and pre-depreciations earnings are positive. Access lines grew approximately 4.5% in 1996. The only reasonable conclusion for the decline in switched access is that SWBT is losing significant switched access traffic to alternative providers. Additionally, terminating traffic is also falling relative to originating traffic, suggesting carriers are seeking alternative service arrangements for terminating traffic by shifting terminating traffic to independent LECs, then back onto SWBT's network or other means.

The 1996 Act provides sufficient competition to provide pricing discipline for both originating and terminating local switching. Given that prominent telecommunications providers will be integrated suppliers (i.e., provides both interexchange and local exchange service), "winning the end-user" will be a primary strategy. Each supplier will wish to "control the customer" by providing "one-stop" shopping. The total cost and revenues associated with serving a customer will be of consideration when formulating telecommunications offerings. Thus, high terminating local switching rates will provide an incentive to a carrier to reduce its local exchange rates and "win the customer" to avoid these terminating local switching rates. In addition, given that there will be many local providers in the marketplace, substitutable methods of call termination will be available to an entrepreneurial interexchange carrier to avoid excessive terminating access charges.

Consider the example of a market where there are two integrated telecommunications providers (Carrier A and Carrier B). Any attempt by Carrier A to raise terminating local switching rates will likely be met with three responses: (1) Carrier B will make its local service offerings more attractive (e.g., lower its rate or provide more attractive bundling of local and interexchange) in order to "win" the terminating customer (i.e., the carrier reduces cost by eliminating the terminating access charge); (2) Carrier B may increase its terminating local switching rate in response; and (3) Carrier B will route its interexchange traffic through a local office (its own or another carrier) and attempt

to complete the call as local traffic. Carrier A may also have to increase its interexhange prices due to imputation of its own access rates and the increased cost of Carrier B's terminating switching rates. In total, it is likely that the increase in terminating switching charges would not be profitable and would have to be rescinded.

The availability of substitutable termination and competitive marketplace realities provide sufficient pricing discipline to constrain pricing of terminating local switching. Therefore, Commission regulation of terminating local switching is unnecessary.

E. JURISDICTIONAL SEPARATIONS ISSUES MUST NOT BE IGNORED IN THIS PROCEEDING.

A number of parties[151] recognize that a review of the jurisdictional separations of costs needs to take place. Indeed, the FCC has already stated on several occasions that it is planning for a Joint Board to perform a comprehensive review of separations and there is a meeting of the Joint Board being planned for late February/early March. While this Joint Board could address the separations issues raised in this proceeding, there is no need to delay action on these issues. The costs in question should be placed in a public policy recovery mechanism in this proceeding, as proposed by SWBT, and if/when the issues are addressed/resolved in a separations proceeding, the public policy element could be adjusted. As was noted by the Tennessee Regulatory Authority,[152] if any costs are shifted to the intrastate jurisdiction as a result of a separations proceeding, a period of transition should be allowed for the state jurisdictions to have sufficient time to allow for the cost shifts and provide for recovery mechanisms.

---

[151]American Association for Adult and Continuing Education, et. al, p. 13; Frederick & Warinner, pp. 5-10; MCI, p. 69; Texas PUC, p. 32.

[152]Tennessee Regulatory Authority, p. 2.

V. CONCLUSION

For the foregoing reasons, SWBT respectfully requests that the Commission adopt the plan for access reform described in SWBT's Comments, and reject the proposals offered by others that would prevent attainment of the Commission's goals.

Respectfully submitted,

SOUTHWESTERN BELL TELEPHONE COMPANY

By _____

Robert M. Lynch
Durward D. Dupre
Mary W. Marks
Thomas A. Pajda

Attorneys for
Southwestern Bell Telephone Company

One Bell Center, Room 3520
St. Louis, Missouri 63101
(314) 235-2507

February 14, 1997

REPLY COMMENTS OF SOUTHWESTERN BELL TELEPHONE COMPANY
CC Docket No. 96-262
LIST OF ATTACHMENTS

Attachment Taylor
Ex Parte by USTA on October 16, 1996, CC Docket No. 96-45 "Not the Real McCoy; A compendium of Problems with the Hatfield Model." This paper by Dr. William E. Taylor of NERA analyzes the extent to which Hatfield measures an economic, forward-looking long run incremental cost relevant for setting prices of network elements. Attached are numerous other references and testimony of experts that have identified problems with the Hatfield models.

Attachment Austin
Paper by Dr. Robert F. Austin titled "Engineering Evaluation of Cost Proxy Model for Determining Universal Service Support: Hatfield Model 2.2, Release 2, dated February 5, 1997, and used in a meeting with Federal State Joint Board Staff on February 5, 1997 Ex Parte Filed by USTA on February 5, 1997. This paper provides an engineering critique of the methods employed in the Hatfield Model and points out a number of problems with the input cost values and the methods used to calculate the cost of a loop and local switch.

Attachments SA-MO and SA-Texas
Attachments to SBC Communications Inc. Response to the Public Notice of November 18, 1996 in CC Docket No. 96-45, seeking comment on the Joint Board's Recommended Decision dated November 8, 1996. The Attachments provide a sensitivity analysis of Missouri (Attachment SA-MO) and Texas (Attachment SA-TX) of the Hatfield Model. The sensitivity analysis points out that using realistic structure assignment factors, instead of the 33% unsubstantiated Hatfield default values, increase the cost of the loop by almost 33%. Using the realistic values provided by SWBT increases the cost of the loop from $13.26 to $28.09 (per loop, per month) in Missouri and $11.62 to $26.53 in Texas.

Attachment Conwell
Rebuttal testimony of W. Craig Conwell filed in Docket No. 97-AT&T-290-ARB before the Kansas Corporation Commission. This attachment compares SWBT actual cost data for Kansas with estimates from the Hatfield Model and concludes that the Hatfield Model should not be used.

Attachment City Data
A table of competitive access providers in SWBT's serving areas, by city.

Attachment Lube
This paper by John P. Lube, a SWBT expert in capital recovery, "The ILECs' Depreciation Reserve Problem," is an empirical rebuttal of the Comments filed by AT&T and MCI.

SOUTHWESTERN BELL TELEPHONE COMPANY

REBUTTAL TESTIMONY OF W. CRAIG CONWELL

DOCKET NO. 97-AT&T-290-ARB

1 Q. PLEASE STATE YOUR NAME, OCCUPATION AND BUSINESS ADDRESS.

2 A. My name is W. Craig Conwell. I am an private consultant specializing in
3 telecommunications costing. My address is 628 Bellenden Drive, Peachtree
4 City, Georgia, 30269.

5 Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

6 A. At Southwestern Bell Telephone Company's request, I reviewed its studies of
7 *unbundled loop costs* and *end office switching costs.* I also reviewed the
8 Hatfield Model sponsored by Mr. Flappan of AT&T in the areas of loop and end
9 office switching costs.[1] My testimony describes the factors which I found that
10 cause significant differences in the unbundled loop costs and end office
11 switching costs provided by Southwestern Bell (SWBT) cost studies and the
12 estimates of the Hatfield Model.

13 Q. WHAT IS YOUR BACKGROUND IN TELECOMMUNICATIONS COST
14 ANALYSIS?

15 A. I have worked in the telecommunications industry for twenty-two years. From
16 1974 to 1979, I was with South Central Bell Telephone company where I
17 performed service cost studies. From 1979 to 1987, I was with AT&T and had a

[1] Hatfield Model, Version 2.2, Release 2.

1 variety of assignments in tariff and costs, planning and financial management,
2 and marketing. In 1989, I joined Arthur Andersen as a senior manager
3 specializing in telecommunications cost matters. I served as the project
4 manager or advisor on numerous engagements in the US and overseas on
5 projects related to network and service costing, the development of
6 telecommunications cost accounting systems, and performance measurement. I
7 became an independent consultant in 1996. I also have taught courses on
8 incremental cost analysis, embedded costing and activity-based costing for the
9 United States Telephone Association and for individual telephone companies for
10 the past eight years.

11 Q. WHAT IS YOUR EXPERIENCE IN MAKING INDEPENDENT REVIEWS AND
12 COMPARISONS OF COST STUDIES?

13 A. While with Arthur Andersen, I was involved in several important reviews of
14 telecommunications cost studies.

15 • In 1992, Arthur Andersen reviewed the switching cost models used by the
16 Regional Bell Operating Companies (RBOCs) in their Open Network
17 Architecture tariff filings. The review was performed on behalf of the
18 Federal Communications Commission (FCC). One of the models,
19 Bellcore's Switching Cost Information System (SCIS), is licensed to and
20 used by SWBT to compute end office switching network element costs.

1 My role in the review was to develop the approach and prepare the final
2 analysis and report to the FCC.[2]

3 • In 1993, I participated with Bellcore in a comparison of digital private line
4 costs between Canadian and US local exchange carriers. This review
5 was made for Stentor Resource Center, Inc. and several Canadian
6 telephone companies.

7 • In 1995, I conducted a review of the USWEST Switching Cost Model
8 (SCM) for the FCC in CC Docket No. 94-128.

9 • Also in 1995, I prepared an analysis and comparison of differences in toll
10 costs between Canadian and US carriers on behalf of Stentor Resource
11 Center as part of the Split Rate Base proceedings in Canada.[3]

12 Q. DO ALL OF THESE REVIEWS HAVE A COMMON THEME?

13 A. Yes. They are aimed at providing an independent, objective comparison in order
14 to ascertain differences in the underlying variables which make one cost and
15 cost study different from another.

16 Q. WHY IS A REVIEW AND COMPARISON OF SWBT COST STUDIES AND THE
17 HATFIELD MODEL IMPORTANT IN THIS CASE, PARTICULARLY IN THE
18 AREAS OF LOOP AND END OFFICE SWITCHING COSTS?

19 A. As shown in Exhibits 1 - 3, the first reason is the most obvious - SWBT and
20 Hatfield model cost results are so different. The Hatfield Model loop cost is

---

2 FCC CC Docket No. 92-91.
3 Reference.

much less than SWBT's loop cost, and the Hatfield end office switching port and usage costs are similarly less than those of SWBT. Differences of this magnitude beg the question, "Why?"

Q. WHAT OTHER REASONS ARE THERE FOR REVIEWING AND COMPARING SWBT COST STUDIES AND THE HATFIELD MODEL?

A. Since the pricing standard prescribed by the FCC Order calls for unbundled network element rates to be based on costs (specifically forward-looking economic costs), an understanding of the costs sponsored by SWBT and AT&T is necessary.[4]

Q. MR. FLAPPAN OF AT&T COMPLAINS OF DIFFICULTY IN REVIEWING LOCAL EXCHANGE CARRIER COST STUDIES AND IMPLIES THAT AT&T IS HAMPERED FROM REVIEWING SWBT'S STUDIES. DID YOU FIND THE STUDIES DIFFICULT TO REVIEW?

A. To say SWBT's cost studies are difficult to review can be misleading. SWBT has performed cost studies for many years. Its study documentation, as I imagine is the case for AT&T, has been primarily to provide a record of the study input, calculations and results with which other cost analysts and managers can refer in order to understand the studies. The documentation has suited their internal needs. A study of network costs is complex because the network is complex. As an outside reviewer of the cost studies, it was necessary to devote time and attention to the details of the studies to understand the methodologies and key

[4] My analysis is undertaken despite the current 8th Circuit Court's stay of the FCC pricing policy.

cost data. If another outside reviewer finds the studies difficult to evaluate, this should not be taken as a reason to conclude the studies are flawed.

Mr. Flappan would like for unbundled network element rates to be based on costs from the Hatfield Model, a model which produces cost estimates lower than those of SWBT. To accept the argument that the SWBT cost studies are difficult to evaluate and, therefore, should not be used would be a mistake. They can be evaluated, if the effort is made.

The real issue is which cost model produces better estimates of forward-looking economic costs. So, a final reason for reviewing and comparing the cost studies is to focus on the key areas of differences in the SWBT and Hatfield cost models so that one can be evaluated with respect to the other.

OVERALL FINDINGS

Q. PLEASE SUMMARIZE YOUR FINDINGS WITH REGARD TO THE MOST SIGNIFICANT DIFFERENCES BETWEEN THE SWBT COST STUDIES AND THE HATFIELD MODEL FOR LOOP AND END OFFICE SWITCHING COSTS.

A. Exhibit 4 lists the major differences found between the two studies. In general, the Hatfield Model costing methodology and cost data which are different from those of SWBT tend to produce lower costs. Examples of these include lower average distribution cable investments, lower fixed costs for digital loop carrier systems, longer service lives which produce lower capital costs, and higher fill factors which lower average investments / unit of demand. There are notable

1 exceptions. For example, the Hatfield Model surprisingly estimates longer
2 distribution cables on average.
3 Q. IS THE LIST OF DIFFERENCES SHOWN IN EXHIBIT 4 COMPLETE?
4 A. I believe the list is fairly complete. As you "peel back" the models you normally
5 discover additional differences. In some cases, the differences in costing
6 methodology or cost data tend to offset one another. However, I believe Exhibit
7 4 contains the major factors underlying the difference in SWBT and Hatfield
8 Model loop and end office switching costs.
9 Q. BEFORE DISCUSSING THE DIFFERENCES IN UNBUNDLED LOOP COSTS,
10 COULD YOU BRIEFLY DESCRIBE THE APPROACH YOU USED TO REVIEW
11 THE STUDIES?
12 A. In reviewing the SWBT cost studies, I read the loop and end office switching
13 documentation. This included the high-level description of results, the various
14 spreadsheets, the output of models such as LOOPVST and SCIS and the
15 supporting work papers. I understand these materials have been made available
16 to AT&T. In addition to reading the various types of documentation, I
17 constructed several Excel worksheets which allowed me to independently verify
18 the SWBT cost calculations and analyze cost drivers.
19 For the Hatfield Model, I read the study documentation and analyzed the
20 algorithms, cost data and costing flow in the Excel worksheets relevant to loop
21 and end office costs. This involved considerable effort. The Hatfield Model is
22 not "simple." It involves thousands of cells of data, and hundreds of algorithms.

1 Tracing the steps through the model was tedious, but necessary to verify the
2 calculations which produce the model results. As with the SWBT studies, I set-
3 up several worksheets to verify the Hatfield costing and analyze cost drivers.

4 DIFFERENCES IN UNBUNDLED LOOP COSTS

5 Q. PLEASE DESCRIBE THE UNBUNDLED LOOP COSTS FROM THE SWBT
6 AND HATFIELD COST MODELS WHICH WERE COMPARED?
7 A. The loop costs provided in the direct testimonies of Mr. Moore of SWBT and Mr.
8 Flappan of AT&T were compared.[5] Exhibit 1 shows these loop costs by
9 geographic zone and for the state of Kansas in total.
10 Q. ARE THE SWBT AND HATFIELD MODEL LOOP COSTS COMPARABLE TO
11 ONE ANOTHER?
12 A. SWBT and Hatfield Model loop cost results are comparable for Kansas *in total.*
13 Since geographic zones are defined differently in the studies, it is not possible to
14 directly compare the loop costs by zone.
15 Q. HOW ARE GEOGRAPHIC ZONES DEFINED IN THE SWBT AND HATFIELD
16 STUDIES?
17 A. The three SWBT geographic zones correspond with *wirecenters* of different *line*
18 *sizes*. Zone 1 includes wirecenters with up to 6,000 lines; zone 2 from 6,000 to
19 100,000 lines; and, zone 3 over 100,000 lines.[6] The Hatfield Model defines

5 See Moore Direct Testimony, Schedule 13, page 1 or 3, and Flappan Direct Testimony, page 88 of 92.
6 See Springfield Direct Testimony, pages 31 and 32.

geographic zones based on *line density* of *Census Block Group (CBG) areas*, with zone 1 having up to five lines per square mile and zone 5 having over 2,550 lines per square mile.

Q. ARE STATEWIDE AVERAGE LOOP COSTS COMPUTED IN THE SWBT COST STUDIES AND THE HATFIELD MODEL SIGNIFICANTLY DIFFERENT?

A. Yes. SWBT's average monthly loop costs shown in Exhibit 5 is almost double the Hatfield Model loop cost. There are approximately 1.3 million lines in service in Kansas. A difference in loop costs of this magnitude equates to an almost $200 million cost difference for Kansas.

Q. CAN SOURCES OF THE DIFFERENCE IN STATEWIDE AVERAGE LOOP COSTS BE FURTHER BROKEN DOWN?

A. Yes. Exhibit 6 compares the SWBT and Hatfield Model loop costs in terms of the three loop components in the Hatfield Model - *loop distribution (including the NID)*[7], *loop concentration and loop feeder*.

SWBT loop costs also include the cost of the main distributing frame (MDF) in the end office. According to the Hatfield Model documentation, the cost of the MDF is included in end office switching costs, rather than the loop.[8] Approximately five percent of the difference in loop costs is due to this difference in costing methodology.

---

7 NID - Network Interface Device.
8 Model Description, Hatfield Model, Version 2.2, Release 2, page 22.

Q. IN WHICH LOOP COMPONENT ARE THE DIFFERENCES IN SWBT AND HATFIELD MODEL COSTS THE GREATEST?

A. The difference in *loop distribution* costs accounts for 67% or most of the difference in loop costs. The difference in *loop concentration* costs accounts for 18%, and the difference in *loop feeder* costs accounts for 10%. The remaining 5% of the difference in loop costs is due to the treatment of MDF.

Q. HOW ARE LOOP DISTRIBUTION, LOOP CONCENTRATION AND LOOP FEEDER DEFINED IN THE HATFIELD MODEL, AND HOW WERE SWBT'S LOOP COMPONENTS MATCHED TO THE HATFIELD MODEL LOOP COMPONENTS?

A. Loop components are defined in the Hatfield Model documentation and its Excel spreadsheets.[9]

- *Loop distribution* costs include the costs of aerial cables, underground cables, buried cables, poles and conduit in the distribution portion of loop plant. They also include the costs of the drop cable, NID, terminal and splices. In SWBT's cost studies, loop distribution includes the Distribution Cable and Premises Termination components.
- *Loop concentration* costs in the Hatfield Model include the costs of the passive serving area interfaces (SAI), multiplexers and digital terminals.

9 Model Description, Hatfield Model, Version 2.2, Release 2, page 5. Also see Hatfield Model spreadsheets titled Distribution, Concentration and Feeder.

In SWBT's cost studies, loop concentration is synonymous with the Digital Loop Carrier component.

- *Loop feeder* costs include the costs of aerial cables, underground cables, buried cables, poles and conduit in the feeder portion of loop plant. Loop feeder in the SWBT cost studies includes the Feeder Stub, Feeder Distribution Interface and Feeder Cable.

Q. WHAT CAUSES THE LOOP COSTS COMPUTED BY SWBT AND THE HATFIELD MODEL TO BE SO DIFFERENT?

A. There generally are two causes of the difference in unbundled loop costs. The first cause is *differences in costing methodology*. This includes differences in:

- *Plant modeling*. The investment in loop plant is determined by variables such as cable length, cable size, the mix of cable types and others. The SWBT and Hatfield cost models estimate these characteristics for future loop facilities in different ways, and therefore produce different results.
- *Recurring cost development*. The models use different approaches in computing capital costs (depreciation, cost of money and income taxes) and operating expenses. In some cases, these differences significantly affect loop costs.

The second cause is *differences in cost data* used in model cost calculations. The SWBT and Hatfield cost models require hundreds of cost data to compute loop costs. These include plant construction costs, plant capacities, fill factors, various investment loadings, capital cost factors, expense data and others.

1 Differences in several key cost data contribute to the difference in SWBT and
2 Hatfield Model loop costs.
3 Q. ASSUMING THE COSTING METHODOLOGY OR COST DATA OF ONE
4 MODEL ARE MORE APPROPRIATE THAN THE OTHER FOR ESTIMATING
5 FORWARD-LOOKING ECONOMIC COSTS, IS IT POSSIBLE TO CORRECT
6 COSTING METHODOLOGY OR COST DATA?
7 A. In some cases, yes. Cost data generally are entered into a model or reside in
8 the model as default values. These often can be changed without difficulty.
9 Costing methodology is more difficult to correct since it requires changing the
10 structure of the model. This is an important consideration in this case because
11 differences in costing methodology significantly contribute to the differences
12 between SWBT and Hatfield Model loop costs.

LOOP DISTRIBUTION COSTS

Q. PLEASE DESCRIBE THE DIFFERENCES IN THE SWBT AND HATFIELD COST MODELS AS THEY RELATE TO THE *LOOP DISTRIBUTION* COMPONENT OF LOOP COSTS?

A. The SWBT and Hatfield loop cost models are quite complicated. As I described earlier, they also incorporate different costing methodologies. To compare loop distribution costs, statewide average values for the key *cost drivers*, or variables which determine costs, were identified. The cost drivers for loop distribution are shown in the following table.

Investment / Pair-Foot of Plant Capacity / Fill Factor
Average Investment / Pair-Foot in Service X Average Cable Length (Feet)
Investment / Loop X Annual Cost Factor
Annual Cost / Loop Common Cost Fixed Allocator
Annual Cost / Loop (Including Common Costs) / 12 Months
Monthly Loop Cost

The loop distribution *investment per pair-foot of cable capacity* is the average, forward-looking cost of constructing distribution cables of various types (aerial, underground and buried cables) expressed per pair-foot of cable capacity. Its value is computed using the full, physical capacity of the distribution cables. The

investment per pair-foot of cable capacity is divided by a *fill factor* for loop distribution to determine the *average investment per pair-foot in service.*[10] The average investment / pair-foot in service is applied to the *average cable length* (feet of distribution cable / loop) to compute the distribution cable *investment per loop*. Finally, the investment per loop is multiplied by an *annual cost factor* to compute capital costs and operating expenses. To this amount, *common costs* (*or variable overheads* in the Hatfield Model) are added, and the result is divided by 12 months to compute the loop distribution *monthly cost / loop.*

Exhibit 7 shows the loop distribution costs for SWBT and the Hatfield Model computed in this simplified format. It shows the differences in the key cost drivers underlying loop distribution costs calculated SWBT and the Hatfield Model.

Q. ARE THE DIFFERENCES IN THE COST DRIVERS SIGNIFICANT?

A. Yes. The differences are substantial.

- The Hatfield Model's average distribution cable investment / pair-foot of capacity is *sixty percent less* than the SWBT value. The Hatfield Model is assuming future distribution cable construction costs per pair-foot of capacity will be sixty percent lower than expected by SWBT.

10 Assume 100 feet of 1,200 pair distribution cable has forward-looking construction cost or investment of $120,000. Its physical capacity is 120,000 pair-feet (100 feet X 1,200 pairs), and the investment per pair-foot of capacity is $1.00. If the fill factor is 40%, this means an average of 400 pairs or 48,000 pair-feet are anticipated to be in service. In this case, the average investment per pair-foot in service is $2.50.

- The Hatfield Model fill factor is significantly higher than the SWBT fill factor. A higher fill factor lowers the average investment / pair-foot *in service*. As a consequence, the Hatfield Model is expecting future construction costs per pair-foot in service to be 71% below the SWBT estimate. This is an extraordinary difference in estimates of future costs.
- On the other hand, the average distribution cable length developed by the Hatfield Model is *80% greater* than SWBT's average distribution cable length. This was surprising since SWBT's average cable length reflects the actual loop lengths in the network today, whereas the Hatfield Model documentation describes a "scorched node" model which develops "efficient, forward-looking network investments and costs"[11] The Hatfield Model was expected to develop shorter distribution cable lengths on average.
- Annual cost factors on an aggregate basis for all plant accounts are approximately the same in the SWBT cost studies and the Hatfield Model. (However, there are significant differences in the underlying capital cost factors and operating expense factors which tend to offset one another.)
- Finally, the difference in SWBT's common cost fixed allocator and the Hatfield Model variable overhead factor contributes to the difference in distribution cable costs.

[11] Model Description, Hatfield Model, Version 2.2, Release 2, page 2.

Q. EXHIBIT 7 ALSO COMPARES THE SWBT AND HATFIELD MODEL COSTS FOR THE PREMISES TERMINATION PORTION OF THE LOOP. ARE THE DIFFERENCES IN PREMISES TERMINATION COSTS SIGNIFICANT?

A. Overall, SWBT's premises termination cost and the Hatfield Model cost for the drop cable, NID, terminal and splice are about the same. The underlying cost drivers (investment / loop, annual cost factor, etc.) are different, but the differences tend to negate one another.

Q. RETURNING TO THE DIFFERENCE IN DISTRIBUTION CABLE COSTS, WHAT CAUSES THE HATFIELD MODEL INVESTMENT / PAIR-FOOT OF CAPACITY TO BE SIXTY PERCENT LOWER THAN THE INVESTMENT IN SWBT'S COST STUDIES?

A. The investment / pair-foot of capacity is a function of *cable mix* (aerial, underground and buried cable), *cable size* (number of pairs) and *cable construction costs / foot*. The *level of structures* investment required to support the distribution cable also is a factor. The values of each of these variables are different between the SWBT and Hatfield cost models. Of the four variables, though, the difference in cable size appears to have the greatest effect. Exhibit 8 shows the distribution of cable construction costs per pair-foot of distribution cable in the Hatfield Model. It indicates an average investment / pair-foot (excluding structures) of $0.0217 and an average distribution cable size of 400 pairs. This is well above the actual distribution cable size in SWBT cost studies as suggested by the data in Exhibit 9. Exhibit 9 shows the SWBT

1 investments / pair-foot for aerial, underground and buried cables. SWBT's
2 average investment / pair-foot (excluding structures) is $0.0639, which indicates
3 an average distribution cable size of 75 to slightly more than 100 pairs.
4 Q. EXHIBIT 9 INDICATES SWBT'S DISTRIBUTION CABLE COSTS ARE HIGHER
5 FOR SMALL SIZED CABLES AND ABOUT THE SAME AS THE HATFIELD
6 MODEL AT CABLE SIZES OVER 200 PAIRS. WHAT CAUSES THIS?
7 A. The Hatfield Model assumes trenches for SWBT buried cable will be shared by
8 other utilities and excludes two-thirds of buried cable placement costs from its
9 cable investments. Mr. Hearst in his rebuttal testimony, though, states that
10 SWBT does not share trenches with other utilities and does not anticipate doing
11 so in the future. If the buried cable placement costs attributed to other utilities
12 are added back to distribution cable costs, the Hatfield Model investment / pair-
13 foot of capacity appears as shown in Exhibit 10. In this case, SWBT and Hatfield
14 Model distribution cable costs are closer, but still significantly different.
15 Q. ARE THERE OTHER IMPORTANT DIFFERENCES IN THE COST DRIVERS
16 UNDERLYING THE DISTRIBUTION CABLE UNIT INVESTMENTS?
17 A. Yes. There are differences in structures loadings. In the Hatfield Model, only
18 one third of the investment in poles and conduit are included in the loop
19 investment. The remaining two thirds are assumed to be attributable to other
20 utilities which presumably share SWBT poles and conduit.
21 Q. IF SWBT'S AVERAGE DISTRIBUTION CABLE SIZES ARE ASSUMED AND
22 STRUCTURES COSTS ARE ESTIMATED AT THE SWBT COST LEVELS,

WHAT IS THE EFFECT ON THE HATFIELD MODEL LOOP DISTRIBUTION COST?

A. Under these assumptions, the SWBT and Hatfield Model investments per unit of capacity would be the same at $0.0685 / pair-foot. The Hatfield Model distribution cable cost should increase from $8.02 / month to $21.77 as shown in Exhibit 11. However, this accepts the Hatfield Model estimate of distribution cable length which appears to be too long. Using SWBT's average distribution cable length the distribution cable cost should increase from $8.02 to $12.81.

Q. WHAT WOULD BE THE HATFIELD MODEL UNBUNDLED LOOP COST UNDER THESE CIRCUMSTANCES?

A. It would increase from $14.95 to $19.74 per month.

Q. IF THE COMMISSION DECIDED, FOR EXAMPLE, THE HATFIELD MODEL'S ESTIMATES OF DISTRIBUTION CABLE SIZE, CABLE LENGTH AND THE TREATMENT OF STRUCTURES WERE NOT REASONABLE, CAN THESE VARIABLES BE READILY CHANGED IN THE HATFIELD MODEL?

A. I don't think so. These are variables determined by the plant modeling inherent in the Hatfield Model. Unlike the Hatfield estimates of construction cost data or fill factors which can be modified by the user, these and other variables which are dependent on internal model algorithms would not be simple to change.[12]

---

12 Cost input data are difficult in some cases to directly "map" from one model to the other. This makes it difficult, for example, to substitute a SWBT value for a value in the Hatfield Model in these cases. For example, the Hatfield Model does not accept average cable lengths as input data.

LOOP CONCENTRATION

Q. PLEASE DESCRIBE THE DIFFERENCES IN THE SWBT AND HATFIELD COST MODELS AS THEY RELATE TO THE SECOND HATFIELD MODEL LOOP COMPONENT - *LOOP CONCENTRATION*.

A. Exhibit 12 summarizes the differences between the SWBT and Hatfield Model loop concentration costs in terms of the underlying cost drivers. Again, the differences are substantial.

- The *average fixed cost of DLC systems* assumed by the Hatfield Model is less than 1/5 the fixed cost expected by SWBT. This is in part due to the fact that SWBT expects 75% of future digital loop carrier (DLC) systems to *not be integrated* with the end office switching system. The Hatfield Model assumes *integrated* DLC systems. Integrated DLC systems do not require nearly as much circuit equipment.
- On average, the Hatfield Model assumes smaller DLC systems in terms of voice grade channels per system. This raises the Hatfield Model fixed cost / channel of capacity. The Hatfield Model also assumes a lower average fill factor which raises its fixed cost / channel in service. These two factors, however, are more than offset by the much lower fixed cost / DLC system.
- Another important difference in the studies is in the variable cost / channel for the channel units. With 75% non-integrated DLC systems, SWBT

requires channel units both at the end office and at the serving area interface 75% of the time. The Hatfield Model appears to assume only one channel unit for the remote location.

- One other investment-related difference is in the estimate of the number of loops in Kansas which will be served via DLC systems. SWBT expects the figure to be substantially less than the Hatfield Model. This is probably due to the Hatfield Model assumption of DLC systems being used for loops with feeder cable lengths over 9,000 feet.[13]
- SWBT's annual cost factor for the loop concentration component and its common cost allocation also are greater than those of the Hatfield Model.

As a result of these differences, the Hatfield Model loop concentration costs are about half the costs anticipated by SWBT.

Q. IF THESE DIFFERENCES IN COSTS ARE TO BE RECONCILED, WHICH AREAS DESERVE THE MOST ATTENTION?

A. The Hatfield Model assumption of *all integrated DLC systems*, its *fixed cost of DLC systems*, and the *percentage of Kansas loops which will be served by DLC systems* are key. In addition, assumptions regarding the expected *service life* for circuit equipment and circuit equipment operating expenses which contribute to the lower Hatfield Model annual cost factor deserve attention. Finally, the

13 A sensitivity analysis was run on the Hatfield Model increasing the distance at which fiber and digital loop carrier systems are used from 9,000' to SWBT's 15,000'. This change increased the Hatfield loop cost from $14.95 to $15.55, or only four percent.

1 difference in SWBT's common cost fixed allocation and the Hatfield variable
2 overhead allocation must be reconciled.

3 LOOP FEEDER

4 Q. DID YOU ALSO ANALYZE THE FACTORS CONTRIBUTING TO THE
5 DIFFERENCE IN LOOP FEEDER COSTS?
6 A. Loop feeder costs were not analyzed to the extent of loop distribution and loop
7 concentration. As shown in Exhibit 6 differences in loop feeder costs represent
8 only ten percent of the total difference in loop costs. Nevertheless, the Hatfield
9 Model loop feeder cost is substantially below SWBT's cost. In broad terms, this
10 is due to Hatfield having lower loop feeder investment / loop in service, lower
11 capital cost factors and a lower common cost allocation. Further analysis would
12 be required to isolate the underlying causes.

13 DIFFERENCES IN END OFFICE SWITCHING COSTS

14 Q. PLEASE DESCRIBE THE END OFFICE SWITCHING COSTS FROM THE
15 SWBT AND HATFIELD COST MODELS WHICH WERE COMPARED?
16 A. The end office switching costs provided in the direct testimonies of Mr. Moore
17 and Mr. Flappan were compared. Exhibits 2 and 3 show these costs for the
18 state of Kansas. Note that SWBT's cost study computes end office usage costs
19 for the three geographic zones in Kansas, whereas the Hatfield Model computes

1 a single, statewide average usage cost. Both SWBT and the Hatfield Model
2 compute statewide average end office port costs.
3 Q. ARE THE END OFFICE COSTS COMPUTED IN THE SWBT AND HATFIELD
4 COST MODELS SIGNIFICANTLY DIFFERENT?
5 A. Yes. The Hatfield end office port and usage cost estimates are about half the
6 SWBT costs.
7 Q. WHAT CAUSES THE HATFIELD END OFFICE SWITCHING COSTS TO BE SO
8 MUCH LOWER THAN SWBT'S COSTS?
9 A. Exhibits 13 and 14 show the key factors underlying the differences in end office
10 switching costs.
11 • First, the SWBT *switching system investment / line in service* is much
12 greater than the value assumed in the Hatfield Model. SWBT's switch
13 investments are computed by the Switching Cost Information System
14 (SCIS). SCIS is widely used by local exchange companies to compute
15 switching system costs based on detailed information on the number of
16 lines in service, usage and other switch characteristics.[14] The Hatfield
17 Model documentation describes its investment / line in service as being
18 based on "the average investment per new line of digital switching paid by

---

14 The FCC describes SCIS in its Order on Open Network Architecture Tariffs of Bell Operating Companies (CC Docket No. 92-91). "SCIS is a forward-looking model that calculates investments based on switch replacement costs rather than historical or embedded costs, and the more recent SCIS software provides the most up-to-date design and pricing basis from which to estimate future BSE-specific investments."" (para. 21)

The Commission also expressed an opinion regarding the validity of SCIS. "Andersen [independent reviewers of the SCIS model] concluded in its report that, although, SCIS permits users fairly wide discretion in selecting variables, the SCIS model itself is fundamentally sound. This finding is consistent with the findings of the Commission's review of the SCIS models submitted to us in camera in December 1991." (para 82.)