ORIGINAL

BEFORE THE

FLORIDA PUBLIC SERVICE COMMISSION

REBUTTAL TESTIMONY OF

JAMES W. WELLS, JR.

ON BEHALF OF

AT&T COMMUNICATIONS OF THE SOUTHERN STATES, INC.

REDACTED VERSION

Docket Nos. 960833-TP/960846-TP/971140-TP/960757-TP/960916-TP

December 9, 1997

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I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is James W. Wells, Jr., and my office address is 5280 Laithbank Lane, Alpharetta, GA 30022

Q. BY WHOM AND IN WHAT CAPACITY ARE YOU EMPLOYED?

A. I have been an employee of AT&T for the past twenty-five years. My current position is District Manager - Outside Plant Cost Engineering in the Cost/Technical Analysis and Advocacy Division of the Local Services Division of AT&T. My area of expertise is Outside Plant (OSP) infrastructure planning, design and construction, including costing aspects of the local loop.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. I am testifying on behalf of AT&T Communications of the Southern States, Inc.

II. PURPOSE:

Q. WHAT ARE THE PURPOSES OF YOUR TESTIMONY?

A. The purposes of my testimony are:

- to offer an analysis of and recommend modifications to the OSP portions of the Local Loop portion of BellSouth's Florida Cost Study and
- to rebut the testimonies of BellSouth witnesses Daniel Baeza, Daonne Caldwell and William Zarakas.

Q. HAVE YOU PROVIDED OTHER TESTIMONY IN THIS PROCEEDING?

A. No.

III. QUALIFICATIONS AND EXPERIENCE:

Q. PLEASE STATE YOUR EDUCATIONAL BACKGROUND AND OSP WORK EXPERIENCE.

A. I have Bachelor of Engineering (Electrical Engineering) and Master of Business Administration degrees and certification as a Project Management Professional. I have gained OSP experience in the following assignments:

- with South Central Bell Telephone Company (now BellSouth) in Birmingham, AL: OSP Construction Foreman - 1 year, OSP Facilities Engineer - 4 years, OSP Planning Engineer - 2 years,
- with Western Electric and AT&T Network Systems (now Lucent Technologies): Technical Representative for OSP Products - 5 years and District Manager - OSP Engineering and Construction - 5 years,
- with AT&T Local Infrastructure and Access Management: District Manager OSP Engineering and Construction - 1 year,

- with AT&T Local Services Division: District Manager Outside Plant Cost Engineering - 8 months.

IV. SYNOPSIS:

Q. HOW DOES YOUR TESTIMONY FIT INTO AT&T's OVERALL CASE?

A. My testimony addresses engineering and costing aspects of the Outside Plant (OSP) portion of the local loop, which is the network infrastructure from the central office to the customer's premise. The impact of my recommendations on the total cost of the local loop is included in the testimony of Mr. Wayne Ellison.

Q. PLEASE PROVIDE AN OVERVIEW OF YOUR CONCERNS WITH BELLSOUTH'S COST STUDY.

A. In my testimony I:

- demonstrate that BellSouth's Cost Study is not the least cost, most efficient, forward looking model utilizing currently available technology, for the OSP portion of the local loop;
- identify several flaws in BellSouth's OSP cost modeling methodology and errors in its spreadsheet values and calculations; and
- make appropriate recommendations for improvements to BellSouth's Cost Study.

My testimony addresses the following OSP specific aspects of BellSouth's Florida Cost Study:

- Forward Looking Assumptions - in which I examine BellSouth's assumptions concerning:

- number of cross-connect boxes in a loop,
- minimum copper cable size,
- bridged tap,
- average fiber cable sizes and
- two-channel Digital Subscriber Lines.

These assumptions determine how certain loops in BellSouth's sample are redesigned, or recasted, to reflect what BellSouth incorrectly asserts is a least cost, most efficient, forward looking local loop OSP network architecture utilizing currently available technology.

- OSP Cost Modeling Assumptions - in which I review BellSouth's assumptions concerning:
  - distribution cable utilization,
  - customer drops,
  - network interface devices,
  - building entrance terminals,
  - circuit level costs and
  - structure sharing.

These assumptions underlie the process employed by BellSouth in determining the cost of a single "hypothetical representative loop"[1] for the entire state of Florida.

- Loading Factors - in which I describe how BellSouth's cable material and conduit loading factors are major add-ons used in BellSouth's Cost Study to inflate local loop investment for what should be relatively minor material expenses.

V. <u>CONCERNS WITH BELLSOUTH'S COST STUDY FOR FLORIDA</u>

Q. DOES BELLSOUTH'S COST STUDY REFLECT LEAST COST, MOST EFFICIENT FORWARD LOOKING ASSUMPTIONS WITH RESPECT TO OSP IN ACCORDANCE WITH TSLRIC METHODOLOGY?

A. No, it does not. The set of OSP assumptions in BellSouth's Cost Study do reflect an improvement over the major inefficiencies of BellSouth's current network design, as evidenced by the sample of loops in its network. However, BellSouth's Florida Cost Study does not produce the least cost, most efficient, forward looking, local telecommunications network based upon currently available technology, which is the correct approach to determining the Total Services Long Run Incremental Cost (TSLRIC) for the OSP elements of the local loop. A set of OSP assumptions that embraces this concept would reflect:

- the economies of large scale projects,
- minimization of cable not on the path to the customer,
- *costing of a single sheath in cable cross sections,*
- minimization of travel time between work locations,
- maximization of structure sharing,
- most efficient utilization of the OSP infrastructure,

- elimination of backward looking network components and methods of operation from loading factors, and
- prudent deployment of currently available technology.

In the following examples, I demonstrate how BellSouth's Cost Study fails to employ these OSP TSLRIC assumptions.

Q. WHY ARE THE BELLSOUTH COST STUDY ASSUMPTIONS CONCERNING THE NUMBER OF CROSS-CONNECT BOXES IN A LOOP NOT FORWARD LOOKING?

A. A forward looking OSP network design would have a single Feeder Distribution Interface (FDI) or cross-connect box in a loop. However, BellSouth has incorporated sampled loops (e.g., FL # 689) with multiple cross-connects into its single hypothetical representative loop. It is recommended that BellSouth add "single cross-connect box" to its list of forward looking redesign criteria for its sampled loops.

Q. WHY ARE BELLSOUTH'S COST STUDY ASSUMPTIONS CONCERNING MINIMUM CABLE SIZE NOT LEAST COST?

A. BellSouth employs a minimum distribution cable size of 25 pairs.[2] The impact of this 25 pair minimum is to exaggerate the number of pairs of distribution cable needed in sparsely populated areas or a side street with eight or fewer customers because the next generally available and economically applicable lower sized cable is 12 pair 24 gauge cable. Based on BellSouth's distribution cable sizing factor of [redacted] lines per living unit, then customer demand of eight or fewer lines or living units should be served more economically by 12 pair cable.

Mr. Baeza testifies that 25 pair is the smallest pair size cable that BellSouth utilizes because of the cost of having additional cable sizes in their inventory, plus the training costs. However, BellSouth has filed installed cost input values for copper aerial cable per foot as follows: 25 pair, 24 gauge - $[redacted], 12 pair, 24 gauge - $[redacted] and 25 pair, 26 gauge - $[redacted].[3] The potential installed cost savings is at least [redacted]% from utilizing a 12 pair 24 gauge aerial cable instead of a 25 pair cable. Any cost savings for BellSouth from not having 12 pair 24 gauge cable as a choice in its inventory cannot begin to offset these potential savings. BellSouth currently has more than [redacted] cable types and sizes of cable in its inventory.

BellSouth's operating practice of 25 pair minimum size cable and 25 pair distribution cable administration are major contributors to BellSouth's rather low copper distribution cable utilization factor of [redacted]%, which in turn drives up BellSouth's TSLRIC cost for distribution cables of all sizes. The very example that Mr. Baeza uses to substantiate BellSouth's low distribution utilization rate would have a utilization factor of 75% if 12 pair cables were deployed on the side streets.[4]

Mr. Baeza's cost savings arguments include reduced training from not having 6 and 12 pair cables. There quite simply are no additional training requirements to place or splice these smaller size cables.

BellSouth's position on this issue is based on their embedded operating practice of having a minimum 25 pair cable. BellSouth can certainly choose to run its business as it see fit. However, for the purpose of establishing the cost basis for Unbundled Network Elements, BellSouth should model the least cost, most efficient, currently available technology, which in this case is 12 pair 24 gauge cable. The result would be cost savings in cable material, utilization and loading factors.

Q. WHY DO YOU BELIEVE THAT BELLSOUTH'S ASSUMPTIONS CONCERNING USE OF BRIDGED TAP ARE NOT LEAST COST AND FORWARD LOOKING?

A. The term bridged tap applies to copper cable that is not on the direct path of the cable pair between the customer and the central office. As used in BellSouth's Cost Study, it includes "pure bridged tap" (i.e., bridged to the cable pair between the customer and the central office) as well as "end section" (i.e., extending past the customer). "Pure bridged tap," which is prevalent in BellSouth embedded network and thus its loop sample, is a consequence of outdate multiple plant design. BellSouth's Cost Study exaggerates copper cable costs by including up to 2,500 feet of either type of bridged tap from its sampled loops after deleting all of its irregular bridged tap between load coils and repeaters. Even with this limitation to the amount of bridged tap that is actually deployed in BellSouth's network, the cost impact of this mostly inefficient bridged tap adds a staggering [redacted]% - [redacted]% to the BellSouth's total loop investment in Florida. (The range of bridged tap investment is estimated based on BellSouth's filings in similar UNE cost dockets in other states since BellSouth did not file the relevant spreadsheet (i.e., a11comp) in this proceeding.)

In his direct testimony regarding bridged tap, Mr. Baeza continues BellSouth's futile quest to develop an example to substantiate the inefficiencies of "pure bridged tap," as opposed to "end section.[5] He states that his example demonstrates that bridged tap "is actually desirable in many cases, since it avoids the necessity of building additional plant to serve our customers." This statement is incorrect and misleading. With 40 homes in the subdivision in Mr. Baeza's example, 20 homes along the main street and 20 homes on the cross street, a 100 pair cable is required from the central office. Therefore, no cable from the central office is avoided by the designed bridged tap in the example. The OSP planner or design engineer would allocate 50 pairs along main street and 50 pairs to the cross street. The multiplying of the 50 pairs allocated to the cross street for assignment along the main street as described in Mr. Baeza's example is neither required nor desired and is contrary to the Detailed Distribution Area Planning practice.[6]

Using BellSouth's own example to further illustrate the uneconomical use of designed bridge tap, the 100 pair cable along the main street could have been tapered to a 25 or 50 pair cable at the cross street and still served the demand, if it was otherwise economical to do so. Mr. Baeza asserts that, "Opening the sheath, cutting the cable and splicing the new cable are not free. As well, costs are incurred in training, warehousing and inventorying splicing equipment and in the maintenance of those splices." He seems to overlook the obvious fact that there will be a splice anyway of the 50 pair cable going down the cross street to the 100 pair cable coming down the main street at the potential taper point. Therefore, the correct economic considerations in determining whether or not to taper the cable would be the wire joining cost of splicing to a 25 or 50 cable continuing on down the main street versus the material cost savings of the 25 or 50 pair cable instead of continuing on with the 100 pair cable. Thus, Mr. Baeza's example of reasonable "bridged tap" avoids no costs, violates distribution design practice, and precludes potential cost savings from tapering the cable along the main street.

One more observation regarding Mr. Baeza's testimony on "bridged tap" is that if he really wanted to use it to avoid the necessity of building additional plant, then in his previous example on distribution cable utilization, the 25 houses could have been served with 50 pairs via "bridged tap" with a 75% utilization (based on (25 houses x 1.5 lines per house) / 50 pairs).

There should be <u>zero</u> "pure bridged tap" and <u>minimal</u> "end section" in a forward looking local loop design based on the current Serving Area design concept. The elimination of "pure bridged tap" from BellSouth's redesign assumptions and the limitation of the single "end section" bridged tap to 2,000 feet in accordance with BellSouth's own directive[7] would substantially lower the [redacted]% - [redacted]% of bridged tap copper cable material investment in BellSouth's Cost Study. If BellSouth were to recast its sampled loops in accordance with this recommendation, I estimate that there would be a 3% - 5% reduction in BellSouth's total loop investment. Other local loop cost models, by comparison, have no "pure bridged tap" in their designed loops.

Q. WHY ARE THE BELLSOUTH COST STUDY ASSUMPTIONS CONCERNING AVERAGE FIBER CABLE SIZE NOT LEAST COST?

A. For loops longer than 12,000 feet on copper feeder, the BellSouth Cost Study redesigns such loops with average size fiber cables that can be larger and more expensive than necessary, thereby exaggerating material investment. In Florida, these average sized fiber cables are [redacted] fiber for aerial, [redacted] fiber for buried, [redacted] fiber for underground and [redacted] for building entrance. BellSouth's Cost Study offers no substantiation for these cable sizes, which differ significantly by state. It is incredulous to model [redacted] fiber cable as the <u>average size</u> building entrance fiber cable, especially when these buildings are more than [redacted] feet from the wire center.

In rebuttal to this point in Louisiana, Ms. Caldwell makes the incredible statement that, "Regardless of these facts, on a per DSO equivalent basis, or any other comparable basis for that matter, 25 pair cable is no more costly than 11 or 6 pair cable and 30 strand fiber cable is not more costly than 6 strand fiber cable."[8] BellSouth's own cost data in this docket show the cost of 6 strand fiber cable to be $[redacted] per foot and 30 strand fiber cable to be $[redacted] per foot. In addition, it also cost more to splice the 24 extra fibers in a 30 strand fiber cable.

Mr. Baeza states that "the truth is that one-sixth of a six pair cable is more expensive the one-twenty fifth of a 25 pair cable."[9] BellSouth's methodology of determining cost on a per circuit or DS0 equivalent basis may be appropriate for allocating and recovering costs associated with an embedded investment. But, a forward looking bottom up cost model based on the concepts of least cost and most efficient would properly size and fully cost each cable in the local loop network. If a 6 or 12 pair cable is of sufficient capacity to serve the customer demand, then that 6 or 12 pair 24 gauge cable costs less than BellSouth's 25 pair 26 gauge cable. Furthermore, and even more importantly, the modeling of 6 and 12 pair cable sizes increases the distribution cable utilization factor, which lowers local loop investment even more because of the way that BellSouth has modeled utilization in its cost study.

By way of comparison, other local loop cost models will determine and then properly size copper and fiber cables for each cable segment of each feeder route in each and every wire center for the entire state of Florida; thereby modeling more realistic material costs for fiber cables in this regard.

Q. HOW ARE THE BELLSOUTH COST STUDY ASSUMPTIONS CONCERNING THE USE OF TWO-CHANNEL DIGITIAL SUBSCRIBER LINE (DSL) SYSTEMS NOT LEAST COST AND FORWARD LOOKING?

A. BellSouth's Cost Study oversizes copper cable spare capacity, thereby increasing material costs and decreasing forward looking utilization factors. Two-channel DSL Systems can operate over 2-wire non-loaded loops out to 18,000 feet and provide a second line capability as needed, which is more economical than having a spare cable pair for each customer. Thus, a least cost, most efficient set of forward looking assumptions utilizing currently available technology would be to reduce some of the spare capacity in copper cables and drops for the non-DLC loops less than 12,000 feet by employing two-channel DSL as the economic alternative if all of the spare cable capacity is used.

The reason that a two-channel DSL System, or BellSouth's Digital Added Main Line (DAML), is more economical than providing excessive spare copper cable capacity is based on the following analysis. With copper utilization rates of [redacted]% for distribution cables and [redacted]% for feeder cables, a substantial amount of BellSouth's loop investment is in spare capacity. Judicious utilization of two-channel DSL systems, or DAML, would raise BellSouth's utilization rates and lower its investment.

BellSouth did not file its investment per local loop in Florida for this proceeding; however, in UNE cost dockets in other states BellSouth has filed $[redacted] - $[redacted] for a 2-wire analog voice grade loop, service level 1. For economic comparison purposes this investment in a spare copper circuit that has very limited redeployment capability is made at time point zero. A two-channel DSL system, or DAML, cost approximately $700. This investment is incurred at some point in the future, if needed. Relatively few of them will likely be needed because there are only [redacted] lines per residence in Florida. DAML is also highly redeployable.

So the appropriate economic comparison is:

- spare capacity in the form of excessive cable investment that is at least [redacted]% to as much as [redacted]% more costly per circuit, is a sunk investment at time point zero, and is provided for all potential users of second lines, versus
- lowered initial cable investment, a smaller cost per additional line that is incurred if, when and only in the amount needed by customers, and is not a sunk investment because it can be redeployed if customer service requirements change.

Mr. Baeza appears to have an entirely different view on how to model and cost a network according to TSLRIC principles. In his rebuttal testimony in Louisiana he states that, "Spending $500 to $700 to gain a pair, and perhaps save an additional drop, at three times the cost of provisioning the pair in the initial cable sizing seems excessive."[10] His oversimplified comparison assumes incorrectly that ultimate spare facilities for all customers must be provided on initial installation and that the economic choice is spare copper pairs or DAML systems initially for all. He does not consider the probability of occurrence, the capability for redeployment nor the discounting of cost associated with a future expenditure for the DAML as the economically viable alternative.

Mr. Baeza also states that the incremental cost of the spare pair is one third of the cost of DAML, which would be $167 to $233. I believe that CLECs would be most interested in leasing BellSouth's spare capacity based on this amount of incremental investment. However, BellSouth's Cost Study uses average investment that is much higher than TSLRIC because, in part, BellSouth's copper utilization rates are too low.

BellSouth's Loop Technology Deployment Directives allow for two-channel DSL systems (referred to therein as DAML for Digital Added Main Line) as BellSouth's last choice for distribution relief.[11] Mr. Wayne Gray (Mr. Baeza's counterpart for Georgia) confirmed at his deposition that DAML is a viable alternative for providing a second line.[12] With two-channel DSL Systems as a viable alternative to oversizing cables for all potential customer needs, initial loop investment will be lowered by raising BellSouth's "forward looking" copper cable utilization factors. Furthermore, any future investment in DSL Systems is only required if, when, and for as long as specifically required.

Mr. Baeza further argues that "DAML is less expensive if demand is only temporary. If demand is permanent and ongoing, the correct solution is to size the distribution cable to provide for the projected demand."[13] He misses the point that DAML is being proposed as the economical alternative to excessive spare copper pairs for unprojected future demand. Instead, BellSouth would rather deploy and charge current customers, particularly its CLEC customers, for the excessive capacity to possibly serve future customers.

Q. WHAT IS YOUR CONCLUSION REGARDING BELLSOUTH'S FORWARD LOOKING OSP ASSUMPTIONS IN ITS LOCAL LOOP COST STUDYING?

A. My conclusion, based on the examples I describe above, is that BellSouth's "forward looking" assumptions fall short of being the least cost, most efficient utilization of currently available technology, and many of BellSouth's OSP assumptions are not really forward looking at all. BellSouth's Cost Study in numerous ways seeks to recover BellSouth's backward looking, embedded costs incurred in building its existing network.

Q. DOES BELLSOUTH'S COST STUDY INCLUDE ALL THE FORWARD LOOKING ASSUMPTIONS OF BELLSOUTH'S INTERNAL NETWORK DEPLOYMENT PLANS?

A. No. BellSouth witnesses have acknowledged that the BellSouth Cost Study specifically does not incorporate many of the forward looking assumptions of BellSouth's own network deployment directives.[14] On the other hand, BellSouth's Cost Study incorporates other aspects of its "Loop Technology Deployment Directive" that perpetuate the underutilization – and therefore exaggerate the material cost – of BellSouth's existing copper plant. For example, the low utilization of copper cables in BellSouth's Cost Study may be partly attributable to BellSouth's internal and self-serving business decision to [redacted].[15]

<u>OSP COST STUDYING ASSUMPTIONS:</u>

A. <u>COPPER DISTRIBUTION CABLE UTILIZATION</u>

Q. HAS BELLSOUTH MADE REASONABLE ASSUMPTIONS IN PROJECTING ITS UTILIZATION OF COPPER DISTRIBUTION CABLE?

A. No. Based on the criteria of a forward looking, least cost, most efficient local loop utilizing currently available technology, I conclude that BellSouth's copper distribution utilization projection of [redacted]% is too low. A more efficient, forward looking distribution network for Florida would incorporate distribution cable fill factors of approximately 70% with commensurate utilization reasonably projected at 60%. BellSouth's projected distribution utilization results in approximately [redacted]% more distribution cable investment than should be required.

It is important to explain the difference between "fill factor" and "utilization." The fill factor for a copper cable is defined in bottoms up cost models as the percentage of the lines served divided by the number of pairs required to serve those lines, allowing for a reasonable amount of spare capacity. The fill factor for copper cable is used in these other cost models to divide into the number of customer lines to determine the number of cable pairs required, which is then increased to the next larger available cable size, which becomes the number of pairs available.

A better descriptive name for "fill factor" would be "cable sizing factor." On the other hand, the term "utilization" is defined as the number of lines served, divided by the number of pairs available.

The following is an example of how a copper cable fill factor works to create spare capacity. If the demand along a particular street was for 60 lines and the applicable fill factor in that density zone was 75%, then a bottoms up cost model would determine that 80 pairs (i.e., 60 / .75) would be the number of cable pairs required to serve the demand. So, the fill factor alone, in this example, has modeled 20 additional cable pairs, which is a fill factor spare capacity level of 33% (i.e., 20 / 60).

However, since copper cables come in discrete sizes, the bottoms up cost model would select the next larger available cable size, which is a 100 pair cable, to serve the 60 customers along that street. The initial utilization would be 60%

(i.e., 60 lines / 100 pairs available), and the initial spare capacity would be 40% (i.e., 40 / 100).

Since the bottoms up cost model fill factor defines the upper limit on initial utilization, then the least amount of spare capacity initially will be 100% less the fill factor. The actual spare capacity will likely be much greater depending upon the actual demand and the rounding up to the next cable size. Thus, the average "cable utilization" that results from the bottoms up cost model will be significantly less than the input values for fill factors for the cost model. It is a misrepresentation to claim that the bottoms up cost model fill factors are unreasonably higher than the ILECs utilization factors because that is simply not an "apples-to-apples" comparison.

The average utilization for a cable section can be approximated as the average of the initial and planned maximum utilization (i.e., initial customer lines and planned maximum divided by the size of cable placed). Initial and planned maximum utilization can be approximated by first constructing a spreadsheet of customer lines divided by a given fill factor and rounded up to the next larger cable size and calculating the initial and planned maximum utilization. Then, by averaging these initial and planned maximum utilizations over a range of customer line requirements, the average utilization can be approximated, as in Exhibit JWW1.

This methodology produces cables that account for the "lumpiness" of cable investments, will serve reasonably projected future demand, allow for as much as 5% defective pairs, and permit churn in the outside plant.

Q. WHAT IS YOUR BASIS FOR CONCLUDING THAT BELLSOUTH'S DISTRIBUTION CABLE UTILIZATION IS TOO LOW?

A. At a [redacted]% utilization factor, BellSouth's distribution cables will have outlived their usefulness long before they exhaust their excessive spare capacity, as demonstrated below. BellSouth has based its copper distribution utilization on the ratio of current access lines divided by ultimate cable requirements. BellSouth expects an annual average access line growth rate of [redacted]% (based on historical data) over the next ten years.[16] Starting at a [redacted]% fill on existing distribution cables, it would take at least [redacted] additional years of compounded growth to reach a typical fill at relief of 85%. On the other hand, BellSouth's stated service life for aerial and buried copper cables is only [redacted] years. In other words, BellSouth has sized its distribution cables to far exceed reasonably foreseeable capacity requirements during their useful life.

Another reason why BellSouth's copper cable utilization rate is too low is the rather high actual defective pair rate of [redacted]% for BellSouth's copper cables.[17] In my opinion, a 5.0% defective pair rate is unacceptably high and is more than covered by the fill factors.

When asked about this matter in her deposition, Ms. Daonne Caldwell, BellSouth's Cost Witness, was not aware if BellSouth had any standards for an acceptable defective pair rate. She also mistakenly stated that defective pairs had not been counted as available pairs in establishing BellSouth's Cost Study utilization factors.[18]

My reasons for stating that a 5% defective pair rate is too high are based on the following:

- BellSouth receives copper cables that should have zero defective pairs,
- BellSouth performs cable acceptance test on cable projects and should not be turning up for service newly installed cables with more than 1% defective pairs, and
- BellSouth UNE cost studies have modeled its investment per cable pair to be $[redacted] - $[redacted] in other dockets.
- BellSouth's cost to clear a defective pair is approximately $[redacted].[19]

Thus, as the defective pair rate begins to approach 5%, it becomes very economical to identify and repair or replace major causes. That is unless BellSouth has such large surplus of spare cable pairs that there is no economic need to recover the [redacted]% - [redacted]% in excessive defective pairs. Low cable utilization (i.e., excessive spare pairs in the cable) encourages high defective pair rates because it is often expedient to simply "cut a change" and transfer the customer having trouble to a spare pair, thus leaving the initial pair defective.

Mr. Baeza's reasoning that defective pairs (or fibers) is justification for lowered utilization[20] is certainly not a model for a least cost, most efficient local loop network and should be unacceptable. BellSouth has rationalized its high defective pair rate in part because of its low utilization rates. In this cost study BellSouth is now trying to rationalize its low utilization rates base in part on its high defective pair rate.

Q. DO BELLSOUTH'S DISTRIBUTION CABLE UTILIZATION ASSUMPTIONS COMPORT WITH BELLSOUTH'S ACTUAL BUSINESS PLANS?

No. BellSouth's own Loop Technology Deployment Directive states that "[redacted]" and "[redacted]".[21] A BellSouth Network Infrastructure Planning Witness has equated this to sizing cable based on anticipated demand in a particular area in the next [redacted] years,[22] as compared to the [redacted] years of spare capacity remaining in cables with [redacted]% average utilization under BellSouth's Cost Study.

Historically, BellSouth has sized its distribution cables based on ultimate demand utilizing a guideline of [redacted] pairs per living unit[23] plus business demand, but is now sizing based on [redacted] pairs per living unit.[24] So, if BellSouth is currently placing distribution cables that are of smaller size based on only the [redacted] year demand or to provide only [redacted] lines per living unit as opposed to its past practice of [redacted] pairs per living unit, then it logically follows that distribution cable utilization rates will rise in the future. Instead, BellSouth's Cost Study reflects the lower distribution cable utilization of its backward looking embedded network deployment of [redacted] pairs per living unit. The importance of this point is that lowered utilization rates have a direct linear impact on unnecessarily high local loop investment in BellSouth's Cost Study.

Mr. Baeza offers as partial justification for BellSouth's low utilization rates that "consideration also has to be given to churn and sufficient pairs must be available to handle dual or nonconcurrent service activity which is likely to increase with the presence of multiple Local Exchange Companies. As a result, cable sizing requirements will increase, and thus help ensure that utilization factors will remain constant."[25] However, when a customer changes service from BellSouth to a Competitive Local Exchange Carrier (CLEC) via a UNE there should be no change in the cable portion of the local loop; in other words, there should only be <u>concurrent</u> service activity in so far as the cable pair or DLC channel is concerned. Thus, no additional OSP facilities with lower utilization should be attributed to customers changing from BellSouth to CLECs over BellSouth UNEs as Mr. Baeza has argued.

Mr. Baeza also testifies that the various Florida plant utilization factors contained in the cost studies BellSouth has presented are reasonable and represent what he believes that BellSouth's utilization factors will be in the future.[26] This is contradicted by BellSouth's own publicity regarding second line growth:

> BellSouth is driving revenue and profit growth by aggressively marketing additional telephone lines to our customers. Additional lines are key to satisfying the expanding consumer demand for connections to the Internet,

Home fax machines, children's phones, telecommuting tools and home office phones. With 1.3 million additional lines, BellSouth has the most of any telephone company in the U.S. Our additional lines increased by 21 percent in 1995, and accounted for nearly half of all new residential connections.[27]

For the purposes of defining a least cost, most efficient, forward looking cost model for the local loop to establish the cost basis for UNEs, it is inconceivable that BellSouth would be allowed to use its historical embedded utilization rates. As used in BellSouth's cost model, utilization rates have a direct linear impact on material costs. If the utilization rates used by BellSouth are set 20% too low for a least cost, most efficient, forward looking cost model for the local loop, then the resulting UNE rates will be 20% too high.

Q. HOW THEN IS A MORE APPROPRIATE ASSUMPTION FOR COPPER DISTRIBUTION UTILIZATION DETERMINED?

A. Mr. Baeza constructed a useful table in Exhibit DMB-3 to his Rebuttal Testimony in the Louisiana Cost Docket that shows the effect of sizing cables based on [redacted] pairs per living unit (i.e., a fill factor of [redacted]%) and rounding up to the next available cable size.[28] This table has been reproduced with the addition of 6 and 12 pair cables as Exhibit JWW1. The conclusion drawn from this example is that the average utilization over the life of the cables would be 62.5% (the initial utilization would be 50.0% (i.e., 8,911 / 17,822) and the ultimate utilization would be 75.0% (i.e., 13,366.5 / 17,825) with average utilization being 62.5%).

Q. DOES BELLSOUTH'S COST STUDY APPLY CABLE UTILIZATION FACTORS CORRECTLY?

A. No. The BellSouth Cost Study uses its copper distribution, copper feeder and fiber cable utilization factors to factor up the amount of investment that it determines on a per DSO circuit basis. It makes no differentiation among utilization rates for its embedded aerial, buried or underground applications, even though BellSouth's practice is to size its cables differently based on the type of plant. Typically, buried cables are sized to serve forecasted demand over a longer period of time, and consequently would have lower average utilization than aerial or underground cables. BellSouth's witnesses repeatedly assert correctly that it is undesirable to dig up streets and lawns to reinforce buried cables. What they do not mention, and what BellSouth's Cost Study does not model, is the fact that BellSouth's aerial and underground cables cable sections are sized for shorter relief intervals and have higher average utilization rates due to the lower cost and minimal disruption of cable reinforcement.

B. <u>COPPER FEEDER CABLE UTILIZATION</u>

Q. IS THE UTILIZATION RATE USED FOR COPPER FEEDER IN THE BELLSOUTH COST STUDY APPROPRIATE AND IF NOT, WHAT DO YOU RECOMMEND?

A. No, it is not appropriate. The copper feeder utilization used by BellSouth is the embedded fill measured at the Main Distributing Frame (MDF) in the central office where all the copper feeder pairs are terminated. It is commonly referred to as "MDF fill".

The copper feeder utilization of [redacted]% used by BellSouth in this proceeding is based on the embedded copper feeder, which is not appropriate for TSLRIC. As explained more fully by economic witnesses,[29] the utilization excluding anticipated growth, or what is called "fill at relief" by OSP engineers, is the appropriate utilization for TSLRIC. The "fill at relief" reflects the estimated capacity of the existing network. Based on my experience, the appropriate "fill at relief" for copper feeder pairs is 90% - 95% based on assigned pairs and 85% - 90% based on working pairs. BellSouth has also stated that 85-90% is the appropriate "fill at relief" for copper cables.[30]

Assigned pairs includes feeder pairs that are spare (commonly referred to as idle assigned pairs) but are left assigned to a customer location to avoid a field visit when service is re-connected. A good example of an idle assigned pair is one connected to an apartment that has been vacated but the service for the new tenant has not yet been connected. This typically represents about 5% (as a percent of the assigned pairs). Also, it is important to recognize that when the feeder cables reach the 85% - 90% "fill at relief", it does not automatically mean that relief is required. It is a "trigger" for the outside plant engineer to study the feeder route to determine whether relief is appropriate. The most important factors to consider in making that decision are spare capacity and growth. Obviously if there is no growth or the growth is small, feeder relief may not be required at the time that the "fill at relief" is reached. The importance of focusing on spare capacity and growth as opposed to automatically reinforcing the feeder network when it reaches 85% or 90% fill, cannot be over emphasized. This is critical to achieving and maintaining efficient utilization of the copper feeder network.

BellSouth uses a copper feeder utilization factor of [redacted]% in Florida, which reflects low utilization of the copper feeder investment. Assuming BellSouth's stated annual growth rate of [redacted]% per year, the BellSouth cost study includes spare copper feeder capacity for [redacted] to [redacted] years growth from its average copper feeder utilization, as opposed to the utilization at the time that a feeder route has been relieved with a new cable. This is excessive because feeder cables are generally sized at the time of placement for only three to five years growth, as corroborated by BellSouth's Loop Technology Deployment Directives.[31] Based on this three to five year period and an 85-90% "fill at relief", the fills for the feeder cables should range between 70% (i.e. the lowest fill will be 85% - 15%) and 90% (i.e. the upper fill will be 90%). Thus, the average should be about 80% which is what I recommend as the appropriate utilization for copper feeder cables in this proceeding.

Q. WHAT ARE THE FACTORS THAT AFFECT THE MDF FILL AND CAN YOU PROVIDE SOME EXPLANATIONS OF WHY THE BELLSOUTH UTILIZATION IS THAT LOW?

A. Based on my experience and the BellSouth information that is applicable to all states, I believe the following five factors contribute significantly to BellSouth's low copper feeder utilization:

1. A major factor is the high percentage of defective pairs based on the following data regarding BellSouth's defective pair rate:[32]

Year	Defective Rate
1991	[redacted]%
1992	[redacted]%
1993	[redacted]%
1994	[redacted]%
1995	[redacted]%
1996	[redacted]%

There are a number of factors that contribute to this high defective percentage of pairs. When feeder utilization is low, there is little incentive to clear defective pairs, and customer troubles are cleared by transferring the customer to a good pair. This results in a continuous increase in the level of defective pairs. High numbers of defective pairs is not efficient utilization of the copper feeder investment and should not be included in TSLRIC. Based on the experience of the Hatfield Model OSP Engineering Team, the target level for defective pairs has traditionally been 2% - 3% for copper feeder cable. If the actual defective pair level exceeded this range, an attempt should be made to clear defective pairs prior to placing additional cable. Furthermore, with the advancement in methods and technology for splicing, terminal equipment, cable material, and SAC (Serving Area Concept) design which minimizes rearrangement of the copper pairs, an appropriate forward looking defective pair level should be considerably lower than the embedded level.

2. The BellSouth strategy for deployment [redacted] leads to low copper feeder utilization.

Where BellSouth [redacted], resulting in the copper feeder utilization being lower than it would be otherwise. As indicated in BellSouth's deployment directives, [redacted] contribute to low feeder utilization and should be excluded from the utilization used in TSLRIC.

3. Over-sizing of feeder cables based on optimistic forecasts of growth is a significant contributor to low feeder utilization. Generally, low growth central offices are the major offenders. Because the growth in these central offices is low, it takes a very long time to correct the problem. Furthermore, with the BellSouth emphasis on DLC deployment for strategic reasons, the low utilization in these central offices will take even longer to correct. It is not appropriate to reflect excess copper feeder cable capacity in a TSLRIC study.

4. The utilization measured at the MDF usually understates the true fill of the copper feeder route. Because of a concern about exhausting the conduit capacity entering a central office (there is a room called a cable vault, typically in the basement, where the cables enter the central office from the outside) some engineers automatically oversize the feeder cable that enters the central office. In these cases the utilization measured at the MDF is lower than the fill measured further away from the central office. For this reason MDF fill usually provides an erroneous measurement of the copper feeder investment utilization. While it is simple to determine the fill at the MDF, it is not an appropriate measurement of the feeder cable utilization, and it is

definitely not an appropriate utilization measurement of the copper feeder network for TSLRIC.

5. BellSouth did not adjust the embedded fill factor to reflect the difference between the embedded local loop network design and the forward looking network design assumed for TSLRIC. BellSouth states that their cost study assumes that all loops over [redacted] kilofeet are served on DLC and that loops less than [redacted] kilofeet are served by copper cables. This results is a very important difference that significantly impacts the fill on the copper feeder network. The embedded (or existing) network involves multiple gauges (fine gauge cables for the short loops and coarse gauge cables for the long loops) whereas in the forward looking network the copper feeder will consist of only one gauge. With the requirement for only one gauge, the fill will be significantly higher because in the multi-gauge situation the cables have to be sized separately for each gauge, resulting in lower fills.

Q. WHAT EFFECT DOES BELLSOUTH'S USE OF EMBEDDED COPPER FILL MEASURED AT THE MDF HAVE ON ITS STUDY?

A. BellSouth has understated its copper feeder cable utilization and thus overstated the copper feeder costs in this cost study by:

- choosing to use the embedded fill, measured at the MDF, which is not an appropriate measure of copper feeder route fill,
- not adjusting the embedded fill for the excessive defective pairs,
- not adjusting for inappropriate over-sizing,

- not adjusting for the negative impact on copper feeder utilization of DLC deployment and
- not adjusting the embedded fill to reflect the forward looking requirement for only one gauge.

BellSouth's use of its low embedded copper feeder utilization [redacted]% does not reflect efficient utilization of the copper feeder network. In his Exhibit DMB-1, Mr. Baeza "demonstrates that BellSouth has a better than average utilization rate as compared to other RBOCs [Regional Bell Operating Companies]."[33] *It is true* that BellSouth's company average embedded feeder utilization of [redacted]% is slightly above the RBOC embedded average of [redacted]%, as is the BellSouth - Florida's embedded feeder utilization rate of [redacted]%. Nevertheless, the relevant criteria *for the cost models in* this UNE proceeding is "most efficient." By that criteria, BellSouth falls far, far short of the "best in class" RBOC embedded feeder utilization rate of 92.2% as shown in Mr. Baeza's Exhibit DMB-1. And of course, the other relevant criteria for these cost models is forward looking, as opposed to embedded utilization.

Based on BellSouth's own guidelines, and the analysis above, I recommend that this Commission require a *utilization of* 80% *in* the BellSouth Cost Study *for the* copper feeder network.

C. DROPS AND NIDs

Q. HAS BELLSOUTH MADE REASONABLE ASSUMPTIONS IN ITS COST STUDYING OF DROPS AND NETWORK INTERFACE DEVICES (NIDs)?

A. No, it has not. A drop is the individual service wire that typically extends from a cable terminal at the curb or rear lot line to the network interface device (NID) on the outside wall of the customer's premise. Drop and NID costs are a major component of BellSouth's local loop costs because they apply to most loops. BellSouth's drop and NID costs of $[redacted] is an excessive amount, which can be attributed in large part to four of BellSouth's Cost Study drop assumptions which are flawed: 1) average drop length is too long, 2) telecommunications labor costs for drops are too much, 3) the percentage of aerial drops is too low, and 4) the sizing of residence buried drops is too large.

Q. DO YOU BELIEVE THAT BELLSOUTH'S ASSUMPTION FOR AVERAGE DROP LENGTH IS ACCURATE OR REALISTIC?

A. No – BellSouth's assumption for average drop length appears inaccurate for several reasons. First, in its cost study, BellSouth utilizes average drop lengths of [redacted] feet for aerial and [redacted] feet for buried based on the opinion of its subject matter experts. However, there is no evidence that an actual survey of drop lengths was done, and it can only be surmised that the opinion survey was representative of the entire state.

Even if BellSouth's regional estimates for drop lengths were accurate for today – and there is no actual evidence that they are – changing demographics should decrease average drop lengths in the future. In his direct testimony Mr. Baeza asserts, "I believe that there is no basis to conclude that the length of these drops would be expected to change in the future."[34] However, in deposition, Mr. Gray does indeed foresee changes in the demographics of the customers of local telephone services in the future. He anticipates that business growth may change the business-residence mix, rural areas will become even less rural, and there will possibly be more concentration of customers and more multiple dwelling units.[35] He also foresees that more densely populated areas would have smaller lots with shorter drops, and that there are cases where no drop wires are required.[36] Such changes in customer demographics should result in shorter average drop lengths in the future in contradiction to Mr. Baeza's testimony and the assumptions of BellSouth's Cost Study.

Q. WHAT DO YOU RECOMMEND AS THE APPROPRIATE DROP LENGTH?

A. First of all, as a comparative benchmark to BellSouth's drop length figures, the Bellcore Survey of BOC Loops[37] showed an average drop length of only 73 feet. Mr. Baeza challenges this national average drop length by asserting that BellSouth's region is a relatively rural area and thus should have longer than average drops.[38] A comparison of access lines per square mile for the former Bell Operating Companies shows that BellSouth has approximately 99 access lines per square mile versus a national average of approximately 119. Thus, BellSouth's region is approximately 17% to the rural side of the national average. However, BellSouth - Florida has approximately 237 access lines per square mile, roughly twice the national average, and is definitely not a "more rural environment" as claimed by Mr. Baeza.

My observation from having worked in OSP for BellSouth in Alabama for seven years, from having field surveyed OSP in ten CBGs all around the state of Georgia in preparing a response to a data request from the Georgia PSC Staff, from living in BellSouth's service areas in four states for most of my life, and from traveling extensively throughout BellSouth's nine state region, is that more than 80% of BellSouth's residential and small business customers have either no drop or drops that are less than 150 feet in length. I therefore recommend adjusting BellSouth's average drop length for both aerial and buried drops to 100 feet.

Q. WHY DO YOU CONCLUDE THAT BELLSOUTH'S ASSUMPTIONS FOR TELECOMMUNICATIONS DROP LABOR COSTS ARE TOO HIGH, AND WHAT DO YOU RECOMMEND?

A. BellSouth has included in its costs for telecommunications labor [redacted] minutes for travel, [redacted] minutes for Network Interface Device (NID) installation, and [redacted] minutes for terminating the drop, for a total of [redacted] minutes. There is also an additional [redacted] minutes of telecommunications labor for placing an aerial drop. BellSouth has assumed an average travel approach between drop placements, in contrast to a least cost, forward looking, large scale project approach that would minimize travel between drop placements. My recommendation is that BellSouth's telecommunications labor time for travel, NID installation and drop termination should be reduced to 60 minutes total, with an additional 20 minutes for placing an aerial drop.

Q. WHY DO YOU CONCLUDE THAT BELLSOUTH'S ASSUMPTION REGARDING ITS PERCENTAGE OF BURIED DROPS IS TOO HIGH, AND WHAT DO YOU RECOMMEND?

A. The BellSouth Cost Study models [redacted]% of drops as aerial and [redacted]% as buried for both business and residence lines, based on data from BellSouth's loop sample, which suggest that these are the actual percentages of loops served by aerial and buried terminals. I believe that this modeling methodology is flawed because it does not account for BellSouth's very common practice of buried cable terminals having aerial drops, but not vice versa. Lacking data on actual physical drop percentages for BellSouth in Florida, my recommendation, based on extensive personal observations in other BellSouth states, is that the drop percentages in BellSouth's Cost Study should be adjusted to 35% aerial and 65% buried drops.

Q. WHY DO YOU CONCLUDE THAT BELLSOUTH'S ASSUMPTION REGARDING THE SIZE OF ITS BURIED DROP FOR RESIDENCES IS TOO LARGE, AND WHAT DO YOU RECOMMEND?

A. BellSouth's Cost Study shows that it serves [redacted] lines per residence, but assumes [redacted] pair buried drops for both residences and businesses. However, a [redacted] pair drop, which is the size that the BellSouth Cost Study assumes for its aerial drop applications, creates an average of [redacted]% spare capacity (based on [redacted] / [redacted] (i.e., [redacted]%) of the capacity of [redacted] pair drops being utilized). While BellSouth can certainly choose to invest in [redacted] pair buried drops to every residence to preclude ever having to reinforce any of them, it is not economically justified that a CLEC should fully support the resulting [redacted]% average spare capacity (based on [redacted] / [redacted] (i.e., [redacted]%) of the capacity of [redacted] pair drops being utilized). Furthermore, the availability of second line DSL Systems working on copper pairs out to 12,000 feet provides a viable alternative for up to four subscriber lines on a 2-pair buried drop for those residence customers who may someday require more than two lines.

My recommendation, for the purpose of costing UNEs, is that all residence buried drops should be 2 pair. From the Copper Cable Table in the BellSouth Cost Study, the cost premium for 5 pair versus 2 pair BSW is $[redacted] per foot. For BellSouth's average [redacted] foot buried drop, this would represent a direct material savings of $[redacted] per drop (including the 6% sales tax) for the [redacted]% of buried drops serving residences.

Additionally, BellSouth has costed NID Material (Bridge & Protector) for two pair aerial and buried. Thus, [redacted]% of the residential station protectors are spare. Station protectors are very modular and can be installed as needed. BellSouth has therefore modeled excessive investment in station protection of approximately $[redacted] for each residence customer location versus the cost of placing single station protection on each residential working line.

Q. WHY DO YOU CONCLUDE THAT SOME OF BELLSOUTH'S DROP AND NID COSTS WERE NOT FACTORED FOR THE AVERAGE

NUMBER OF LOOPS PER RESIDENCE, AND WHAT DO YOU RECOMMEND?

A. In its Drop Wire/NID Material spreadsheets, BellSouth's Cost Study has correctly factored for the number of residence and business loops with drops in its calculation of Material for Drop and NID, Contractor Labor, and Telco - Install and Terminate Drop Labor. However, it has not applied this factor appropriately to Exempt Material, Telco - Travel Time, or Telco Install NID Labor. Exhibit JWW2 correctly applies these factors to all of the appropriate elements.

Q. CAN YOU SUMMARIZE THE COMBINED IMPACT OF YOUR RECOMMENDATIONS FOR ADJUSTMENTS TO BELLSOUTH'S DROP COSTS?

A. The interdependent impact of all of these recommendations, as detailed in Exhibit JWW2, would be to lower the total average weighted material for drop investment from $[redacted] to $[redacted]. This represents a major reduction of $[redacted] in the drop investment, resulting in a substantial reduction (my estimate is [redacted]% - [redacted]% since BellSouth did not file the spreadsheet for total loop investment) in the total material investment for BellSouth's hypothetical representative local loop.

Q. DOES YOUR ANALYSIS OF TELECOMMUNICATIONS DROP LABOR ALSO APPLY TO BELLSOUTH'S CALCULATION OF THE COSTS FOR NIDs?

A. Yes it does. First of all, it is unlikely that AT&T would request BellSouth to install a stand-alone NID for leasing as UNE. The reasoning is that a CLEC might wish to lease an existing BellSouth NID as an Unbundled Network

Element. However, if no BellSouth NID existed at the customer's location, it is likely that the CLEC would choose to install its own stand-alone NID rather than incur the expense for BellSouth to make a trip to just install a stand-alone NID. Therefore, BellSouth's Cost Study should calculate the costs for a NID as if the NID had been installed along with the drop. BellSouth has loaded the full [redacted] minutes of travel that it costed for drops and NIDs into its standalone NID costs. Under a least cost, forward looking approach, the travel time would be minimal for the original installation of the NID along with the drop, and what travel time there is should be shared between the drop and the NID. My recommended reductions in travel time to 15 minutes and in total NID labor to 25 minutes, coupled with the 35% aerial and 65% buried drop occurrence recommendation, will produce revised Material Inputs to the costs for 2-Wire and 4-Wire NIDs as detailed on Page 4 of Exhibit JWW2.

D. <u>BUILDING ENTRANCE TERMINALS</u>

Q. HAS BELLSOUTH MADE REASONABLE ASSUMPTIONS IN ITS COST STUDYING OF BUILDING ENTRANCE TERMINALS (i.e., OSP CABLE TERMINATIONS INSIDE OF BUILDINGS THAT OFTEN REQUIRE ELECTICAL STATION PROTECTION)?

A. No it has not. In its June 20, 1997, revised filing of its Georgia Cost Study, BellSouth changed all building entrance terminals from cross boxes to a costing formula based on multiple 100 pair units of its average building entrance station protector at $[redacted] per 100 pair unit. Station protection is required on metallic cable pairs entering a building to provide a safe path to ground in case of an electrical fault in the OSP. I have four major issues with respect to BellSouth's new building entrance terminal assumptions which I believe add unreasonable costs into BellSouth's local loop model:

- BellSouth has assumed that all building entrance cables in urban areas require costly station protection. In urban areas where buildings are close and sufficiently high to provide cone-of-protection shielding, and where extensive underground metallic piping systems exist to dissipate large currents, building entrance terminals do not require costly station protectors.[39]
- BellSouth has improperly placed station protected terminals on some of BellSouth's existing loops and redesigned loops which have non-metallic fiber feeder into the building (e.g. FL # 23). The derived feeder pairs from the DLC remote terminal fed by the fiber cable do not require station protection as assumed by Ms. Caldwell.[40]
- In some cases, the costing for building entrance terminals has been exaggerated because station protectors have been modeled on the cable pairs that distribute within the building (e.g. FL # 23).[41]
- In BellSouth's Cost Study assumptions prior to its June 20th revision in Georgia, when building entrance terminals were treated as cross-connect boxes, BellSouth had divided the cost of the building entrance terminal between feeder and distribution. In BellSouth's current Cost Study, the full cost of multiple 100 pair station protected terminals has been double counted for both feeder and distribution in some building entrance facilities (e.g. FL # 23) in contradiction to Ms. Caldwell's statements in deposition.[42]

Q. HOW COULD BELLSOUTH'S BUILDING ENTRANCE TERMINALS BE MORE ACCURATELY COSTED?

A. The material portion of the hypothetical representative loop for field reporting code FRC 12C, which includes the Building Entrance Terminals, is typically relatively minor (BellSouth did not file the data in this proceeding) because these exaggerated costs are converted to a per DSO equivalent. An accurate re-costing of the building entrance terminals would require access to BellSouth's plats for all the affected loop samples in order to determine the number of feeder and distribution pairs per building entrance terminal and whether any unexposed feeder pairs were terminated and thus would not be worth the effort. However, correction of the rather obvious deficiencies in BellSouth's Cost Study of placing station protection on fiber building entrance cables and distribution pairs within a building can and should be done.

E. <u>**OTHER OSP COST STUDYING ASSUMPTIONS**</u>

Q. WHAT OTHER ISSUES AND RECOMMENDATIONS DO YOU HAVE CONCERNING BELLSOUTH'S ASSUMPTIONS FOR ITS LOCAL LOOP COST STUDYING?

A. There are three other miscellaneous issues:

1. Circuit Level Copper Cable Material Costs,
2. Structure Sharing and
3. Errors in BellSouth's Tables, etc.

Q. WHAT ARE YOUR CONCERNS REGARDING BELLSOUTH'S MODELING OF CIRCUIT LEVEL COPPER MATERIAL COSTS?

A. In converting its hypothetical representative loop to TELRIC Calculator inputs, BellSouth converts copper cable material costs into circuit level costs per foot by dividing the cost per sheath foot by the number of pairs in the cable and the utilization factor. Exhibit JWW3 shows that the cost of copper cable by circuit-foot (i.e., pair-foot) decreases significantly as the pair size of the cable increases through 600 pairs before leveling off.

This is a example of convoluted modeling logic in BellSouth's Cost Study in that larger cables, which actually add more to BellSouth's network investment, produces a lower average loop cost. Thus, the least cost local loop output employing BellSouth's Cost Study would be obtained by redesigning each cable to its maximum size. For example, all 25 pair buried cables redesigned to 2400 pair cables would illogically produce the "least cost" solution using BellSouth's Cost Study. However, such a modeling approach does not produce the "most efficient" solution, as evidenced by BellSouth's low utilization rates. In contrast, other bottoms up cost models size each cable appropriately, and smaller cables contribute smaller amounts of investment to the network solution.

BellSouth has determined its single hypothetical representative loop by compiling the actual cable sizes by type for each segment of its 349 samples of existing loops. BellSouth has stated that, "Cables are appropriately sized in the BellSouth studies." The cables in BellSouth's loop survey are its existing cables, and nothing has been done to substantiate that they have been "appropriately sized."[43]

On the contrary, BellSouth's low utilization factors and current deployment directives support a conclusion that, in general, BellSouth's cables are oversized. There are two types of cases where the inefficiencies of BellSouth's existing network result in smaller size cables at higher per circuit-foot costs being included in its Cost Study.

The first case is where there is a cost inefficient tapering in BellSouth's embedded feeder route. This seemingly minor cost inefficiency gets compounded numerous times throughout BellSouth's Cost Study as it is magnified by utilization, inflation, material loading and conduit loading factors.

My second issue regarding BellSouth's conversion to cost per circuit-foot is that many of BellSouth's embedded cable cross sections contain multiple sheaths from years of reinforcement projects. Therefore, many of the cables included in BellSouth's hypothetical representative loop do not reflect the proper sizing that would be achieved if the least cost, most efficient cable were placed to serve the requirements of each cross section.

When multiple cables of less than 600 pairs parallel each other, there are significant cost inefficiencies on a per circuit-foot basis as shown in Exhibit JWW3. These cost inefficiencies in the basic cable material costing get compounded over and over throughout BellSouth's Cost Study via its subsequent loading factors.

By comparison, other cost models appropriately taper each cable section and uses the most economically efficient cable to serve the requirements. Short of redesigning BellSouth's sampled loops with a set of its plats to eliminate these two cost inefficiencies, it can only be estimated as to how much BellSouth's copper cable circuit level material costs are overstated. Based on Exhibit JWW3, my estimate is 25%, which translates directly into a 20% reduction in the copper cable investment amounts.

Q. WHAT ARE YOUR CONCERNS WITH BELLSOUTH'S MODELING ASSUMPTIONS REGARDING STRUCTURE SHARING?

A. BellSouth's Cost Study does not incorporate a forward looking view of structure sharing in a competitive environment where there will be greater opportunities and incentive for telecommunications companies to share pole lines, trenches and conduit runs. Mr. Baeza grossly misrepresents the structure sharing assumptions of other cost study models when he claims that they assume sharing of structures such as poles, conduit and trenches 100% of the time.[44] Other cost models utilize a weighted percentage of structure sharing that varies depending upon the type of plant and density zone.

Q. WHAT CONCERNS DO YOU HAVE IN REGARDS TO BELLSOUTH'S TABLES, ETC.?

Cost models evolve, particularly when reviewed by third parties, and BellSouth's Cost Study is certainly no exception. In addition to the modeling issues detailed above, a short list of items that still appear to need correction include:

- In the Cable Material Table, the investment for 25 pair buried cable is listed as $[redacted] per foot. It should be $[redacted] per foot. Similarly, 1800 pair aerial cable is listed as $[redacted] per foot when it should be $[redacted] per foot.[45]
- The weighted costs for the 50 pair building entrance and intrabuilding cables include [redacted]% of BKTS-50, a self-supporting cable code which includes the

cost of strand. However, strand is not required in building entrance and intrabuilding cables.

BellSouth's Cost Study is at a relatively early stage in the rigorous process of critical review and improvement. Several corrections have been made; however, other cost models are much further along.

OSP LOADING FACTORS

Q. HAS BELLSOUTH MADE REASONABLE ASSUMPTIONS FOR OSP LOADING FACTORS IN ITS LOCAL LOOP COST STUDYING?

A. No it has not. BellSouth's OSP loadings are not forward looking and, instead, are utilized to recover the costs of BellSouth's past methods of operation. Numerous loadings have been developed based on BellSouth's embedded investment and its 1995 costs and investments. These loadings typically comprise an enormous [redacted]% - [redacted]% of the total investment in the 2-wire analog voice grade loop (BellSouth did not file the information required to accurately determine the loading on it hypothetical representative loop in this proceeding). To paraphrase the analogy employed by Ms. Caldwell, that is a awful lot of "nuts, bolts and screws" compared to the amount of "lumber" being used to build this "house."

Q. WHAT CHANGES, IF ANY, DO YOU RECOMMEND TO BELLSOUTH'S OSP LOADING FACTORS?

A. All of the loadings in the BellSouth Cost Study that are applied to the average material cost of BellSouth's single hypothetical representative loop for the entire state should first be adjusted to eliminate any embedded costs that are not forward looking. I am incapable of deciphering the details of BellSouth's accounting, but examples of such embedded costs in BellSouth's loading factors could include: load coils in its material costs, historical conduit investment based on large, coarse gauge copper cables to serve long loops, maintenance of buried air core PIC cables, etc.

Q. WHAT LOADING FACTORS DO YOU BELIEVE BELLSOUTH HAS OVERSTATED, AND UPON WHAT DO YOU BASE YOUR CONCLUSIONS?

A. I believe that BellSouth has overstated its cable material and conduit loading factors.

Q. WHY DO YOU BELIEVE THAT BELLSOUTH'S COST STUDY OVERSTATES ITS CABLE MATERIAL LOADING FACTORS?

A. My initial concern is with BellSouth's cost modeling methodology of its loadings. BellSouth applies a material loading factor to the inflated direct material cost for copper and fiber cables in its Outside Plant (OSP) Field Reporting Codes (FRC). These material loading factors are modeled primarily to recover telecommunications engineering and labor, vendor engineering and installation, exempt (i.e., minor) material, and sales tax. BellSouth's methodology is to calculate a ratio of these associated expenses to its non-exempt (i.e., major) material investments for the year [redacted], and then multiply this ratio by the direct material associated with its single hypothetical representative loop for the state.

I do not believe that BellSouth's ratio of material loading expenses to cable investment in [redacted] should be considered least cost, most efficient, or forward looking based on currently available technology. Mr. William Zarakas, BellSouth's Cost Modeling Witness, stated in his deposition that, "our assumption there would be that the cost of installing a pole in the future would basically be the same as it was in the past, because we see no change in the technology. <u>And we did that for each individual factor or loading (emphasis supplied)</u>."[46]

Going beyond the fundamental methodology question and looking into the data provided on the material loading factors raises additional questions. These material loading factors for cable are huge contributors to the total loop investment as follows: aerial - [redacted], buried - [redacted], underground - [redacted] and building - [redacted]. Thus, for example, BellSouth is saying via its cost study that for every $1.00 of aerial copper cable material that it puts into its network, it loads in additional costs of $[redacted] in in-plant material loadings, which does not even include the costs of poles, which is another loading of $[redacted] per each $1.00 of aerial cable material.

A more familiar way of expressing this relationship is to say that in BellSouth's modeling of cable investment, [redacted]% - [redacted]% of the cost is in the cable and [redacted]% - [redacted]% is in the loadings for engineering, construction, etc. This far exceeds a generally accepted ratio in the industry of 40% cable material to 60% in loadings. In BellSouth's Cost Study the focus is predominantly on the material, but the "big dollars" are in the loading factors which are an accounting mystery of embedded investments and operating practices.

Clearly, BellSouth's current practice and forward looking policy directive is to build more cost efficient fiber plant,[47] but its cost study is "overloaded" with the embedded cost inefficiencies of its copper cable in-plant loadings. Lacking the accounting details or expertise to challenge the specific expenses and investments underlying these material factor ratios, my recommendation is that they be reduced significantly. This would bring the average ratio of material loadings to non-exempt material from BellSouth's exorbitant level down to a ratio of 1.5, which is consistent with the assumptions of the AT&T/MCI sponsored cost model.

Q. WHY DO YOU BELIEVE THAT BELLSOUTH'S COST STUDY OVERSTATES ITS CONDUIT LOADING FACTOR?

A. BellSouth uses a conduit loading factor applied to underground cable investment to determine the amount of conduit investment to add to the total 2-wire analog voice grade loop investment. This factor results in $[redacted] in associated conduit costs for each $1.00 in underground copper and fiber cable after the cable material costs have been inflated and had the previously described material loadings added. This conduit loading factor is derived from the ratio of BellSouth's embedded conduit and underground cable investment accounts, which have been adjusted to current costs and inflated.

I have three issues with BellSouth's conduit loading factor. First, BellSouth's cost modeling methodology is seriously flawed, in that it assumes that the cost of conduit is proportional to the material cost of the cable that is placed in the conduit. This is a terribly oversimplified and incorrect assumption. Mr. Zarakas states that "the cost of installing poles and conduit will similar in the future as it is today."[48] What Mr. Zarakas fails to understand and model is that the ratio of those costs to the material costs of the cables that they support has changed dramatically from BellSouth's historical cost ratio.

The cost of a duct does not vary based on whether a 600 pair or 3600 pair copper cable is pulled into it. BellSouth's conduit loading factor does not take into account that a 4-inch duct is typically used to support only one copper cable but three fiber cables. Neither does the BellSouth Cost Study account for such cost variables as the number of ducts in a conduit run nor the cost to cut and restore the trench based on its particular location.

Second, the historical ratio of conduit to underground cable investment is a dreadfully inappropriate forward looking ratio, due to the dramatic shift from large, heavy gauge copper cables to fiber cables for interoffice trunking and for feeder routes over 9,000 feet. Conduit systems of 4-inch ducts that were sized to accommodate a single large copper cable in the past now easily accommodate three fiber cables per 4-inch duct, with each of these fiber cables having far more circuit capacity than the single copper cable. Yet the BellSouth Cost Study applies the same conduit loading factor to both copper and fiber underground cable investments. Existing underground copper cables are being replaced by fiber cables, as corroborated by BellSouth's declining underground cable - metal investment account. Thus, BellSouth's future requirements for conduit will be far less. Also, because of this transition to fiber cables and removal of copper feeder cables,[49] existing conduit runs will not likely have to be reinforced in the future. A significant portion of BellSouth's historical conduit investment account is attributable to projects it undertook to reinforced existing conduit runs. Such conduit investments will simply no longer be required as they were in the past.

Third, BellSouth's embedded ratio for conduit loading includes conduit investments that have been sized for a [redacted] year service life (and will not likely ever have to be reinforced) divided by underground cable investments that are sized to be relieved in less than ten years. Furthermore, the most efficient, least cost, forward looking practice will require most of BellSouth's future underground cables to be placed in existing ducts, which will require no additional conduit investment.

BellSouth's conduit loading factor typically accounts for an considerable [redacted]% - [redacted]% of the total investment in BellSouth's representative 2-wire analog voice grade loop (BellSouth did not file the data to determine this exactly for this proceeding). Applying least cost, most efficient, forward looking assumptions clearly demonstrates that BellSouth's conduit loading factor is egregiously overstated. I estimate that it should be reduced from [redacted] to .250. In contrast, other cost models place new conduit runs to support the underground cables designed for each unique feeder route in each unique wire center in the entire state.

VI. <u>SUMMARY AND CONCLUSION</u>

Q. HOW WOULD YOU SUMMARIZE YOUR TESTIMONY CONCERNING BELLSOUTH'S COST STUDYING OF OUTSIDE PLANT FOR THE LOCAL LOOP?

A. While BellSouth's Cost Study reflects an improvement over the inefficiencies of BellSouth's current network design, my analysis concludes that it is certainly not the least cost, most efficient, forward looking set of assumptions for a local loop model, particularly when compared to the other bottoms up cost models currently available. Moreover, I believe that further analysis and more information would uncover additional deficiencies in the OSP component of BellSouth's local loop Cost Study.

Nevertheless, identification and correction of all of the known and yet to be determined deficiencies in the OSP portion of BellSouth's Cost Study will not resolve the fact that BellSouth's OSP cost modeling methodology, which is based on a single hypothetical representative loop for the entire state of Florida, is fundamentally unsound. I base this conclusion on the fact that the OSP portion of local loop investment varies greatly depending upon a number of factors, but primarily determined by loop length and the density of customers. BellSouth's Cost Study cannot be applied to determine an accurate estimate of the local loop cost for any customer's loop or grouping of loops below the total state level, and therefore is fundamentally unsound for costing local loops in a competitive environment.

It is rather obvious that BellSouth's intent in modeling local loop cost with a single hypothetical representative loop is to create an barrier to market entry for potential Competitive Local Exchange Carriers. BellSouth's Cost Study achieves this objective by costing the shorter loops in customer dense areas which have the most revenue potential at cost levels far in excess of BellSouth's own costs. In sharp contrast, BellSouth has employed a much lower cost basis for its ESSX loops, which face a competitive alternative. It is also noteworthy that BellSouth has excluded ESSX loops from it sample for determining UNE costs.

For all of these reasons, my final recommendation is that if it has already been decided that the BellSouth Cost Study will be the basis for determining local loop costs in Florida that BellSouth's OSP modeling assumptions and input values be modified based on the recommendations in my testimony.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

Endnotes:

[1] Direct Testimony of BellSouth's Cost Witness, Ms. Daonne Caldwell, before the Florida Public Service Commission, Docket Nos. 960833-TP/960846-TP/960757-TP/960916-TP/971140-TP, November 13, 1997, page 25, line 11.

[2] Direct Testimony of BellSouth's Network Infrastructure Planning Witness, Mr. Daniel Baeza, before the Florida Public Service Commission, Docket No. 960833-TP/960846-TP/960757-TP/960916-TP/971140-TP, November 13, 1997, page 14, line 15 - page 15, line 10.

[3] Input Values for BCPM 2.0 before the Kentucky Public Service Commission, Administrative Case No. 360, October 15, 1997.

[4] Direct Testimony of BellSouth's Network Infrastructure Planning Witness, Mr. Daniel Baeza, before the Florida Public Service Commission, Docket No. 960833-TP/960846-TP/960757-TP/960916-TP/971140-TP, November 13, 1997, page 10, line 24 - page 15, line 15.

[5] Direct Testimony of BellSouth's Network Infrastructure Planning Witness, Mr. Daniel Baeza, before the Florida Public Service Commission, Docket No. 960833-TP/960846-TP/960757-TP/960916-TP/971140-TP, November 13, 1997, page 15, line 22 - page 18, line 4.

[6] Former Bell System Practice 901-350-250, Task 4, Step 1.

[7] BellSouth RL: 96-02-026BT Attachment A limits any single bridged tap to 2,000 feet.

[8] Rebuttal Testimony of BellSouth's Cost Witness, Ms. Daonne Caldwell, in Louisiana Cost Docket U-22022/U-22093 on September 6, 1997, page 25, line 20 through page 26, line 6.

[9] Direct Testimony of BellSouth's Network Infrastructure Planning Witness, Mr. Daniel Baeza, before the Florida Public Service Commission, Docket No. 960833-TP/960846-TP/960757-TP/960916-TP/971140-TP, November 13, 1997, page 15, lines 2 - 3.

[10] Rebuttal Testimony of BellSouth's Cost Witness, Mr. Daniel Baeza, in Louisiana Cost Docket U-22022/U-22093 on September 5, 1997, page 6, lines 7-17.

[11] The judicious deployment of DAML if spare cable pairs are exhausted is supported by BellSouth's DAML Deployment Directive RL:97-03-012BT.

[12] Deposition of BellSouth's Network Infrastructure Planning Witness, Mr. Wayne Gray, in Georgia Cost Docket No. 7061-U on August 13, 1997, page 149, line 23 through page 152, line 10.

[13] Direct Testimony of BellSouth's Network Infrastructure Planning Witness, Mr. Daniel Baeza, before the Florida Public Service Commission, Docket No. 960833-TP/960846-TP/960757-TP/960916-TP/971140-TP, November 13, 1997, page 15, lines 18 - 20.

[14] Deposition of BellSouth's Network Infrastructure Planning Witness, Mr. Wayne Gray, in Georgia Cost Docket No. 7061-U on August 13, 1997, page 101, lines 12-23.

Rebuttal Testimony of BellSouth's Cost Witness, Ms. Daonne Caldwell, in Louisiana Cost Docket U-22022/U-22093 on September 6, 1997, page 21, lines 9-13.

15 BellSouth's Loop Technology Deployment Directive RL: 96-09-026BT ("BellSouth RL: 96-09-026BT"), Paragraph 6.05.

16 BellSouth's response to MCI's 1st Set of Data Requests in Georgia Cost Docket No. 7061-U, Item No. 1-43.

17 BellSouth's Response to AT&T's 2nd Set of Interrogatories in Georgia Cost Docket No. 7061-U, Item No. 30.

18 Deposition of BellSouth's Cost Witness, Ms. Daonne Caldwell, in Louisiana Cost Docket No. U-22022/U-22093 on August 19, 1997, page 87, line 1 through page 89, line 15.

19 RL:97-03-012BT, Section 3.1(a).

20 Direct Testimony of BellSouth's Network Infrastructure Planning Witness, Mr. Daniel Baeza, before the Florida Public Service Commission, Docket No. 960833-TP/960846-TP/960757-TP/960916-TP/971140-TP, November 13, 1997, page 11, lines 18 - 19 and page 12, line 2.

21 BellSouth RL: 96-09-026BT, Executive Summary, page 2.

22 Deposition of BellSouth's Network Infrastructure Planning Witness, Mr. Wayne Gray, in Georgia Cost Docket No. 7061-U on August 13, 1997, page 53, line 18 through page 54, line 3.

23 Direct Testimony of Mr. Wayne Gray, BellSouth's Network Infrastructure Planning Witness, before the Tennessee Regulatory Authority Docket No. 97-01262, October 10, 1997, page 9, lines 4-5.

24 Direct Testimony of BellSouth's Network Infrastructure Planning Witness, Mr. Wayne Gray, before the Public Service Commission of South Carolina, Docket No. 97-374-C on November 3, 1997, page 11, lines 11 - 12.

25 Direct Testimony of BellSouth's Network Infrastructure Planning Witness, Mr. Daniel Baeza, before the Florida Public Service Commission, Docket No. 960833-TP/960846-TP/960757-TP/960916-TP/971140-TP, November 13, 1997, page 12, line 11 - 16.

26 Direct Testimony of BellSouth's Network Infrastructure Planning Witness, Mr. Daniel Baeza, before the Florida Public Service Commission, Docket No. 960833-TP/960846-TP/960757-TP/960916-TP/971140-TP, November 13, 1997, page 12, line 24.

27 BellSouth's web site at http://www//bellsouthcorp.com/investor/annualreport95/docs/southeast.html states:

28 See Rebuttal Testimony of BellSouth's Cost Witness, Mr. Daniel Baeza, in Louisiana Cost Docket U-22022/U-22093 on September 6, 1997, page 7, line 20 through page 8 line 3.

29 Direct Testimony of Dr. Richard Cabe, AT&T/MCI's Economic Witness, before the Georgia Public Service Commission, Docket 7061-U, April 30, 1997, page 16 line 20 - page 19 line 16.

30 BellSouth's Response to Staff's Third Data Request to BellSouth in Georgia PSC Docket 7061-U, Item No. STF-3-11.

31 BellSouth's Response to TCTA's (Tennessee Cable Telecommunications Association) First Data Requests, Item No. 8 in Tennessee Regulatory Authority Docket No. 97-01262, document RL: *96-09-026BT*, "Loop Technology Deployment Directives, Table P1.

32 BellSouth's Response to AT&T's First Data Requests in Tennessee Docket 97-01262, Item No. 29.

33 Direct Testimony of BellSouth's Network Infrastructure Planning Witness, Mr. Daniel Baeza, before the Florida Public Service Commission, Docket No. 960833-TP/960846-TP/960757-TP/960916-TP/971140-TP, November 13, 1997, page 10, lines 11 - 13.

34 Direct Testimony of BellSouth's Network Infrastructure Planning Witness, Mr. Daniel Baeza, before the Florida Public Service Commission, Docket No. 960833-TP/960846-TP/960757-TP/960916-TP/971140-TP, November 13, 1997, page 19, lines 23 -25.

35 Deposition of BellSouth's Network Infrastructure Planning Witness, Mr. Wayne Gray, in Georgia Cost Docket No. 7061-U on August 13, 1997, page 110, line 15 through page 111, line 13.

36 Deposition of BellSouth's Network Infrastructure Planning Witness, Mr. Wayne Gray, in Georgia Cost Docket No. 7061-U on August 13, 1997, page 125 line 24 through page 127, line 15 .

37 BOC Notes on the LEC Networks 1994, page 12-9.

38 Direct Testimony of BellSouth's Network Infrastructure Planning Witness, Mr. Daniel Baeza, before the Florida Public Service Commission, Docket No. 960833-TP/960846-TP/960757-TP/960916-TP/971140-TP, November 13, 1997, page 19, lines 10 - 20.

39 Deposition of BellSouth's Cost Witness, Ms. Daonne Caldwell, in Louisiana Cost Docket No. U-22022/U-22093 on August 19, 1997, page 86, lines 17-25.

40 Deposition of BellSouth's Cost Witness, Ms. Daonne Caldwell, in Louisiana Cost Docket No. U-22022/U-22093 on August 19, 1997, page 85, lines 10-15.

41 Deposition of BellSouth's Cost Witness, Ms. Daonne Caldwell, in Louisiana Cost Docket No. U-22022/U-22093 on August 19, 1997, page 85, lines 16-21.

42 Deposition of BellSouth's Cost Witness, Ms. Daonne Caldwell, in Louisiana Cost Docket No. U-22022/U-22093 on August 19, 1997, page 83, line 25 through page 84, line 7.

43 Rebuttal Testimony of BellSouth's Cost Witness, Ms, Daonne Caldwell, in Louisiana Cost Docket U-22022/U-22093 on September 6, 1997, page 25, lines 22-23.

44 Direct Testimony of BellSouth's Network Infrastructure Planning Witness, Mr. Daniel Baeza, before the Florida Public Service Commission, Docket No. 960833-TP/960846-TP/960757-TP/960916-TP/971140-TP, November 13, 1997, page 21, lines 1-3.

45 Refer to the BellSouth Cost Study spreadsheet CABALT1, cells P387 and U654.

46 Deposition of BellSouth's Cost Model Witness, Mr. William Zarakas, in Louisiana Cost Docket No. U-22022/U-22093 on August 19, 1997, page 110, lines 12-23.

47 BellSouth's RL: *96-09-026BT*.

[48] Direct Testimony of BellSouth's Cost Model Witness, Mr. William P. Zarakas, before the Tennessee Regulatory Authority Docket No. 97-01262, October 10, 1997, page 37, lines 10-22.

[49] BellSouth RL:96-09-026BT, Paragraph 4.08.

Exhibit ______________

Docket Nos: 960833-TP/960846-TP/971140-TP/960757-TP/960916-TP

Jim Wells Exhibit JWW-1

Distribution Cable Utilization - FL Version 1

Liv Units Served	Prs. Reqd @ 1.5/LU	Cable Size	Liv Units Served	Prs. Reqd @ 1.5/LU	Cable Size	Liv Units Served	Prs. Reqd @ 1.5/LU	Cable Size
1	1.5	6	47	70.5	100	93	139.5	200
2	3.0	6	48	72.0	100	94	141.0	200
3	4.5	6	49	73.5	100	95	142.5	200
4	6.0	6	50	75.0	100	96	144.0	200
5	7.5	12	51	76.5	100	97	145.5	200
6	9.0	12	52	78.0	100	98	147.0	200
7	10.5	12	53	79.5	100	99	148.5	200
8	12.0	12	54	81.0	100	100	150.0	200
9	13.5	25	55	82.5	100	101	151.5	200
10	15.0	25	56	84.0	100	102	153.0	200
11	16.5	25	57	85.5	100	103	154.5	200
12	18.0	25	58	87.0	100	104	156.0	200
13	19.5	25	59	88.5	100	105	157.5	200
14	21.0	25	60	90.0	100	106	159.0	200
15	22.5	25	61	91.5	100	107	160.5	200
16	24.0	25	62	93.0	100	108	162.0	200
17	25.5	50	63	94.5	100	109	163.5	200
18	27.0	50	64	96.0	100	110	165.0	200
19	28.5	50	65	97.5	100	111	166.5	200
20	30.0	50	66	99.0	100	112	168.0	200
21	31.5	50	67	100.5	200	113	169.5	200
22	33.0	50	68	102.0	200	114	171.0	200
23	34.5	50	69	103.5	200	115	172.5	200
24	36.0	50	70	105.0	200	116	174.0	200
25	37.5	50	71	106.5	200	117	175.5	200
26	39.0	50	72	108.0	200	118	177.0	200
27	40.5	50	73	109.5	200	119	178.5	200
28	42.0	50	74	111.0	200	120	180.0	200
29	43.5	50	75	112.5	200	121	181.5	200
30	45.0	50	76	114.0	200	122	183.0	200
31	46.5	50	77	115.5	200	123	184.5	200
32	48.0	50	78	117.0	200	124	186.0	200
33	49.5	50	79	118.5	200	125	187.5	200
34	51.0	100	80	120.0	200	126	189.0	200
35	52.5	100	81	121.5	200	127	190.5	200
36	54.0	100	82	123.0	200	128	192.0	200
37	55.5	100	83	124.5	200	129	193.5	200
38	57.0	100	84	126.0	200	130	195.0	200
39	58.5	100	85	127.5	200	131	196.5	200
40	60.0	100	86	129.0	200	132	198.0	200
41	61.5	100	87	130.5	200	133	199.5	200
42	63.0	100	88	132.0	200			
43	64.5	100	89	133.5	200	8,911	13,366.5	17,822

44	66.0	100	90	135.0	200		
45	67.5	100	91	136.5	200	Initial Utilization =	50.00%
46	69.0	100	92	138.0	200	Ultimate Utilization =	75.00%

DROP WIRE / NID INPUTS (REVISED)

	B	D	F	H	J	L
1						
2						
3	STATE	Florida				
4						
5						
6	**Item**	**Source**	**FRC**	**Sub-FRC**	**Amount**	**Comments**
7					[redacted]	
8	I&M - POTS Labor Rate	Cost Factors				
9	Job Function Code	Network				
10	Average # of Loops - Residence	CRIS				
11	Average # of Loops - Business 2pr	MKIS				
12	Average # of Loops - Business 5pr	MKIS				
13	Drop Material (Buried, 2-Pr., Res)					
14	Drop Material (Aerial, 2-Pr, Bus & Res)	Network	22C	01		
15	Drop Material (Buried, 5-Pr., Bus)	Network	45C	01		
16	NID Material (Interface Only)	Network	22C & 45C	01		
17	NID Material (Bridge & Protector) 2pr	Network	22C & 45C	01		
18	NID Material (Bridge & Protector) 5pr	Network	22C & 45C	01		
19	Exempt Material - Aerial	Network	22C	01		
20						
21	Contractor Labor (0-500 ft) - Buried	Network	45C	01		
22	Telco Labor - Travel	Network	22C & 45C	01		
23	Telco Labor - Install NID	Network	22C & 45C	01		
24	Telco Labor - Aerial Install&Term. Drop	Network	22C	01		
25	Telco Labor - Buried Install&Term. Drop	Network	45C	01		
26						
27	Sales Tax	Cost Factors				
28						
29	% Investment Aerial	Sample Calculation				
30	% Investment Buried	Sample Calculation				
31	% Residence Loops With Drop	Sample Calculation				
32	% Business Loops With Drop	Sample Calculation				
33						

	A	B	C	D	E	F	G	H	I	J	K	L
34		**Assumptions / Notes:**										
35		[redacted]										
36												
37												
38												

	B	D	F	H	J
1		**DROP WIRE / NID MATERIAL (REVISED)**			
2					
3	STATE	Florida			
4					
5					
6	**Item**	**Source**	**FRC**	**Sub-FRC**	**Amount**
7		u3			
8	**Residence - 2wire Aerial**				
9	Material - Drop	(+InputsJ14*InputsJ27) /InputsJ10	22C	01	[redacted]
10	Material - NID Interface	(+InputsJ16*InputsJ27)/InputsJ10	22C	01	[redacted]
11	Material - NID Prot/Bridge	+InputsJ17*InputsJ27	22C	01	[redacted]
12	Exempt Material	(+InputsJ19*InputsJ27)/InputsJ10	22C	01	[redacted]
13	Contractor Labor	N/A	22C	01	[redacted]
14	Telco - Travel Labor	(+InputsJ8*InputsJ22)/InputsJ10	22C	01	[redacted]
15	Telco - Install NID Labor	(+InputsJ8*InputsJ23)/InputsJ10	22C	01	[redacted]
16	Telco - Install & Term. Drop Labor	(+InputsJ8*InputsJ24) /InputsJ10	22C	01	[redacted]
17					[redacted]
18	% Investment Aerial	+InputsJ29	22C	01	[redacted]
19	% Residence Loops With Drop	+InputsJ31	22C	01	[redacted]
20					[redacted]
21	Weighted Material ==>	Sum(J9-J16)*J18*J19	22C	01	[redacted]
22					[redacted]
23	***Residence - 2wire Buried***				[redacted]
24	Material - Drop (2-Pair)	(+InputsJ13*InputsJ27)/InputsJ10	45C	01	[redacted]
25	Material - NID Interface	(+InputsJ16*InputsJ27)/InputsJ10	45C	01	[redacted]
26	Material - NID Prot/Bridge	+InputsJ17*InputsJ27	45C	01	[redacted]
27	Exempt Material	N/A	45C	01	[redacted]
28	Contractor Labor	+InputsJ21/InputsJ10	45C	01	[redacted]
29	Telco - Travel Labor	+(InputsJ8*InputsJ22)/InputsJ10	45C	01	[redacted]
30	Telco - Install NID Labor	(+InputsJ8*InputsJ23)/InputsJ10	45C	01	[redacted]
31	Telco - Install & Term. Drop Labor	(+InputsJ8*InputsJ25) /InputsJ10	45C	01	[redacted]
32					[redacted]
33	% Investment Buried	+InputsJ30	45C	01	[redacted]
34	*% Residence Loops With Drop*	+InputsJ31	45C	01	[redacted]
35					[redacted]
36	Weighted Material ==>	Sum(J24-J31)*J33*J34	45C	01	[redacted]
37					[redacted]
38	**Business - 2wire Aerial**				[redacted]
39	Material - Drop	(+InputsJ14*InputsJ27)/InputsJ11	22C	01	[redacted]
40	Material - NID Interface	(+InputsJ16*InputsJ27)/InputsJ11	22C	01	[redacted]
41	Material - NID Prot/Bridge	+InputsJ17*InputsJ27	22C	01	[redacted]
42	Exempt Material	+(InputsJ19*InputsJ27)/InputsJ11	22C	01	[redacted]
43	Contractor Labor	N/A	22C	01	[redacted]
44	Telco - Travel Labor	+(InputsJ8*InputsJ22)/InputsJ11	22C	01	[redacted]
45	*Telco - Install NID Labor*	(+InputsJ8*InputsJ23)/InputsJ11	22C	01	[redacted]
46	Telco - Install & Term. Drop Labor	(+InputsJ8*InputsJ24)/InputsJ11	22C	01	[redacted]
47					[redacted]
48	% Investment Aerial	+InputsJ29	22C	01	[redacted]
49	% Business Loops With Drop	+InputsJ32	22C	01	[redacted]
50					[redacted]
51	Weighted Investment ==>	Sum(J39-J46)*J48*J49	22C	01	[redacted]
52					[redacted]
53	**Business - 2wire Buried**				[redacted]
54	Material - Drop (5-pair)	(+InputsJ15*InputsJ27)/InputsJ11	45C	01	[redacted]
55	Material - NID Interface	(+InputsJ16*InputsJ27)/InputsJ11	45C	01	[redacted]
56	*Material - NID Prot/Bridge*	+InputsJ17*InputsJ27	45C	01	[redacted]
57	Exempt Material	N/A	45C	01	[redacted]
58	Contractor Labor	+InputsJ21/InputsJ11	45C	01	[redacted]
59	Telco - Travel Labor	(+InputsJ8*InputsJ22)/InputsJ11	45C	01	[redacted]
60	Telco - Install NID Labor	(+InputsJ8*InputsJ23)/InputsJ11	45C	01	[redacted]
61	Telco - Install & Term. Drop Labor	(+InputsJ8*InputsJ25)/InputsJ11	45C	01	[redacted]
62					[redacted]
63	% Investment Buried	+InputsJ30	45C	01	[redacted]
64	% Business Loops With Drop	+InputsJ32	45C	01	[redacted]
65					[redacted]
66	Weighted Material ==>	Sum(J54-J61)*J63*J64	45C	01	[redacted]

	A	B	C	D	E	F	G	H	I	J
67				[redacted]						
68				[redacted]						
69				[redacted]						
70				[redacted]						
71				[redacted]						
72				[redacted]						
73				[redacted]						
74				[redacted]						
75				[redacted]						
76				[redacted]						

	A	B	C	D	E	F	G	H	I	J
1				**DROP WIRE / NID MATERIAL (REVISED)**						
2										
3		STATE		Florida						
4										
5										
6		**Item**		**Source**		**FRC**		**Sub-FRC**		**Amount**
7										
8		**Business - 4wire Aerial**								
9		Material - Drop		(+InputsJ14*InputsJ27) / InputsJ12		22C		01		[redacted]
10		Material - NID Interface		(+InputsJ16*InputsJ27)/InputsJ12		22C		01		[redacted]
11		Material - NID Prot/Bridge		+InputsJ18*InputsJ27		22C		01		[redacted]
12		Exempt Material		(+InputsJ19*InputsJ27)/InputsJ12		22C		01		[redacted]
13		Contractor Labor		N/A		22C		01		[redacted]
14		Telco - Travel Labor		(+InputsJ8*InputsJ22)/InputsJ12		22C		01		[redacted]
15		Telco - Install NID Labor		(+InputsJ8*InputsJ23)/InputsJ12		22C		01		[redacted]
16		Telco - Install & Term. Drop Labor		(+InputsJ8*InputsJ24)/InputsJ12		22C		01		[redacted]
17										[redacted]
18		% Investment Buried		+InputsJ29		45C		01		[redacted]
19		% Business Loops With Drop		+InputsJ32		22C		01		[redacted]
20										[redacted]
21		Weighted Material ==>		Sum(J9-J16)*J18*J19		22C		01		[redacted]
22										[redacted]
23		**Business - 4wire Buried**								[redacted]
24		Material - Drop (5-Pair)		(+InputsJ15*InputsJ27)/InputsJ12		45C		01		[redacted]
25		Material - NID Interface		(+InputsJ16*InputsJ27)/InputsJ12		45C		01		[redacted]
26		Material - NID Prot/Bridge		+InputsJ18*InputsJ27		45C		01		[redacted]
27		Exempt Material		N/A		45C		01		[redacted]
28		Contractor Labor		+InputsJ21/InputsJ12		45C		01		[redacted]
29		Telco - Travel Labor		(+InputsJ8*InputsJ22)/InputsJ12		45C		01		[redacted]
30		Telco - Install NID Labor		(+InputsJ8*InputsJ23)/InputsJ12		45C		01		[redacted]
31		Telco - Install & Term. Drop Labor		(+InputsJ8*InputsJ25)/InputsJ12		45C		01		[redacted]
32										[redacted]
33		% Investment Buried		+InputsJ30		45C		01		[redacted]
34		% Business Loops With Drop		+InputsJ32		45C		01		[redacted]
35										[redacted]
36		Weighted Material ==>		Sum(J24-J31)*J33*J34		45C		01		[redacted]

	A	B	C	D	E	F	G	H	I	J
1				**NID INVESTMENTS (REVISED)**						
2										
3		STATE		Florida						
4										
5										
6		**Item**		**Source**		**FRC**		**Sub-FRC**		**Amount**
7										
8		**2-Wire - Residence - Aerial**								
9		Material - NID Interface		(+InputsJ16*InputsJ27)/InputsJ10		22C		01		[redacted]
10		Material - NID Prot/Bridge		+InputsJ17*InputsJ27		22C		01		[redacted]
11		*Telco - Travel Labor*		(+InputsJ8*InputsJ22)/InputsJ10		22C		01		[redacted]
12		Telco - Install NID Labor		(+InputsJ8*InputsJ23)/InputsJ10		22C		01		[redacted]
13		% Investment Aerial		+InputsJ29		22C		01		[redacted]
14		Weighted Investment ==>		SUM(J9.J12)*J13		22C		01		[redacted]
15										[redacted]
16		**2-Wire - Residence - Buried**								[redacted]
17		Material - NID Interface		(+InputsJ16*InputsJ27)/InputsJ10		45C		01		[redacted]
18		Material - NID Prot/Bridge		+InputsJ17*InputsJ27		45C		01		[redacted]
19		Telco - Travel Labor		(+InputsJ8*InputsJ22)/InputsJ10		45C		01		[redacted]
20		Telco - Install NID Labor		(+InputsJ8*InputsJ23)/InputsJ10		45C		01		[redacted]
21		% Investment Buried		+InputsJ30		45C		01		[redacted]
22		*Weighted Investment ==>*		*SUM(J17.J20)*J21*		45C		01		[redacted]
23										[redacted]
24		**2-Wire - Business - Aerial**								[redacted]
25		Material - NID Interface		(+InputsJ16*InputsJ27)/InputsJ11		22C		01		[redacted]
26		Material - NID Prot/Bridge		+InputsJ17*InputsJ27		22C		01		[redacted]
27		Telco - Travel Labor		(+InputsJ8*InputsJ22)/InputsJ11		22C		01		[redacted]
28		Telco - Install NID Labor		(+InputsJ8*InputsJ23)/InputsJ11		22C		01		[redacted]
29		% Investment Aerial		+InputsJ29		22C		01		[redacted]
30		Weighted Investment ==>		SUM(J25.J28)*J29		22C		01		[redacted]
31										[redacted]
32		**2-Wire - Business - Buried**								[redacted]
33		*Material - NID Interface*		*(+InputsJ16*InputsJ27)/InputsJ11*		45C		01		[redacted]
34		Material - NID Prot/Bridge		+InputsJ17*InputsJ27		45C		01		[redacted]
35		Telco - Travel Labor		(+InputsJ8*InputsJ22)/InputsJ11		45C		01		[redacted]
36		Telco - Install NID Labor		(+InputsJ8*InputsJ23)/InputsJ11		45C		01		[redacted]
37		% Investment Buried		+InputsJ30		45C		01		[redacted]
38		Weighted Investment ==>		SUM(J33.J36)*J37		45C		01		[redacted]
39										[redacted]
40		**4-Wire - Business - Aerial**								[redacted]
41		Material - NID Interface		(+InputsJ16*InputsJ27)/InputsJ12		22C		01		[redacted]
42		Material - NID Prot/Bridge		+InputsJ18*InputsJ27		22C		01		[redacted]
43		Telco - Travel Labor		(+InputsJ8*InputsJ22)/InputsJ12		22C		01		[redacted]
44		Telco - Install NID Labor		*(+InputsJ8*InputsJ23)/InputsJ12*		22C		01		[redacted]
45		% Investment Aerial		+InputsJ29		22C		01		[redacted]
46		Weighted Material ==>		SUM(J41.J44)*J45		22C		01		[redacted]
47										[redacted]
48		**4-Wire - Business - Buried**								[redacted]
49		Material - NID Interface		(+InputsJ16*InputsJ27)/InputsJ12		45C		01		[redacted]
50		Material - NID Prot/Bridge		+InputsJ18*InputsJ27		45C		01		[redacted]
51		Telco - Travel Labor		(+InputsJ8*InputsJ22)/InputsJ12		45C		01		[redacted]
52		Telco - Install NID Labor		(+InputsJ8*InputsJ23)/InputsJ12		45C		01		[redacted]
53		% Investment Buried		+InputsJ30		45C		01		[redacted]
54		Weighted Material ==>		SUM(J49.J52)*J53		45C		01		[redacted]
55										[redacted]
56										[redacted]

COMPARISON OF COOPER CABLE COSTS PER PAIR - FOOT

SIZE	AERIAL		BURIED		UNDERGROUND	
(PAIRS)	($/FT)	($/PR-FT)	($/FT)	($/PR-FT)	($/FT)	($/PR-FT)
25	[redacted]					
50						
100						
200						
300						
400						
600						
900						
1200						
1500						
1800						
2100						
2400						
2700						
3000						
3600						

WORST

1 / 2
25/50
50/100
100/200
200/400
300/600
600/1200
900/1800
1200/2400
1500/3000
1800/3600

PLAUSIBLE

[redacted]