

GTE has only provided data that apparently already includes local telephone company installation and engineering and power. These factors are in BCPM for Sprint and BellSouth, and so the table below shows a comparison of total installed investment (including telephone company installation and engineering and power), MDF and protector, but do not include land or building.

Q. What is the difference on a per line basis between the Nortel, Lucent and GTD switch manufacturer as included in the BCPM filings?

A. Table 3 in Rebuttal Exhibit CEP-1 shows the differences.

Q. Is this disparity among the vendors appropriate or acceptable?

A. No. Lucent and Nortel are aggressively competing in all areas of the switching market. As these switches are essentially identical in functionality and features, these vendors compete primarily on price. Corroborating statements made by Southwestern Bell and Pacific Bell indicate that the same price is paid for switching regardless of vendor.[15] It is illogical, and incorrect for a forward-looking cost study, that a telephone company would consistently *plan* to pay more for one switch than another. What is logical is to assume that telephone companies, in the forthcoming competitive environment would choose the low cost provider. The difference in switch price between the GTD-5 and Nortel and Lucent is discussed in the GTE Input Data Section of this document.

Q. What if specific switch vendor contracts for one company appear to substantiate the difference? How can that be reconciled with your previous assertions that the switch prices should be similar?

A. There are numerous reasons why at a given time, a particular telephone company may produce contracts that appear to justify a large disparity among switch vendors. Some of these reasons are:

- The contract could be a "baseline" contract. I characterize this as the off-the-shelf contract. It is similar to the first price a car salesman will quote you when you ask how much the dealer wants for the car. These baseline contracts are typically in place with all large telephone companies.

- There usually are separate agreements, competitive bids or additional contracts that are simultaneously in effect that may not have been provided, that could even the disparity. These prices are the equivalent of the price for a car after hard negotiations and after the salesman has 'approval from his manager.'

- A particular telephone company simply may not have plans to place switches in the immediate future and has not initiated aggressive negotiations for competitive switch prices, and therefore may not have a contract that reflects forward-looking prices.

Q. **How should this disparity be treated in the cost studies?**

A. The cost studies should use switch prices for all technologies that are comparable and reflect least-cost, generally available technology.

Q. **How do the discounted prices in BCPM used by BellSouth, GTE and Sprint compare to switching prices in the industry?**

A. The Northern Business Information (NBI) study, "U. S. Central Office Equipment Market", states that the average price for RBOC digital switches per line shipped in 1995 was $102, and $99 in 1996. The study also indicates that per line prices are expected to continue to decline slightly through the remainder of the decade.

Both Lucent and Nortel have referenced this document's marketing data estimates, which lends credibility to NBI's expertise in the central office equipment market.[16]

Q. **Do the switch prices reported for Pacific Bell support BCPM's prices?**

A. No. Four years ago, Pacific Bell negotiated a major contract for approximately $110 per line.[17] According to the NBI study, the price per line for switching has been declining and is expected to continue to decline. The four-year old data for Pacific Bell, when brought down to current switch prices with a .97 factor per year[18] would result in $97 per line.[19] There were no separate prices quoted for different size switches, so the deflated $97 per line either applies to all line size switches or is an average; and the $97 per line provides a comparative price point to evaluate the BellSouth switching prices.

Q. Do the switch prices reported by SPRINT support BCPM's prices?

A. No. The January, 1997, BCPM proxy model contained switching prices using a fixed cost of $261,871 and variable per line amount of $225[20] that were the results of a survey, based on telephone company inputs to SCIS. Sprint later retracted these switching prices, stating that "there exists a fundamental disagreement concerning the costs of switching."[21] Sprint submitted new BCPM inputs for switching prices of $150,000 fixed/startup and $110 per line.[22] Sprint said "the current BCPM values [the new lower values] more closely approximate Sprint's current costs of switching . . .."[23] For a 15,000-line switch, allocating the $150,000 fixed cost to the lines would result in an overall average price of switching of $120 per line. Note that AT&T does not suggest that this is the correct price; but as shown in the vendor switch price per line table at the end of this section, Sprint's switch prices in this proceeding appear disingenuous, at best.

Q. Does Southwestern Bell's 1996 switch price per line support BCPM's prices?

A. No. Mr. Hugh Raley stated in 1996 testimony that for Southwestern Bell Telephone, "the Engineered, Furnished and Installed"(EF&I) price was

$85/line"[24] for switching. Mr. Raley stated that $85 includes "everything that is required to make the switch work,". . . "the trunks, the fabric, the processors - the total price from a vendor standpoint divided by the number of lines on the switch." He also indicated that this figure represents recent bids both from Lucent and Nortel and that this price was the average *and not the lowest bid price*. Mr. Raley included in his testimony an Attachment[25], which revealed the following:

	1-15,000 lines	15-40,000 lines	40-80,000 lines
EF&I Inv. Per Line	$140	$115	$85

Q. **Do Vendor Announcements support the BCPM's prices?**

A. No. The most current information comes from Nortel's Internet web page[26] announcing that a contract has been signed with US WEST "in excess of $US 100 million" for 2.2 million DMS-100 lines. This implies switch prices as low as $45 per line. Even allowing for the *in excess* to be an incredible additional 50% of the contract, for a total of $150 million, $150 million divided by 2.2 million lines would yield a price per line of only $68.[27] Nortel also indicated that this upgrade of US WEST's network will provide advanced digital features, such as ISDN, network business services and advanced display services. In addition, Nortel stated that "Nortel will keep US WEST's network ready for new services, such as Local Number Portability and for Advanced Intelligent Network AIN features . . .."

Q. Please summarize the switch prices you have discussed and compare them to the prices used in this filing

A. The table below compares the average prices per line and demonstrates that BCPM's prices are significantly overstated.

Source	Price Per Line
NBI	~$100
Pacific Bell	$110
Sprint Inputs to BCPM	~$120
Raley Testimony-BellSouth	$85/115/140
Nortel/US West	~$50
BellSouth USF Filing	*$188*
Sprint USF Filing	*$168*

GTE's data cannot be entered here because these prices are switch-vendor prices only and apparently GTE's data includes telephone company engineering, installation and power.

It is valuable to note the information provided in Mr. Pitkin's testimony, Section IV, regarding the dramatic reduction in switch investment that occurred when the BCPM defaults were replaced by US WEST with US WEST-specific data.

VIII. BELLSOUTH INPUT DATA ERRORS

Q. What are the inputs "Percent of Line New" and are they correct?

A. BellSouth's discount inputs are different for "new" lines, meaning lines that are placed at the initial installation of a switch, compared to lines that are added subsequent to initial installation, or "growth" lines. The inputs that identify what percent of lines are new is entered for the 5ESS and DMS-100.

These inputs are not correct because they contribute to faulty TELRIC cost calculations in BCPM. Using a TELRIC construct, the percent of new lines for both switch types should be 100% as Sprint has used in this filing.[28] TELRIC cost study methodology requires that a new network be deployed, using the existing wire centers. That means new switches at new switch prices. We do not advocate that some unreasonably low switch price could be achieved by asking the vendor to quote a price for a total system replacement, but do advocate that the best new switch discount currently available is the correct one to use in a TELRIC study.

Q. Why is the use of growth prices inappropriate?

A. All of the models proposed in this proceeding are "snapshot" models. Performing full, life-cycle analyses costing is extremely difficult and requires a tremendous amount of contentious forecasting. As snapshot, or point-in-time models, they capture the cost of equipment to serve current demand.

Incorporating the cost of growth into the switch prices changes the fundamental definition of the models and the cost study. And BCPM uses special growth prices solely for switching, while ignoring "growth" costs with respect to the remainder of the network. It is important to note that "growth" in loop plant, for example, would be cheaper than initial installation per loop because structure (poles, conduit), which are a significant portion of the cost would not be required. The incorporation of growth only in the switch studies is inconsistent with the loop and USF-related other studies and opportunely increases costs.

Q. Please define Reserved CCS and explain the problem with the BellSouth Input.

A. Reserved CCS is spare capacity within certain line-related components of a switch that is due to exhausting a different capacity on the same components, thereby "stranding" the costs of the unused capacity. This issue arises due to differences between the US WEST SCM and Bellcore's SCIS models. To my knowledge, SCIS includes this cost in the port investment, while SCM includes it in the line usage category. According to BCPM documentation, it appears that the BCPM default regression data includes the Reserve CCS cost in the line usage category. The ALSM Method #2, however, include the Reserve CCS in the line port category.[29]

The inputs for Reserve CCS are supposed to add this cost to the port and subtract it from the usage category. When we changed BellSouth's Global

Input from Line to Usage, the port investments increased significantly, but the usage investments declined much less.[30] In addition, it is not clear given the contradictions within the BCPM model and documentation of the treatment of this investment category that this BellSouth input hasn't already been included in the port investments.

BellSouth's input values in the State Default Inputs for the discounted cost of Reserve CCS per line are not correct. First of all, the DMS, unlike the 5ESS, typically has minimal reserve CCS because the inherent nature of its architecture allows "fine-tuning" of the engineering and purchase of the components, drastically reducing any stranded capacity costs. BellSouth's numbers indicate an absolutely huge amount of Reserve CCS for the DMS host, that is almost twice as much as the already inflated 5ESS Reserve CCS. The 5ESS Reserve CCS input values far exceed any costs I have ever seen. When BellSouth's information is provided to the data requests, the quantification of these Reserve CCS overstatements should be possible.

As the model methodology concerning this whole area is suspect, BellSouth should set these inputs to 0.

Q. **Are BellSouth switch prices inflated due to forcing switches to be 5ESS or DMS-100s?**

A. Yes, it appears that there are approximately 35 BellSouth switches that fall into BCPM's default definition of small switch. Acknowledging that small switches do have different cost characteristics, BCPM provided a small switch option price matrix, but BellSouth chose not to use it. If BellSouth were to use the small switch option, the small switch price matrix should be revised to reflect the prices paid by a large LEC, rather than using the RUS data for very small telephone companies, as described in the following Sprint input data section.

IX. SPRINT INPUT DATA ERRORS

Q. Please identify the problems with the Small Switch price data used by Sprint.

A. The BCPM sponsors populated the small switch option with data from an FCC presentation by Dr. Gabel.[1] These prices were obtained for very small independent telephone companies that obtain RUS assistance. These prices certainly would not be applicable to a GTE or Sprint, as the buying power of these companies would certainly allow them to obtain better pricing than the extremely small companies that provided the data in the RUS study. (I also have serious reservations about using Dr. Gabel's data even for small companies purchasing small switches. The widely diverging prices per line between host and remotes is not reasonable, in my experience. The variable price per line does not change significantly between host and remote as it is basically the same equipment. The relevant, significant difference between the two switch types is in the fixed costs.)

In addition, the BCPM Documentation indicates the website of the final version of this report with "slightly revised results".[32] The following table illustrates a comparison of the revised results to those used in BCPM that raises serious questions about the BCPM sponsors' definition of "slightly revised."

Switch Type		BCPM Input	NRRI Gabel /
Standalone	Fixed per Switch	$589,263	$518,307
	Inv. Per Line	$43	$44
Host	Fixed per Switch	$589,263	$572,988
	Inv. Per Line	$43	$44
Remote	Fixed per Switch	$54,270	$82,279
	Inv. per Line	$145	$140

Q. What problems appear with the Sprint switch types?

A. In response to a data request, Sprint provided a working SCIS model loaded with data from Sprint's Florida switches. We have been unable to determine precisely how this data was used in the BCPM filing, but a serous data error appears to have been made regarding the identification of switches as hosts/remotes/standalones. In BCPM, Sprint has 139 offices, of which 47 are standalone, 32 are hosts, and 60 are remotes. Sprint's SCIS data also shows 139 offices, but Sprint's inputs to SCIS indicate that of the 139 offices 38 are standalone/hosts and 101 are remotes. It would be expected that a higher ratio of remotes to host/standalones would be more efficient with corresponding lower costs. BCPM, however uses more than twice the number of standalones and hosts, and therefore the costs may have been overstated.

X. GTE Input Data Errors

Q. What is different about GTE's use of BCPM compared to Sprint and BellSouth?

A. GTE has not used the default switch prices based on the BCPM regression coefficients in the model for some of the switches. As GTE's working model was received late, I have not had a full opportunity to review all of the GTE data, and will supplement this testimony, if necessary.

The analysis to date has indicated that BCPM entered data for certain switches under the SCM switch price input columns, which are then used to compute the USF. The switches that GTE selected for this special treatment are 52 standalone, 6 host and 11 remote "DTD" switches, which I assume are actually GTD-5 switches. (Apparently, BCPM cannot accept any name that doesn't begin with a 5(5ESS) or a D (DMS-100) and GTE had to fake out the program to get it to run. Entering the real name of the switch causes the BCPM investments to come up as errors.) GTE also selected 21 5ESS and DMS-100 switches that are standalone switches only. No 5E or DMS hosts or remotes were included. There is obviously some bias involved in choosing specific switches to be entered separately by GTE via the SCM inputs. The remaining 208 host and remote switches appear to have used the BCPM default regressions. Interestingly there are significant differences in costs for GTE's SCM-entered switches and BCPM default costs as shown below:

Switch Type	SCM Inv. per Line	BCPM Inv. per Line
Standalone	$169	$204
Host	$182	$211
Remote	$164	$212

The BCPM default prices apparent bias for overstating costs is also discussed in Mr. Pitkin's testimony.

Q. Is the GTD-5 switch considered to be forward-looking?

A. No. In multiple jurisdictions, GTE has been required to eliminate the GTD-5 switches from forward-looking cost studies. We have been unable to locate any major shipments of new GTD-5 switches for eight years, except one outside of the United States. Although the manufacturer still maintains the switch, the vendor does not appear to promote this switch nor does it seem to compete with other vendors for GTE's business, which means the vendor has little incentive to price competitively.

GTE formed a joint venture called AG Communication Systems (AGCS) with AT&T (now Lucent) in January, 1989, for their digital central office switch, GTD-5. GTE held the majority ownership for the first five years, with increasing ownership to Lucent reaching 100% in 2004.

As reported in Telephony, January 9, 1989, GTE Chairman James L. "Rocky" Johnson proclaimed that "There are no plans for a massive switch change-out" and AT&T Chairman Robert Allen stated that the joint venture will manage an "orderly transition" to new technology for the GTD-5's installed base.

Francis McInerney, an analyst with North River Ventures was quoted in Telephony, April 30, 1990, saying that "GTE wanted to get out of manufacturing because the GTD-5 switch was too expensive to develop. The joint venture with AT&T would meet GTE's needs until the GTD-5 switch was no longer needed."

Indeed, Telephony reported on April 30, 1990, that "GTE pulls funding from AG's ISDN development plan". They opined that "questions were raised at the time about the commitment of AT&T and GTE to the GTD-5 switch, given its limited share of the market."

In 1992, the Chicago Sun-Times, April 23, reported the AGCS closing of its Northlake facility and said: "Workers were told Wednesday that the manufacturing of big-ticket telephone switching systems will be phased out by the end of next year."

The Arizona Business Gazette reported on November 4, 1993, that "AG Communication intends to support its installed base of GTD-5 switches (most of them at telephone operating companies) for the rest of their call-handling lives – perhaps the year 2000 or later. And AG Communication will play a key role in the transition of the GTE systems to AT&T switches." . . . "In the meantime, AG Communication is working to develop new lines of business."

In the same article, Ms. Van Fleet, a spokeswoman for AGCS, was quoted "We're not really competing for new business in the switching systems business any longer. Ms. Van Fleet explained. "What we're doing instead is developing new business opportunities where we can use our expertise in telecommunications and apply it to emerging areas of the industry."

This appears to be exactly what they have done as evidenced in 1995 with announcements for advanced intelligent network peripheral equipment such as voice recognition, voice-activated dialing and fax storage and forwarding capabilities, called INgage. Their February 23, 1995, announcement quoted Mr. Curtis Steinhoff, an AG Communication spokesman, "The INgage line compares with AG Communication's primary business: servicing its installed base of GTD-5 switching systems. The company no longer makes base systems, but maintains and enhances GTD-5s for its customers, Mr. Steinhoff explained."

In addition, in 1997, AGCS announced its new ATM product line.

The last announcement of any major sale of GTD-5 switching systems our search could find was in 1989 in Canada.

The articles and quotes I have assembled above provide credence that the GTD-5 switch and it's historical prices should not be included in a forward-looking TELRIC cost study. In addition, the migration of this embedded base of lines to Lucent and Nortel should increase GTE's volume purchasing power with these vendors; thereby decreasing the cost of switching overall.

In Indiana's Generic Proceeding on GTE's Rate for Interconnection Services Unbundled Elements, Transport and Termination approved May 7, 1998, found: The fact that GTE may use this particular switch in its existing network, and may continue to do so for the foreseeable future, does not mean that this is an appropriate technology to include in a long-run cost analysis. Neither GTE's' past choices of equipment for use in its existing network, nor its choice of technology to add to its existing stock of equipment, have any bearing on the issue."

Q. **What evidence is there that the GTD-5 is not least-cost technology?**

A. Staff Economist, Nelson Parish, of the Public Utility Commission of Texas, in response to GTE's very similar studies filed in that state, conducted an analysis comparing the unit investments required to furnish a weighted average of various switching services using the GTD-5 versus other switching technologies. Mr. Parish's analysis demonstrates that the GTD-5 requires an average of twice the investment needed for the other technologies to provide the same functions.

The Indiana Commission Order referenced earlier also found, "GTE witness Steele argued that the inclusion of the GTD-5 switch in the technology mix conforms to TELRIC costing principles as forward looking. He based this conclusion only on the fact that a Canadian telephone company purchased some GTD-5 central office equipment last April. GTE Exh. BIS-R, p.12. Mr. Steele admitted on cross-examination, however, that elimination of the GTD-5 switch from the technology mix would reduce the cost of a two wire port by $1.76. TR F-38. Given this admission, we fail to see how GTE can claim that its use of the inclusion of the GTD-5 in its switching technology mix meets the "least cost" principle of TELRIC.

In this proceeding, the average price per line for the GTD-5 switches is $195, higher than the average price per line for all 5E or DMS switches for BellSouth, Sprint and GTE. The averages break down to consistently higher prices for GTD-5 standalones, hosts and remotes than the equivalent standalone, host and remote switches in the other switch technologies.

XI. SUMMARY AND CONCLUSION

Q. Please summarize your testimony

A. The BCPM model has numerous errors that make the model inaccurate. Most importantly, however, it is based on confidential models that effectively prohibit interested parties from ensuring that the models are accurate, that the data used to run them is consistent with BCPM inputs and assumptions and the modeling methodologies are compatible. BCPM's claims that alternate sources, presumably non-proprietary, are simply not viable, because the detailed complex engineering-based outputs are only available from proprietary models. Even if the user enters locally developed total switch investment on a switch by switch basis, BCPM's logic invokes all the data to partition the total investment into the individual buckets that was again, obtained from the proprietary models.

BCPM's overly complex attempt to granularize switching investment into small, discrete functions does not add any accuracy to the analysis – only complexity and increased probability of errors.

BCPM's methodology that attempts to segregate host, remote and standalone switch costs is flawed because it is dependent upon the embedded host/remote configurations that are not forward-looking, nor efficient. Again, BCPM sponsors claim users can enter this data individually switch by switch, overriding the LERG information, but this is next to impossible. Even if a company could enter all the data, including the precise host-remote affiliations, how could it be verified as efficient? The best estimate that exists today of the efficiencies gained by forward-looking host/remote/standalone configurations would be the blended costs in the Northern Business Report used in the HAI model because those costs represent the current mix of host/remote/standalone switches being shipped today.

Should this Commission favor the flawed BCPM model, then the filing companies' input data must be corrected. In addition, more time should be granted in order to ensure a thorough review of all underlying data inputs to the proprietary models to ensure they are consistent with the way BCPM uses them and the filing companies enter their input data.

Q. Does this conclude your testimony.

A. For now. When the complete responses are received to the data responses that were not available at the time of this testimony preparation, this testimony may require modification and/or supplemental testimony may be necessary to ensure as complete an analysis is made available to the Commission on the BCPM switch model.

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[1] This is how Sprint and BellSouth determined these additives. GTE apparently included unknown additives in its starting prices for engineering, installation, common equipment and power, and were not added separately in BCPM.

[2] Bowman Direct Testimony, p. 12. [emphasis added]

[3] BCPM 3.1 Model Methodology, Appendix D - Switch Curve Methodology, Page 132 [emphasis added]

[4] See USF Report and Order ¶ 242. Also, e.g., Staff Cost Model Analysis ¶ 15; State Cost Study Criteria

[5] Based on the incomplete response received from Sprint and no responses at the time this testimony was written to requests for the SCIS models used to support BCPM.

[6] Ibid.

[7] This special study is not documented nor even described in any detail. BCPM 3.1 Model Methodology, Page 68-69.

[8] BellSouth, Sprint and GTE all used the default BCPM switch prices. GTE used the defaults for 70% of its switches along with GTE-entered data for some switches identified as using the US West SCM model.

[9] In switching, the "fill factor" is typically an administrative fill – those lines permanently reserved for testing and other administrative functions and do not include spare capacity. Utilization factor is a more accurate term in switching to describe the total difference between engineered and working lines.

[10] BCPM 3.1 Switch Model Inputs, Page 20. [emphasis added]

[11] The BCPM "bundling" of ALSM investment categories can be found in the ALSM input sheet, columns R-V.

[12] Telephone Company Engineering and Installation Factor, BCPM 3.1 Switch Model Inputs, Page 17

[13] Ibid, Page 17-18

[14] As the time of preparing this testimony, I have not received the actual switch vendor contracts, except for one contract for one company and therefore my testimony is limited. It is crucial that the switch investment reflect the efficient forward-looking cost of switching as evidenced by competitive bid or seriously negotiation contracts with switch vendors. When I receive this data, this testimony will be supplemented, if allowed the opportunity.

[15] This is substantiated by Mr. R. Scholl and Mr. J. Caling in Deposition of R. Scholl p. 46, ls 1-5, and Deposition of J. Caling, p. 93, ls 13-18, dated February 12, 1997.

[16] Lucent and Nortel October 15, 1996, filings in response to FCC Supplemental Request for Information from Lucent and Nortel, respectively. Cited in FCC 97-125, page 24.

[17] Quoted in GTE's Responses to proxy cost model questions in CC Docket 96-45, Federal-State Joint Board on Universal Service Proxy Cost Models, January 7, 1997.

[18] Extrapolated from the NBI yearly prices.

[19] This data substantiates the prices used in Hatfield. The average switch size for Pacific Bell is 27,200 lines. The average switching price on the Hatfield cost curve for a 27,200 line switch is $90.

[20] BCPM Methodology (no date), Page 20.

[21] Ex Parte Letter, 3/24/97, from Mr. Warren D. Hannah, Sprint to Mr. William F. Caton, FCC, Attachment A, page 5.

[22] Id., Attachment BCPM National Results Using Sprint Input Values, Page 3.

[23] Id., Attachment A, Page 3. The remainder of the quote dealt with a recommendation to use the higher rates for USF purposes.

[24] Direct Testimony of Hugh W. Raley, 9/6/96, Docket Nos. 16189,16196,16226,16285,16290; p. 7, lines 9-10 and Deposition of Hugh Raley, 9/13/96.

[25] Note, however, that there are other equipment costs added to Mr. Raley's $85/line such as taxes. AT&T agrees that these need to be added, but the relevant cost in this analysis is the actual price paid to the vendor which Mr. Raley calls EF&I. This compares to the prices used in the Hatfield Model switch curve that also are switch prices paid to the vendor. The Hatfield Model includes costs for the other components shown on Mr. Raley's chart in subsequent calculations. Mr. Raley was claiming that Southwestern Bell Telephone's $85 per line was significantly higher than the Hatfield Model's $59 per line for an 80,000 line switch. This comparison was flawed for two reasons: [1] Mr. Raley stated that the $85.00 per line was based on an average switch size of 53,653 lines; therefore, Mr. Raley's comparison to the Hatfield Model 80,000 line switch is inappropriate; and [2] the Hatfield Model's $59 per line is the price without trunk ports and when these are added back in, the actual price the Hatfield Model calculates for a 53,653 line switch is approximately $80 per line. Mr. Raley's $85.00 per line is, in actuality, very close to the $80 per line that the Hatfield Model calculates.

[26] www.nortel.com/home/press/1997b/6_16_9797219_US_West.html

[27] Thus substantiating that the large switch price of $75 per line used in Hatfield is conservative. All switch prices are quoted as prices paid to the vendor just for

vendor EF&I switch equipment and do not include taxes, telephone company installation, etc.

[28] Sprint affirmatively stated in February 16, 1998 testimony before the North Carolina Utilities Commission (Bollinger Supplemental Direct) in Docket No. P-100, Sub 133d that "The switching cost study has been changed to incorporate the switch discount associated with new switch purchases. The original cost study reflected a growth switch discount representative of additional investment to current switches. Sprint has determined that a new switch discount is more representative of forward looking switching costs than a growth switch discount." Pp 1-2

[29] This can be seen in the ALSM input sheet. The column labeled Min. Inv. per Line from SCIS includes the Reserve CCS. None of the other columns subtract the Reserve CCS before attributing the cost to the port, and therefore Method #2 used by GTE automatically includes Reserve CCS in the port investments. This is contrary to the information provided in the Switch Model Inputs, pp. 23-24.

[30] This appears to occur for every switch. One example is switch CLLI ABDLFLXa96H where the port increased by $_____, and the usage per line decreased by only $_____ for a net *increase* per port of $_____.

[31] BCPM 3.1 Switch Model Inputs, p. 37

[32] Ibid.

Table 1 - VENDOR SWITCH PRICE PER LINE

	BellSouth $/Line	GTE*	Sprint $/Line
Standalone		N/A	
Hosts		N/A	
Remotes		N/A	
Average		N/A	

*GTE has provided only the fully installed price per line.
This table is vendor switch prices only.

Table 2 - FULLY INSTALLED SWITCH PRICE PER LINE

	BellSouth $/Line	GTE $/Line	Sprint $/Line
Standalone			
Hosts			
Remotes			
Average			

Table 3 - PER LINE PRICE FOR SWITCH TYPES

	5ESS $/Line	GTD-5 $/Line	DMS-100 $/Line
Standalone			
Hosts			
Remotes			
Average			