BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Investigation into Pricing of Unbundled Network Elements	)))	Docket No. 990649B-TP

SURREBUTTAL TESTIMONY OF

DR. TIMOTHY J. TARDIFF

AND

MR. FRANCIS J. MURPHY

ON BEHALF OF

VERIZON FLORIDA INC.

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INTRODUCTION

Q. DR. TARDIFF, PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Timothy J. Tardiff. I am a Vice President at National Economic Research Associates ("NERA"). My business address is 1 Main Street, Cambridge, MA 02142.

Q. DR. TARDIFF, PLEASE DESCRIBE NERA AND THE WORK YOU PERFORM.

A. NERA provides micro-economic analysis, often in regulatory and litigation settings. During the last several years, our telecommunications practice in general, and I in particular, have been actively involved in the economic issues associated with implementing the Telecommunications Act of 1996 (the "Act"), including participating in unbundled network element ("UNE"), universal service fund ("USF"), and interLATA entry ("Section 271") proceedings. I have filed several affidavits in proceedings before the Federal Communications Commission ("FCC") (often in collaboration with Professor Alfred Kahn) covering issues such as the proper economic principles for costing and pricing local exchange services and UNEs, the competitiveness of high-capacity transmission services in support of applications by US West for forbearance under Section 10 of the Act, and public interest affidavits in support of SBC's applications for entry into the interLATA long-distance market. I have also testified in state regulatory proceedings and arbitrations pursuant to the Act on local network

unbundling and universal service funding. My academic credentials and professional experience are set forth in more detail in Attachment 1 to this joint testimony.

Q. MR. MURPHY, PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Francis J. Murphy. I am the President of Network Engineering Consultants, Inc. ("NECI"), located at 5 Cabot Place, Suite #3, Stoughton MA, 02072.

Q. MR. MURPHY, PLEASE DESCRIBE NECI AND THE WORK YOU PERFORM.

A. NECI specializes in the fields of cost model analysis and development, and network engineering, planning and implementation. I specialize in service cost analysis as it relates to the telecommunications industry. Since founding NECI, I have analyzed and evaluated telecommunications costing methodologies and models involved with local network unbundling, USF support, non-recurring costs, avoided costs, and collocation cost proceedings. I have also authored expert reports and provided expert testimony on engineering and cost analyses of models filed in numerous state and federal dockets. During the past five years, I have analyzed extensively the various releases of the HAI Model, the Benchmark Cost Proxy Model ("BCPM"), the FCC's universal service cost proxy model (the so-called "Synthesis Model" or "Model" (referred to by Dr. Ford as the "HCPM")),

as well as the three versions of the Modified Synthesis Model sponsored by AT&T Communications, Inc. ("AT&T") and WorldCom, Inc. ("WorldCom") in various UNE and USF proceedings. My work with these models has included an evaluation of how each model's platform and inputs were used in different applications including federal USF, state USF, and state UNE cost studies. My academic credentials and professional experience are set forth in more detail in Attachment 2 to this joint testimony.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. We will rebut Z-Tel Communications Inc.'s ("Z-Tel") witness George Ford's comparative cost analysis as between Verizon Florida Inc. ("Verizon") and BellSouth. We will show that the cost model Dr. Ford relied upon, the Synthesis Model, cannot identify differences between carriers providing UNEs in the same state, and that Dr. Ford has put the Model to a use for which it was never intended. Moreover, Dr. Ford has not, and does not intend to, run the Model -- he is so unfamiliar with the Model that his comparative cost analysis is inherently suspect. Dr. Ford's questionable and unexamined cost comparisons provide no useful information that the Florida Public Service Commission ("Commission") can use to evaluate Verizon's Integrated Cost Model ("ICM-FL") or select the proper inputs for its service territory in Florida.

II. DR. FORD'S COMPARATIVE COST ANALYSIS IS FUNDAMENTALLY FLAWED

A. The FCC Has Never Used, Nor Authorized the Use of, the Synthesis Model in the Manner Proposed by Dr. Ford

Q. CAN THE SYNTHESIS MODEL ACCURATELY IDENTIFY COST DIFFERENCES BETWEEN CARRIERS PROVIDING UNES IN THE SAME STATE?

A. Absolutely not. Despite Dr. Ford's statements to the contrary, the outputs of the Model cannot accurately measure the cost differences between carriers operating in the same state. Dr. Ford asserts, incorrectly, that the FCC has used his approach in numerous 271 proceedings. (Ford Revised Direct Testimony at 21.) The FCC has done no such thing. In the Section 271 context, the FCC uses the Synthesis Model to compare the rates of the *same incumbent local exchange carrier ("ILEC")* across *two states*. However, as Dr. Ford eventually conceded, the FCC has never used, nor has it authorized the use of, the Synthesis Model to identify the relative cost differences between *two ILECs* operating in a *single state*. (Ford Depo. Tr. at 51-52, 85-86, 103-104; *see also* Ford Depo. Tr. at 106 (Dr. Ford acknowledging that "[t]he FCC has never said a thing about . . . using the [Synthesis Model] to compare costs within a state").)

Q. IS DR. FORD'S USE OF THE SYNTHESIS MODEL CONSISTENT WITH THE MANNER IN WHICH THE FCC HAS USED THE MODEL IN SECTION 271 PROCEEDINGS?

A. No. Dr. Ford fails to recognize that the Synthesis Model comes into play only when the FCC is examining whether a state regulatory commission did not apply TELRIC, or did so improperly, when setting UNE rates. In such a case, the FCC uses the Synthesis Model to benchmark the proposed rates of the ILEC seeking Section 271 authorization against the ILEC's rates in a Section 271-approved state to determine whether the proposed rates fall within a TELRIC-based range of reasonableness. Associated with this comparison are the following prerequisites: "two states have a common BOC; the two states have geographic similarities; the two states have similar, although not necessarily identical, rate structures for comparison purposes; and the Commission has already found the rates in the comparison state to be reasonable." (Application of Verizon Pennsylvania Inc. et al. for Authorization to Provide In-Region, InterLATA Services in Pennsylvania, CC Docket No. 01-138, *Memorandum Opinion and Order* (Sept. 19, 2001) at ¶ 63 ("PA 271 Order").) Dr. Ford's use of the Synthesis Model fails to meet any of these FCC-mandated criteria. Moreover, as Dr. Ford acknowledges, he has not evaluated either ICM-FL's platform or inputs, and thus, can make no independent determination as to whether Verizon's proposed rates are TELRIC-compliant. (Ford Depo. Tr. at 127-128.)

Finally, to date, the FCC's applications of its "range of reasonableness" test have only demonstrated that previously-established rates were reasonable. Thus, while "passing" the test confirms the

reasonableness of rates, "failing" the test does not necessarily mean that the rates are unreasonable. Because of the complex nature of estimating UNE costs, there may well be perfectly reasonable explanations, including legitimate differences in critical inputs between companies, that properly account for cost differences that may seem unduly large.

Q. ARE DR. FORD'S CALCULATIONS THE SAME AS THOSE MADE AND REPORTED BY THE FCC IN 271 PROCEEDINGS?

A. No. Even assuming that Dr. Ford's use of the Synthesis Model were appropriate in this context -- which it is not -- it became apparent during Dr. Ford's deposition that he had failed to make the requisite adjustments, identified by the FCC, to the Synthesis Model's cost estimates as he had initially claimed. (Ford Depo. Tr. at 81; *see also* PA 271 Order at 37, n.249.) When first questioned about the consistency between the changes made to the Synthesis Model's outputs in this proceeding and the changes made by the FCC in Verizon's Pennsylvania 271 proceeding -- the FCC's most recent ruling on the subject -- Dr. Ford stated that, with respect to loops, he knew "*for certain*" that his modifications were consistent with the calculations made by the FCC in the Massachusetts and Pennsylvania 271 Orders. (Ford Depo. Tr. at 72 (emphasis added); *see also* Ford Revised Direct Testimony at 21; Z-Tel's Response to Verizon's Motion for Extension of Time to File Surrebuttal Testimony (noting that "the calculations performed by Dr. Ford using the output files of the Model *are the same*

calculations made and reported by the FCC in the Verizon-Massachusetts and Verizon-Pennsylvania 271 orders") (emphasis added).) This is simply not true.

Among other things, Dr. Ford's switching values do not reflect all of the modifications made in the Pennsylvania 271 Order (Ford Depo. Tr. at 81), and he was not certain whether his computations accounted for the fact that the FCC considered UNE-P to be a wholesale offering. (Ford Depo. Tr. at 80.) Despite having referenced the Pennsylvania 271 Order in his revised direct testimony (Ford Revised Direct Testimony at 21), Dr. Ford reported that he "didn't read the footnotes carefully enough" to realize the full complement of changes made by the FCC to the Synthesis Model for 271 purposes. (Ford Depo. Tr. at 81.) As Dr. Ford admits, his use of the Synthesis Model in this proceeding does not satisfy the criteria established by the FCC in its Pennsylvania 271 Order. (Ford Depo. Tr. at 85.) Indeed, with respect to switching, Dr. Ford admits that his calculations were "a guess." (Ford Depo. Tr. at 72.)

B. Dr. Ford's Unfamiliarity with the Synthesis Model Renders His Comparative Cost Analysis Inherently Suspect

Q. WAS DR. FORD OR Z-TEL INVOLVED IN THE DEVELOPMENT OF THE SYNTHESIS MODEL?

A. No. Neither Z-Tel or Dr. Ford, by his own admission, was not involved in the FCC's universal service proceeding (CC Docket Nos. 96-45 and

97-160), in which the Synthesis Model was developed and ultimately adopted by the FCC. (Ford Depo. Tr. at 32.) This proceeding spanned a number of years and involved representatives of all segments of the telecommunications industry, including ILECs (such as Verizon and BellSouth) and CLECs (such as members of the ALEC Coalition). However, while purporting to know the variety of purposes for which the Synthesis Model was developed, and uses to which it can be put, neither Dr. Ford, nor his employer Z-Tel, participated in the Model's development.

Q. HAS DR. FORD FAMILIARIZED HIMSELF WITH THE SYNTHESIS MODEL'S PLATFORM AND INPUTS?

A. No. Dr. Ford has read the Synthesis Model's documentation, but admittedly has "not studied it." (Ford Depo. Tr. at 33.) Dr. Ford admits that he has never run the Model, (Ford Depo. Tr. at 58, 78), or accessed anything other than Model outputs that were posted on the FCC's website over a year ago. (Ford Depo. Tr. at 34, 37, 41, 74 and 78.) As a result, Dr. Ford is generally unfamiliar with the Synthesis Model's platform and inputs.

Dr. Ford concedes that he does not understand the process the Model uses to compute loop costs, and has no idea whether it was similar or dissimilar to the methodology employed in ICM-FL. (Ford Depo. Tr. at 58.) In addition, with respect to inputs, Dr. Ford cannot identify which of the Model's approximately 1,400 default inputs reflect nationwide (as

opposed to state- or company-specific) values (Ford Depo. Tr. at 34-35), and has not attempted to verify the accuracy of the Model's input values. (Ford Depo. Tr. at 34.) In fact, when questioned as to his familiarity with a variety of the Model's inputs, including the customer location data, plant mix, structure sharing and switch discounts, Dr. Ford concedes that he did not know how the Synthesis Model reflected the differences between Verizon and BellSouth with respect to those inputs. (Ford Depo. Tr. at 61-62, 64-65.) Moreover, Dr. Ford acknowledges that he is not an engineer and is not familiar with outside plant design (Ford Depo. Tr. at 48, 60), and thus is unable to verify whether the Synthesis Model adheres to widely-accepted engineering design practices. (Ford Depo. Tr. at 59.)

C. Dr. Ford's Comparative Cost Analysis Is Based Upon An Obsolete and Error-Ridden Version of the Synthesis Model

Q. WHICH RELEASE OF THE SYNTHESIS MODEL DID DR. FORD USE IN CONDUCTING HIS ANALYSIS?

A. Dr. Ford was "not exactly sure" which version of the Synthesis Model he used to produce his results. (Ford Depo. Tr. at 41.) He assumed that his conclusions were based upon the version of the Synthesis Model contained on the FCC's website at the time he performed his calculations -- some 10 to 12 months ago. (Ford Depo. Tr. at 41, 74; *see also* Ford Depo. Tr. at 43 (Dr. Ford admitting that he did not "recall updating the model . . . within the last 10 months").) In fact, the outputs Dr. Ford uses are from the version that produced the FCC's

cost estimates for the universal service fund for 2000, which were posted on the FCC's website in January of that year.

Q. IS THIS THE MOST RECENT RELEASE OF THE SYNTHESIS MODEL?

A. No. In the 10 to 12 months that have transpired since Dr. Ford conducted his analysis, the FCC has released at least four new versions of the Synthesis Model -- in June, July, August, and as recently as December of 2001. (Ford Depo. Tr. at 43 and Depo. Exhibit 3 ("Design History of HCPM").) Thus, any change or update to the Synthesis Model, or correction of errors contained therein, is not reflected in the comparative cost analysis performed by Dr. Ford. On this point there is no dispute: the Model's output file, which forms the basis of his analysis, is obsolete (Ford Depo. Tr. at 41-44, 75), and Dr. Ford admits that he has not reviewed the various changes made by the FCC to the Synthesis Model since he initially performed his calculations over a year ago. (Ford Depo. Tr. at 43.)

Q. WHAT TYPES OF CHANGES HAS THE FCC MADE TO THE SYNTHESIS MODEL SINCE DR. FORD CONDUCTED HIS ANALYSIS?

A. The FCC has made a number of changes to the Synthesis Model since Dr. Ford conducted his analysis. For example, the December 18, 2001 release of the Model changed the line counts (i.e., demand), as well as the usage data, employed by the Model. (Ford Depo. Tr. at 44.) The

Model Dr. Ford used does not reflect any of this updated information. (Ford Depo. Tr. at 44.)

Equally problematic is the fact that Dr. Ford is unaware of the numerous corrections that have been made to various Model components upon which the Synthesis Model is based. For example, Dr. Ford had no idea that the FCC, and/or the sponsors of modified versions of the Synthesis Model (i.e., AT&T and WorldCom), have acknowledged, and attempted to fix, a host of errors contained in both the Synthesis Model's loop module (Depo. Exhibit 3 ("Design History of HCPM")) and the HAI Model's switching and interoffice module, from which the Synthesis Model's switching and interoffice module was derived. (Ford Depo. Tr. at 64.)

III. THE SYNTHESIS MODEL WAS NEVER DESIGNED TO ESTIMATE RELATIVE COST DIFFERENCES BETWEEN CARRIERS IN A SINGLE STATE

Q. WHAT IS YOUR OVERALL ASSESSMENT OF DR. FORD'S RELATIVE COST COMPARISONS?

A. For the reasons we discuss below, even if they were valid (which they are not), Dr. Ford's relative cost comparisons provide no useful information to the Commission in evaluating the ICM-FL's platform and Verizon-specific inputs. In fact, each of the comparisons Dr. Ford provides in Exhibit GSF-11 (loops, switching, and transport) is flawed -- Dr. Ford's application of the Synthesis Model does not provide definitive information on whether Verizon's costs are (or should be)

higher or lower than BellSouth's.

Q. EVEN ASSUMING DR. FORD HAD MADE THE NECESSARY ADJUSTMENTS, IS THE SYNTHESIS MODEL CAPABLE OF ACCURATELY IDENTIFYING RELATIVE COST DIFFERENCES WITHIN A GIVEN STATE?

A. No. Dr. Ford's whole analysis rests on the faulty premise that the Synthesis Model properly represents the relative cost differences between companies, states, or by implication, any two entities one might want to compare. (Ford Depo. Tr. at 94.) In performing the comparison, however, many (if not most) of the critical inputs (e.g., the prices of network equipment, the amount of sharing with other companies, etc.) are assumed to be the same for the entities being compared. Applied in this fashion, the Synthesis Model will never produce valid relative costs, let alone absolute cost levels for Florida.

Q. IS DR. FORD'S BASIC PREMISE VALID?

A. No. The Synthesis Model will produce the wrong cost *levels* (i.e., its costs will be too high or too low) for two fundamental reasons: (1) its estimates of the quantities of network equipment (e.g., telephone poles, cable, etc.) are incorrect due to platform errors, and (2) the nationwide average inputs used to produce those quantities are incorrect. Dr. Ford's analysis assumes that, whatever errors may result from having the wrong cost levels, different entities will be affected in the same way (i.e., if an error causes Company A's costs to

be overstated by 25 percent, Company B's costs will also be overestimated by 25 percent). Dr. Ford further assumes that the specific manner in which a state commission measures these costs (i.e., through the use of a Commission-selected UNE cost model) is irrelevant to the Synthesis Model's purported ability to correctly depict these relative cost relationships. Dr. Ford ignores the fact that, in the real world, there is no reason to expect such a fortuitous result -- especially when analyzing a complex industry such as telecommunications. Given the complexity of cost models and the sheer number of user adjustable inputs they include, and the specific universal service application for which the Synthesis Model was developed, it is unreasonable to expect that the Synthesis Model has attained the level of perfection that Dr. Ford's basic premise implies.

Q. ARE THE SYNTHESIS MODEL'S LOOP COST COMPARISONS VALID IN FLORIDA?

A. No. Even before the FCC completed its development of the Synthesis Model, the Commission selected a cost model and associated inputs for universal service support in Florida. Despite that fact that neither the Commission's model (as evident from the Commission's selection of both a different platform and inputs for BellSouth's UNE rates) nor the Synthesis Model are capable of establishing proper UNE prices for Verizon, comparing the results from the respective models in Florida calls into question the notion that the Synthesis Model produces valid relative cost comparisons, let alone proper loop cost estimates for

Florida. As Table 1 (attached hereto as Attachment 3) demonstrates, compared to the Commission's universal service model and inputs, the Synthesis Model understates loop investment per line, but by noticeably different percentages for Bell South (29 percent) and Verizon (23 percent). Clearly, the fact that the Synthesis Model's platform flaws and/or nationwide inputs produce cost estimates that are incredibly unrepresentative of the costs of providing service in Florida casts doubt on usefulness and validity of Dr. Ford's comparative cost analysis.

Q. ARE THERE OTHER REASONS THAT THE SYNTHESIS MODEL CANNOT PROVIDE A PROPER BENCHMARK FOR VERIZON'S LOOP COSTS IN FLORIDA?

A. Yes. Not only does the Synthesis Model produce different relative costs when compared to the Commission's previous universal service cost model and inputs, its relative costs are very different from those produced by the ICM-FL sponsored by Verizon in this case. Dr. Ford's comparison would seem to suggest that if the Synthesis Model produces a cost estimate for a particular company that is 80 percent of an external cost measure for density zone 1, then approximately the same 80 percent ratio should apply to the costs for other density zones. The Synthesis Model, however, does not produce accurate measures of these relative costs, as demonstrated by Table 2 (attached hereto as Attachment 4), which compares the loop costs produced by the Synthesis Model for the density zones proposed by

Verizon (adjusted to match the average loop cost shown in Dr Ford's GSF-11) to the values reported in Verizon witness Dennis Trimble's testimony. Table 2 demonstrates that, unlike the ICM-FL, the Synthesis Model is incapable of accurately reflecting a carrier's cost differences between density zones, thereby casting doubt on its ability to accurately reflect the cost differences between carriers within a state.

Q. WHY IS THE SYNTHESIS MODEL INCAPABLE OF IDENTIFYING ACCURATE RELATIVE COSTS DIFFERENCES BETWEEN COMPANIES?

A. In representing the most fundamental characteristics of how loop plant is deployed (e.g., the size of the distribution areas that serve Florida's customers) the Synthesis Model does not adequately account for either the engineering principles used to design such areas or important local conditions that may well produce real differences between companies, but would be undetected by the Model. Indeed, the FCC has acknowledged that the Synthesis Model does not conform to the Bellcore engineering standards, which guide real-world network planning. Although it could be adapted to accommodate networks designed for different jurisdictions, meet different service quality standards and network design principles (FCC HCPM Documentation, "Computer Modeling of the Local Telephone Network," (Oct. 1999) at Section 4.2, p. 20), Dr. Ford did not attempt to capitalize on the Model's ability to reflect such differences.

Further, the use of inappropriate engineering criteria is compounded by the Synthesis Model's use of imprecise and outdated data regarding the number and locations of customers and national inputs that do not reflect variations between companies. Consequently, the Model does not recognize such critical cost drivers such as the existence of any natural barriers (bodies of water), preservation areas, rights-of-way restrictions, highways, rail lines, etc. when configuring the network and determining the cost of facilities. As a result, the Model ignores real-world ILEC considerations, which would impact: (1) the actual characteristics of distribution areas (e.g., the lengths and sizes of cable facilities); (2) structure type (whether local ordinances, road side hazards, existing structure, etc., restrict the use of particular placement options, such as aerial); and (3) structure sharing opportunities (safety considerations, local ordinances, existing structure of other users). There is no reason to believe that ignoring the effects of such critical factors would distort the cost estimates for two different companies proportionately, as Dr. Ford assumes.

Q. IS DR. FORD'S END-OFFICE SWITCHING COMPARISON ACCUARTE?

A. No, for two reasons. First, the FCC includes only local usage in the monthly switching costs reported by Dr. Ford, so his comparison is incomplete at best. Second, and more important, the comparison itself seems puzzling and counterintuitive.

Q. PLEASE EXPLAIN.

A. Dr. Ford's comparison implies that BellSouth has a higher switching cost per line than does Verizon. The specific costs in Dr. Ford's Exhibit GSF-11 are incorrect because (among other things) they exclude non-local usage. Further, this result is counter-intuitive for the reasons the FCC provided in its Massachusetts 271 Order. (Memorandum Opinion and Order, *Application of Verizon New England Inc., Bell Atlantic Communications Inc. (d/b/a Verizon Long Distance), NYNEX Long Distance Company (d/b/a Verizon Enterprise Solutions) and Verizon Global Networks Inc., For Authorization to provide In-Region, InterLATA Services in Massachusetts,* 16 FCC Rcd 8488 (2001) at ¶ 16.) Switched costs per line are a function of the number of lines per switch and the relative number of remote switches in the network. Specifically, the Synthesis Model produces lower switching costs when switches are larger and when there are relatively more remotes. In fact, according to the Synthesis Model, BellSouth has a larger average switch size (33,000 lines versus 26,000 lines) and a greater proportion of remote switches (30 percent versus 13 percent), suggesting that its switching costs should be lower than Verizon's.

Q. WHAT ARE THE SPECIFIC PROBLEMS WITH THE SYNTHESIS MODEL'S TRANSPORT CALCULATIONS?

A. During the last couple of years, Verizon witnesses have uncovered fundamental errors in the switching and interoffice module of the Synthesis Model. These errors resulted in the exclusion of major

components of the fiber rings and associated electronics that make up interoffice facilities. Indeed, these "missing parts" account for the majority of the investment in interoffice facilities. The supplier of this module (HAI Consulting) and its sponsors (AT&T and WorldCom) have acknowledged these errors and supplied a purportedly corrected replacement module for use in the HAI Model. This replacement module has not yet been incorporated into the Synthesis Model. The Synthesis Model's error-ridden calculations could not possibly provide an accurate or useful benchmark for transport costs.

Q. WHY DOES THE SYNTHESIS MODEL PRODUCE SUCH INACCURATE AND IMPRECISE RESULTS FOR FLORIDA?

A. The Synthesis Model was designed for a very high level purpose -- to estimate the relative cost differences among states for a hypothetical carrier operating a narrowband-only network. As such, the Synthesis Model is fundamentally incapable of conducting the more detailed analysis necessary to identify the relative cost differences between two real-world carriers providing both narrowband and high-speed services within the same state. The Synthesis Model was never intended, let alone approved, by the FCC to estimate company-specific costs and use them in the manner proposed by Dr. Ford. In fact, when developing the Synthesis Model, the FCC specifically determined that it was not necessary to estimate the costs of a particular carrier. (Tenth Report and Order, *In re Federal-State Joint Board on Universal Service, In re Forward-Looking Cost Mechanism for High Cost Support*

for Non-Rural LECs, 14 FCC Rcd 20156, ¶ 162 (1999) (FCC explaining that, in adopting the Synthesis Model, it was "not attempting to identify any particular company's cost of providing the supported services") ("*Tenth Report and Order*").) Rather than engage in this time-consuming and burdensome, company- and jurisdiction-specific analysis in a nationwide proceeding, the FCC adopted a *national* proxy model, populated with *nationwide* input values, as an expedient. In doing so, the FCC acknowledged the obvious -- that its model could not accurately estimate the costs (forward-looking, TELRIC-based, or otherwise) of a particular carrier in a particular state. (*Tenth Report and Order* at ¶¶ 32, 162.) In fact, in light of the Synthesis Model's limited design parameters, the FCC has repeatedly and unequivocally stated that the Synthesis Model should not be used for purposes other than determining the *relative cost differences among states.* (*See e.g.*, *Tenth Report and Order* at ¶ 32; Memorandum Opinion and Order, *In the Matter of Verizon New England Inc., Bell Atlantic Communications, Inc. (d/b/a Verizon Long Distance), NYNEX Long Distance Company (d/b/a Verizon Enterprise Solutions) and Verizon Global Networks, Inc. for Authorization to Provide In-Region InterLATA Services in Massachusetts*, 16 FCC Rcd 8988 ¶ 32 (rel. Apr. 16, 2001).)

Q. ARE THERE OTHER REASONS WHY THE SYNTHESIS MODEL LACKS THE PRECISION NEEDED TO DETERMINE UNE COSTS?

A. Yes. The Synthesis Model was originally developed to identify costs for *high cost* areas, which the FCC has defined as 135 percent of the

national average cost produced by its Model. (In the Matter of Federal-State Joint Board on Universal Service, CC Docket No. 96-45, *Ninth Report and Order and Eighteenth Order on Reconsideration,* FCC 99-306 at ¶ 45 (rel. Nov. 2, 1999).) A state receives support only if the overall average cost in that state exceeds this benchmark, and federal universal service support is only allocated to those wirecenters that exceed the benchmark. (Id. at ¶ 70.) Therefore, the federal program ends up providing only a modest amount of funding to a very small number of wirecenters and lines. Indeed, when the FCC used the Model to determine 2000 funding levels, it provided high-cost funding for only 928 of the 12,501 wirecenters nationwide (about 7 percent), and less than 3 million of the 163 million lines (under 2 percent) owned by the companies subject to the program.

Q. DO YOU AGREE WITH DR. FORD'S ASSERTION THAT THE PRECISION OF THE SYNTHESIS MODEL IS DEMONSTRATED BY THE FACT THAT IT IS USED TO SPREAD A LARGE AMOUNT OF FUNDS? (FORD DEPO. TR. AT 102.)

A. No. Dr. Ford asserts, incorrectly, that "if [the Synthesis Model] is good enough to spread around 350 or 400 million dollars . . . then I don't know why it can't be good enough to do what I've done here." (Ford Depo. Tr. at 102.) First, Dr. Ford's assertion is factually incorrect. The Model has been used to determine and allocate federal high cost funds for three years (2000, 2001, and 2002), and for each year, the total funds were a little over $200 million. Moreover, while $200 million per

year in federal universal service support is not insignificant, it is only a tiny fraction of the total costs for basic service -- on the order of $0.10 per-month when the average cost of basic service estimated by the Model is over $20 per month. Indeed, absolutely no federal high-cost funds are provided in any of the territories served by the Florida ILECs (Verizon, BellSouth, Sprint, and Central) subject to the program.

IV. THE SYNTHESIS MODEL'S PLATFORM AND INPUT FLAWS CONCEAL THE RELATIVE COST DIFFERENCES BETWEEN CARRIERS IN A SINGLE STATE

Q. WHAT SPECIFIC PLATFORM FLAWS RENDER THE MODEL INCAPABLE OF ACCURATELY ESTIMATING THE RELATIVE COST DIFFERENCES AMONG CARRIERS OPERATING IN A SINGLE STATE?

A. A number of the Model's platform flaws render it incapable of accounting for significant attributes of a given carrier's network and the specific operating realities faced by that carrier in certain serving areas. As such, the Model is inherently unable to account for the associated differences in costs incurred by carriers operating very real, yet very different, networks in a particular state. For example, the Synthesis Model is incapable of reflecting the relative differences in ILEC costs based on their mix of high-capacity special access services. As an expedient, the Model assumes a uniform dispersion of surrogate special access demand in its loop cost calculations. In the real world, however, the preponderance of these special access

services are provisioned over fiber or coaxial cable and are generally concentrated in a few large business locations. Thus, the Model -- with its simplistic assumptions regarding special access services -- distorts the amount of outside plant constructed between serving areas, wire centers and carriers; and, as a result, is fundamentally incapable of accounting for these costly, real-world operational differences.

The Synthesis Model is also incapable of accounting for local operating conditions with respect to outside plant, and thus would be unable to accurately reflect the comparative costs of carriers operating in different areas of the state. For example, a carrier operating in a city where the local ordinances prohibit the placement of aerial cable (thereby necessitating the placement of the more-costly underground or buried cable) would have comparatively higher costs than a carrier operating in a city where there was no such restriction. The Synthesis Model's platform design parameters, however, render it incapable of accounting for these local differences and any cost disparities that may exist between these two carriers would not be accounted for in the Model's outputs.

Finally, the Model cannot reflect the unique demand characteristics, and the costs associated therewith, for a particular serving area. The Synthesis Model builds a network to accommodate a known, fixed level of demand, thereby ignoring the fact that, in the real world, telecommunications companies must deploy network resources to

meet demand as it materializes, expands, and fluctuates over time. Accordingly, the Synthesis Model is fundamentally incapable of producing cost estimates that reflect a carrier's unique deployment and allocation of resources.

Q. WHAT SPECIFIC INPUT FLAWS RENDER THE MODEL INCAPABLE OF IDENTIFYING COMPANY- AND STATE-SPECIFIC COST DIFFERENCES?

A. Paramount among the flaws that render the Model incapable of identifying company- and state-specific cost differences is the Model's reliance on nationwide average inputs. By definition, these nationwide averages conceal the true company-specific cost differences between carriers. Instead of addressing how differences in inputs and/or characteristics of service territories may produce legitimate cost differences between companies, Dr. Ford's results are based upon the use of a common set of vintage, nationwide inputs -- a comparison that necessarily hides legitimate costs difference between companies. For example, the Synthesis Model's switching costs are based upon nationwide ILEC depreciation data, and are limited to new switch purchases only. As such, the Model's switch prices do not reflect the cost differences associated with a specific carrier's mix of switches in a given state.

Dr. Ford acknowledges the problems associated with the Model's use of nationwide averages, yet does nothing to address this inherent

model shortcoming. For example, with respect to material prices and labor rates, Dr. Ford acknowledges that the Synthesis Model's inputs are not state- or company-specific, and thus would not represent the labor rates or material prices that Verizon (or BellSouth for that matter) actually experiences in Florida. (Ford Depo. Tr. at 48.) Indeed, even the FCC acknowledges that the use of company-specific values may be more appropriate for critical outside plant inputs such as plant mix, plant-specific expenses, and cable and structure costs. (*Tenth Report and Order* at ¶¶ 92, 93 and 356.) Dr. Ford, however, makes no adjustments to the Model to account for these intra-state, company-specific cost differences. Indeed, he has not even attempted to analyze whether the use of company- or state-specific data would have any impact on the cost estimates produced by the Synthesis Model. (Ford Depo. Tr. at 52.)

In short, Dr. Ford's reliance on generic, standardized, nationwide inputs render the Model fundamentally incapable of identifying the relative cost differences between Verizon, BellSouth, or any other carrier operating in Florida -- the Model cannot recognize these differences because Dr. Ford refuses to acknowledge they exist.

Q. DOES THIS CONCLUDE YOUR SURREBUTTAL TESTIMONY?

A. Yes.

TIMOTHY J. TARDIFF

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Dr. Tardiff received a B.S. with honors in Mathematics from the California Institute of Technology in Pasadena and a Ph.D. degree in Social Science from the University of California, Irvine, under a National Science Foundation Pre-doctoral Fellowship and an NSF Grant for Improving Dissertation Research in the Social Sciences.

Dr. Tardiff joined the faculties of the Department of Civil Engineering and the Division of Environmental Studies at the University of California, Davis. He taught undergraduate and graduate level courses in transportation and environmental policy analysis. His research included applications of econometric models of consumer choice to transportation planning problems. Dr. Tardiff's research was funded by the National Science Foundation, the Institute of Transportation Studies and the California Department of Transportation.

Prior to joining NERA, Dr. Tardiff's work included transportation, energy, public utility and telephone industry projects for the U.S. Departments of Transportation and Energy, the California Energy Commission, and several telephone and electric utilities.

Since joining NERA, he has evaluated pricing policies for increasingly competitive telecommunications markets, including appropriate mechanisms for pricing access services to competitors; studied actual and potential competition for services provided by telephone operating companies; analyzed the demand and revenue impacts of new telephone rate structures; developed and evaluated damage studies used in major telecommunications antitrust actions; analyzed the market potential for cellular radio; evaluated the investment and marketing programs of telephone companies; and developed a demand model for analyzing the market potential for alternative employee health care plans, including health maintenance organizations.

Dr. Tardiff has published extensively in the transportation literature. He has presented and published papers on the telecommunications industry. These papers address the issues of pricing and costing policies for emerging competition in telecommunications markets; evaluating and forecasting the impacts of telephone rate plans such as local measured service; analyzing the

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Dr. Tardiff received a B.S. with honors in Mathematics from the California Institute of Technology in Pasadena and a Ph.D. degree in Social Science from the University of California, Irvine, under a National Science Foundation Pre-doctoral Fellowship and an NSF Grant for Improving Dissertation Research in the Social Sciences.

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Dr. Tardiff has published extensively in the transportation literature. He has presented and published papers on the telecommunications industry. These papers address the issues of pricing and costing policies for emerging competition in telecommunications markets; evaluating and forecasting the impacts of telephone rate plans such as local measured service; analyzing the

markets for new telecommunications products and services; and local competition and the bypass issue.

EDUCATION

UNIVERSITY OF CALIFORNIA, IRVINE
Ph.D., Social Sciences, 1974

CALIFORNIA INSTITUTE OF TECHNOLOGY
B.S., Mathematics, 1971

EMPLOYMENT

NATIONAL ECONOMIC RESEARCH ASSOCIATES, INC.

1992 Vice President. Works on cases, mainly legal and regulatory, on issues of pricing policy, assessing demand for new and existing products and services, and economic damages. This work involves studies, often involving econometric demand analysis methods, for telecommunications, utilities and other clients. Specific areas have included: assessment of competition in the telecommunications industry; analysis of alternative approaches for regulating telephone utilities; evaluation of the benefits from telecommunication products and services; analyzing the demand for local services, toll, and carrier access; evaluation of the prudence of telephone company investments; damage studies for telecommunications antitrust cases; evaluation of methods for environmental damage assessment; and analysis of energy conservation /programs.

1984-1992 Senior Consultant

CHARLES RIVER ASSOCIATES, INC.--Boston, Massachusetts

1979-1984 Director of Marketing Research. Managed program to apply econometric customer demand models to marketing research problems in telecommunications, electric utilities, transportation and other industries.

Senior Research Associate. Performed studies on urban transportation, freight transportation, energy and telecommunications issues.

UNIVERSITY OF CALIFORNIA, DAVIS--Davis, California

1974-1979 Assistant Professor, Department of Civil Engineering and Division of Environmental Studies. Taught undergraduate and graduate course in transportation and environmental policy and quantitative research methods; conducted research on passenger transportation demand, (including econometric issues).

FELLOWSHIPS, GRANTS, AWARDS

First Place, Dissertation Contest of the Transportation Science Section of the Operations Research Society of America.

NSF Research Initiation Grant (Engineering Division), 1976-1978.

NSF Grant for Improving Doctoral Dissertation Research in the Social Sciences, 1973-1974.

NSF Predoctoral Fellowship, 1972-1974.

Public Health Service Traineeship, 1971-1972.

AFFILIATIONS

American Economic Association
International Telecommunications Society

TESTIMONY

Surrebuttal Testimony of Howard Shelanski and Timothy Tardiff on economic principles for determining the costs of unbundled network elements, prepared for filing with the Pennsylvania Public Utility Commission on behalf of Verizon-Pennsylvania, Docket No. R-00016683, February 8, 2002.

Rebuttal Testimony of Timothy J. Tardiff and Joseph A. Gansert on the application of the Modified Synthesis Model for the costs of unbundled network elements, prepared for filing with the Pennsylvania Public Utility Commission on behalf of Verizon-Pennsylvania, Docket No. R-00016683, February 8, 2002.

Rebuttal Testimony of Howard Shelanski and Timothy Tardiff on economic principles for determining the costs of unbundled network elements, prepared for filing with the Pennsylvania Public Utility Commission on behalf of Verizon-Pennsylvania, Docket No. R-00016683, January 11, 2002.

Rebuttal Testimony of Timothy J. Tardiff on the application of the Modified Synthesis Model for the costs of unbundled network elements, prepared for filing with the Pennsylvania Public Utility Commission on behalf of Verizon-Pennsylvania, Docket No. R-00016683, January 11, 2002.

Supplemental Rebuttal Testimony of Timothy J. Tardiff on the application of the Modified Synthesis Model for the costs of unbundled network elements, prepared for filing with the Federal Communications Commission on behalf of Verizon-Virginia, CC Docket Nos. 00-218, 00-249, and 00-251, November 16, 2001.

Declaration of Timothy J. Tardiff on the use of the HAI, Release 5.2a for deriving an unbundled switch cost reduction, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, October 30, 2001.

Declaration of Timothy J. Tardiff on the use of the HAI, Release 5.2a for deriving an unbundled loop cost reduction, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, October 19, 2001.

Surrebuttal Testimony of Howard Shelanski and Timothy J. Tardiff on economic principles for determining the costs of unbundled network elements, prepared for filing with the Federal Communications Commission on behalf of Verizon-Virginia, CC Docket Nos. 00-218, 00-249, and 00-251, September 21, 2001.

Rebuttal Testimony of Timothy J. Tardiff on the application of the Modified Synthesis Model for the costs of unbundled network elements, prepared for filing with the Maryland Public Service Commission on behalf of Verizon-Maryland, Case No. 8879, September 5, 2001.

Declaration of Timothy J. Tardiff on the use of the HAI, Release 5.2a and Modified Synthesis Models for unbundled loop and switch costs, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, September 4, 2001.

Rebuttal Testimony of Timothy J. Tardiff on the application of the Modified Synthesis Model for the costs of unbundled network elements, prepared for filing with the Federal Communications Commission on behalf of Verizon-Virginia, CC Docket Nos. 00-218, 00-249, and 00-251, August 27, 2001.

Affidavit of Timothy J. Tardiff on the use of proxy costs models for unbundled network elements, prepared for filing with the Regulatory Commission of Alaska, on behalf of Alaska Communications Systems, Docket No. U-96-89, July 27, 2001.

Rebuttal Testimony of Timothy J. Tardiff on the application of the Hatfield Model for the costs of unbundled network elements, prepared for filing with the Massachusetts Department of Telecommunications and Energy on behalf of Verizon-Massachusetts, Docket No. D.T.E. 01-20, July 18, 2001.

Rebuttal Testimony of Timothy J. Tardiff on the application of the Hatfield Model for the costs of unbundled network elements, prepared for filing with the New Jersey Board of Public Utilities on behalf of Verizon-New Jersey, Docket No. TO00060356, October 12, 2000.

Supplemental Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the State of Maine Public Utilities Commission on behalf of Bell Atlantic-Maine, Case No. 97-505, October 10, 2000.

Public Interest Affidavit before the Federal Communications Commission in the matter of Application of SBC Communications Inc. Nevada Bell Telephone Company and Southwestern Bell Communications Services, Inc. d/b/a Nevada Bell Long Distance for Provision of In-Region InterLATA Services in Nevada (with Alfred E. Kahn), July 24, 2000.

Responsive Testimony on the HAI Model of unbundled network elements, prepared for filing with the New York Public Service Commission on behalf of Bell Atlantic-New York, Case 98-C-1357 (filed as part of panel testimony), June 26, 2000.

Affidavit of Timothy J. Tardiff on avoided cost discounts for wholesale services, prepared for filing with the Regulatory Commission of Alaska, on behalf of Alaska Communications Systems, Docket Nos. U-99-141, U-99-142 and U-99-143, April 17, 2000.

Third Affidavit of Timothy J. Tardiff on costs models for unbundled network elements, prepared for filing with the Regulatory Commission of Alaska, on behalf of Alaska Communications Systems, Docket Nos. U-99-141, U-99-142 and U-99-143, March 24, 2000.

Second Affidavit of Timothy J. Tardiff on costs models for unbundled network elements, prepared for filing with the Regulatory Commission of Alaska, on behalf of Alaska Communications Systems, Docket Nos. U-99-141, U-99-142 and U-99-143, February 25, 2000.

Rebuttal Testimony of Timothy J. Tardiff on collocation costs models, prepared for filing with the Delaware Public Service Commission on behalf of Bell Atlantic-Delaware, Docket No. 99-251, February 24, 2000.

Affidavit of Timothy J. Tardiff on costs models for unbundled network elements, prepared for filing with the Regulatory Commission of Alaska, on behalf of Alaska Communications Systems, Docket Nos. U-99-141, U-99-142 and U-99-143, February 11, 2000.

Public Interest Affidavit before the Federal Communications Commission in the matter of Application of SBC Communications Inc. Southwestern Bell Telephone Company and Southwestern Bell Communications Services, Inc. d/b/a Southwestern Bell Long Distance for Provision of In-Region InterLATA Services in Texas (with Alfred E. Kahn), January 10, 2000.

Rebuttal Testimony of Timothy J. Tardiff on collocation costs models, prepared for filing with the Pennsylvania Public Utility Commission on behalf of Bell Atlantic-Pennsylvania, Docket Nos. R-00994697 and R-00994697C0001, December 21, 1999.

"Relaxed Regulation of High Capacity Services in Phoenix and Seattle: The Time is Now," prepared for filing with the Federal Communications Commission on behalf of US WEST Communications, Petitions of US WEST Communications for Forbearance from Regulation as a Dominant Carrier in the Phoenix and Seattle MSAs (with Alfred E. Kahn), July 21, 1999.

Rebuttal Testimony of Timothy J. Tardiff on the HAI Model of unbundled network elements, prepared for filing with the Pennsylvania Public Utility Commission on behalf of Bell Atlantic-Pennsylvania, Docket Nos. P-00991648 and P-00991649, June 15, 1999.

"High Capacity Competition in Seattle: Reply to Comments of Intervening Parties," prepared for filing with the Federal Communications Commission on behalf of US WEST Communications, Petition of US WEST Communications for Forbearance from Regulation as a Dominant Carrier in the Seattle, Washington MSA (with Alfred E. Kahn), March 10, 1999.

Rebuttal Testimony of Timothy J. Tardiff on collocation costs models, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, February 8, 1999.

Surrebuttal Testimony of Alfred E. Kahn and Timothy J. Tardiff, filed with the Missouri Public Service Commission, in support of the Applications of SBC Communications, Inc., Southwestern Bell Telephone Company, and Southwestern Bell Communications Services, Inc., for Provision of In-Region InterLATA Services in Missouri, Docket No. TO 99-227, February 4, 1999.

Rebuttal Testimony of Timothy J. Tardiff on the HAI Model of unbundled network elements, prepared for filing with the Rhode Island Public Utilities Commission on behalf of Bell Atlantic-Rhode Island, Docket No. 2681, January 15, 1999.

Reply Testimony of Timothy J. Tardiff on collocation costs models, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, January 11, 1999.

"Economic Evaluation of High Capacity Competition in Seattle," prepared for filing with the Federal Communications Commission on behalf of US WEST Communications, Petition of US WEST Communications for Forbearance from Regulation as a Dominant Carrier in the Seattle, Washington MSA (with Alfred E. Kahn), December 22, 1998.

Testimony of Timothy J. Tardiff on collocation costs models, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, December 18, 1998.

"Measuring and Recovering the Costs of Long-Term Number Portability: Implications of Price Cap Regulation," Prepared for Southwestern Bell for presentation to the Federal Communications Commission, December 10, 1998.

Direct Testimony of Alfred E. Kahn and Timothy J. Tardiff, filed with the Missouri Public Service Commission, in support of the Applications of SBC Communications, Inc., Southwestern Bell Telephone Company, and Southwestern Bell Communications Services, Inc., for Provision of In-Region InterLATA Services in Missouri, Docket No. TO 99-227, November 20, 1998.

"High Capacity Competition in Phoenix: Reply to Comments of Intervening Parties," prepared for filing with the Federal Communications Commission on behalf of US WEST Communications, Petition of US WEST Communications for Forbearance from Regulation as a Dominant Carrier in the Phoenix, Arizona MSA (with Alfred E. Kahn), October 28, 1998.

"Measuring and Recovering the Costs of Long-Term Number Portability," Prepared for Southwestern Bell for presentation to the Federal Communications Commission, October 28, 1998 (with Alfred E. Kahn).

Declaration of Timothy J. Tardiff on the economic impacts of separate subsidiary requirements for the offer of advanced services by incumbent local exchange carriers, prepared for filing with the Federal Communications Commission on behalf of Bell Atlantic, in the mater of Deployment of Wireline Services Offering Advanced Telecommunications Capability, October 15, 1998.

"An Analysis of the HAI Model Release 5.0a," Rebuttal Testimony filed with the Florida Public Service Commission, Docket No. 980696-TP, on behalf of GTE Florida, September 2, 1998 (with Gregory M. Duncan, Karyn E. Model, Christian M. Dippon, Jino W. Kim, Francis J. Murphy, Robert P. Cellupica, and Thomas F. Guarino).

"Economic Evaluation of High Capacity Competition in Phoenix," prepared for filing with the Federal Communications Commission on behalf of US WEST Communications, Petition of US WEST Communications for Forbearance from Regulation as a Dominant Carrier in the Phoenix, Arizona MSA (with Alfred E. Kahn), August 14, 1998.

Rebuttal Testimony of Timothy J. Tardiff on the HAI Model of unbundled network elements, prepared for filing with the New Hampshire Public Utilities Commission on behalf of Bell Atlantic-New Hampshire, Docket No. DE-97-1171, June 22, 1998.

Rebuttal Affidavit before the Arkansas Public Service Commission in the matter of the Application of Southwestern Bell Telephone Company Seeking Verification that It Has Fully Complied with and Satisfied the Requirements of Section 271 (c) of the Telecommunications Act of 1996, June 11, 1998.

Rebuttal Testimony before the State Corporation Commission of the State of Kansas in the matter of Southwestern Bell Telephone Company – Kansas' Compliance With Section 271 of the Federal Telecommunications Act of 1996, Docket No. 97-SWBT- 411-GIT (with Alfred E. Kahn), May 27, 1998.

Rebuttal Affidavit Before the Public Utilities Commission of the State of California in support of Pacific Bell's Draft Application for Authority to Provide InterLATA Services in California (with Alfred E. Kahn), May 20, 1998.

"An Analysis of the Hatfield Model Release 4.0," prepared for filing with the California Public Utilities Commission on behalf of GTE California, May 1, 1998 (with Gregory M. Duncan, Karyn E. Model, Christian M. Dippon, Jino W. Kim, Francis J. Murphy, Robert P. Cellupica, and Thomas F. Guarino).

Reply Testimony of Timothy J. Tardiff on unbundled network element prices and retail service price floors, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, April 27, 1998.

Rebuttal Testimony of Alfred E. Kahn and Timothy J. Tardiff, filed with the Oklahoma Public Service Commission, in support of the Applications of SBC Communications, Inc., Southwestern Bell Telephone Company, and Southwestern Bell Communications Services, Inc., for Provision of In-Region InterLATA Services in Oklahoma, Case No. PUD 970000560, April 21, 1998.

Reply Affidavit before the Federal Communications Commission in the matter of Application of SBC Communications Inc. Southwestern Bell Telephone Company and Southwestern Bell Communications Services, Inc. d/b/a Southwestern Bell Long Distance for Provision of In-Region InterLATA Services in Texas (with Alfred E. Kahn), April 17, 1998.

Testimony of Timothy J. Tardiff on unbundled network element prices and retail service price floors, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, April 8, 1998.

Affidavit before the Federal Communications Commission in the matter of Application of SBC Communications Inc., Pacific Bell, and Pacific Bell Communications for Provision of In-Region InterLATA Services in California (with Alfred E. Kahn), March 31, 1998.

"Economic Principles Governing Measurement of Nonrecurring/OSS Costs: An Analysis of the AT&T/MCI Recommendations," prepared for filing with the California Public Utilities Commission on behalf of GTE California and Pacific Bell, March 4, 1998 (with Gregory M. Duncan).

"Analysis of the Hatfield Model Release 5.0a," Rebuttal Testimony filed with the North Carolina Utilities Commission, Docket No. P-100, Sub 133d, on behalf of GTE South, March 2, 1998 (with Gregory M. Duncan, Rafi A. Mohammed, Christian M. Dippon, Aniruddha Banerjee, Karyn E. Model, Francis J. Murphy, Robert P. Cellupica, and Thomas F. Guarino).

"Analysis of the Hatfield Model Release 5.0a," Rebuttal Testimony filed with the South Carolina Public Service Commission, on behalf of GTE South, March 2, 1998 (with Gregory M. Duncan, Rafi A. Mohammed, Christian M. Dippon, Aniruddha Banerjee, Karyn E. Model, Francis J. Murphy, Robert P. Cellupica, and Thomas F. Guarino).

Affidavit before the Federal Communications Commission in the matter of Application of SBC Communications Inc. Southwestern Bell Telephone Company and Southwestern Bell Communications Services, Inc. d/b/a Southwestern Bell Long Distance for Provision of In-Region InterLATA Services in Texas (with Alfred E. Kahn), March 2, 1998.

"Analysis of the Hatfield Model Release 5.0a," Rebuttal Testimony filed with the Kentucky Public Service Commission, on behalf of GTE South, February 26, 1998 (with Gregory M. Duncan, Rafi A. Mohammed, Christian M. Dippon, Aniruddha Banerjee, Karyn E. Model, Francis J. Murphy, Robert P. Cellupica, and Thomas F. Guarino).

Affidavit before the Federal Communications Commission in the matter of Application of SBC Communications Inc. Southwestern Bell Telephone Company and Southwestern Bell Communications Services, Inc. d/b/a Southwestern Bell

Long Distance for Provision of In-Region InterLATA Services in Arkansas (with Alfred E. Kahn), February 24, 1998.

Testimony before the State Corporation Commission of the State of Kansas in the matter of Southwestern Bell Telephone Company – Kansas' Compliance With Section 271 of the Federal Telecommunications Act of 1996, Docket No. 97-SWBT- 411-GIT (with Alfred E. Kahn), February 17, 1998.

"Analysis of the Hatfield Model Release 5.0," Rebuttal Testimony filed with the Alabama Public Utilities Commission, on behalf of GTE South, February 13, 1998 (with Gregory M. Duncan, Rafi A. Mohammed, Christian M. Dippon, Aniruddha Banerjee, Karyn E. Model, Francis J. Murphy, Robert P. Cellupica, and Thomas F. Guarino).

Affidavit before the Federal Communications Commission in the matter of Application of SBC Communications. Inc. Southwestern Bell Telephone Company and Southwestern Bell Communications Services, Inc. d/b/a/ Southwestern Bell Long Distance for Provision of In-Region InterLATA Services in Oklahoma (with Alfred E. Kahn), February 13, 1998.

"Analysis of the Hatfield Model Release 5.0," Rebuttal Testimony filed with the North Carolina Utilities Commission, Docket No. P-100, Sub 133b, on behalf of GTE South, January 30, 1998 (with Gregory M. Duncan, Rafi A. Mohammed, Christian M. Dippon, Aniruddha Banerjee, Karyn E. Model, Francis J. Murphy, Robert P. Cellupica, and Thomas F. Guarino).

Supplemental Rebuttal Testimony of Timothy J. Tardiff on switching costs, prepared for filing with the State of Maine Public Utilities Commission on behalf of Bell Atlantic-Maine, Case No. 97-505, December 22, 1997.

"Reply to AT&T Recommendations for Regulatory Treatment of OSS Costs," prepared for filing with the California Public Utilities Commission on behalf of GTE California and Pacific Bell, December 15, 1997 (with Gregory M. Duncan).

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the Vermont Public Service Board on behalf of Bell Atlantic-Vermont, Case No. 57-13, November 21, 1997.

Reply Affidavit of Timothy J. Tardiff on the Hatfield Model, filed with the New York Public Service Commission on behalf of Bell Atlantic-New York, Case 94-C-0095 and Case 28425, November 17, 1997.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the State of Maine Public Utilities Commission on behalf of Bell Atlantic-Maine, Case No. 97-505, October 21, 1997.

Rebuttal Testimony of Timothy J. Tardiff on the application of the Hatfield Model to universal service funding requirements, prepared for filing with the New Jersey Board of Public Utilities on behalf of Bell Atlantic-New Jersey, Docket No. TX95120631, October 20, 1997.

"Analysis of the Hatfield Model Release 4.0," filed with the Pennsylvania Public Utility Commission on behalf of GTE North, October 20, 1997 (with Gregory M. Duncan, Rafi A. Mohammed, Christian M. Dippon, Francis J. Murphy, Robert P. Cellupica, and Thomas F. Guarino).

Supplemental Rebuttal Testimony of Timothy J. Tardiff on toll and carrier access demand elasticities and universal service rate rebalancing, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, October 10, 1997.

Rebuttal Testimony of Timothy J. Tardiff on toll and carrier access demand elasticities and universal service rate rebalancing, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, September 30, 1997.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the State Corporation Commission of Virginia on behalf of Bell Atlantic-Virginia, Case No. PUC970005, June 10, 1997.

Reply Affidavit of Alfred E. Kahn and Timothy J. Tardiff, filed with the Federal Communications Commission, in support of the Applications of SBC Communications, Inc., Southwestern Bell Telephone Company, and Southwestern Bell Communications Services, Inc., for Provision of In-Region InterLATA Services in Oklahoma, May 26, 1997.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the District of Columbia Public Service Commission on behalf of Bell Atlantic-DC, Formal Case No. 962, May 2, 1997.

Declaration of Timothy J. Tardiff on OANAD Cost Studies, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, April 16, 1997.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the Maryland Public Service Commission on behalf of Bell Atlantic-Maryland, Case No. 8731-II, April 4, 1997.

"Economic Evaluation of the Hatfield Model, Release 3.1," filed with the Washington Utilities and Transportation Commission on behalf of GTE, March 28, 1997 (with Gregory M. Duncan and Rafi Mohammed).

"Economic Evaluation of the Hatfield Model, Version 2.2, Release 2," prepared for filing with the California Public Utilities Commission on behalf of GTE California and Pacific Bell, March 18, 1997 (with Gregory M. Duncan).

Statement of Alfred E. Kahn and Timothy J. Tardiff, "Funding and Distributing the Universal Service Subsidy," Prepared for US West for presentation to the Federal Communications Commission, March 13, 1997.

Testimony of Timothy J. Tardiff on toll and carrier access demand elasticities, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, March 6, 1997.

Surrebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the Pennsylvania Public Utility Commission on behalf of Bell Atlantic-Pennsylvania, Dockets A-310203F0002, A-310213F0002, A-310236F0002, A-310258F0002, February 21, 1997.

Affidavit of Alfred E. Kahn and Timothy J. Tardiff, filed with the Oklahoma Public Service Commission, in support of the Applications of SBC Communications, Inc., Southwestern Bell Telephone Company, and Southwestern Bell Communications Services, Inc., for Provision of In-Region InterLATA Services in Oklahoma, February 21, 1997.

"Reply to Kravtin/Selwyn Analysis of the Gap Between Embedded and Forward-Looking Costs," affidavit filed with the Federal Communications Commission, In the Matter of Access Charge Reform, Price Cap Performance Review for Local Exchange Carriers, Transport Rate Structure and Pricing, on behalf of GTE, February 14, 1997.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the Arkansas Public Service Commission on behalf of Southwestern Bell Telephone Company, Docket 96-395-U, January 9, 1997.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the Kansas Corporation Commission on behalf of Southwestern Bell Telephone Company, Docket 97-AT&T-290-Arb, January 6, 1997.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the Massachusetts Department of Public Utilities on behalf of New England Telephone and Telegraph Company, Docket 96-80/81, October 30, 1996.

Statement of Alfred E. Kahn and Timothy J. Tardiff, "Joint Marketing, Personnel Separation and Efficient Competition Under the Telecommunications Act of 1996," Prepared for US West for presentation to the Federal Communications Commission, October 11, 1996.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the Oklahoma Public Service Commission on behalf of Southwestern Bell Telephone Company, September 30, 1996.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the Missouri Public Service Commission on behalf of Southwestern Bell Telephone Company, Case No. TO-97-040 & TO 97-40-67, September 30, 1996.

"Economic Evaluation of Version 2.2 of the Hatfield Model," prepared for filing in interconnection arbitrations in Pennsylvania, California, Florida, Indiana, North Carolina, Oklahoma, Iowa, Texas, Virginia, Minnesota, Hawaii, Nebraska, Kentucky, Washington, and Missouri on behalf of GTE, September 1996 (with Gregory M. Duncan).

Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the Texas Public Utility Commission on behalf of Southwestern Bell Telephone Company, Docket Nos. 16189, 16196, 16226, 16285, 16290, September 6, 1996.

"Economic Analysis of MFS's Numerical Illustration," prepared for filing with the Federal Communications Commission, In the Matter of Implementation of the Non-Accounting Safeguards of Sections 271 and 272 of the Communications Act of 1934, as amended and Regulatory Treatment of LEC Provision of Interexchange Services Originating in the LEC's Local Exchange Area, on behalf of US West, August 30, 1996.

Affidavit of Timothy J. Tardiff on proxy rates for unbundled local switching, prepared for filing with the Federal Communications Commission on behalf of GTE Corporation, petition for a stay of the First Report and Order in the Matter of Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, August 28, 1996.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the New York Public Service Commission on behalf of New York Telephone, July 15, 1996

Reply Testimony of Timothy J. Tardiff on local exchange service price floors, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, July 10, 1996.

"Economic Evaluation of Version 2.2 of the Hatfield Model," attached to Reply Testimony of Timothy J. Tardiff , prepared for filing with the California Public Utilities Commission on behalf of GTE California, July 10, 1996. Also presented to the Federal Communications Commission as attachment to letter from Whitney Hatch of GTE to William F. Caton, In the Matter of Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, July 11, 1996.

Testimony of Timothy J. Tardiff on local exchange service price floors, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, June 14, 1996.

Declaration of Alfred E. Kahn and Timothy J. Tardiff, prepared for filing with the Federal Communications Commission, In the Matter of Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, on behalf of Bell Atlantic, May 30, 1996.

Declaration of Timothy J. Tardiff on Round I and Round II OANAD Cost Studies, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, May 24, 1996.

"Economic Evaluation of Pacific Bell's Round I and Round II Cost Studies: Reply Comments," prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, April 17, 1996.

"Incremental Cost Principles for Local and Wireless Network Interconnection," prepared for filing with the Federal Communications Commission on behalf of Pacific Telesis, March 4, 1996 (with Richard D. Emmerson).

"Economic Evaluation of Selected Issues from the Fourth Further Notice of Proposed Rulemaking in the LEC Price Cap Performance Review: Reply Comments," Prepared for filing with the Federal Communications Commission on behalf of the United States Telephone Association, March 1, 1996 (with William E. Taylor and Charles J, Zarkadas).

Declaration of Timothy J. Tardiff on the toll and carrier access demand stimulation caused by the January 1, 1995 price reductions (update), prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, January 19, 1996.

"Universal Service Funding and Cost Modeling," prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, January 19, 1996.

"Changes in Interstate Price Regulation: Reply Comments," prepared for filing with the Federal Communications Commission on behalf of Pacific Bell and Nevada Bell, January 10, 1996.

"Economic Evaluation of Selected Issues from the Fourth Further Notice of Proposed Rulemaking in the LEC Price Cap Performance Review," Prepared for filing with the Federal Communications Commission on behalf of the United States Telephone Association, December 18, 1995 (with William E. Taylor and Charles J, Zarkadas).

"Changes in Interstate Price Regulation: An Economic Evaluation of the Pacific Bell and Nevada Bell Proposal," prepared for filing with the Federal Communications Commission on behalf of Pacific Bell and Nevada Bell, December 11, 1995 (with Alfred E. Kahn).

"Evaluation of the Benchmark Cost Model," prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, December 1, 1995.

Affidavit of William E. Taylor and Timothy J. Tardiff on interconnection regulation, prepared for filing with the Mexican Secretariat of Communications and Transport on behalf of Southwestern Bell International Holdings Corporation, October 18, 1995.

Participant, California Public Utilities Commission, Full Panel Hearing on Universal Telephone Service, September 29, 1995.

"Incentive Regulation and Competition: Reply Comments," prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, September 18, 1995 (with Richard L. Schmalensee and William E. Taylor).

"Incentive Regulation and Competition: Issues for the 1995 Incentive Regulation Review," prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, September 8, 1995 (with Richard L. Schmalensee and William E. Taylor).

"Preserving Universality of Subscription to Telephone Service in an Increasingly Competitive Industry," prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, September 1, 1995 (with Alfred E. Kahn).

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"Franchise Services and Universal Service," prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, March 10, 1995 (with Richard D. Emmerson).

Illinois Commerce Commission on behalf of GTE North: surrebuttal testimony on the benefits of intraMSA presubscription, September 30, 1994.

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"Economic Evaluation of OIR/OII on Open Access and Network Architecture Development: Reply Comments," prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, March 31, 1994 (with Richard D. Emmerson).

"Declaration of Timothy J. Tardiff on Pacific Bell's Productivity Under Price Caps," prepared for filing with the Federal Communications Commission, on behalf of Pacific Bell, February 28, 1994.

"Regulation of Mobile and Wireless Telecommunications: Economic Issues," prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, February 25, 1994

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"Access to Intelligent Networks: Economic Issues," prepared for filing with the Federal Communications Commission, on behalf of Pacific Bell, December 1, 1993.

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"Performance Under Alternative Forms of Regulation in the U.S. Telecommunications Industry," prepared for filing with the Canadian Radio-television and Telecommunications Commission on behalf of AGT Limited, April 13, 1993. Timothy J. Tardiff and William E. Taylor, Study Directors.

"Pacific Bell's Performance Under the New Regulatory Framework: An Economic Evaluation of the First Three Years," prepared for filing with the California Public Utility Commission on behalf of Pacific Bell, April 8, 1993. William E. Taylor and Timothy J. Tardiff, Study Directors.

"Pricing Interconnection and the Local Exchange Carrier's Competitive Interstate Services," prepared for filing with the Federal Communications Commission, on behalf of Pacific Bell, February 19, 1993.

"The Treatment of FAS 106 Accounting Changes Under Price Cap Regulation: Reply Comments," prepared for filing with the Federal Communications Commission on behalf of Pacific Bell, July 1992. William E. Taylor and Timothy J. Tardiff, Study Directors.

"Costs and Benefits of IntraLATA Presubscription," prepared for filing with the State of New York Public Service Commission on behalf of New York Telephone, May 1, 1992. Timothy J. Tardiff and William E. Taylor, Study Directors.

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Expert Witness on State Transportation Energy Forecasting, California Energy Commission, Sacramento, September 1980.

SELECTED CLIENT REPORTS

Enhancing Competition for Broadband Services: The Case for Removing the Prohibition against High-Speed InterLata Transmission by Regional Bell Operating Companies, With Alfred E. Kahn, Prepared for the United States Telecom Commission, May 22, 2000 (released April 2001).

An Analysis of Resale in Long Distance Telecommunications Markets, With William E. Taylor and J. Douglas Zona (Confidential) Prepared for plaintiffs in Darren B. Swain, Inc. d/b/a U.S. Communications v. AT&T Corp., November 15, 1995.

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Economic Significance of Interconnection, Prepared for Japan Telecom, June 1995.

The Effect of Competitive Entry into Local Exchange and State Toll Markets on the Revenues of Southern New England Telephone, with J.D. Zona, (Confidential), Prepared for Southern New England Telephone, February 1995.□

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SELECTED PUBLICATIONS AND PRESENTATIONS

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Tardiff, T.J. and L.J. Perl, "Price Regulation and Productivity," presented to the Public Staff of the North Carolina Utilities Commission, Raleigh, North Carolina, September 6, 1995.

Hausman, J.A. and T.J. Tardiff, "Efficient Local Exchange Competition," *Antitrust Bulletin*, Vol. 40, No. 3, Fall 1995, pp. 529-556.

Instructor, "Seminar in Current Economic Issues", United States Telephone Association course, Orlando, Florida, April 3-5, 1995.

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Participant in AGT International Symposium on Local Interconnection Policy, Emerald Lake, British Columbia, Canada, May 27-28, 1994.

Tardiff, T.J., "Access Charges and Toll Prices in the United States: An Economic Evaluation," Presented to representatives of Japanese Long-Distance Companies, New York, New York, May 16, 1994.

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Tardiff, T.J. and M.O Bidwell, Jr., "Evaluating a Public Utility's Investments: Cash Flow vs. Revenue Requirement," *Public Utilities Fortnightly*, May 10, 1990.

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SUMMARY

President of a telecommunications consulting company with over 30 years of administrative, operations, marketing and technical experience covering regulatory issues, pricing, costing, central office operations, test center operations and customer premises installation and maintenance operations. Demonstrated success in founding, organizing and managing successful consulting company and staff of highly experienced engineers and regulatory personnel. Proven record of corporate and team leadership, customer service, problem identification and resolution.

EXPERIENCE

President of Network Engineering Consultants, Inc., Stoughton, Massachusetts, 1997 to present. Founded Network Engineering Consultants in 1997 to work with major telecommunications clientele throughout the United States and in Australia. Company specializes in Regulatory Compliance, and Technical Engineering with Cost Modeling Analysis and more.

Independent Consultant to the Telecommunications Industry 1995 to 1997.

NYNEX TRG, Boston, Massachusetts 1990 to 1995

Staff Director - Pricing and Costing (1990 to 1995)

Responsible for cost justification in support of interstate access service rates and Federal Communications Commission (FCC) filings and reporting rate of return information to the FCC.

Integral part of the Billed Party Preference (BPP) Docket Management Team solely responsible for identifying the cost ($120 million) to NYNEX to implement BPP as well as developing industry wide BPP implementation cost analysis ($2.0 billion), and presenting same to the FCC on an Ex Parte basis. Solely responsible for the cost support associated with NYNEX's Open Network Architecture (ONA) and 800 Database filings.

Managed the special access non-recurring rate restructure filing project. This project involved the development of a new non-recurring rate structure and rates for both NYNEX New England and NYNEX New York, the development of appropriate costs, and the coordination of all filing related activities from initial internal approval to customer/stakeholder socialization and implementation. The filing was highly successful as evidenced by timely FCC acceptance and no customer/stakeholder intervention.

NEW ENGLAND TELEPHONE COMPANY, Boston, Massachusetts 1970 to 1990

Manager - Special Service Center (1988 to 1989)

Responsible to plan, design and implement a new test center for special service circuits that consolidated five existing test centers while simultaneously managing a staff of 60 people operating the largest of the five existing Special Service Centers (SSC).

Totally responsible for planning, designing and implementing a 20,000 square foot test center. This included real estate issues, furniture design/selection, communication and test system planning/implementation, labor relations coordination and the physical move itself. Project was completed on schedule and within budget.

Achieved outstanding service results while managing SSC by exceeding the corporate commitment to excellence objectives. The SSC installed 99.3% of all new customer service orders on time and reduced average service outages from 6 hours per case to 4 hours per case.

Manager, Installation and Maintenance (1985 to 1987)

Responsible for managing an organization of approximately 120 people including management, technical and clerical personnel performing installation and maintenance functions on special service and high capacity digital services at customer locations throughout greater Boston with an annual budget of approximately $20 million. Through the development and implementation of various programs and measurement plans (training, productivity measurement, safety, absence control, personnel development) all major objectives were significantly exceeded. Examples include average installation time reductions from 3.6 hours per job to 2.3 hours per job with 98.6% on time installations. This result was achieved despite year over year installation volume increases of 25% and concurrent staff reductions. Simultaneous decreases in year over year maintenance volumes of 10% and decreases in average repair times from 2.6 hours per case to 2.2 hours per case reflect significant improvements in both quality and productivity.

Staff Manager - Metropolitan Special Services Division (1984)

Responsible for administration/management of Division office staff reporting directly to Division Manager. The Metropolitan Special Services Division had overall responsibility for all special services and digital high capacity services provisioning and maintenance operations throughout eastern Massachusetts with an organization of approximately 1,000 people and an annual budget of $120 million. Responsibilities included the development and tracking of the annual budget as well as the development and tracking of services objectives and results. The Division under ran its budget and met all major service objectives. Received outstanding evaluation for this assignment.

Manager - Toll Test Operations (1981 to 1983)

Responsible for central office Toll Test operations in the Brookline and Malden areas. Responsibilities included the central office wiring and overall testing and maintenance of switched circuits, special service circuits and interoffice carrier systems in approximately 12 different central offices with an organization of approximately 70 technical, clerical and management personnel.

Supervisor - Toll Test Operations (1974 to 1980)

Responsible for the supervision of approximately 12 Central Office Technicians performing wiring, testing and maintenance activities on switched circuits, special service circuits and interoffice high capacity carrier systems. Promoted to Manager's position after seven years of demonstrated high performance levels achieving quality service results.

Toll Test Technician (1970 to 1973)

Hired, with no related experience, as Central Office Technician after completing military obligations. Promoted to Supervisor after 3 years of demonstrated aptitude and performance in wiring, testing and maintaining switched circuits, special service circuits and high capacity interoffice carrier systems.

EDUCATION

Bachelor of Arts – Business Management
Boston College, 1986.

SELECTED REGULATORY WITNESSING, TESTIMONY AND COMMENTS

STATE	DATE	DOCKET	SUBJECT
Alabama	2/13/98	25980	Universal Service Fund (USF) Cost Analysis- Hatfield Model
California	5/30/96	R.93-04-003 I.93-04-002	Deposition Re: Avoided Costs
	3/18/97		Declaration Re: Hatfield Model 2.2.2
	4/15/97		Supplemental Declaration Re: Hatfield Model 2.2.2
	7/1/97		Engineering Critique Re: Hatfield Model 3.1
	5/1/98	R.93-04-003	Collocation Opening Comments
	1/1/99	I.93-04-002	Testimony Re: Comments on Non-Recurring Costs (NRC)
	2/8/99	I.93-04-002	Collocation Rebuttal Testimony
Florida	10/98	980696-TP	Witnessing Re: USF/HAI 5.0
Hawaii	8/28/97	7702	Witnessing Re: USF/HAI 5.0
Idaho	3/8/00	GNR-T-97-22 GNR-T-00-2	Direct Testimony Re: FCC Model
	5/24/00	GNR-T-97-22 GNR-T-00-2	Reply Testimony Re: FCC Model & HAI 5.2
Maryland	5/21/01	8745	Rebuttal Testimony Re: Modified FCC Model
	6/11/01	8745	Surrebuttal Testimony Re: Modified FCC Model Witnessing Re: USF
	9/501	8879	Rebuttal Testimony Re: Modified FCC Model Witnessing Re: UNE
Nebraska	4/8/98	C-1633	Unbundled Network Elements (UNE) Testimony
	5/98		Witnessing presentation given to PSC, et al.
New Mexico	6/6/97	97-35-TC	UNE Rebuttal Testimony HM 3.1
	6/97	97-35-TC	Witnessing Unbundled Network Elements
Oregon	11/7/97	UT 138 & 139	Reply Testimony Non-Recurring Costs

	12/98	UT 138 & 139	Witnessing Re: Non-Recurring Costs
	1/00	UM 731	Rebuttal Testimony HAI 5.1 & SM
	2/00	UM 731	Witnessing Re: USF
S. Carolina	11/18/97	97-239-C	Rebuttal Testimony Re: HAI 4.0
	3/2/98	97-239-C	Rebuttal Testimony Re: HAI 5.0
	3/98	97-239-C	Witnessing Re: USF
Texas	3/18/98	18515	USF Rebuttal Testimony
	6/5/98	18515	Supplemental Testimony
	6/10/98-9/16/98		Various Testimony, Replies and Rebuttals
	3/98		Witnessing
Virginia	8/27/01	CC 00-218, 00-249, 00-251 (FCC Arbitration)	UNE Rebuttal Testimony
Washington	5/12/97	UT960369, -70, -71	Declaration Re: TICM Data
	6/13/97	UT960369, -70, -71	Supplemental UNE Testimony
	9/11/98	UT960369, -70, -71	Supplemental Testimony Re: USF

The FCC Multiple and Varied Affidavits on behalf of and support of clients: 1/30/98, 12/17/98, 1/15/99, 1/25/99, Docket Numbers: 96-45 & 97-160 in support of FOIA's, Petitions For Re-Consideration, Applications for Review, and Opposition to Comments.

Ex-Parte of 2/20/98 RE:HAI 5.0, and 5/7/98 RE: HAI5.0a

Australia Affidavit on behalf of TELSTRA before the Australian Telecommunications Authority Regarding Universal Service Costs, March 1999

TABLE 1

	Synthesis Model	Florida Commission	Ratio
Bell South	$629	$892	71%
Verizon	$588	$767	77%

TABLE 2

Verizon Density Zone	Verizon Cost	FCC Cost	FCC Cost/Verizon Cost
1	$22.17	$15.65	71%
2	$30.91	$19.24	62%
3	$77.39	$34.42	44%

In conducting this analysis, the average loop cost per density zone was reduced by the same $1.61 that Dr. Ford used in his Exhibit GSF-11, which removes some of the overhead costs that the FCC assigns exclusively to loops.