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Sprint

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September 2, 1998

Ms. Blanca S. Bayo, Director
Division of Records and Reporting
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, Florida 32399-0850

Re: Docket No. 980696-TP

Dear Ms. Bayo:

Enclosed for filing in the above docket are the original and fifteen (15) copies of the Direct Testimonies of Carl H. Laemmli, Kent W. Dickerson, Brian K. Staihr and James W. Sichter on behalf of Sprint-Florida, Incorporated.

Please acknowledge receipt and filing of the above by stamping the duplicate copy of this letter and returning the same to this writer.

Thank you for your assistance in this matter.

Sincerely,

Charles J. Rehwinkel

CJR/th

Enclosures

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ORIGINAL

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

REBUTTAL TESTIMONY OF CARL H. LAEMMLI

ON BEHALF OF SPRINT-FLORIDA, INCORPORATED

DOCKET 980696-TP

SEPTEMBER 2, 1998

Q. **Please state your name, business address, employer and current position.**

A. My name is Carl H. Laemmli. My business address is 4220 Shawnee Mission Parkway, Suite 203A, Fairway, Kansas 66205. I am presently employed as Senior Manager – Network Costing for Sprint/United Management Company. I am testifying on behalf of Sprint-Florida, Incorporated (hereafter referred to as "Sprint" or the "Company").

Q. **Please describe your educational background and business experience.**

A. I received a Bachelor of Science degree in Business Administration from Central Missouri State University in 1983.

I have 22 years of experience in Local Loop planning, design, construction, costing and Customer Service Operations in rural, urban and suburban environments. My experience includes Line and Staff responsibilities for local loop design; new technology evaluation and support, Operational Support System (OSS) design and implementation; Network and Operations Policy development, Policy development and implementation of Network and

Operational support for Competitive Local Exchange Carriers (CLEC's) for both ILEC and CLEC operations. I am currently responsible for network and operations costing for unbundled network elements, universal service fund and other product offerings.

From 1976 to 1978 I performed contract engineering design work of urban local loops for Southwestern Bell Telephone Company and rural multi-party elimination projects for United Telephone in Missouri. (Sprint).

From 1978 to 1985, I was employed by United Telephone (Sprint) with responsibility for local loop planning, design, costing and construction including copper loops, Digital Subscriber Loop Carrier (DLC), as well as local and interoffice fiber optic cable.

I worked on United Telephone's (Sprint's) Texas operations staff from 1985 to 1987 with responsibility for Customer Service Operations methods and OSS implementation.

From 1987 to 1994, with United Telephone (Sprint) in New Jersey, I held positions of Network Engineering Manger, (Responsible for Outside Plant (OSP) and Special Circuit Engineering), Service Center Manager (Responsible for Dispatch, Assignment, Testing and the Repair Call Center) and Area Service Manager (Responsible for Residential and Small Business Customer Installation, Repair and Network Maintenance).

From 1994 to the present I have held several corporate staff positions with Sprint/United Management Company. I have had responsibility for: Network Support of Access Restructuring; New network technology assessment/implementation; OSS development, Network and Operations Policy Development; Results development, Operations and Network Policy and Methods development for Unbundled Network Element and Resale implementation. I have also been responsible for the development of the Operations infrastructure for Sprint – National Integrated Services, Sprint's CLEC. I am currently responsible for network and operations costing for unbundled network elements, universal service fund and other product offerings.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to respond to the direct testimony and exhibits of Mr. James W. Wells testifying on behalf of MCI Telecommunications Corporation and Mr. Don J. Woods testifying on behalf of AT&T Communications of the Southern States and MCI Telecommunications with respect to the validity of certain HAI Model assumptions and inputs.

My rebuttal testimony:

- Discusses proper geographic sizing of Carrier Serving Areas (CSA) and the impact that this sizing will have on enhanced services and USF model outcomes.
- Identifies realistic structure sharing opportunities; show that the HAI structure sharing inputs are completely unsupported, based on pure conjecture, and are not achievable today or in the future.
- Demonstrates that the HAI national default plant mix percentages are irrelevant and inappropriate to Florida conditions, and are not supported by fact.
- Shows that AT&T and MCI's assumption of using copper "T1" to serve remote customers is not forward-looking and will deprive rural customers of access to enhanced services.

In addition, my testimony identifies instances in which AT&T and MCI misquote, omit key information and misapply technical references; instances in which AT&T and MCI state one set of assumptions in their documentation and then fail to apply those assumption in the HAI model; and instances in which model assumptions are not followed consistently. The impact of these omissions and changes is to consistently understate USF costs. All citations identified by footnotes are provided in Exhibit CHL Rebuttal 1.

Carrier Serving Area (CSA) Sizing

Q. Have you had the opportunity to review the HAI *Model Description* and HAI Inputs Portfolio (HIP) filed by Mr. Don Wood and Mr. James Wells relative the engineering design of Carrier Serving Areas (CSAs)?

A. Yes.

Q. Does Sprint have any concerns regarding the CSA engineering design principles used by the HAI Model?

A. Yes. In defining the engineering principles behind CSA design, Bellcore states that:

> The evolution of the network that can provide digital services using distribution plant facilities has led to the development of the CSA Concept. A CSA is a geographical

area that is, or could be served by, a DLC from a single remote terminal site and within which all loops, without conditioning or design, are capable of providing conventional voice-grade message service, digital data service up to 64 kbs, and some 2-wire, locally switched voice-grade special services[1]

Essentially, Bellcore defined the "forward-looking technology" that serves as the basis for both the HAI and BCPM cost proxy models. At issue is the proper CSA geographic size. That is, what is the furthest distance that a customer should be from the Digital Loop Carrier? Sprint supports 12,000 feet (12 kft). AT&T and MCI, through the HAI model inputs, support 18,000 feet (18 kft).

This issue is important because it has an impact on network cost and the ability of the network to support advanced services. In general, the larger CSA's proposed by AT&T and MCI will result in lower costs, since there are fewer DLC's required. However, that will impede the provision of advanced services because of the longer distances from the DLC to the customer.

AT&T and MCI support an 18,000 foot CSA based on a single reference to a Bellcore document. In their documentation, AT&T and MCI misrepresent a statement supporting 18,000 foot CSAs to be a direct quote from the referenced Bellcore document. The Bellcore reference is clearly taken out of context. It refers to a plant design that requires load coils and is, therefore, clearly not forward-looking nor relevant to this proceeding.

Furthermore, the quotation has been materially altered from the original source which actually recommends CSA placements beginning at 24,000 feet, not 18,000 feet.

Finally, 18,000 foot CSA sizes are inconsistent with industry practice, and other Bellcore and AT&T documentation.

Q. On page 36 of the HIP, section 2.7.6, AT&T and MCI provide a direct quote from Bellcore document, *BOC Notes on the Network – 1994, p.12-4*[2] as supporting an 18,000 foot maximum distance from the Central Office to the customer. Does this document, in fact, support an 18,000 foot maximum distance?

A. No, it does not. This reference has been taken completely out of context and is actually referring to a network design that is not forward-looking and has no relevance to this proceeding.

The AT&T/MCI citation refers *only* to the "Revised Resistance Design" (RRD) method of designing local POTS loops, not to CSA design. The RRD method is not a forward-looking design method, as it recommends load coils on pairs that extend between 18,000 feet and 24,000 feet from the central office. In its order in the USF Docket, the FCC specifically states that load coils are inconsistent with the required forward looking network design. The order states, "Load coils should not be used because they impede the provision of advanced services."[3]

Additionally, in what is represented by AT&T and MCI to be a direct quote from this Bellcore document, the quotation has been materially altered to support their position. AT&T and MCI represent the document as saying, "Loops exceeding ***18 kft*** in length should be implemented using Digital Loop Carrier". In fact, the document reads, "...loops longer than ***24 kft*** should be implemented using Digital Loop Carrier...".

Furthermore, AT&T and MCI have made a significant omission. The statement, "...loops 18 kft to 24 kft in length (including bridged-tap) should be loaded and have loop resistances less than or equal to 1500 ohms." has been omitted from the middle of the direct quote. The actual paragraph, which does not support 18,000' CSAs reads:

> RRD guidelines recommend that loops 18 kft in length and less, including bridged-tap, should be non-loaded and have a loop resistance of 1300 ohms or less; loops 18 kft to 24 kft in length (including bridged tap) should be loaded and have loop resistances less than or equal to 1500 ohms; loops longer than 24 kft should be implemented using Digital Loop Carrier (DLC) as a first choice or by CREG or MLRD as second choices"[4,5]

HAI's incomplete and inaccurate reference to this Bellcore documents clearly provides no support for their position.

Q. **Does the document *Bellcore Notes on the Network* - referenced by HIP - provide *any* support relative to the use of either 12,000' or 18,000' maximums for Carrier Serving Areas?**

A. Yes, on the next page, in section 12.1 *A Bellcore Notes on the Networks*[6], speaks at length to Carrier Service Area Design and to the need for a 12,000' maximum loop to support enhanced services. It states:

> The evolution of the network that can provide digital services using distribution plant facilities has led to the development of the CSA Concept. A CSA is a geographical area that is, or could be served by, a DLC from a single remote terminal site and within which all loops, without conditioning or design, are capable of providing conventional voice-grade message service, digital data service up to 64 kbs, and some 2-wire, locally switched voice-grade special services (see Figure 12-2). ***The maximum loop length in a CSA is 12 kft for 19-, 22-, or 24-guage cable and 9 kft for 26-gauge cables.***

Additionally, Table 7-11 entitled *Loop Design Plans*[7] (page 7-70) summarizes CSA, RRD and MLRD design plans. In the column for Carrier Serving Area design, it clearly states that the maximum loop length should be 12 kft. The accompanying text[8] reiterates that the reason for this limit is to facilitate the provision of digital services.

Q. Does the document *Bellcore Notes on the Network* - referenced by HIP - provide *any* support relative to the use of either 12,000 feet or 18,000 feet maximums for Customers served from a Central Office?

A. Yes. Section 12.1.4 *Bellcore Notes on the Networks* further states that this 12,000' limit is also applicable to customers served directly out of the central office.[9] The Bellcore document reads:

> The area around the serving central office within a distance of 9kft for 26 gauge cable and 12 kft for 19-, 22-, and 24-gauge cable, although not a CSA, is compatible with the CSA concept in terms of achievable transmission performance and supported services."

Q. Are there other published documents supporting an industry standard 12,000' CSA design instead of 18,000'?

A. Yes. In AT&T's *Outside Plant Engineering Handbook*, on page 13-1 under the heading *Carrier Service Area (CSA) Philosophy* it clearly states that CSAs should be designed based on a maximum12,000' distance from the Customer to the Digital loop carrier. It states:

> The boundaries of the CSA are based on [cable] resistance limits of 900 ohms for the distribution plant beyond the RT [Remote Terminal]. These

> limits basically equate to 9,000 feet (2743.2 m) of 26-gauge cable and 12,000 feet (3657.6 m) for 19-, 22- or 24-gauge cable including bridged tap.[10]

Also, the same handbook, on page 3-16, under the section headed *Carrier Serving Area (CSA) Design*, states:

> To meet the 64 kb/s transmission rate, the secondary system cables [distribution cables] within a CSA must not exceed 9,000 feet (2743 m) in 26-gauge (.4 mm) design area and 12,000 feet (3658 m) in a 24/22/19-gauge (0.5/0.6/0.9 mm) area. If there is a concentration of special services in the area these limitations may have to be reduced.[11]

Q. What cable gauge does the HAI model utilize?

A. AT&T and MCI state that all feeder and distribution cables 400 pairs or larger are assumed to be smaller, less costly 26-gauge cable. As noted above, a predominantly 26 gauge design would further limit CSA size to 9,000 feet. AT&T and MCI need to increase calbe costs to reflect 24-gauge or larger cable, or reduce their CSA sizes to 9,000'.

Q. Please summarize your testimony regarding CSA size.

A. The size of Carrier Serving Areas that are assumed in a forward-looking proxy model materially impact network cost and the ability to support or impede the provision of enhanced services. AT&T and MCI have changed assumptions as needed to produce the lowest cost.

Sprint has proposed the industry standard CSA size of 12,000 feet. This size is supported by Bellcore and AT&T engineering guidelines, and will not impeded the delivery of enhanced services.

AT&T and MCI support a CSA size of 18,000 feet. The only support provided for 18,000 foot CSAs is a misquote of a Bellcore document that refers to a loaded loop design, which is by definition, not a forward-looking plant design. The cited Bellcore document, in fact, supports 12,000 foot CSAs, in order not to impede the deployment of advanced services.

AT&T and MCI's CSA sizes are inconsistent with the cable gauges that they use for the purposes for developing cable prices. These assumptions are mutually exclusive.

Finally, the unsupported selection of an 18,000 foot CSA size serves only to artificially reduce the network cost produced by the proxy models and to thereby reduce support.

II. Structure Sharing - Introduction

Q. What is "Structure"?

A. For modeling purposes, "Structure" is considered to be poles, underground conduit and the "hole in the ground" (plowed, backhoed, trenched, etc.) into which a buried cable is placed. "Underground Cable" is cable that is placed in an underground conduit. "Buried Cable" is cable that is placed directly in the ground.

Q. What is structure sharing?

A. Structure Sharing occurs when more than one company share the use and the cost of a structure, such as attaching to the same pole or sharing a trench.

Q. Why is it important to get the correct input values for structure sharing?

A. Structure cost is one of the largest costs of building the outside plant network. While there are many real opportunities for sharing, there are also many limitations. These may be driven by regulation, physical limitation, the economics of different utility networks, weather, soil conditions and many other factors. Incorrectly evaluating these factors can result in unachievable structure sharing percentages and dramatically different model costs.

Structure sharing inputs must be based on sound, factual information that reflects actual conditions. For instance, it is far more economical for a power company to place aerial cable than to place buried, whereas the opposite tends to be true for telephone. It is not unusual for a power company to be 80% aerial in an area, where telephone is 80% buried. It would be inappropriate to assume that they would suddenly, perfectly coincide. This is because each is responding to its own economic realities, not because either is making poor network decisions.

Q. Have you had the opportunity to review the testimony and structure sharing inputs sponsored by Mr. Wells (MCI Telecommunications Corporation) and Mr. Woods (AT&T Communications of the Southern States and MCI Telecommunications) in this proceeding?

A. Yes, I have.

Q. Does Sprint agree with the structure sharing inputs proposed by the AT&T and MCI?

A. No. A comparison of the structure sharing inputs proposed by Sprint and the HAI sponsors is attached to this testimony as Exhibit CHL-3. In general, AT&T and MCI propose levels of sharing that are significantly higher than those proposed by Sprint. These inputs are not achievable today, or at any point in the future. Use of the AT&T/MCI inputs will result in a significant understatement of the cost of providing universal service to customers in Florida.

In reviewing the inputs and testimony I have determined that:

1) HAI inputs are unsupported by any data and do not appear to have been validated.
2) The HAI structure sharing percentages, improperly apply the "rebuilt network principle" by unrealistically assuming not only a complete reconstruction of the

telephone network, but also of every other power, CATV, water, gas and sewer company's infrastructure.

3) The HAI modelers do not correctly apply the underlying assumptions that they describe in the HAI Inputs Portfolio and Model Description.

4) AT&T and MCI recognize that there is additional cost incurred in order to share a pole, but fail to add the additional cost when sharing underground conduit and buried cable.

5) The HAI model inputs fail to properly recognize the safety code issues.

6) The HAI model inputs inaccurately portray the economics of sharing.

These input values have too significant an impact on model outcomes to use unsupported numbers.

Q. AT&T's response to a Sprint data request[12] (see Exhibit CHL-4) demonstrates that AT&T and MCI believe that power and telephone will share virtually 100% of all telephone network structure. Is there any basis provided for this conclusion?

A. No. This is simply not a reasonable assumption. It is not supported with any facts and is 180° out of sync with experience. It is in direct conflict the AT&T and MCI's HIP which states that power cannot share feeder to the extent that it shares distribution[13]. Power company networks are predominately aerial while telephone networks are predominately buried.

In order to accept this assumption, one must believe that for every single inch of plant in the network, if telephone is aerial, power will be aerial. For every inch of plant in the network, if telephone is buried, power will be buried. For every foot of telephone feeder conduit, power will abandon their existing facilities and choose to bury cable.

The reality of the situation is this; the economics of power and telephone networks are different. It is far more expensive for a power company to bury a cable than it is for them to place aerial wire. This because of the far more expensive buried conductors, deeper trench required, and more expensive transformers, etc. that must be used. In contrast, because the cost varies less and there are significant maintenance savings, Sprint finds burying cable to be the far more economical alternative. Each provider is going to make network decisions that are in their own economic interests.

The net result is that Florida Power Corporation is 81%[14] aerial while Sprint is 78% buried. Sprint is 17% underground and Florida power has no underground facilities. Structure sharing does not overcome the economics driving this mix and it is not expected to change significantly in the future.

Q. Do AT&T and MCI follow the model assumptions for structure sharing that they describe in their Hatfield model documentation?

A. No. The HIP states that, due to technical constraints, power and telephone cannot share a feeder trench to the same degree that they can share a distribution trench. The HIP reads:

In addition, LEC shares of buried feeder structure are larger than buried distribution structure shares because a LEC's ability to share buried feeder structure with power companies is less over the relatively longer routes that differentiate feeder runs from distribution runs. This is because power companies generally do not share trenches with telephone facilities over distances exceeding 2500 ft.[15]

However, in the model, AT&T and MCI actually assume that the telephone company will share a trench with power 100% of the time in both feeder and distribution, even though their documentation states that this is not technically possible.

Sprint Exhibit CHL-4, provided by AT&T in response to a Sprint data request, clearly demonstrates that for buried trenches, AT&T and MCI assume:

1. 100% of Distribution trenches are occupied by telephone, *power* and 1 "other"
2. 60% of Feeder trenches are shared by telephone, *power* and one "other"
3. The remaining 40% of feeder trenches are shared by telephone and *power*.

AT&T and MCI have not followed their model assumptions.

Q. Has AT&T published other recommendations for joint trenching with power?

A. Yes. AT&T has stated, "Joint trenching with power facilities should be employed only for distribution cables and service wires, not for feeder or trunk cables."[16] AT&T now apparently recommends that *all* feeder be placed with power.

Q. Are AT&T and MCI's below ground structure sharing percentage based on a reasonable assumption relative to the "rebuilt network standard?

A. No. AT&T and MCI's below ground feeder sharing inputs assume that, not only is the entire telephone network being reconstructed, but evidently the entire power, cable, water, gas and sewer infrastructure as well. To accept these inputs, one must be willing to believe that there are 1 to 2 other companies with a need to build a network at the same time and in the same place, for every single foot of Sprint's Florida network. AT&T and MCI have stretched the rebuilt network standard to the point of absurdity.

AT&T's overlay of the fictitious assumption that the entire United States utility infrastructure are being reconstructed simultaneously reduces the proxy model approach to pure fantasy.

Q. Are the AT&T and MCI structure sharing inputs achievable today?

A. MCI's witness, Mr. Wells, does not believe so. In previous testimony[17], Mr. Wells stated that, to his knowledge, no local exchange company (incumbent or new entrant) has been able to achieve a sharing factor of the magnitude that AT&T and MCI support. Mr. Wells acknowledged that the two most likely candidates for sharing support structure with a LEC, the electric and CATV companies, already have networks in place, and presumably have no interest in sharing the cost of the support structures necessary to reconstruct the telephone network.[18] Finally, Mr. Wells admitted that the sharing fraction proposed by AT&T and MCI has not been achieved today, and cannot be achieved today.

Sprint, as well, believes that the AT&T and MCI structure sharing inputs are not achievable today, nor in the foreseeable future.

Q. What empirical evidence do AT&T and MCI provide to support the HAI structure sharing inputs?

A. In response to a Sprint Data Request[19] regarding support for aerial feeder and distribution structure percentages, AT&T responded:

> The HAI Model Default input values for aerial feeder and distribution structure percent assigned to the telephone company are based on the expert opinion of a team of engineers with extensive experience. Questionnaires were not sent to vendors, contractors, nor to any other party to determine the default input values for aerial feeder and distribution structure assigned to the telephone company.

When asked[20] to provide copies of structure sharing contracts that were used as a basis for developing structure sharing inputs, AT&T responded:

A specific contract or contracts were not explicitly sourced in deriving the structure sharing default values in the HAI model.

AT&T and MCI provide no empirical evidence to support the HAI structure sharing inputs. Instead, AT&T and MCI rely upon opinion. These inputs have a significant impact on total cost. Development of these costs cannot be based solely on unvalidated opinion.

In the HIP[21], AT&T and MCI refer to the current structure sharing percentages in New York City's, Nynex owned Empire City Subway as supporting underground sharing percentages, even stating that "..well over 30 telecommunications providers" now occupy Nynex ducts. However, when asked to provide documentation in support of this assertion[22], AT&T responded, "...that information would undoubtedly be considered proprietary by Bell Atlantic, and is not available to AT&T and its consultants." [emphasis added by Sprint]

Furthermore, the Empire City Subway support is actually irrelevant to this proceeding. The cited example represents leasing or renting of duct space from an ILEC. The HIP (Appendix B page 152) specifically – and correctly - states that the Hatfield Model does not assume leased conduit to be "shared" for modeling purposes. Since both BCPM and HAI cost out only the actual conduit used by the LEC, and not the cost of the additional, leased conduit, the cost of the additional conduit cannot be "shared away".

Q. Is Mr. Wells familiar with how the structure sharing inputs were developed?

A. No. On page 24 of his testimony, beginning on line 22, Mr. Wells states, "The HAI Model OSP Team has done a more thorough job than any other model proponent in documenting assumptions and validating input values..."

However, in the North Carolina USF proceeding, Mr. Wells stated that these inputs were developed before he joined the HAI Model Outside Plant Engineering Team[23]; that he had no knowledge of: who proposed this group of inputs, the extent to which the inputs were discussed, or any information as to how they were developed.[24] Mr. Wells indicated that he was unaware of any documentation that reflects this process[25] and was sure that if any documentation existed, he had not seen it.[26]

Q. Has AT&T demonstrated that it has done anything at all to validate these critical structure sharing inputs?

A. No. On page 24, line 21 of his direct testimony, MCI witness, Mr. Wells states that, "...there are many ways to validate expert opinion". Based on his direct testimony and AT&T responses to data requests, AT&T has not used any of these "many ways" to validate the opinions of the HAI engineering team.

Structure Sharing – Buried Cable

Q. Is there any direct correlation between structure sharing percentages that can be attained on aerial pole lines and the percentages that can be attained for buried facilities?

A. Clearly not. As a practical matter, one would normally expect to see higher sharing of poles than of trenches. A pole line will be in place and accessible to all parties for as long as it exists. A trench can only be used within a short window of days that it remains open. Therefore sharing only occurs to the extent another company has a need to build facilities along that same identical route at the same identical time. This is not at all comparable to an asset that is available and accessible for sharing at any time over many years.

Q. Do HAI inputs supported by AT&T and MCI for Buried and Underground Structure Costs include the additional costs that would be incurred in order to "share" the structure.

A. No. They include the additional cost for poles, but not for buried or underground structure.

The HAI national default inputs assume that a 40' pole is used at every pole location. If a pole was placed solely for a single telephone company's use, it is likely that a 25' or 30' pole would be adequate. So, in the case of "Pole Structure", the model clearly recognizes the need to add the higher cost of "shared" structure –in this case a larger pole - before reducing this higher cost by the structure sharing percentage for poles.

However, in the case of underground conduit or buried cable, the cost of the structure is not increased to reflect this additional cost before applying the sharing percentage. In order to share a trench with power, Sprint must pay a higher cost of trenching due to deeper and/or wider trenches, additional back filling and material handling.

Nowhere in the HAI national default input documentation is it demonstrated that these increased costs are considered. As such, AT&T's inputs for underground construction costs are clearly conceptually inconsistent pole sharing assumptions and further understated when used in conjunction with their unrealistically high assumptions for structure sharing.

Q. Do AT&T and MCI fail to consider construction codes that must be followed when placing cables?

A. Yes. National Electrical Safety Code® (NESC) specifies rules for placing buried power and communications cables. The (NESC) is a technical publication of the Institute of Electrical and Electronics Engineers, Inc. (commonly known as the IEEE). It established rules for the purpose of "..the practical safeguarding of persons during the installation, operation or maintenance of electric supply and communications lines and associated equipment. These rules contain the basic provisions that are considered necessary for the safety of the employees and the general public *under specified conditions* [emphasis added by Sprint]."[27]

The current edition of the code is NESC C2-1997. It contains 256 pages of technical specifications, most of which is specific to particular situations or conditions. When referencing the code, it is always necessary to understand the specific context of a citation as well to read the entire relevant sections.

Q. Do Sprint construction practices conform to the NESC rules?

A. Yes.

Q. Does the NESC prescribe rules regarding the placement of buried communications cable and buried power lines?

A. Yes. The NESC has clearly defined rules that require vertical and horizontal separation of communications cable and power lines. This means that communications and power cables cannot be simply thrown into the same trench and covered in one operation – at no additional cost – as modeled by AT&T and MCI.

It requires physical separation for the electrical protection of workers and the public. It is intended to ensure that each company can access their cable for maintenance without causing damage and service interruptions to other companies' facilities and customers. The code does allow exceptions to these rules with additional requirements of the power company. They also require the agreement of *all* involved parties. Placing power and telephone cables directly together in the same trench is commonly called, "random lay".

Placing buried power and communications facilities together without any physical separation is hazardous to workers and the public and does not provide adequate space to maintain each companies facilities. Sprint's workers are not trained, licensed nor equipped to work in the immediate proximity of high voltage power lines. Furthermore, Sprint's customers would not be tolerant of the delays in service restoration time that would result from having to wait for the power company to show up to move and de-energize the power cable before Sprint could begin service restoration.

The NESC requires the agreement of all parties before allowing exceptions to the separations rules. If a power company, CATV company or communications provider does not want to put their facilities at risk by placing them all together, they can effectively prevent Sprint from doing so. Clearly, Sprint is not the sole decision-maker on matters of joint, buried construction. There are no power companies in Florida that have agreed to allow Sprint to use "random lay".

Q. Why don't power companies agree to do random lay?

A. Power companies don't agree to do "random lay" because *they* have nothing to gain and much to loose.

<u>There is no upside:</u> The power company will receive essentially the same structure sharing dollars whether the telephone company places their facility in the bottom of the trench with the power cable or throws in 12" of dirt and then places their telephone cable.

<u>There is a lot of downside:</u> "Random Lay" requires the power company to spend more money for hardware and labor cost to meet NESC bonding and grounding requirements and requires additional coordination. The power company's exposure to increased future maintenance cost goes up dramatically as does its exposure to potential liability problems.

<u>Power</u> companies have a vested interest in maintaining code-required separation. They act reasonably and in there own self-interest when they refuse to do "random lay". Telephone companies cannot force a power company to agree to do random lay.

Q. What are the NESC rules relative to placing buried power and communications cable?

A. The NESC rules for buried cable are defined in section 35. Beginning on Page 186, the relevant rules are the following:

> **Rule 351A1:** Cables should be located so as to be subject to the least disturbance practical. Cables to be installed parallel to other subsurface structures should not be located directly over or under other subsurface structures, but if this is not practical, the rules of separations in Rule 352 should be followed.

Rule 351A3: Cables are to routed so as to allow safe access for construction, inspection and maintenance.

Rule 352A: Horizontal separation. The horizontal separation between direct-buried and other underground structures should be not less than 300mm (12 in) to permit access to and maintenance of either facility without damage to the other. Installations with less than 300mm (12 in) horizontal separation, shall conform with the requirements of Rule 352C, Rule 354 or both.

Rule 352B4: Crossings. Adequate vertical separation shall be maintained to permit access to and maintenance of either facility without damage to the other. A vertical separation of 300mm (12 in) is , in general, considered adequate, but the parties involved may agree to a lesser separation.

Rule 352C: Parallel Facilities. When conditions require a cable system to be installed with less than 300mm (12 in) of horizontal separation, or directly over and parallel to another underground structure (or another underground structure installed directly over and parallel to a cable), it may be done providing all parties are in agreement as to the method. Adequate vertical separation shall be maintained to permit access to and maintenance of either facility without damage to the other.

Rule 354D: Supply cables ["supply" refers to power cables] and communications cables or conductors may be buried together at the same depth with no deliberate separation between facilities, provided all parties involved are in agreement and the applicable rules in 354D1 are met and either Rule 354D2 or 354D3 is met. (Note: These rules reference additional bonding, grounding and protection requirements.)

Q. Do these rules apply to fiber optic cables as well?

A. Yes. Fiber optic cable can be purchased with a shield and central strength member that is made of a metal material or made of non-metallic material such as Kevlar®. (The "shield" surrounds the bundles of glass fibers and provides mechanical protection, the central strength member makes the cable more rigid and allows it to be pulled without damaging the fibers). The HIP[28] suggests that fiber optic cables without metallic components would be exempt from NESC buried cable separation requirements. This statement demonstrates a lack of understanding of network operations, and a misunderstanding of the purposes of the NESC buried cable separation rules.

Telephone companies generally do not bury fiber optic cables that do not have metallic components. Without a metallic component, the cable can not be easily located or identified. The fiber optic cables are the backbone, the high traffic carriers of the network. A Bellcore summary of all major service outages reported to the FCC for the year ending

June 30, 1997, found that fully 79% were caused by fiber cuts. Companies must clearly be able to locate their fiber cables in order to keep the network healthy and functioning.

Secondly, the intent of the separation rule is not just to provide electrical isolation, but it is to permit access to and maintenance of either facility without damage to the other. (NESC 352A, 352C) It's hard to imagine a more certain guarantee of a service outage than a fiber cable that can't be located, lying right beside someone else's cables.

Q. In Florida, do developers provide free trenches and place telephone cables at no cost to the telephone company?

A. In the HIP[23], AT&T and MCI state that in new subdivisions, builders, "...usually dig trenches at their own expense, and place power, telephone and CATV cables in the trenches, if the utilities are willing to supply the materials. Thus, many buried structures are available to the LEC at no charge."

There is no requirement in Florida that builders in new subdivisions provide a trench at no cost to the telephone company. Developers in Florida will not do Sprint's network construction at no cost to Sprint.

Structure Sharing - Underground Conduit

Q. Do you agree with AT&T and MCI that Sprint should be able to recover one-half to two-thirds of the cost of Underground conduit trenching cost?

A. No. As previously noted, Sprint and AT&T/MCI agree that leasing of individual ducts is not appropriately considered "structure sharing" for modeling purposes.[30] This leaves sharing the cost of the "hole in the ground" for the conduit system as the only opportunity to share cost.

AT&T and MCI suggest that LEC's can readily share the costs of constructing conduit, "...with other telecommunications companies, cable companies, electric, gas or water utilities, particularly when new construction is involved."[31] However, there is actually almost no opportunity for sharing of the magnitude AT&T and MCI suggest.

1) It requires that another company needs to build the same route at the same time.

In order to achieve the AT&T and MCI sharing percentages one must assume that there will be 1 or 2 other companies that need to build in the exact same location at the exact same time – 100% of the time. This is, frankly, an utterly absurd assumption that is completely without any basis in experience or fact.

2) It is more economical to lease space than to share structure cost.

A telecommunications provider or CATV provider has two options when deciding to place additional plant along a new telephone company conduit run. They can either lease a conduit from the ILEC or they can pay 50% of the cost of the trench. AT&T and MCI correctly point out in the HIP[32] that the Telecommunications Act *requires* non-discriminatory access to ILEC structures at *Economic* prices.

The economic cost of leasing one duct will clearly be a fraction of the cost of paying for 50% of the trench. For example, in a 12 conduit system, the economic cost would be about 1/12th of the conduit system cost. No reasonable provider will *ever* opt to share the cost of the trench when they can lease a duct.

This is evidenced by the HIP indication that "...well over 30 telecommunications occupy conduits owned by Empire City Subway in New York. AT&T and MCI further acknowledge this saying, "...use of existing conduits is a much more economical alternative than excavating established street and other paved areas[33]"

3) Code standards make sharing conduit structure uneconomical and unattractive.

As a practical matter, other utilities do not seek to build next to Telephone Company conduit systems as is implied by the AT&T and MCI structure sharing percentages. In fact, they deliberately avoid placing their facilities in close proximity to a telephone company conduit system because of the tremendous liability associated with potential damage.

Additionally, the National Electrical Safety Code (NESC) significantly restricts the construction of other sub-surface structures near underground conduit systems.

Specifically, the NESC states that Conduit systems extending parallel to other sub-surface structures should not be located directly over or under other sub-surface structures.[34] Where this is not practical, rules for physical separation are provided. In general these rules state that separation between a conduit system and other underground structures paralleling it should be large enough to permit maintenance of the system without damage to the paralleling structure.[35] Specifically, conduits occupied by power must be separated by 3" of concrete, 4" of masonry, or 12" of earth.[36] The NESC requires that water mains be located as far away as practical to protect the conduit from being undermined if the water main breaks.[37] Conduit should have sufficient separation from fuel lines to allow the use of pipe maintenance equipment.[38]

In actual practice, this means that a conduit system might be built in proximity to an *existing* utility line, but when building two new facilities, one would never build by placing another utility's line directly above or below a conduit system. It means that, the two new facilities would actually be placed side by side, with a minimum of 12" to 24" separation to allow each company access to maintain their facilities. There is no cost a saving to this approach.

4) Sharing increases overall cost.

Finally, AT&T and MCI assume that – in the unlikely event that someone is willing to share 50% of the cost of the excavation – the overall cost does not go up! Clearly, if another utility is to share the trench, it must be either deeper or wider, at additional cost. This cost must be added to the total cost before the sharing percentage is applied. HAI includes these additional sharing costs for poles, but ignores them for underground conduit and buried cable.

Additionally, a conduit system requires a large excavation, 24"- 36" wide and 36"-60" or more deep. Clearly, another conduit system could not occupy this same space, so the only facility that might possibly share the trench would be a buried power cable or communications cable. Such a cable would require an excavation only 3" wide and 24"-30" deep. AT&T and MCI provided an analysis of pole sharing cost in which they conclude that the companies share cost based on the relative amount of space they occupy.[29] However, when determining the sharing of costs for conduit trenches, they assume that the company that takes 3" of the space will be willing to split the cost 50/50 with the company that requires 24" of space. AT&T Practice 917-356-100, page 15, provides a detailed description of the calculations to be used to fairly apportion the cost of a jointly used trench between the occupants. The method apportions cost based on actual usage, not on equal shares to all occupants as the HAI model does.

The effect of AT&T and MCI's inconsistent approach is to always share away the greatest percentage of the cost.

Q. Are Sprint and the HAI sponsers in agreement that commercial electrical power lines are not candidates for sharing of ducts conduit systems?

A. Yes. AT&T and MCI indicate that for safety reasons, telephone company conduits cannot be shared with power lines.[40]

Q. In light of these obstacles and practical realities, does the assumption by AT&T and MCI that a telephone company can share away one half to two thirds of the cost of the trench for every foot of underground conduit systems, seem in anyway credible or achievable?

A. No, absolutely not. The FCC's requirement that telephone companies lease conduit on a non-discriminatory basis to CLECs, *at economic cost*, makes leasing space more attractive for telecommunications providers and CATV companies than offering to share in the cost of the trench. Sprint and the HAI supporters agree that leasing is not relevant to the modeling of structure sharing.

The NESC allows conduit to be placed in close proximity to other underground structures on such a limited basis, that it is fanciful to assume that this will happen 100% of the time.

AT&T and MCI fail to acknowledge the obvious fact that the trench must be wider or deeper to accommodate another company in the trench with a conduit. They fail to increase the cost accordingly before they apply their sharing fraction, although they clearly recognize the need to include the additional costs for poles.

Finally, AT&T and MCI assume that occupants of a pole will share on a pro rata basis based on the space that they use. However, for underground conduit they assume that the cost shared on an equal basis, regardless of the space that is used. It is unrealistic to think that this would be true. In fact AT&T documentation provides a formula for calculating pro-rata sharing of trench costs.

Structure Sharing – Aerial Cable

Q. Sprint and HAI inputs for pole sharing are relatively close. Does this mean that Sprint is in agreement with the assumptions used by HAI in their development?

A. No. Sprint's structure sharing input for poles is simply a modeling issue. Both BCPM and HAI model the pole line by assuming 100% joint use poles large enough to accommodate multiple providers. Since Sprint would rarely need to use this large a pole for our sole use, Sprint must logically share away a large portion of the cost to get a reasonable structure cost out of the model. The pole sharing factor, a factor derived to accommodate model constraints, cannot be compared to actual feeder structure sharing percentages.

Q. Does HAI inappropriately share the cost of anchors and guys?

A. Yes. In the HIP[41], AT&T and MCI indicate that the costs for anchors and guys material and labor are included in the HAI labor costs for placing poles. As such, this cost would be shared along with the cost of the pole when the structure sharing percentage is applied.

Anchors and guys are designed only to support the telephone facilities on one cable strand. As such, 100% of their cost should be allocated to the telephone company. HAI inappropriately assigns as little as 25% of the anchor and guy cost to the telephone company.

III. Plant Mix Inputs

Q. Have you had the opportunity to review the HAI *Model Description* and HAI Inputs Portfolio (HIP) filed by Mr. Don Wood and Mr. James Wells relative the selection of aerial, buried or underground cable – generally referred to as plant mix?

A. Yes.

Q. Does Sprint have any concerns regarding the Plant Mix inputs that are proposed by AT&T and MCI in the HAI Model inputs?

A. Yes. AT&T and MCI have proposed national default values instead of Florida specific input values for Plant Mix. Because the AT&T and MCI national defaults are not Florida specific they are not appropriate for use in this proceeding.

National default values are simply not representative of the particular conditions that exist in Sprint's Florida exchanges. In particular, the ease of burying cable in Florida's soil and the obvious need to significantly storm-proof Sprint's network causes Sprint to place large amounts of buried cable.

In contrast to AT&T and MCI's national defaults, Sprint has used actual Florida plant mix data as the source of the Plant Mix input.

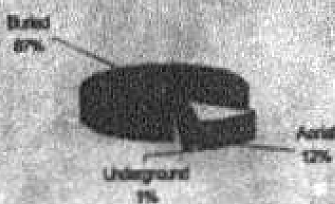
In comparing Sprint's actual Florida data with AT&T and MCI's national default data, we find that the AT&T and MCI national defaults are heavily skewed toward aerial cable which may have a lower initial cost. In fact, the HAI model itself reflects a bias toward aerial cable. While it contains an algorithm that will place buried cable instead of aerial in certain conditions, it will not do the opposite when long term costs for buried are lower than aerial.

The maintenance costs for aerial cable and poles is significantly higher than the maintenance costs for buried cable. These maintenance costs, along with customer service levels and protection of the network must be considered in selecting aerial or buried cable.

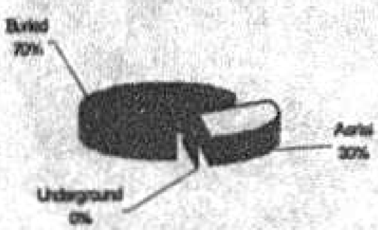
Q. In general, how do the results of the Sprint analysis compare to the HAI's national default inputs?

A. In general, the HAI national default inputs tend to assume significantly more aerial cable than Sprint's analysis shows is actually the case. For example, looking at the 201-650 Density zone - which contains the largest number of Sprint customers - for distribution cable, Sprints analysis finds the following differences:

For distribution cable, Sprint's analysis finds 12% aerial cable, while HAI estimates 30%.

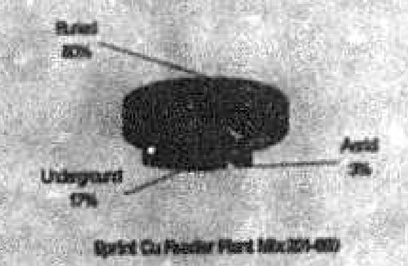


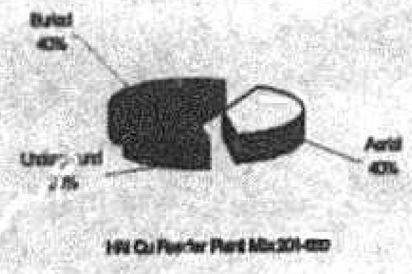
Sprint Distribution Plant Mix 201-650



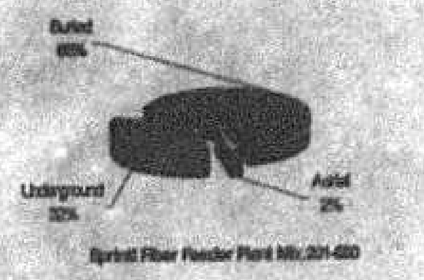
HAI Distribution Plant Mix 201-650

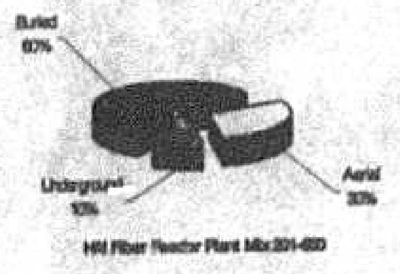
For Copper Feeder cable, Sprint's analysis finds 3% aerial cable, while HAI estimates 40%.





For Fiber Feeder cable, Sprint's analysis finds 2.0% aerial, while HAI estimates 30%.





A complete comparison is included in my testimony as attachment CHL-2.

Q. What is the impact of this inappropriate bias for placing aerial over buried cable?

A. The HAI model, with the national default inputs, will understate the cost of the telephone network in Florida, and the level of support that is required to support Florida's high cost customers.

Q. What factors does an engineer consider when deciding whether to place aerial, buried or underground cable?

A. The decision to place aerial buried or underground cable is impacted by a multitude of factors. The *AT&T Outside Plant Engineering Handbook*[25] provides a very good discussion of these factors. They include such issues as; Initial cost, Maintenance Cost, Growth Rates, Access to right-of-way, Availability of poles or conduit, Governmental requirements or restrictions, Future reinforcement requirements, condition of existing plant, trees, rock, potential for service disruptions, aesthetics and many other factors.

As OSP Engineers design Sprint's Florida network, they have to consider all these factors and make the appropriate decisions for every foot of cable that is placed. While no proxy model could hope to develop the same sophistication in decision making that comes from this level of review, a model can approximate the outcome with the correct inputs.

This is easily done by taking the composite result of this engineering work – the existing plant mix – and applying it to the model. This is exactly what Sprint has done.

By using existing plant mix as a guide, Sprint is able to reflect all of the weather, soil, regulatory, service level and other impacts that are specific to Florida and drive an appropriate and efficient Plant Mix for this market.

Q. Do AT&T and MCI provide any fact-based support for the Plant Mix inputs used in the HAI model?

A. No. There are no studies, surveys, analysis, statistics, trend analysis, summary of current national plant mix nor any other support provided for national defaults that AT&T and MCI represent as being applicable to the Florida. These are the same national defaults that are used by AT&T and MCI in every market in the U.S., regardless of any regulatory, geographical or weather conditions that may exist.

Q. Does HAI's "Shifting Algorithm", which ostensibly changes the plant mix to reflect local rock conditions, cause HAI to more accurately portray plant mix?

A. No. On Page 6 of his testimony, beginning on line 14, Mr. Wells states that the HAI model, "...automatically adjusts the buried and aerial structure percentages to account for varying maintenance costs and placement costs occasioned by local Florida soil conditions and bedrock." This would seem to suggest that the model could place *more* buried plant than the

Buried Plant percentage input, if total long run costs were lower. However, HAI does not do this.

The HAI model *will* shift from buried cable to aerial cable. But regardless of the long run costs, it will never place more buried cable than the buried cable percentage input. Therefor, HAI does not adequately adjust the default inputs to reflect local conditions. In fact, even in some CBG's in Florida without any rock, HAI inexplicably shifts the plant mix from buried to aerial.

Sprint performed a sensitivity analysis in which we reduced buried structure cost to "$0". One would think that this would result in a significant shift of the plant mix toward this very inexpensive option. In fact, changing the cost to bury cable to "$0" caused the model to place only *.4* % (4/10th of one percent) more buried cable. (HAI reduced the amount that it had already shifted from buried to aerial.)

Q. Is the HAI Model, with national default inputs, able to recognize the need for, and plan a network that will withstand the extreme weather conditions that are encountered in Florida?

A. No. With one national set of inputs, AT&T and MCI's HAI model will build the exact same network regardless of the incidence of hurricanes, and the subsequent need to storm-proof the telephone network.

Other Issues

Q. Have you had the opportunity to review the HAI documentation regarding the use of Copper T1 carrier to serve remote clusters instead of fiber optic cable and DLCs?

A. Yes, I have.

Q. Does Sprint have any concerns about the validity of this approach to serving remote customers?

A. Yes. USF models are supposed to identify the costs of serving high cost customers. When these high cost customers are encountered in the HAI model, AT&T and MCI change the rules to artificially generate an unrealistically low cost. AT&T and MCI selectively apply different modeling standards for "forward-looking technology", "least-cost" and "provisioning of advanced services". Under the AT&T and MCI approach, rural customers will not be afforded the same quality and access to advanced services.

This clearly distorts the intent of this effort. Sprint has these specific concerns:

1) Copper T1 Carrier is not forward-looking technology.

T1 Carrier running on copper cable pairs and Fiber Optic cable are both technologies that can be used to connect Digital Loop Carriers to host central offices. T1 carrier technology is over 25 year old. It is very high cost to maintain and has inherently limited bandwidth. Sprint has not placed new T1 carrier routes for many years.

In the HAI Model Description's discussion of options for feeder technology[43] there is no mention of Copper T1 Carrier being considered as an alternative feeder technology. Only fiber optics and regular copper pairs are considered, even though T1 is technically a completely viable alternative. Apparently T1 carrier over copper pairs is not considered to be forward-looking technology, so it is not considered as an option.

In the HIP[44] discussion of potential wireless alternatives to copper distribution, AT&T and MCI indicate that HAI assumes fiber optic feeder to the remote radio sites. T1 carrier would certainly work in this application. But again, apparently T1 carrier over copper cable pairs is not considered to be forward-looking technology, so it is not considered to be an option.

So how can T1 carrier over copper pairs suddenly become forward-looking technology? Are governments, schools and businesses clambering for "copper"? No, they want fiber. Are long distance companies wooing customers with television commercials touting their modern "all copper" networks?

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Copper T1 is not forward-looking technology in any application.

2) Copper T1 is not "Least-cost" technology.

The migration from copper to fiber is driven by fiber's inherently lower long-term cost. Copper T1 is very expensive to own and operate. Instead of only two active electronic components, as in a fiber optic network, it also has electronic repeaters every 3,000'. It is susceptible to electrical interference, it has no remote provisioning, remote maintenance or other OAM&P capability. It requires technicians on site, to complete virtually all maintenance and management functions.

AT&T and MCI apply the same percentage of maintenance cost to T1 over copper as they apply to NGDLCs that have almost 100% remote administration capability.

3) Copper based T1 carrier will not support advanced services.

Think of it this way. The total bandwidth available to serve all 24 customers that could be served over a T-1 carrier is 1.544 mb/s. Customers operating out of NGDLCs can receive 1.544Mb/s each, and more.

4) The models already Cap investment..

Both models recognize that there may be future alternative technologies available at lower cost and provide a user adjustable cap on per line investment. There is no need to additionally constrain investment by changing the rules for the level of service that will be provided to rural customers.

Q. Have AT&T and MCI assumed that all loop carrier will be NGDLCs - and that no copper T1 carrier will be placed – when it creates a more favorable cost outcome for them?

A. Yes, they have. When developing Non-Recurring Charges for the installation of services in a forward-looking environment, AT&T and MCI assume that 100% of the digital loop carrier network will be served using Next Generation Digital Loop Carrier (NGDLC), and that there will be no copper based T1 carrier used. NGDLCs have remote provisioning capabilities that allow trips to the carrier site to be avoided when installing new service. Copper based T1's do not have this capability. Changing their network assumption in this instance allows AT&T and MCI to assume a lower cost for service installation and lower non-recurring charges.

Q. Do AT&T and MCI understate the material cost of cable by using unreliable means to estimate cost rather than simply obtaining price quotes?

A. Yes, rather than simply obtaining price quotes, AT&T and MCI use two different methods to estimate the cost of cable, depending on the size of the cable. Both of these methods grossly underestimate the cost of cable.

For cable from 12 pairs to 400 pairs, AT&T and MCI use the formula: Cable Cost = $.30 + (Pairs * $.007). This formula understates the cost of cable for every cable size. For instance, for 400 pair cable, Sprint's actual cost is $2.75 per foot. The AT&T and MCI formula generates a cost of $.58, which is only 21% of the actual cost.

Most importantly, one cannot simply rely on an unvalidated formula. Some "reasonableness test" should be applied to ensure that the formula is producing valid results. The obvious way to do that is to simply obtain the prices. Certainly companies the size of AT&T and MCI would have relationships with manufacturers and distributors that would have allowed them to obtain the actual costs for 17 sizes of cable. AT&T and MCI state that they did, in fact, obtain actual price quotes for 6- and 12-pair cables[45]. The price quotes did not support the AT&T and MCI formula. So, AT&T and MCI changed the input values. Presumably, AT&T and MCI could have obtained price quotes for the other sizes of cable as well.

For cables larger than 400 pairs, AT&T states, "A review of many installed cable costs around the country were used...."[46] However, when asked by Sprint to produce source documents used in this "review", AT&T responded that none existed and that the values were based solely on expert opinions[47]. AT&T and MCI could certainly have obtained the actual costs of these cables along with the 6- and 12- pairs cables that they claim to have externally validated.

In summary, rather than use readily obtainable, actual costs, AT&T relies on formulas and "opinion" which grossly understate costs. In the only instance in which they acknowledge attempting to validate cost, the actual numbers prov[illegible]d the formula wrong. Rather than revisiting their assumptions, AT&T and MCI simply change the input values and assume that the remaining values are correct.

Q. Do AT&T and MCI understate the cost of indoor SAIs?

A. Yes, the AT&T and MCI costs for Indoor SAIs are significantly underestimated. Furthermore, if one attempts to validate AT&T and MCI's input values by using data provided by AT&T and MCI, one can easily demonstrate that this fact.

Indoor SAIs are "built" on site. The costs include material and labor for splicing cables, placing terminating blocks (66 Blocks), tying down cables on the terminating blocks, cost for protection, placing protection and splicing protection, as well as placing jumper wires and testing of the installation. Sprint was able to determine the AT&T and MCI model costs for the protection, the cost of the 66 blocks and the jumper running. These items represent a small portion of the total cost of an indoor SAI. When only these few costs are totaled, they exceed the total AT&T and MCI input values for each indoor SAI. The following table demonstrates this calculation for a 7200 pair SAI. Source data is footnoted. Sprint has used an estimated labor rate times an AT&T/MCI work time for jumper running.

7200 Pair Indoor SAI	Unit Cost	Quantity	Total
Protection, per pair[48]	$2.00	3,100	$6,200
66 Blocks, bracket and cover[49]	$8.00	288	$296
Place Jumpers[50]	$1.34	2,480	$3,323
Total from Documentation			$9,819
AT&T and MCI Input[51]			$9,656

Using AT&T component cost data, it is clear that AT&T and MCI have not accounted for much of the cost of an Indoor SAI.

Q. In support of distribution span length inputs, the HIP[51] quotes the book; *Outside Plant, ABCs of the Telephone Series* as stating in part, "...where conditions permit open wire spans can approach 400 feet in length...". What is "open wire"?

A. "Open Wire" refers to individual Iron or Copper alloy wire conductors strung between poles on glass insulators attached to pins or wooden 10-Pin cross arms. One frequently sees "open wire" depicted in photos of telecommunications plant from the 1920's and 30's. The green glass insulators may be purchased at antique stores. Sprint does not consider "open wire" to be forward-looking technology.

Q. Please summarize your testimony.

A. AT&T and MCI have presented National Default inputs in this proceeding that are not representative of the costs or realities of providing telephone service in Florida.

AT&T and MCI have misquoted, misrepresented and omitted key pieces of technical references in order to make them appear to support their inputs, when in fact the documents do not. This has included support for:

- Carrier Serving Area size

- Using the longer possible "open wire" spans to support cable span lengths
- Existing conduit leasing to support sharing of trenches
- Network capability to support enhanced services

AT&T and MCI change key model assumptions when doing so allows the model to generate lower universal service costs. Assumptions are changed for:

- Degree to which power can share feeder trenches
- Whether Copper based T1 is, or is not, forward-looking
- Whether the network is 100% NGDL or a mix of NGDLC and copper
- Formulas for calculating cable costs
- Whether a network must be able to support enhanced services
- Plant mix should shift to reflect conditions...except for aerial to buried

AT&T and MCI rely on opinion and conjecture, and have not provided any empirical support, validation or accurate technical documentation:

- CSA sizes
- Copper based T1 carrier
- Structure Sharing and Plant Mix
- Cable Cost
- Ability of network to support advanced services
- Florida Costs

AT&T and MCI ignore factual realities related to:

- National Electrical Safety Code restrictions on structure sharing
- 80% of Power network is aerial;
- The timing and availability of potential sharing partners
- Weather in Florida

The HAI Model and AT&T and MCI inputs will not accurately estimate the costs that will be incurred to provide universal service to Florida customers.

Q. Does this conclude your rebuttal testimony?

A. Yes.

Exhibit: CHL Rebuttal-2
Comparison of Sprint and HAI Plant Mix Inputs

Distribution Plant Mix

0	0.8%	0.0%	87.5%	75.0%	11.7%	25.0%
6	1.0%	0.0%	87.1%	75.0%	11.9%	25.0%
101	1.1%	0.0%	86.7%	75.0%	12.2%	25.0%
201	1.2%	0.0%	86.4%	70.0%	12.4%	30.0%
651	1.2%	0.0%	86.1%	70.0%	12.7%	30.0%
851	1.3%	0.0%	85.9%	70.0%	12.8%	30.0%
2551	1.4%	5.0%	85.6%	65.0%	13.0%	30.0%
5001	1.4%	5.0%	85.5%	35.0%	13.1%	60.0%
10001	1.5%	10.0%	85.3%	5.0%	13.2%	85.0%

Feeder Plant Mix - Copper

0	12.0%	5.0%	84.7%	45.0%	3.3%	50.0%
6	14.0%	5.0%	82.9%	45.0%	3.1%	50.0%
101	15.7%	5.0%	81.4%	45.0%	2.9%	50.0%
201	17.1%	20.0%	80.1%	40.0%	2.8%	40.0%
651	18.3%	40.0%	79.0%	30.0%	2.7%	30.0%
851	19.4%	60.0%	78.1%	20.0%	2.5%	20.0%
2551	20.3%	75.0%	77.2%	10.0%	2.5%	15.0%
5001	21.2%	85.0%	76.5%	5.0%	2.3%	10.0%
10001	21.9%	90.0%	75.8%	5.0%	2.3%	5.0%

Feeder Plant Mix - Fiber

0	23.5%	5.0%	74.4%	60.0%	2.1%	35.0%
6	25.8%	5.0%	72.1%	60.0%	2.1%	35.0%
101	28.6%	5.0%	69.4%	60.0%	2.0%	35.0%
201	31.8%	10.0%	66.2%	60.0%	2.0%	30.0%
651	35.8%	40.0%	62.3%	30.0%	1.9%	30.0%
851	40.8%	60.0%	57.4%	20.0%	1.8%	20.0%
2551	47.2%	75.0%	51.1%	10.0%	1.7%	15.0%
5001	55.8%	85.0%	42.7%	5.0%	1.5%	10.0%
10001	67.8%	90.0%	30.8%	5.0%	1.4%	5.0%

Exhibit: CHL Rebuttal- 3
Comparison of Sprint and HAI Sharing Fractions

Feeder Conduit

100.00%	97.50%	95.00%	95.00%	95.00%	95.00%	95.00%	95.00%	95.00%
50.00%	50.00%	40.00%	33.00%	33.00%	33.00%	33.00%	33.00%	33.00%

Distribution Conduit

100.00%	95.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%
100.00%	50.00%	50.00%	50.00%	40.00%	33.00%	33.00%	33.00%	33.00%

Buried Feeder Cable

100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	97.50%	95.00%	95.00%	95.00%	95.00%	95.00%	95.00%	95.00%
40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%

Buried Distribution Cable

100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	95.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%
33.00%	33.00%	33.00%	33.00%	33.00%	33.00%	33.00%	33.00%	33.00%

Pole Structure / Feeder & Dist

30%	30%	30%	30%	30%	30%	30%	30%	30%
100%	100%	100%	100%	100%	100%	100%	100%	100%
50.00%	33.00%	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%

Exhibit: CHL Rebuttal – 1
Footnotes

1. *Bellcore Notes on the Networks, Distribution, SR-2275, Issue 3, December 1997, Sec. 12.1.4, page 12-5.*
2. The current version of this document, *Bellcore Notes on the Networks, SR-2275, Issue 3, December 1997*, is now available. With minor punctuation changes, Section 12.1.3 is unchanged.
3. *Report and Order*, FCC CC Docket No. 96-45, page 138
4. *Bellcore Notes on the LEC Networks, Issue 2, April 1994, Section 12.1.3, page 12-4*
5. [CREG: Concentrated Range Extender with Gain, MLRD: Modified Long Route Design]
6. *Bellcore Notes on the Networks, SR-2275, Issue 3, December 1997, Section 12.1.4, page 12-5*
7. *Bellcore Notes on the Networks, SR-2275, Issue 3, December 1997, Table 7-11 page 7-70.*
8. *Bellcore Notes on the Networks, SR-2275, Issue 3, December 1997, Section 7.15.5, page 7-71.*
9. *Bellcore Notes on the Networks, SR-2275, Issue 3, December 1997, Section 12.1.4, page 12-5*

10. AT&T Network Systems Customer Education and Training, *Outside Plant Engineering Handbook*, AT&T, 1994, page 13-1.
11. AT&T Network Systems Customer Education and Training, *Outside Plant Engineering Handbook*, AT&T, 1994, page 3-16.
12. AT&T Nevada's Response to Sprint's 1st Set, Docket 98-6005, July 17, 1998, Nevada Request No. 139
13. *Hatfield Model Release 5.0 Inputs Portfolio*, December 31, 1997, Appendix B, page 152
14. *1997 Fact Finder*, Florida Power Corporation, 1997
15. *Hatfield Model Release 5.0 Inputs Portfolio*, December 31, 1997, Appendix B, page 153
16. AT&T Network Systems Customer Education and Training, *Outside Plant Engineering Handbook*, AT&T, 1994, page 9-6.
17. North Carolina, Docket No. P-100, Sub 133b, Transcript Volume III, page 23
18. Ibid., page 29-31
19. AT&T Nevada's Response to Sprint's 1st Set, Docket 98-6005, July 17, 1998, Nevada Request No. 136
20. AT&T Nevada's Response to Sprint's 1st Set, Docket 98-6005, July 17, 1998 Nevada Request No. 145
21. *Hatfield Model Release 5.0 Inputs Portfolio*, December 31, 1997, Appendix B, page 156-157
22. AT&T Nevada's Response to Sprint's 1st Set, Docket 98-6005, July 17, 1998, Nevada Request No. 146
23. North Carolina, Docket No. P-100, Sub 133b, Transcript Volume III, page 22
24. North Carolina, Docket No. P-100, Sub 133b, Transcript Volume III, page 22
25. North Carolina, Docket No. P-100, Sub 133b, Transcript Volume III, page 25
26. North Carolina, Docket No. P-100, Sub 133b, Transcript Volume III, page 25.
27. *National Electrical Safety Code*, Section ,1 P. 010.Purpose , page 1
28. *Hatfield Model Release 5.0 Inputs Portfolio*, December 31, 1997, Appendix B, page 153
29. *Hatfield Model Release 5.0 Inputs Portfolio*, December 31, 1997, Appendix B, page 156
30. The HIP specifically – and correctly - states that the, "Hatfield Model does not assume that conduit is shared". Since both BCPM and HAI cost out only the actual conduit used by the LEC, and not the cost of the additional, leased conduit, the cost of the additional conduit cannot be "share away". See HIP, Appendix B, B.I. Page 152.
31. *Hatfield Model Release 5.0 Inputs Portfolio*, December 31, 1997, Appendix B, page 152
32. *Hatfield Model Release 5.0 Inputs Portfolio*, December 31, 1997, Appendix B, page 152
33. *Hatfield Model Release 5.0 Inputs Portfolio*, December 31, 1997, Appendix B, page 152
34. *National Electrical Safety Code*, IEEE, 1997 Edition, 320.A.1.a, page 176
35. *National Electrical Safety Code*, IEEE, 1997 Edition, 320.A.1, page 176
36. *National Electrical Safety Code*, IEEE, 1997 Edition, 320.B.2, page 177
37. *National Electrical Safety Code*, IEEE, 1997 Edition, 320.B.4, page 176

Exhibit: CHL Rebuttal – 1
Footnotes

[38] *National Electrical Safety Code*, IEEE, 1997 Edition, 320.B.5, page 176
[39] *Hatfield Model Release 5.0 Inputs Portfolio*, December 31, 1997, Appendix B, page 155
[40] *Hatfield Model Release 5.0 Inputs Portfolio*, December 31, 1997, Appendix B, page 152
[41] *Hatfield Model Release 5.0 Inputs Portfolio*, December 31, 1997, 2.4.1, page 24, 26
[42] AT&T Network Systems Customer Education and Training, *Outside Plant Engineering Handbook*, AT&T, 1994, page 3-21.
[43] *Hatfield Model Description 5.0*, HAI Consulting, Inc., January 5, 1998, Section 6.3.5, page 40
[44] *Hatfield Model Release 5.0 Inputs Portfolio*, December 31, 1997, 6.3.4, page 39
[45] *Hatfield Model Release 5.0 Inputs Portfolio*, December 31, 1997, 2.3.2, page 20, footnote
[46] *Hatfield Model Release 5.0 Inputs Portfolio*, December 31, 1997, 2.3.2, page 20 &3.4.1, p. 59
[47] AT&T Nevada's Response to Sprint's 1st Set, Docket 98-6005, July 17, 1998 Nevada Req. No. 52 & 53
[48] *Hatfield Model Release 5.0 Inputs Portfolio*, December 31, 1997, § 2.9, page 43
[49] Document provided by AT&T Consultant, Mr. John Donovan, Dated 2/13/98
[50] Work time from AT&T NRCM Model , NTAB 2.2 Att. B, Page 7 multiplied by a Sprint loaded labor rate of $64.45.
[51] *Hatfield Model Release 5.0 Inputs Portfolio*, December 31, 1997, 2.6.2, page 33