BEFORE THE MISSOURI PUBLIC SERVICE COMMISSION

IN THE MATTER OF THE PETITION OF DIECA COMMUNICATIONS, INC. D/B/A COVAD COMMUNICATIONS COMPANY FOR ARBITRATION OF INTERCONNECTION RATES, TERMS, CONDITIONS AND RELATED ARRANGEMENTS WITH SOUTHWESTERN BELL TELEPHONE COMPANY	)	**Case No. TO-2000-322**

DIRECT TESTIMONY
OF
JOHN C. DONOVAN

ON BEHALF OF DIECA COMMUNICATIONS, INC. D/B/A COVAD COMMUNICATIONS COMPANY, FOR ARBITRATION OF INTERCONNECTION RATES, TERMS, CONDITIONS, AND RELATED ARRANGEMENTS WITH SOUTHWESTERN BELL TELEPHONE COMPANY

DATED: January 7, 2000

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I. INTRODUCTION AND SUMMARY

Q. PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.

A. My name is John C. Donovan and my business address is 11 Osborne Road, Garden City, New York 11530. I am appearing on behalf of Dieca Communications, Inc. D/B/A Covad Communications Company ("Covad").

Currently, I am providing telecommunications consulting services to a number of firms concerning telecommunications infrastructure design, construction and the costing aspects of the local loop. I have also provided services to several manufacturers of telecommunications equipment, investment companies, insurance claims companies, patent attorneys, and others.

Q. PLEASE DISCUSS YOUR EDUCATIONAL AND BUSINESS EXPERIENCES.

A. I received a Bachelor of Science degree in Engineering from the United States Military Academy at West Point, NY, and a MBA degree from Purdue University. I have also attended the Penn State Executive Development Program. I have 30 years of telecommunications experience. My last employment before forming Telecom Visions, Inc. was with the NYNEX Corporation, now known as Bell Atlantic-North. I retired from NYNEX after 24 years of experience in a variety of line and staff assignments, primarily in outside plant engineering and construction. That experience included everything from splicing fiber and copper cables, to heading an organization responsible for the procurement, warehousing, and distribution of approximately $1 million per day in telecommunications equipment. I have had detailed hands-on experience in rural, suburban, and high density urban environments, consisting of assignments in Upstate New York for the northeastern portion of the state including the Adirondack Mountain area, in suburban Long Island, and in Midtown Manhattan. I spent several years on the corporate staff of NYNEX responsible for the development of all Methods and Procedures for Engineering and Construction within that company. To summarize, I have planned outside plant, I have designed outside plant, I have purchased telecommunications materials and contract labor, I have personally engineered and constructed outside plant, and I have designed methods for those who do such functions. I have also performed other functions, or have supervised those who do, in installing, connecting, repairing, and maintaining the various parts of the telecommunications network.

I have also taught undergraduate students as an Adjunct Professor of Telecommunications at New York City Technical College, and have attended numerous courses in telecommunications technologies, methods and procedures. For the past three and one half years, I have submitted affidavits, written testimony, and appeared as an expert telecommunications witness in proceedings before state regulatory commissions in Alabama, Arizona, Colorado, Georgia, Kansas, Louisiana, Maine, Maryland, Massachusetts, Nevada, New Jersey, New York, Oklahoma, Pennsylvania, Texas, Washington, and before the Federal

Communications Commission ("FCC"). Attachment JCD-1 to this Affidavit provides further detail concerning my qualifications and experience.

II. PURPOSE

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?

A. The purpose of this Direct Testimony is to provide factual support for Covad's Petition for Arbitration of Interconnection Rates, Terms, Conditions, and Related Arrangements with Southwestern Bell Telephone Company ("SWBT"), filed on November 9, 1999. That Petition sought resolution of a number of unresolved issues that remained with respect to the terms and conditions of SWBT's provisioning of xDSL services to Covad, including the loop qualification charges, conditioning charges, ISDN loop rates, and cross connect charges.

My *Direct Testimony* identifies technical issues, including appropriate guidelines used by outside plant engineers for decades in designing loops that should preclude the need to remove excessive bridged tap on all loops, and should preclude the need to remove any load coils on loops with less than 18,000 feet of copper. I also fully support the opinions and comments of witness Terry L. Murray in these proceedings, and intend for my comments to provide additional assistance to this Commission regarding technology, and to provide information regarding the reasonableness of SWBT's unsubstantiated estimates of times required to perform work functions.

This *Direct Testimony* explains the technical aspects of the network based upon generally accepted telecommunications engineering principles practiced by those well versed in the art of telecommunications. I will discuss how the network has been built over many years, how it should have been built over those time periods, and what work functions are normally involved in conditioning loops when necessary to correct substandard conditions or to enhance loop functionality.

Q. PLEASE SUMMARIZE YOUR TESTIMONY AND RECOMMENDATIONS.

It is my position that none of SWBT's non-recurring charges for loop conditioning is justified or reasonable because they contradict not only forward-looking network designs, but long established engineering guidelines that should create the most efficient network designs. Responses to Covad's data requests provide clear evidence that SWBT is well aware of these long-standing guidelines that avoid bridged taps and load coils. A correctly designed and engineered network would not require the removal of analog loop conditioning such as load coils, excess bridged taps, nor repeaters. Recurring loop costs reflect all costs to plan, engineer, construct, order, and connect a basic local loop for a customer. The "forward-looking" design appropriate for copper loops of less than 18,000 feet has actually existed for 20 to 30 years, and is therefore not new; such vintage plant is well within approved service lives, and costs for outside plant far beyond their service lives have been fully recovered. This Commission should rule that no loop conditioning charges should be imposed for copper loops of zero to 18,000 feet.

In addition, it appears that SWBT is attempting to get CLECs to subsidize the modernization of its outside plant that has existed long beyond its normal service life or that was not designed according to evolving prescription engineering design guidelines. At the same time, SWBT has recovered – and continues to recover – rates from Missouri ratepayers that were supposed to be used to modernize its network.

Further, CLECs should be allowed access to existing databases such as LFACS and TIRKS, on a read-only basis, to be able to determine outside plant characteristics prior to ordering a loop. Responses to Covad's data requests provide clear evidence that these systems are where loop qualification resides.[1]

Notwithstanding Covad's position that SWBT's proposed rates are not justified, it is clear from a review of SWBT's proposed charges that they are unreasonable upon their face. Should this Commission fail to agree with Covad's position that no loop conditioning charges should be imposed for copper loops of less than 18,000 feet, I am also prepared to demonstrate more reasonable times for removing bridged taps, load coils, and repeaters that conform with generally

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1 SWBT's response to Covad's Data Request No. 68, "LFACS is the data source which tells the Engineer the cable pair characteristics (Loop length, B.T. [bridged tap], loads, and repeaters)..."

accepted outside plant design principles by actually performing those operations on a cable splice before this Commission.

III. CORRECTLY DESIGNED OUTSIDE PLANT FOR THE PAST 27 YEARS EFFECTIVELY ELIMINATES CHARGES FOR CONDITIONING.

Q. CAN YOU DESCRIBE DESIGN GUIDELINES USED BY OUTSIDE PLANT ENGINEERS TO PLAN, DESIGN, AND BUILD OUTSIDE PLANT COPPER CABLES FOR AT LEAST THE PAST 27 YEARS.

A. Yes. I will start with industry designs of the 1950's, and will explain how they evolved in a manner that should avoid the need to condition copper loops of less than 18,000 feet.

<u>A Brief History of Outside Plant Design</u>

1. The term "outside plant" refers to all physical telecommunications facilities located outside of central office buildings, normally consisting of poles, conduit, fiber optic cable, copper cable, and ancillary equipment. Issues surrounding outside plant form the basis for the majority of unresolved concerns in this case.
2. Engineering design must take into account transmission characteristics of copper cable. Customers are lumped into geographical groupings, and then a fail-safe transmission design is created for all customers in that grouping, using the worst case

loop. This simplifies distribution network design[2]. Such a grouping of customers is normally referred to as a *Distribution Area.* All cables within a Distribution Area should have a uniform cable gauge makeup and loading[3] characteristics. This traditional simplified engineering planning and design method, also known as "prescription design", has been used for decades to preclude the engineer from having to do a manual loop qualification for each individual loop within the Distribution Area.

3. Over many years, several distribution network designs have evolved. The major distribution network designs that evolved are *Multiple Plant*, *Dedicated Plant*, *Interfaced Plant*, the *Serving Area Concept* ("*SAC Design*"), and the *Carrier Serving Area Concept* ("*CSA design*"). Network design has evolved such that CLECs can provide either advanced or analog services over the vast majority of existing outside plant.

4. *Multiple Plant* (**pre-1960's**): *Multiple Plant* design dates back to the days of party line service. While there are still some customer lines on party line service, the industry has long recognized that party line service should have been eliminated years ago in order to provide equivalent service levels to all end users of POTS common carrier service. This very old design created many cases of "bridged tap."

5. *Bridged tap* is defined as follows:

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[2] Bellcore, *Telecommunications Transmission Engineering*, 1990, p. 91. See Attachment JCD-3 to this testimony.

[3] Load coils are inductors placed on copper cable wires to counteract the effects of increasing capacitance as pair lengths become longer.

> Bridged tap [occurs when] an extra pair of wires [is] connected in shunt [parallel] to a main cable pair. The extra pair is normally open circuited but may be used at a future time to connect the main pair to a new customer. Short bridged taps do not effect voice frequency signals but can be extremely detrimental to high frequency digital signals.[4]

6. *Bridged tap* was initially used so that telephone companies could provide facilities less expensively in a market where not all customers would want telephone service. Since an exact customer requesting dial tone, among several, could not be predicted, use of bridged tap allowed the company to draw dial tone on one pair of wires at several locations. That outdated environment produced a design concept called "multiple plant". *Multiple plant* is defined as follows:

> Multiple plant design involves splicing two or more distribution pairs to a single feeder pair, as illustrated [below]. That is, feeder and distribution plant are combined with no interface between them. This procedure provides flexibility to accommodate future assignments by providing multiple appearances of the same loop pair at several distribution points. In times when multiparty service was common, it accommodated field-bridging of party-line stations, saving feeder pairs at the cost of added field work for rearrangements. However, adding new feeder pairs forced line and station transfers to relieve the distribution cables. Because changing existing plant or adding new facilities is labor intensive and because party-line service continues to shrink, multipled plant design has been largely replaced by other designs.[5]

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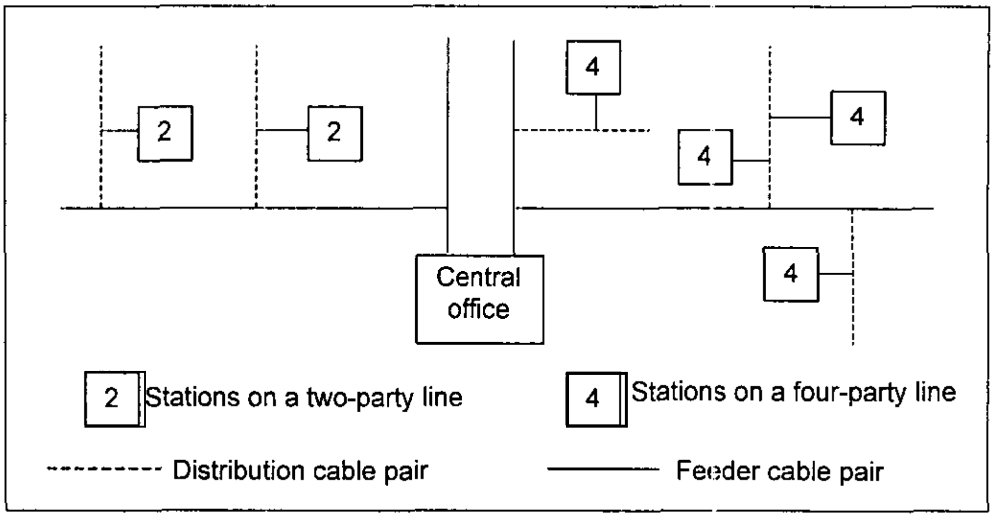
4 Gilbert Held, *Dictionary of Communications Technology*, John Wiley & Sons 1995, p. 56. See Attachment JCD-3 to this testimony.

5 Bellcore, *Telecommunications Transmission Engineering*, 1990, p. 92. See Attachment JCD-3 to this testimony.

Multiple Plant Design



7. *Dedicated Plant* (**late 1960's**): *Dedicated plant* was a short-lived attempt to provide a permanently assigned cable pair from the central office main distributing frame ("MDF") to each customer's Network Interface, without a Feeder Distribution Interface. This resulted in little network flexibility, and created maintenance problems. "... [D]edicated plant has been superseded by interfaced plant."[6]

8. *Interfaced Plant* (**1960 - 1972**): *Interfaced plant* design guidelines mandated the use of a Feeder Distribution Interface ("FDI"),

> a manual cross-connection and demarcation point between feeder and distribution plant.
>
> Compared to multipled and dedicated plant, interfaced plant provides greater flexibility in the network. The serving area concept, discussed below, uses the interfaced plant design.[7]

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[6] Bellcore, *Telecommunications Transmission Engineering*, 1990, p. 92. See Attachment JCD-3 to this testimony.

[7] Bellcore, *Telecommunications Transmission Engineering*, 1990, pp. 92-93. See Attachment JCD-3 to this testimony.

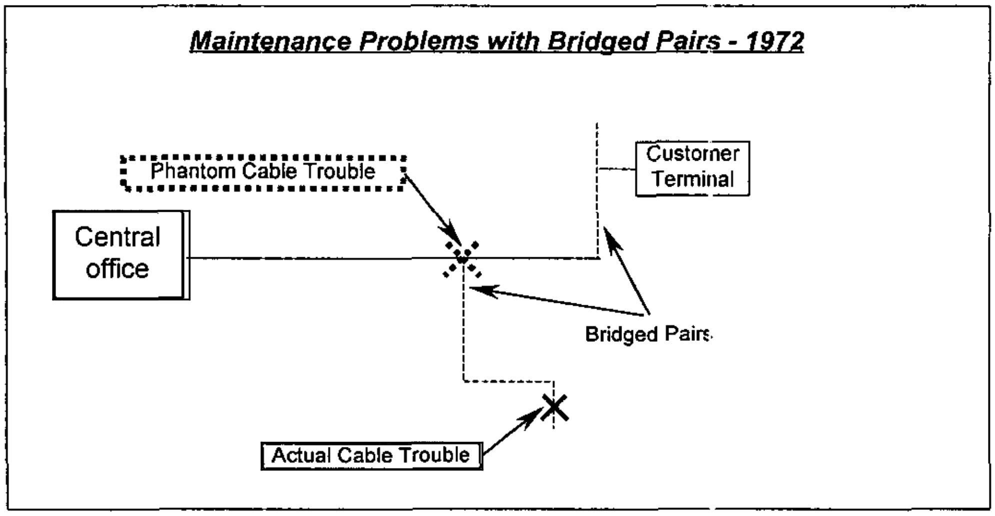
9. *Serving Area Concept* (**<u>1972 - 1980+</u>**): The *Serving Area Concept* ("*SAC*") design was introduced in the early 1970's as a prescription simplified engineering planning and design method, and was the first major attempt to modernize the network to care for growing and ubiquitous service to an ever shifting customer base. Many concepts carried over into the *Carrier Serving Area* ("*CSA*") design guidelines that have been used since approximately 1980. The following are important aspects of *SAC* design that form the basis for the modern day concept of outside plant planning and design that have been in place for over 27 years:

> Portions of the geographic area of a wire center are divided into discrete serving areas...
>
> The outside plant within the serving area is the distribution network. It is connected to the feeder network at a single interconnection point, the serving area interface [or feeder distribution interface].
>
> ... it simplifies and reduces engineering and plant records necessary to design, construct, administer, and maintain outside plant...
>
> **<u>It aids transmission by minimizing bridged taps</u>**, a distinct advantage in providing services of bandwidth greater than voice. [emphasis added][8]

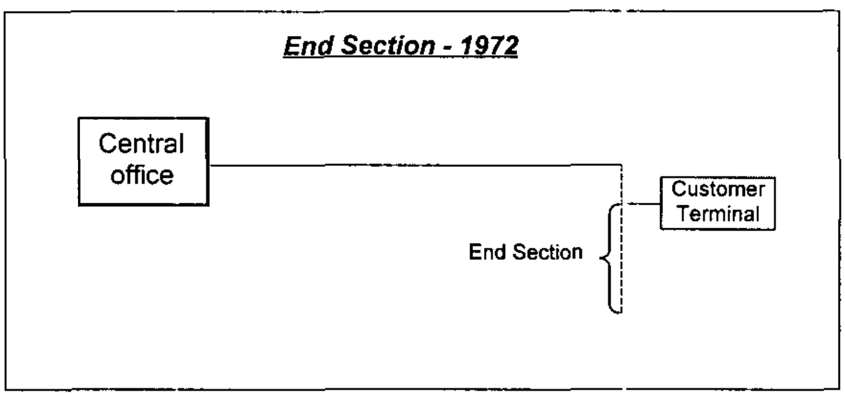
The *SAC* concept also stated that there should be no multipled copper feeder cable (i.e., no bridged tap at all in copper feeder plant), no multipled copper cable binder groups between distribution cable side legs (i.e., no bridged tap at all in copper distribution plant), and that a primary and secondary copper distribution pair would be dedicated to a customer's block terminal, with those pairs cut dead beyond the serving terminal (i.e., no bridged tap in the form of "end section" for at least 2 pairs per living unit).

I was a new outside plant engineer, recently transferred from cable maintenance, when *SAC* design standards were introduced. Another reason for eliminating all *bridged taps* from distribution side legs involved the ability to locate cable troubles. Where a single cable pair appeared in two different side legs, if there was a cable trouble off of the direct route back to the central office, in the side leg nearer to the central office, test measurements using a Wheatstone Bridge would indicate that the trouble was at the bridged tap splice, not at the actual trouble location. The following diagram illustrates the problem with *bridged taps* on distribution side legs:

8 Bellcore, *Telecommunications Transmission Engineering*, 1990, pp. 92-93. See Attachment JCD-3 to this testimony.



Whereas I have previously discussed the maintenance reasons for eliminating bridged tap between a customer and the central office, the following diagram shows the existence of end section, which is electrically similar, but is bridged in parallel with the working line, going away from the customer's location, rather than between the customer and the central office.



An end section should not be longer than 2,000 feet, thereby meeting the 1980 CSA design criteria that the industry, including SWBT, has adopted. This end section should occur only for the rare occasion when the xDSL line is the third line to this customer, since the primary and secondary pairs should have been cut off at the serving terminal per SWBT engineering guidelines[9].

10. *Carrier Serving Area* (**<u>1980+</u>**): The next guideline for modernizing the network was the introduction of the "*Carrier Serving Area Concept*" to care for customers' demand for increasing transmission bandwidth. This new *CSA* prescription simplified engineering planning and design guideline initially used a simple 900 ohm rule that could be equated to loop lengths depending on wire gauge. The following Bellcore description indicates precisely the loops desired by service providers in provisioning xDSL loops of any kind currently in the marketplace:

> The maximum allowable bridged-tap is 2.5 kft, with no single bridged-tap longer than 2.0 kft. All CSA loops must be unloaded and should not consist of more than two gauges of cable.[10]

11. Summary: What we have is a history clearly stating that all loops since 1980 should have been designed to the *CSA* concept that would support sought-after digital services. All loops since 1972 should have at least been designed under the *Serving*

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9 See Attachment JCD-2, SWBT *Transport Engineering and Construction Policies*, Tab 11, page 1, "General", and SWBT *Loop Deployment Policy and Guidelines*, Section 3, page 2.

10 Bellcore, *Bellcore Notes on the Networks - Issue 3*, December 1997, p. 12-5. See Attachment JCD-3 to this testimony. See also Attachment JCD-2, SWBT *Transport Engineering and Construction Policies*, Tab 20, page 1.

Area Concept, in which all distribution cable, within an entire *Distribution Area*, has the same transmission characteristics (all loaded or all non-loaded), all of the same copper gauge cable, and with no bridged tap. Therefore, correctly designed outside plant for the past 27 years should present little problem to CLECs applying for xDSL service loops. Loops older than 27 years are far beyond their useful service lives and depreciation lives.

12. It should be noted that xDSL technologies were created under the vision that most existing copper circuits would support much higher bandwidth using sophisticated electronics. The legacy of that position goes back to the promulgation of CSA guidelines in 1980. Thus, most loops in SWBT's outside plant inventory can support DSL and voice service because network design has evolved such that CLECs can provide either advanced or analog services over the majority of existing outside plant. CLECs just want a normal, well-designed copper loop. CLECs are not requesting a host of "unusual loops" or "unique loops" that justify the imposition by SWBT of "unusual" and "unique" special charges.

IV. CONDITIONING OF LOOPS WITH LESS THAN 18,000 FEET OF COPPER TO REMOVE LOAD COILS SHOULD NOT BE NECESSARY, OR SHOULD BE TREATED AS A CORRECTABLE PROBLEM.

Q. FOR PURPOSES OF THESE PROCEEDINGS, PLEASE DEFINE WHAT IS MEANT WHEN BOTH COVAD AND SWBT USE THE TERM "CONDITIONING LOOPS".

A. This proceeding is about xDSL loops, and xDSL loops cannot operate properly as high speed digital lines if copper pairs have load coils, excessive bridged tap, or digital repeaters on them. Therefore, the "conditioning loops", as used by all parties in this proceeding, refer to removing load coils, removing excessive bridged tap, or removing digital repeaters, so as to obtain a "clean copper loop".

Q. SWBT CLASSIFIES COPPER LOOPS AS CATEGORY RED, CATEGORY YELLOW, AND CATEGORY GREEN. WHAT DOES SWBT MEAN BY THOSE CATEGORIES?

A. SWBT classifies loops with more than 17,500 feet of copper as Category Red, loops with 12,000 to 17,500 feet of copper as Category Yellow, and loops with less than 12,000 feet of copper as Category Green.

Q. DOES THE TELECOMMUNICATIONS INDUSTRY NORMALLY USE SUCH DISTINCTIONS OR CATEGORIES?

A. No. Generally accepted outside plant engineering practices do not recognize the categories proposed by SWBT. There is no loop length criteria at 17,500 feet. An appropriate break point occurs at 18,000 feet. All POTS loops containing more than 18,000 feet of copper must utilize load coils to mitigate the effect of capacitance build-up on the pairs (which would not, however, be deployed in a forward-looking network design); that is the only meaningful break point for classifying copper loops. SWBT's inappropriate use of a 17,500 foot cut-off is based on other than technical reasons. Evidence supporting my claim is contained in SWBT's proprietary response to Covad's Data Request Number 80, page 13, paragraph 1. Additional evidence of SWBT's actual engineering practices that support a number of points raised in my testimony are revealed in SWBT's proprietary engineering practices provided in response to Covad's Data Request Number 9, and included as Attachment JCD-2 to this testimony.

Q. WHAT IS THE SIGNIFICANCE OF SWBT'S CATEGORY GREEN COPPER LOOPS OF LESS THAN 12,000 FEET?

A. The only significance to SWBT's Category Green copper loops of less than 12,000 feet is that if they find there is excessive bridged tap, load coils, or repeaters, they will consider that an engineering design error, and will repair (condition) the loop to eliminate the interferors without charge to the CLEC.

Q. WHAT IS THE SIGNIFICANCE OF SWBT'S CATEGORY RED COPPER LOOPS OF MORE THAN 17,500 FEET?

A. First, SWBT incorrectly assumes a 500 foot margin that has already been cared for in outside plant engineering design standards, and backs off from an 18,000 foot loop break point to 17,500 feet. SWBT assumes that all loops with more than 17,500 feet of copper have load coils, and will therefore require conditioning 100% of the time. If this break point were changed to 18,000 feet, it would conform to generally accepted outside plant engineering principles, and I could accept it as a meaningful break point for load coil removals, if it were not for the introduction of Carrier Serving Area guidelines in 1980 that called for the planned elimination of all loaded loops on a going-forward basis.

Q. WHAT DO YOU MEAN BY THE USE OF THE PHRASE, "ON A GOING-FORWARD BASIS"?

A. Starting in 1980, Long Range Outside Plant Plans were to be developed for all central offices. Those long range plans identified the ultimate design configuration of the local loop; that is, meeting the Carrier Serving Area criteria of 100% non-loaded loops, and limited bridged tap, so that digital services such as ISDN could be supported by all loops without special conditioning. The Long Range Outside Plant Plans also sketched the existing outside plant configuration, and created a planned, gradual migration to a CSA compliant outside plant architecture over time.

Q. HAS IT BEEN LONG ENOUGH TO EXPECT OUTSIDE PLANT THAT CONFORMS TO CSA GUIDELINES?

A. Yes. It has been 20 years since the industry adopted those guidelines for non-loaded outside plant. Twenty years exceeds the service lives established by this Commission for outside plant categories of aerial, buried, and underground copper cables. Whereas SWBT intends to continue to collect recurring costs that include a significant component for depreciation expense, SWBT is also attempting to have CLECs pay to have load coils removed from fully exhausted copper cables, or copper cables that were not designed to meet the 20 year old CSA design guidelines. Load coils on copper pairs should be treated as a problem condition, and SWBT should remove those load coils without charging CLECs.

Q. DOES SWBT ACCEPT THE CONCEPT OF CSA DESIGN STANDARDS?

A. Yes. In response to Covad Data Request No. 40, SWBT's responds to Covad's question, "Does SWBT agree that, with the CSA design concept, all loops must be unloaded and should not consist of more than two gauges of cable?", with the response as follows:

> Yes. See Tab 20 of the TECP [Transport Engineering and Construction Policy):
>
> Loops should not be loaded, should not have more than one gauge change, nor should they exceed 5 dB of loss. (This translates into not more than 9 Kft of 26 gauge or approximately 12 Kft for 24 gauge).

SWBT also responded to Covad's Data Request No. 28 which asked, " Please verify that SWBT's study of UNE loop cost does not include the cost for load coils as an input.", as follows:

> For the unbundled 8dB analog loop, SWBT did not include costs for load coils.

Regarding timeframes, SWBT responded to Covad's Data Request No. 37, stating, "Yes, SWBT has deployed the CSA concept since the 1980s."

Q. SHOULD CLECS BE CHARGED FOR LOAD COIL REMOVAL ON ANY LOOP WITH LESS THAN 18,000 FEET OF COPPER?

A. No. SWBT has agreed that no loop conditioning charges apply to copper loops of less than 12,000 feet. That offer should be extended to loops less than 18,000 feet to conform to generally accepted outside plant engineering principles that have existed for decades.

Q. HAS SWBT TAKEN ANY POSITION ON THE EXISTENCE OF LOAD COILS FOR LOOPS SHORTER THAN 18,000 FEET?

A. Yes. SWBT states that it is very likely that Digital Loop Carrier ("DLC") systems have been placed on the longest loops first, that long copper loops may have been transferred onto the DLC to free up spare copper closer to the central office, and that their engineering guidelines do not call for the proactive removal of all copper load coils in such cases[11].

Q. IN YOUR OPINION AS AN EXPERT, DOES THAT EXPLANATION MAKE SENSE?

A. Such things can happen, but in my opinion, sanctioning such practices does not make sense. I fail to understand why a telephone company would continue to pay ad valorem taxes on an asset no longer in use, unless SWBT has been retiring the load coil cases but not physically removing them. In addition, it does not make sense to free up copper pairs for use closer to the office without removing unnecessary load coils. Even if no planned action were taking place, an engineer

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[11] See SWBT's response to Covad's Data Request No. 23, "The new fiber being place[d] into existing feeder routes typically reinforces that route and the existing copper pairs are left in place in order to provide POTS service."

would certainly call for the removal of all load coils on a cable at the time of any activity in the cable.

Q. DO SWBT'S PUBLISHED ENGINEERING PRACTICES AND PROCEDURES SUPPORT YOUR ARGUMENTS REGARDING LOAD COILS?

A. Yes, SWBT's practices very much follow what I have described as generally accepted outside plant engineering practices. SWBT has classified its engineering practices and procedures as proprietary, so I have limited any citations to their actual practices in support of my load coil arguments, and refer the Commission to a proprietary attachment to this *Direct Testimony*, which I have labeled Attachment JCD-2.

Q. PLEASE SUMMARIZE YOUR POSITION ON COPPER PAIR CONDITIONING COSTS TO ELIMINATE LOAD COILS FOR LOOPS CONTAINING LESS THAN 18,000 FEET OF COPPER.

A. I have described the evolution of generally accepted outside plant planning, engineering, and construction practices. SWBT is well aware of those generally accepted practices, and supports them. SWBT has elected to repair any non-conforming load coil conditions on copper pairs shorter than 12,000 feet. I maintain that SWBT's non-conforming load coil condition offer should be extended to loops of any length. If this Commission should reject this argument, then at the very least, SWBT's 12,000 foot offer should be extended to 18,000 feet for cost-free conditioning of copper loops due to the existence of load coils.

If this Commission should reject both of these arguments above, regarding the cost of removing load coils from copper loops, then this Commission can at least recognize that the retention or existence of load coils on loops that are less than 18,000 feet in length is not consistent with the TELRIC principles as applied to developing a forward-looking network design[12]. SWBT should appropriately condition all loops in a cable at a load point at one time, and a CLEC should bear only the equivalent cost of deloading one pair out of many, thereby appropriately diluting the cost of bringing the offending copper cable up to a standard CSA design.[13] In the past SWBT has stated that for copper loops less than 17,500 feet in length with load coils, that it would only remove one load coil at a time, rather than deload entire binder groups. This practice not only makes no sense, since loops less than 18,000 feet will never need load coils, it also contradicts SWBT's policies. The flaw in this SWBT policy was revealed in the Texas Arbitration case in SWBT Response to ACI Third Request for Information, Request No. 22, in Consolidated ACI/Covad Texas Arbitration[14]. The Texas Commission ruled

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12 This is precisely the language utilized by the Public Utility Commission of Texas in Docket Nos. 20226 & 20272, Arbitration Award of Rhythms Links, Inc. and Covad vs. SWBT, pages 93-94.

13 In this last instance, most cost efficient methods and procedures should be utilized, which I am prepared to demonstrate with an actual copper cable splice before this Commission.

14 As quoted in Ms. Murray's testimony, SWBT's response stated, "In wire centers that SWBT had identified to deploy retail ADSL service, SWBT is currently identifying 50

that on overage, 50 pairs at a time would be deloaded, and therefore ruled that deloading costs should be divided by 50 to arrive at an appropriate non-recurring cost, where required This methodology makes complete sense. To do otherwise would be akin to locating a cable trouble for a working customer, finding a splice filled with water and pairs with deteriorated insulation, but then only repairing one pair of conductors. The correct thing to do is to reinsulate or repair all conductors in that splice, not just the one with the current trouble report.

Another important reason for deloading groups of pairs in a splice at one time is to prevent frequent reentry into outside plant splices. One of the major causes of outside plant troubles is what those skilled in the art of outside plant refer to as the "hands in the plant" problem. Every time wires in a splice are handled, there is a risk of creating wire troubles. If a craftsman or construction supervisor were to see an engineering order to deload only one pair, the first action would be to call the engineer to question his or her judgment, and asking why a full 25-pair or 50-pair group at a time were not being conditioned. Plant stabilization objectives dictate going into splices as seldom as possible. Given relatively low cable fills, it makes absolute sense to condition groups of pairs at a time. SWBT's practices are correct in doing 50 pairs at a time or more. For those cables that serve customers less than 18,000 feet from the central office (where no load coils are appropriate), cutting away all loads in one visit is the right engineering job.

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pair binder groups (minimum) for ADSL deployment. SWBT will groom (if needed) those 50 pair binder groups by removing Bridge Tap or loads if necessary. These binder groups will carry not only SWBT's ADSL service, but also CLEC ADSL service."

V. CHARGES PROPOSED BY SWBT FOR LOAD COIL REMOVALS ARE EXCESSIVE.

Q. IF THIS COMMISSION WERE TO RULE THAT SWBT MAY CHARGE FOR THE REMOVAL OF LOAD COILS FOR LOOPS BETWEEN 12,000 FEET AND 17,500 FEET, HAS SWBT PROVIDED FOR APPROPRIATE COSTS FOR THIS FUNCTION?

A. No. I still maintain that SWBT's "no charge" load coil removal policy for loops less than 12,000 feet should be extended to 18,000 feet, but failing that, SWBT's costs are inflated way beyond what is reasonable.

Q. ON WHAT BASIS HAS SWBT PROPOSED WORK TIMES FOR THE DELOADING OF COPPER CABLE PAIRS?

A. SWBT has based its proposed rates on the opinions of its alleged experts. Whereas I would expect SWBT to be able to produce hard data based on independent time and motion studies that comport with generally accepted industrial engineering methods, no hard data has been presented in this case. As a result, there is no factual basis for this Commission to consider. I will present my expert opinions on what are reasonably achieved task times; I will break the tasks down into far more discrete tasks than SWBT has presented in its filings, and I am prepared to physically demonstrate to this Commission that my opinions are reasonable, and even conservatively high.

Q. IF LOAD COILS MUST BE REMOVED, HOW MANY LOCATIONS ARE NORMALLY INVOLVED?

A. Once load coils are deployed, starting only when a copper loop reaches 18,000 feet in length, loads are immediately deployed at three locations (at approximately 3,000 feet, 9,000 feet, and at 15,000 feet). Also, since feeder cable is normally placed in conduit when close to the central office, I have assumed that the first two load coil locations involve underground cable at manhole locations. The third location is most likely in aerial or buried locations; therefore I have assumed that 50 percent of the time deloading of the 3rd load coil location will be at an aerial location, and 50 percent of the time, deloading of the 3rd load coil location will be at a buried location. It is my opinion that the following conservative time estimates can be used by this Commission to estimate the costs involved[15]:

Average Cost for Load Coil Removals at 3 sites		
Step	Task	Cost/Line
1	Deload pairs at 1st underground Site	$2.20
2	Deload pairs at 2nd underground Site	$2.20
3	Deload pairs at 3rd site, aerial 50% of the time	$0.86
3	Deload pairs at 3rd site, buried 50% of the time	$0.50
	Total Cost per Line to Deload at 3 Locations	$5.77

[15] The labor rates shown in the following tables are set at $55.00 which I believe are typical for splicing technicians, and include loadings for motor vehicle expense and exempt material.

Underground Cable Load Coil Removal in a Manhole		
Step	Description	Task (min.)
1	Travel time to underground splice location	20
2	Set up work area protection and underground work site	5
3	Pump and ventilate manhole	15
4	Rerack cable and set up splice	5
5	Open splice case	5
6	Identify pairs to be deloaded for 1st 25-pair binder group	5
7	Bridge 25-pair binder group for service continuity (if necessary)	5
8	Remove/sever connection from main cable to load 'in' & 'out taps.	3
9	Rejoin/splice 25-pair binder group through main cable	5
10	Remove bridging modules from Step 7	2
11	Identify pairs to be deloaded for 2nd 25-pair binder group	5
12	Bridge 25-pair binder group for service continuity (if necessary)	5
13	Remove/sever connection from main cable to load 'in' & 'out taps.	3
14	Rejoin/splice 25-pair binder group through main cable	5
15	Remove bridging modules from Step 12	2
16	Clean, reseal, and close splice case	10
17	Rack cables, pressure test cables in manhole	10
18	Close down manhole, stow tools, break down work area protection	10
	Total Minutes	120
	Total Hours	2.00
	No. Technicians	1
	Total Timesheet Hours	2.00
	$/Hr.	$55.00
	Total Cost/50 Pairs	$110.00
	Total Cost/Pair	$2.20

Aerial Cable Load Coil Removal at a Pole		
Step	Description	Task (min.)
1	Travel time to aerial splice location from underground splice location	10
2	Set up work area protection	5
3	Set up ladder or bucket truck	10
4	Open splice case	5
5	Identify PIC pairs to be deloaded for 1st 25-pair binder group	2
6	Bridge 25-pair binder group for service continuity (if necessary)	5
7	Remove/sever connection from main cable to load 'in' & 'out taps.	3
8	Rejoin/splice 25-pair binder group through main cable	5
9	Remove bridging modules from Step 6	2
10	Identify pairs to be deloaded for 2nd 25-pair binder group	2
11	Bridge 25-pair binder group for service continuity (if necessary)	5
12	Remove/sever connection from main cable to load 'in' & 'out taps.	3
13	Rejoin/splice 25-pair binder group through main cable	5
14	Remove bridging modules from Step 11	2
15	Clean, reseal, and close splice case	10
16	Secure splice case to strand and clean up work area	10
17	Close down aerial site, stow tools, break down work area protection	10
	Total Minutes	94
	Total Hours	1.57
	No Technicians	1
	Total Timesheet Hours	1.57
	$/Hr.	$55.00
	Total Cost/50 Pairs	$86.17
	Total Cost/Pair	$1.72

Buried Cable Load Coil Removal at a Pedestal		
Step	Description	Task (min.)
1	Travel time to buried splice location from underground splice location	10
2	Set up traffic cone at rear bumper of truck	1
3	Walk to site & open splice pedestal	2
5	Identify PIC pairs to be deloaded for 1st 25-pair binder group	2
6	Bridge 25-pair binder group for service continuity (if necessary)	5
7	Remove/sever connection from main cable to load 'in' & 'out taps.	3
8	Rejoin/splice 25-pair binder group through main cable	5
9	Remove bridging modules from Step 6	2
10	Identify pairs to be deloaded for 2nd 25-pair binder group	2
11	Bridge 25-pair binder group for service continuity (if necessary)	5
12	Remove/sever connection from main cable to load 'in' & 'out taps.	3
13	Rejoin/splice 25-pair binder group through main cable	5
14	Remove bridging modules from Step 11	2
16	Secure splice within buried pedestal and clean up work area	3
17	Close down buried site, stow tools and traffic cone	5
	Total Minutes	55
	Total Hours	0.92
	No. Technicians	1
	Total Timesheet Hours	0.92
	$/Hr.	$55.00
	Total Cost/50 Pairs	$50.42
	Total Cost/Pair	$1.01

Q. IS THERE OTHER LOGIC THAT WOULD SHOW THAT SWBT'S DELOADING COSTS ARE UNREASONABLE?

A. Yes. For the case where 50 ADSL lines were requested over time, not only would SWBT send out bills totaling 50 times its requested rate of $797.78, or $39,889, the splice would have been entered and rearranged enough times to render it a major trouble spot in the SWBT network.

Q. DO SWBT'S OWN PRACTICES ADVOCATE DOING WHAT IS BEST FOR IT'S OWN PURPOSES?

A. As Ms. Murray states in her testimony, where SWBT is preconditioning lines, it is doing it in minimums of 50 pairs at a time.

VI. CONDITIONING OF LOOPS OF ANY LENGTH TO REMOVE EXCESSIVE BRIDGED TAP SHOULD NOT BE NECESSARY, OR SHOULD BE TREATED AS A CORRECTABLE PROBLEM.

Q. IS SWBT'S USE OF THE "YELLOW" ZONE BETWEEN 12,000 FEET AND 17,500 FEET APPROPRIATE CONCERNING EXCESSIVE BRIDGED TAPS?

A. No. As I previously discussed, there is no industry standard at 17,500 feet; also, whereas there is an industry standard for load coils on copper loops that are longer than 18,000 feet, appropriate engineering guidelines indicate that excessive bridged taps should not exist for loops of any length.

Q. WHAT ARE THE APPLICABLE ENGINEERING DESIGN GUIDELINES, GENERALLY ACCEPTED BY THE INDUSTRY, RELATING TO BRIDGED TAPS?

A. Bridged taps were eliminated on a going-forward basis with the advent of the Serving Area Concept ("SAC") in 1972.

Q. DOES SWBT STATE THAT BRIDGED TAPS ARE APPROPRIATE, CONTRARY TO SAC DESIGN GUIDELINES?

A. Yes, and no. Specifically, SWBT's response to Covad's Data Request No. 27 was incorrect, where SWBT stated, "Bridged taps are simply the use of the pairs of those cables in multiple locations which results in a more efficient cost than if those bridged taps were not used."

As an experienced outside plant engineer, and one who has taught telecommunications design, this is an incorrect statement widely disputed by the literature. In contrast, SWBT's responses to Covad's Data Requests No. 9 and No. 25 are clear and correct, and as stated in their response to Data Request No. 25, SWBT states:

> Below is the first paragraph of TECP Tab 11 which states:
>
> All new urban-suburban residential distribution plant will be designed using the Serving Area Concept (SAC) principles with Type II Administration, all feeder pairs are Multiple free [i.e., zero bridged tap] from the central office to the Serving Area Interface (SAI) and non-multiple binder groups will be used for distribution laterals [i.e., zero bridged tap between distribution side legs]. The primary and secondary distribution pairs will be dedicated for each ultimate definable living unit and it is recommended that dedicated pairs be cut off beyond the serving terminal to reduce bridged tap and maintenance problems [i.e., zero end section, which has the same effect as bridged tap, but extends beyond the serving block terminal].

This SWBT engineering guideline is right on the mark, the concept has been in place since 1972; it calls for zero tolerance of bridged tap in copper feeder or among distribution side legs, and allows only for some end section in a side leg if a customer has more than two lines.

Q. IS THERE ADDITIONAL EVIDENCE IN SUPPORT OF YOUR CLAIM THAT EXCESSIVE BRIDGED TAP SHOULD NOT BE A PROBLEM?

A. Yes. However, since SWBT's actual engineering practices have been declared Proprietary, I refer the Commission to my Proprietary Attachment JCD-2 to this testimony.

Q. WHAT IS INVOLVED IN ELIMINATING END SECTION FROM A CABLE PAIR?

A. Because cutting away bridged tap is such an easy job for the technician, an Engineering Work Order really isn't necessary. The technician reads the order, locates the terminal, identifies the line to be installed, and cuts away the offending bridged cable pairs with splicing shears (scissors). The simplest condition is when a buried splice is located in a pedestal, such as the 6" x 6" green pedestal that is frequently seen sticking out of the ground in neighborhoods, in front of houses where buried distribution is used[16]. The following diagram illustrates the work involved in cutting and clearing bridged tap from a circuit.

16 For an illustration, see Attachment JCD-3.11 to this testimony.

BRIDGED TAP REMOVAL

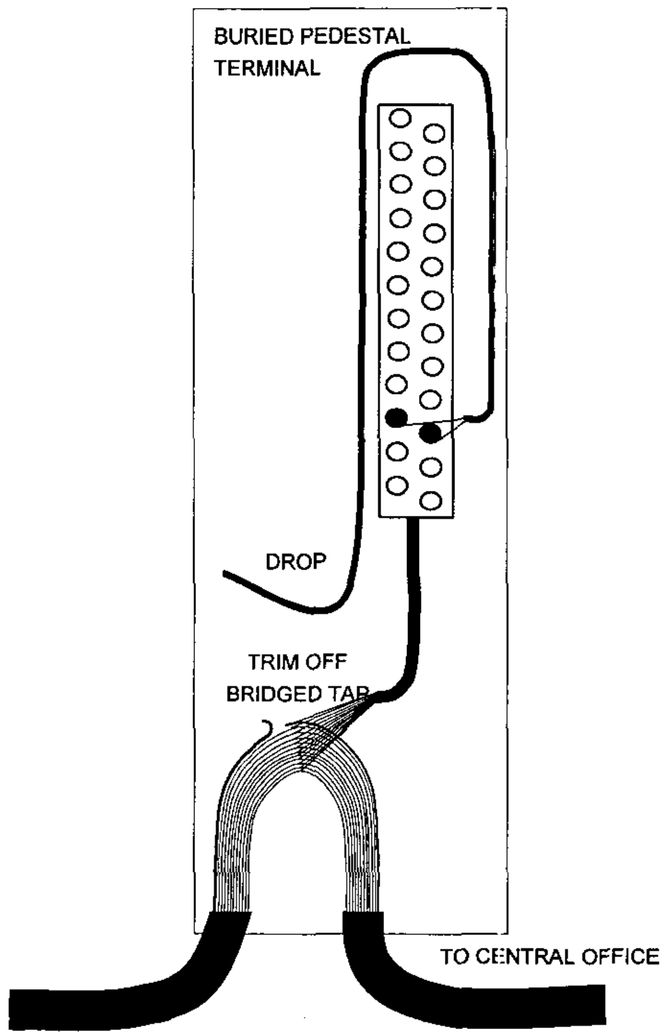

FIGURE 2

Q. AS AN EXPERIENCED ENGINEER, WOULD YOU EVER CALL FOR RESTORING BRIDGED TAP ON THE OCCASION OF A CUSTOMER DISCONNECT, AS SWBT SAYS IT WOULD DO IN ABOUT ONE THIRD OF THE CASES?

A. Absolutely not. Doing such a thing is virtually unheard of in the industry. As I have explained earlier in my testimony, the existence of excessive bridged tap is an error in a forward-looking network. There would be no reason to put an error back in outside plant inventory. SWBT is being compensated under recurring UNE costs to provide sufficient facilities to each and every customer location. In addition, fill rates used by SWBT provide large numbers of excess pairs. Bridged tap was designed for party line service decades ago. There is no engineering reason to revert to such plant designs. In addition, and as mentioned previously, "hands in the plant" is a primary source of defective pairs. The more that wires are handled in a splice, the more defective pairs are created. The typical phrase in the industry is to try to "simplify and stabilize"; that means don't churn the outside plant. Bridged taps should not be restored; the industry does not restore them, and SWBT's proposal to impose a cost for such a function should be eliminated.

Q. PLEASE SUMMARIZE YOUR POSITION ON COPPER PAIR CONDITIONING COSTS TO ELIMINATE EXCESSIVE BRIDGED TAP.

A. I have described the evolution of generally accepted outside plant planning, engineering, and construction practices. SWBT is well aware of those generally accepted practices, and supports them. SWBT has elected to repair any non-conforming bridged tap conditions on copper pairs shorter than 12,000 feet. I maintain that SWBT's non-conforming bridged tap condition offer should be extended to loops of any length. If this Commission should reject my argument in this respect, then I recommend that the Commission decide that SWBT should remove all bridged tap, other than end section, at their own expense, and that a CLEC should only bear the efficient cost of cutting away end section at the customer's serving terminal, a function that could be performed at virtually no cost if an installation visit is charged to the CLEC.

VII. CHARGES PROPOSED BY SWBT FOR BRIDGED TAP REMOVALS ARE EXCESSIVE.

Q. IF THIS COMMISSION WERE TO RULE THAT SWBT MAY CHARGE FOR THE REMOVAL OF BRIDGED TAPS FOR LOOPS, HAS SWBT PROVIDED FOR APPROPRIATE COSTS FOR THIS FUNCTION?

A. No. I still maintain that SWBT's "no charge" bridged tap removal policy for loops less than 12,000 feet should be extended to 18,000 feet and even beyond, but failing that, SWBT's costs are inflated way beyond what is reasonable.

Q. ON WHAT BASIS HAS SWBT PROPOSED WORK TIMES FOR THE DELOADING OF COPPER CABLE PAIRS?

A. Like its position on load coil removals, SWBT has based its proposed rates on the opinions of its alleged experts. Whereas I would expect SWBT to be able to produce hard data based on independent time and motion studies that comport with generally accepted industrial engineering methods, no hard data has been presented in this case. As a result, there is no factual basis for this Commission to consider. I will present my expert opinions on what are reasonably achieved task times; I will break the tasks down into far more discrete tasks than SWBT has presented in its filings, and I am prepared to physically demonstrate to this Commission that my opinions are reasonable, and even conservatively high.

Q. IF BRIDGED TAPS MUST BE REMOVED, WHERE IN THE NETWORK ARE THEY MOST LIKELY TO BE REMOVED, AND HOW MANY LOCATIONS ARE NORMALLY INVOLVED?

A. As I have explained previously, bridged taps should have been eliminated almost 30 years ago, except for limited end section which could be removed from the one pair at the service terminal at time of an installation visit. In addition, bridged tap should not exist in underground feeder cable close to the central office. Therefore, I have assumed that a single case of bridged tap, if it occurs, would occur 50 percent of the time at an aerial location, and 50 percent of the time at a buried location. It is my opinion that the following conservative time estimates can be used by this Commission to estimate the costs involved[17]:

Average Cost for Bridged Tap Removal at One Site		
Step	Task	Cost/Line
1	Remove bridged tap at site, aerial 50% of the time	$0.72
2	Remove bridged tap at site, buried 50% of the time	$0.36
	Total Cost per Line to Deload at 3 Locations	$1.07

[17] The labor rates shown in the following tables are set at $55.00 which I believe are typical for splicing technicians, and include loadings for motor vehicle expense and exempt material.

Aerial Cable Bridged Tap Removal at a Pole		
Step	Description	Task (min.)
1	Travel time to aerial splice location	20
2	Set up work area protection	5
3	Set up ladder or bucket truck	10
4	Open splice case	5
5	Identify PIC pairs for bridged tap removal for 1st 25-pair binder group	2
6	Remove bridging modules or cut & clear pairs for 1st 25-pair group	2
7	Identify PIC pairs for bridged tap removal for 2nd 25-pair binder group	2
8	Remove bridging modules or cut & clear pairs for 2nd 25-pair group	2
9	Clean, reseal, and close splice case	10
10	Secure splice case to strand and clean up work area	10
11	Close down aerial site, stow tools, break down work area protection	10
	Total Minutes	78
	Total Hours	1.30
	No. Technicians	1
	Total Timesheet Hours	1.30
	$/Hr.	$55.00
	Total Cost/50 Pairs	$71.50
	Total Cost/Pair	$1.43

Buried Cable Bridged Tap Removal at a Pedestal		
Step	Description	Task (min.)
1	Travel time to buried splice location	20
2	Set up traffic cone at rear bumper of truck	1
3	Walk to site & open splice pedestal	2
4	Identify PIC pairs for bridged tap removal for 1st 25-pair binder group	2
5	Remove bridging modules or cut & clear pairs for 1st 25-pair group	2
6	Identify PIC pairs for bridged tap removal for 2nd 25-pair binder group	2
7	Remove bridging modules or cut & clear pairs for 2nd 25-pair group	2
8	Secure splice within buried pedestal and clean up work area	3
9	Close down buried site, stow tools and traffic cone	5
	Total Minutes	39
	Total Hours	0.65
	No. Technicians	1
	Total Timesheet Hours	0.65
	$/Hr.	$55.00
	Total Cost/50 Pairs	$35.75
	Total Cost/Pair	$0.72

VIII. CONDITIONING OF LOOPS OF ANY LENGTH TO REMOVE RE[PEATERS SHOULD NOT BE CHARGED TO ANY WHOLESALE OR RETAIL CUSTOMER SEEKING TO OBTAIN A LOOP UNDER THE 8 DB UNE RATE.

Q. WHY WOULD SWBT PLACE A REPEATER ON A COPPER LOOP?

A. All repeaters utilized for telecommunications loops are digital repeaters. SWBT would only place a digital repeater on a loop for advanced services.

Q. CAN A REGULAR POTS LINE WORK WITH A DIGITAL REPEATER ON THE LINE?

A. No. A digital repeater renders a line useless for analog POTS voice grade services, and is effectively a problem on the line.

Q. SHOULD CUSTOMERS REQUESTING A LINE UNDER THE 8 DB UNE LINE RATE HAVE TO PAY FOR REMOVING PROBLEMS ON A LINE THAT IT OUT OF CONFORMANCE WITH GENERALLY ACCEPTED LOOP PERFORMANCE FOR AN 8 DB LINE?

A. No. Such problems should be repaired by SWBT at SWBT's expense.

IX. CHARGES PROPOSED BY SWBT FOR REPEATER REMOVALS ARE EXCESSIVE.

Q. IF THIS COMMISSION WERE TO RULE THAT SWBT MAY CHARGE FOR THE REMOVAL OF REPEATERS FOR LOOPS, HAS SWBT PROVIDED FOR APPROPRIATE COSTS FOR THIS FUNCTION?

A. No. I still maintain that SWBT's "no charge" repeater removal policy for loops less than 12,000 feet should be extended to 18,000 feet and even beyond, but failing that, SWBT's costs are inflated way beyond what is reasonable.

Q. ON WHAT BASIS HAS SWBT PROPOSED WORK TIMES FOR REMOVING REPEATERS FROM COPPER CABLE PAIRS?

A. Like its position on other removals, SWBT has based its proposed rates on the opinions of its alleged experts. Whereas I would expect SWBT to be able to produce hard data based on independent time and motion studies that comport with generally accepted industrial engineering methods, no hard data has been presented in this case. As a result, there is no factual basis for this Commission to consider. I will present my expert opinions on what are reasonably achieved task times; I will break the tasks down into far more discrete tasks than SWBT has presented in its filings, and I am prepared to physically demonstrate to this Commission that my opinions are reasonable, and even conservatively high.

Q. IF REPEATERS MUST BE REMOVED, WHERE IN THE NETWORK ARE THEY MOST LIKELY TO BE REMOVED, AND HOW MANY LOCATIONS ARE NORMALLY INVOLVED?

A. Most digital repeaters are required for longer loops, usually not in underground feeder cable close to the central office. Therefore, I have assumed that a single case of repeater, if it occurs, would occur 50 percent of the time at an aerial location, and 50 percent of the time at a buried location. It is my opinion that the work efforts required for repeater removal are nearly identical to the removal of aerial and buried load coils, and so propose the same analysis and costs as indicated previously in my testimony, except that a single occurrence in aerial or buried plant would be appropriate. Such an analysis would produce the following results[18]:

Average Cost for Load Coil Removals at 3 sites		
Step	Task	Cost/Line
3	Remove Aerial Repeater, 50% of the time	$0.86
3	Remove Buried Repeater, 50% of the time	$0.50
	Total Cost per Line to Deload at 3 Locations	$1.37

18 The labor rates shown in the following tables are set at $55.00 which I believe are typical for splicing technicians, and include loadings for motor vehicle expense and exempt material.

Aerial Cable Remove Repeater at a Pole		
Step	Description	Task (min.)
1	Travel time to aerial splice location from underground splice location	10
2	Set up work area protection	5
3	Set up ladder or bucket truck	10
4	Open splice case	5
5	Identify PIC pairs to be unrepeatered for 1st 25-pair binder group	2
6	Bridge 25-pair binder group for service continuity (if necessary)	5
7	Remove/sever connection from main cable to repeater 'in' & 'out taps.	3
8	Rejoin/splice 25-pair binder group through main cable	5
9	Remove bridging modules from Step 6	2
10	Identify pairs to be unrepeatered for 2nd 25-pair binder group	2
11	Bridge 25-pair binder group for service continuity (if necessary)	5
12	Remove/sever connection from main cable to repeater 'in' & 'out taps.	3
13	Rejoin/splice 25-pair binder group through main cable	5
14	Remove bridging modules from Step 11	2
15	Clean, reseal, and close splice case	10
16	Secure splice case to strand and clean up work area	10
17	Close down aerial site, stow tools, break down work area protection	10
	Total Minutes	94
	Total Hours	1.57
	No. Technicians	1
	Total Timesheet Hours	1.57
	$/Hr.	$55.00
	Total Cost/50 Pairs	$86.17
	Total Cost/Pair	$1.72

Buried Cable Remove Repeater at a Pedestal		
Step	Description	Task (min.)
1	Travel time to buried splice location from underground splice location	10
2	Set up traffic cone at rear bumper of truck	1
3	Walk to site & open splice pedestal	2
5	Identify PIC pairs to be unrepeatered for 1st 25-pair binder group	2
6	Bridge 25-pair binder group for service continuity (if necessary)	5
7	Remove/sever connection from main cable to repeater 'in' & 'out taps.	3
8	Rejoin/splice 25-pair binder group through main cable	5
9	Remove bridging modules from Step 6	2
10	Identify pairs to be unrepeatered for 2nd 25-pair binder group	2
11	Bridge 25-pair binder group for service continuity (if necessary)	5
12	Remove/sever connection from main cable to repeater 'in' & 'out taps.	3
13	Rejoin/splice 25-pair binder group through main cable	5
14	Remove bridging modules from Step 11	2
16	Secure splice within buried pedestal and clean up work area	3
17	Close down buried site, stow tools and traffic cone	5
	Total Minutes	55
	Total Hours	0.92
	No. Technicians	1
	Total Timesheet Hours	0.92
	$/Hr.	$55.00
	Total Cost/50 Pairs	$50.42
	Total Cost/Pair	$1.01

Q. ARE THERE OTHER AREAS WHERE PROPOSED CHARGES ARE IN ERROR?

A. Yes; I have reviewed SWBT's cost studies, and have found that they call for widely different work times for essentially identical functions. There is no appreciable difference, for example, in engineering or drafting times between deloading pairs, removing bridged taps, or removing repeaters. They all require about the same amount of work, yet SWBT has them differing by as much as 50%.

X. CHARGES PROPOSED BY SWBT FOR LOOP QUALIFICATION ARE EXCESSIVE.

Q. WHERE IS LOCAL LOOP MAKEUP INFORMATION KEPT AT SWBT?

A. The critical information that CLECs require, specifically loop length, bridged tap, load coils, and repeaters, have the Operations Support System (OSS) LFACS as the data source[19]. CLECs should have direct, read-only access into that OSS to provide for the most efficient method of obtaining necessary information – just as SWBT uses this OSS information in responding to CLEC loop qualification inquiries. Industry wide, LFACS has been the generally acknowledged repository of this information for the past 12 years or more. As witness Bernard Chao's testimony states, SWBT has been required to provide CLECs access to this data in a mechanized fashion. The appropriate charge for this mechanized interface should be $0.

Q. EVEN IF SWBT WERE ALLOWED TO CHARGE FOR MANUAL LOOP QUALIFICATION, ARE THEIR PROPOSED COSTS REASONABLE?

A. No. As Ms. Murray states in her testimony, the times are too long and the tasks are mis-assigned. I have supervised large engineering clerical forces over many years. I am very familiar with all tasks involved in the engineering office. Under no circumstance would I assign a highly paid engineer to perform and analyze what is known as a "length & gauge" study. That type of work is done by

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[19] See SWBT response to Covad Data Request No. 68.

engineering studies clerks or drafters. In the environment where I worked, if such a task were performed by an engineer, the local union would submit a grievance for management doing craft work. If costs are to be granted, they should be based on the positions taken by Ms. Murray in her testimony -- tasks performed by engineering clerks or drafters, not engineers.

XI. CHARGES PROPOSED BY SWBT FOR CROSS CONNECTS ARE EXCESSIVE.

Q. IN MS. MURRAY'S TESTIMONY, SHE STATES THAT SWBT'S CROSS CONNECTION CHARGES ARE TOO HIGH. DO YOU AGREE?

A. Yes. I have reviewed SWBT's cost studies. From a technical perspective, what is being called a "shielded cross connect" is actually referred to as a "tie cable" by engineers. These are no individual cases of a twisted wire cross connect surrounded with a wire-braid shield that must be attached to a grounding strip. This is a regular 100-pair tie cable with normal termination blocks. The cable itself happens to have a metallic shield around all of the pairs. I am used to that in outside plant. All outside plant copper cable has a shield (we call it a "turnplate") that is under the black polyethylene cable sheath, and surrounds the round bundle of cable pairs. Therefore, a shielded 100 pair tie cable is not a significantly unusual item. Twisted wire cross connects for ADSL service are still plain old twisted wire cross connects that take a couple of minutes to run between points on a distribution frame. This labor effort is already included in order to get dial tone to work on an 8 dB UNE loop. Also, studying the UNE charges, I believe that costs for the minimal work involved should really be reviewed for reasonableness, because I do not believe they capture the nature of running large tie cables, and then later a simple twisted wire cross connect between two points on a distribution frame.

In summary, there is nothing special about a tie cable with a metallic turnplate under the sheath. The pairs inside, their terminations, and their cross connections, are identical to POTS cross connects.

XII. CHARGES PROPOSED BY SWBT FOR ISDN LOOPS ARE EXCESSIVE.

Q. IN MS. MURRAY'S TESTIMONY, SHE STATES THAT SWBT'S ISDN COSTS ARE FAR OUT OF LINE WITH OTHER COMPANIES BECAUSE OF DLC COSTS. DO YOU AGREE?

A. Yes. I have reviewed SWBT's cost studies, and have found that SWBT's costs are flawed primarily because they are based on costs for obsolete technology. The correct forward looking technology for ISDN is fully integrated Digital Loop Carrier operating as Next Generation DLC ("NGDLC") using GR-303 standards. GR-303 compliant DLC's have been available for more than 8 years, and were especially created to overcome problems with ISDN in older DLC units. Older units required BRITE cards at both a central office terminal and at a remote terminal. GR-303 requires cards in only a remote terminal in order to efficiently handle ISDN lines. Older units take up 3 card slots for one ISDN line, thereby cutting a 672 line DLC remote with 4 lines per card slot down to only 56 lines of capacity (168 ea. 4-line card slots ÷ 3 = 56). GR-303 allows 4 lines to a card slot, and grooms all of the data links onto one card in the unit. It's just much more efficient.

Q. DOES THAT CONCLUDE YOUR TESTIMONY AT THIS TIME?

A. Yes, it does. I may, however, submit rebuttal testimony.

VERIFICATION

STATE OF ______NEW YORK______)
) SS:
COUNTY OF ______NASSAU______)

Comes now John C. Donovan, being of lawful age and duly sworn, who states that he is the witness who has provided the foregoing testimony, that he has prepared and read the foregoing testimony, and that the information contained therein is true and accurate to the best of his knowledge and belief.

[signature]

Subscribed and sworn to before me on this 7 day of January, 2000.

[signature]
Notary Public

DIANE GIOIA
Notary Public, State of New York
No. 01GI5066872
Qualified in Nassau County
Commission Expires October 7, 2000

My commission expires:

Attachments

to the

Direct Testimony

of

John C. Donovan

JOHN C. DONOVAN

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Executive Summary

Expert witness in telecommunications for AT&T, MCI WorldCom, the NYNEX Corporation (now Bell Atlantic), and other clients involving fiber optic damage claims, equipment damage claims, a patent infringement law suit, a class action law suit, and cost estimation. Experience in setting major corporate strategy, imaginative and innovative problem solving, in-depth analysis, large scale project management involving engineering, physical construction and Information Services systems development. Expert in fiber optics and electronics. Extensive leadership and technical telecommunications background, especially in outside plant design, construction, maintenance, project implementation, cost estimating, network modeling theory, procurement, and logistics. Experienced lecturer and producer of material for presentations to customers and senior management, and in writing strategic position papers.

Professional Experience

Telecom Visions, Inc. **1996 - Present**
Garden City, New York
President

- *Nationally known expert witness before the FCC and state public utility commissions. Appeared before 19 state jurisdictions[1] on behalf of AT&T, Covad Communications, MCI WorldCom, and Rhythms NetConnections as their Engineering Witness for implementation of the Telecommunications Act of 1996. Providing outside plant local loop expert advice and modeling theory for the HAI Model, a key economic model used by the FCC and various state jurisdictions to determine compliance with the Telecommunications Act of 1996, to set Unbundled Network Element Prices, and to determine the level of the multi-billion dollar Universal Service Fund.*
- *Expert witness for U S Patent Infringement law suits, fiber optic cable damage cases, a telecommunications equipment damage case, a service related class action law suit again a major regional telephone company, and others.*
- *Currently providing telecommunications consulting services involving various organizations and individuals, including telecommunications and data services management in the northeast for a major financial management firm, strategic advice on the effect of local loop competition to an equipment manufacturer, and valuation studies for due diligence, claims settlements, and other purposes .*
- *Provided Marketing Strategy for a large fiber optic multiplexer manufacturer introducing a new line of SONET based products, and worked with a major management consulting firm to provide advice to the government of Portugal.*
- *Manufacturer's representative for automated electronic cross connection devices.*

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[1] *Alabama, Arizona, Colorado, Georgia, Kansas, Louisiana, Maine, Maryland, Massachusetts, Missouri, Nevada, New Jersey, New York, Kansas, New York, Oklahoma, Pennsylvania, Texas, and Washington; advised witnesses and/or prepared testimony for California, Connecticut, Florida, Iowa, Illinois, Kentucky, Minnesota, Mississippi, Montana, North Carolina, North Dakota, New Hampshire, New Mexico, Oregon, Rhode Island, South Carolina, Tennessee, Utah, Vermont, and Wisconsin.*

NYNEX **1994 - 1996**

New York City, New York

General Manager, Plug-In Management.

- *Led a group of 350 people in managing all NYNEX logistics functions for NYNEX's $10 billion investment in electronic printed circuit boards for switching systems and digital carrier systems.*
- *Responsibilities included purchasing, billing verification, warehousing, and repairing all NYNEX printed circuit boards.*
- *Scope of operation included average capital purchases of $1 million in new plug-ins per work day, and managing an expense budget of $30 million per year.*
- *Personally responsible for setting NYNEX's strategic direction in this area through major process re-engineering design. This effort included examining business plans, evaluating goals and objectives, and measuring effectiveness of achieving business plan goals. Efforts determined that major realignment was necessary.*
- *Results included consolidating 3 warehouses into one, 50% expense savings, improving repair intervals from 45 days to 5 days, and developing a multi-million dollar, "state-of-the-art" plug-in tracking system. The plug-in tracking system was a major Information Services development effort requiring large scale project management, definition of requirements, detailed design, and supervision of coding by contract programming companies.*

NYNEX **1991 to 1994**

New York City, New York

Managing Director, Engineering & Construction Methods & Systems.

- *Led a group of 115 managers and 45 contractors in maintaining existing computerized design and support systems for Central Office Engineers, Outside Plant Engineers, and Construction Managers that design and construct NYNEX's $2.4 billion annual capital construction program.*
- *Personally devised new, innovative methods for converting paper outside plant records to digital mapping formats, which reduced conversion costs from $150 million to $30 million. This innovative breakthrough has been the cornerstone of records conversion methods by successful companies such a Lucent and IGS (Information Graphics Systems Inc.).*
- *Devised a new Construction Work Management System*[2] *that mechanized the scheduling and reporting of work (profitability of 41% Rate of Return with a 2 year payback). Project managed a large scale IS development effort involving IS personnel recruited into the organization plus 35 contract IS development personnel from the Oracle Corporation. This multimillion dollar project was successfully completed, and upon completion comprised the second largest distributed platform developed in North America involving mini-computers and PCs.*
- *Supervised the development of all new Methods & Procedures for emerging technologies such as Fiber To The Curb, and for Open Network Architectures such as Signaling System 7 and Co-Location of Competitive Access Providers in telco switching centers.*

NYNEX **1989 - 1991**

Albany, New York

Director of Operations, Engineering & Construction, Northeastern Region, New York

- *Directed the overall operations of 600 employees and contract personnel to plan, engineer and construct pole line, conduit, fiber cable, copper cable, fiber optic multiplexers, and pair gain equipment to provide service throughout the Northeast region of New York State ($75 million annual budget supporting 86 central office switching center areas).*
- *Developed the NYNEX strategy of using a "business case" method for substantiating outside plant infrastructure improvements now used throughout the company.*
- *Created the "All Fiber Feeder" strategy implemented by NYNEX.*
- *Devised and implemented rapid fiber optic deployment to 225 sites in 16 months.*

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[2] *ECRIS – Engineering Construction Records information System.*

- *Served as the Outside Plant Expert Witness for the 1990 Rate Case, providing the successful rebuttal case for the largest New York Public Service Commission Staff recommended disallowance of $110 million.*
- *Headed the Core Support Team handling the Public Service Commission Operational Audit of Outside Plant throughout New York Telephone.*

NYNEX **1989**

Albany, New York

Director, Customer Services Staff, Upstate New York

- *Directed the Upstate Vice President-Customer Services Staff in support of all 3 Upstate New York regions. Disciplines included Personnel & Training, Capital & Expense Budgets, Installation & Repair Operations, Business Offices, Outside Plant Construction & Engineering, and Facilities Assignment Centers.*

NYNEX **1987 - 1989**

New York City, New York

Director of Operations, Engineering & Facilities Assignment Centers, Midtown Manhattan

- *Directed a force of 150 personnel in engineering and assigning the rapid expansion of all local loop facilities in Midtown Manhattan (Approximately $40 Million Annual Budget).*
- *Created NYNEX's strategy for the aggressive deployment of high technology to customer locations to meet competitor initiatives (primarily Teleport).*
- *In an area responsible for 25% of New York Telephone's revenues, rapid deployment of fiber optics to 450 buildings was achieved in less than 2-1/2 years.*
- *Worked with Lucent Technologies to invent the AUA-45 Private Line card used in their SLC-Series 5 Digital Loop Carrier system, saving New York Telephone $10 million.*
- *Made active sales calls to major customers to design private line networks and disaster recovery systems, resulting in $8 - $10 million in new sales revenue.*
- *Number 1 rated district manager in New York City.*

NYNEX Service Company (Corporate Staff) **1986 - 1987**

New York City, New York

Staff Director, Engineering & Construction Methods

- *Formed the first combined New York/New England corporate staff group supporting engineering and construction after divestiture.*
- *Developed strategies and directed the development of Central Office Engineering, Outside Plant Engineering, and Construction for New York and New England Telephone Companies.*
- *Efforts included start-up activities for the new organization, implementation of new Central Office Engineering design systems, trials on Digitized/Mechanized Outside Plant Records in Burlington Vermont, initiating a mechanized planning system for New England Telephone, and expanding the introduction of high technology into the local loop.*

New York Telephone Company **1982 - 1985**

New York City, New York

Staff Manager, Corporate Staff, Outside Plant Engineering Methods

- *Corporate lightguide expert for Outside Plant.*
- *Authored the Manhattan Overlay Strategy for fiber optic deployment to over 650 commercial buildings.*
- *Conceived, supervised and implemented innovative rapid deployment plan for 13,500 fiber mile interoffice trunk project, completed in 5 months.*
- *Corporate Divestiture expert for Outside Plant.*
- *Wrote the post-divestiture Outside Plant Marketing Business Plan.*
- *Assigned all Outside Plant assets, and negotiated all Outside Plant contracts with AT&T Communications.*
- *Corporate evaluator for employee innovative suggestions.*

- *Corporate evaluator for major projects.*

New York Telephone Company **1980 - 1982**
Garden City, New York
Staff Manager, Long Island Area Staff.
- *Directed a staff group of 17 personnel to track, analyze, evaluate, and make recommendations to upper management concerning operational results for an 800 person Engineering, Construction and Facilities Assignment Center organization.*

New York Telephone Company **1974 - 1980**
Garden City, New York
Engineering Manager, Nassau County
- *Directed an operations center of 55 personnel responsible for cable TV coordination, conduit design, pole engineering, highway improvement coordination, securing Rights of Way, claims adjustments, drafting blue prints, and posting outside plant records.*
- *Supervised a Long Range & Current Planning group of 35 engineering personnel responsible for planning, design, project evaluation, and implementation of major feeder and trunk cable.*
- *Prepared and administered a $20 million per year construction program.*
- *Worked as a Long Range and Current Planner, Feeder Cable Design Engineer, Estimate Case Evaluator and Preparer, and Capital Program Administrator.*
- *Developed new budgeting methods, including writing 30-40 computer programs.*
- *Developed the Cost Estimating Program used by NYNEX and incorporated in the former Bell System JMOS Cost Estimating Model.*

New York Telephone Company **1972 - 1974**
Long Island, New York
Field Manager, Cable Maintenance and Construction, Nassau & Suffolk Counties
- *"Hands-on" craft through second level management experience in constructing and repairing outside plant cable, including analysis, locating, repair, dispatch, and cable trouble trend tracking.*
- *Developed several computer programming systems to track and analyze cable troubles.*

United States Army Signal Corps **1966 – 1970**
Germany; Viet Nam; Fayetteville, North Carolina
Captain
- *Airborne, Ranger, Decorated Viet Nam Veteran (Bronze Star Medal + others), Top Secret Clearance.*
- *Germany: Platoon Leader, Company Executive Officer, Battalion Operations Officer, Battalion Executive Officer*
- *Vietnam: Chief of the Communications Branch - Saigon Support Command*
- *Ft. Bragg, North Carolina: Battalion Communications Officer-82nd Airborne Division*

Education

Penn State Graduate School of Business **1988**
University Park, Pennsylvania
Executive Development Program

Purdue University Graduate School of Business **1970 - 1971**
West Lafayette, Indiana
MBA, Marketing & Finance

United States Military Academy **1962 - 1966**
West Point, New York
BS Electrical & Mechanical Engineering

Organizations

New York City Technical College **1987 - 1993**
Brooklyn, New York
Adjunct Professor of Telecommunications, Chairman of the Transmission Laboratory, Member of the Telecommunications Executive Committee, Member of the Board

Shenendehowa School Board **1991**
Clifton Park, New York
Served on the Technology Planning Committee for the local school board

AM/FM International **1993 - 1994**
Boulder, Colorado
Member of Executive Management Board, representing the telecommunications industry for the world's largest organization of digitized mapping and facilities management professionals.

Member of Various Other Organizations:
MENSA High IQ Society, IEEE, Amateur Radio Emergency Services group.

Recent Published Articles

"The Multi-Billion Dollar Outside-Plant Estimate Case", OSP Engineering & Construction Magazine, February 1999 issue, pp. 14-15. See this published article at: http://www.broadband-guide.com/cbl4man/standards/stand0299.html

Recent Testimony

- Before the Georgia Public Service Commission;

Docket No. 10692-U: Re: Generic Proceeding to Establish Long-Term Pricing Policies for Unbundled Network Elements; On behalf of AT&T Communications of the Southern States, Inc.;

Oral Deposition:	June 17, 1999	Prefiled Testimony:	June 30, 1999
Prefiled Rebuttal Testimony:	July 9, 1999	Testimony:	July 13 & 14, 1999

- Before the Massachusetts Department of Telecommunications and Energy;

Docket Nos. 96-73/74, 96-75, 96-80/81, 96-83, and 96-84: Re: Consolidated Petitions for Arbitration of Interconnection Agreements – Dark Fiber; On behalf of AT&T Communications of New England, Inc.;
Testimony: February 17 & 19, 1999

- Before the Maryland Public Service Commission:

Docket No. 8786: Re: Investigation of Non-Recurring Charges for Telecommunications Interconnection Service; On behalf of AT&T Communications of Maryland, Inc. and MCI Telecommunications, Inc.;
Surrebuttal Testimony: January 15, 1999

- 19th Judicial District Court, East Baton Rouge, LA:

Case No. 436582, Division J, Petition for Damages: TCI Cablevision of Georgia, Inc. DBA TCI of Louisiana v. Barber Brothers Contracting, Inc.; Expert Report on behalf of Defendants;
Expert Report: December 30, 1998 Settlement based on Expert Report: February 5, 1999

- Before the Nevada Public Utilities Commission;

Docket No. 98-6005: Re: Filing of Central Telephone Company-Nevada d/b/a Sprint of Nevada's Unbundled Network Element (Unbundled Network Element) Cost Study; On behalf of AT&T Communications of Nevada, Inc.;
Testimony: July 1, 1998 Supplemental Testimony: December 4, 1998

- Before the Nevada Public Utilities Commission;

Docket No. 98-6004: Re: Filing of Nevada Bell Unbundled Network Element (UNE) Cost Study; On behalf of AT&T Communications of Nevada, Inc.;
Testimony: July 1, 1998 Supplemental Testimony: September 3, 1998

- Before the Alabama Public Service Commission;

Docket No. 25980: Re: Implementation of Universal Service Requirements of Section 254 of the Telecommunications Act of 1996; On behalf of AT&T Communications of the South Central States, Inc.;
Testimony: February 26, 1998

- Before the Louisiana Public Service Commission;

Docket U-20883, Subdocket A: In re: Submission of the Louisiana Public Service Commission's Forward-Looking Cost Study to the FCC for Purposes of Calculating Federal Universal Service Support Pursuant to LPSC order No. U-20883 (Subdocket A), dated August 12, 1997; On behalf of AT&T Communications of the South Central States, Inc.;
Oral Deposition: January 21, 1998 Testimony: January 29, 1998

- Before the State of Maine Public Utilities Commission;

Docket No. 97-505: In re: Public Utilities Commission Investigation of Total Element Long-Run Incremental Cost (TELRIC) Studies and Pricing of Unbundled Network Elements; On behalf of AT&T Communications;
Written Testimony: December 22, 1997

- Before the State of New Jersey Board of Public Utilities;

Docket No. TX95120631: In the Matter of the Board's Investigation Regarding Local Exchange Competition for Telecommunications Services; On behalf of AT&T Communications of New Jersey, Inc. and MCI Telecommunications Corp.;
Oral Deposition: October 27, 1997

- Before the Pennsylvania Public Utility Commission;

Docket No. I-00940035: In re: Formal Investigation to Examine and Establish Updated Universal Service Principles and Policies for Telecommunications Services in the Commonwealth; On behalf of AT&T Communications of Pennsylvania, Inc. and MCI Telecommunications Corp.;
Testimony: October 21 & 23, 1997

- Before the Public Utilities Commission of the State of Colorado

Re: The Investigation and Suspension of Tariff Sheets Filed by U S WEST Communications, Inc. with Advise Letter No. 2617, Regarding Tariffs for Interconnection Local Termination, Unbundling, and Resale of Services; On behalf of AT&T of the Mountain States and MCI Telecommunications Corporation;
Oral Deposition: April 9, 1997

- Before the Arizona Corporation Commission;

Docket No. U-2428-96-417: In the Matter of the Petition of AT&T Communications of the Mountain States, Inc. for Arbitration with U S WEST Communications, Inc. of Interconnection Rates, Terms, and Conditions Pursuant to 47 U.S.C. § 252(b) of the Telecommunications Act of 1996; On behalf of AT&T Communications of the Mountain States;
Docket No. U-3175-96-479: In the Matter of the Petition of MCI Metro Access Transmission Services, Inc. for Arbitration of Interconnection Rates, Terms, and Conditions Pursuant to 47 U.S.C. § 252(b) of the Telecommunications Act of 1996; On behalf of MCI Metro Access Transmission Services, Inc.
Testimony: November 20, 1996

- Before the State Office of Administrative Hearings for the Public Utility Commission of Texas, Austin, Texas;

Docket No. 16226: Petition of AT&T Communications of the Southwest, Inc. for Compulsory Arbitration to Establish an Interconnection Agreement Between AT&T and Southwestern Bell Telephone Company; On behalf of AT&T of the Southwest;
Docket No. 16285: Petition of MCI Telecommunications Corporation and Its Affiliate MCIMetro Access Transmission Services, Inc. for Arbitration and Request for Mediation Under the Federal Telecommunications Act of 1996; On behalf of MCI Telecommunications Corporation;
Oral Deposition: August 30, 1996 Testimony: October 2-3, 1996

ATTACHMENT JCD-2

SWBT ENGINEERING PRACTICES

IN RESPONSE TO

COVAD DR-9

NOTE:

ATTACHMENT IS CLASSIFIED AS

PROPRIERARY

Bellcore

Bell Communications Research

Telecommunications Transmission Engineering

Third Edition

Technical Personnel
Bellcore and
Bell Operating Companies

Networks and Services

ATTACHMENT JCD-3.1

cross-connection, or interface, allows any feeder pair to be connected to any distribution pair. This increases flexibility and reduces outside-plant investment and labor costs. Compared to multipled and dedicated plant, interfaced plant provides greater flexibility in the network. The serving area concept, discussed below, uses the interfaced plant design.

Serving Area Concept. Portions of the geographical area of a wire center are divided into discrete serving areas to be administered under the serving area concept [4]. The outside plant within the serving area is the distribution network. It is connected to the feeder network at a single interconnection point, the serving area interface. Figure 3–3, a typical configuration for the serving area concept, illustrates the use of the interface. All pairs at the input and output of the interface are terminated on connecting blocks that provide interconnection between feeder and distribution pairs.

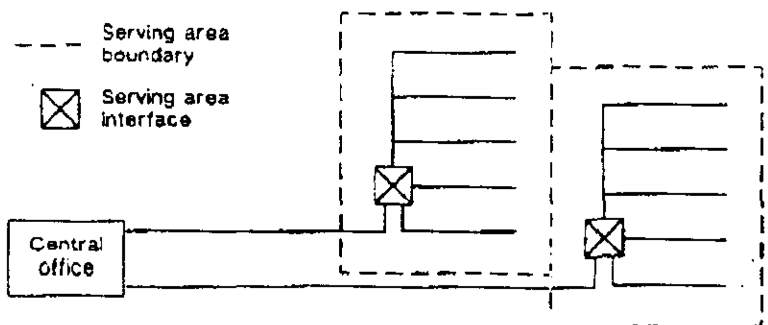


Figure 3–3. The serving area concept.

The concept provides for the expansion of permanent and reassignable services, yet minimizes future rearrangements; it simplifies and reduces engineering and plant records necessary to design, construct, administer, and maintain outside plant; and it reduces and improves maintenance activities in terminals and enclosures. It aids transmission by minimizing bridged taps, a distinct advantage in providing services of bandwidth greater than voice. The serving area concept also accommodates the use of analog or (especially) digital carrier in the feeder plant.

Investment economies are realized by separating the distribution and feeder facilities. For example, distribution facilities may

ATTACHMENT JCD-3.2

Multipled plant design involves splicing two or more distribution pairs to a single feeder pair, as illustrated in Figure 3-2. That is, feeder and distribution plant are combined with no interface between them. This procedure provides flexibility to accommodate future assignments by providing multiple appearances of the same loop pair at several distribution points. In times when multiparty service was common, it accommodated field-bridging of party-line stations, saving feeder pairs at the cost of added field work for rearrangements. However, adding new feeder pairs forced line and station transfers to relieve the distribution cables. Because changing existing plant or adding new facilities is labor intensive and because party-line service continues to shrink, multipled plant design has been largely replaced by other designs.

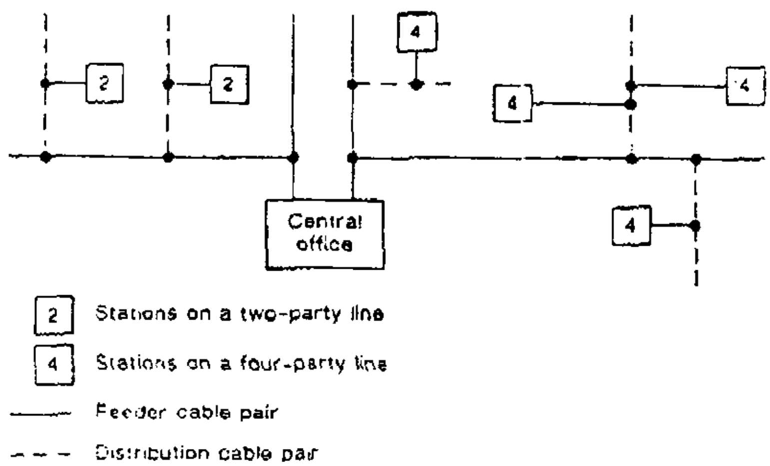


Figure 3-2. Multipled plant design.

Dedicated plant provides a permanently assigned cable pair from the office main distributing frame (MDF) to each customer's NI (excluding multiline business customers). Party-line loops are bridged together at the central office. Dedicated plant largely eliminates expensive transfers of lines and stations, but at the cost of low pair use and relatively little flexibility. For new construction dedicated plant has been superseded by interfaced plant.

Interfaced plant uses a manual cross-connection and demarcation point between feeder and distribution plant. The

ATTACHMENT JCD-3.3

digital or analog carrier systems. Feeder cables provide large numbers of cable pairs, physical or electronically derived, from the office to strategic remote locations called serving area interfaces or simply, interfaces. These are cross-connection points in the network that connect the feeder plant coming from the office to the distribution plant that terminates at the customer's NI. Sections of the feeder plant are augmented on a periodic basis to accommodate growth.

The relief period for wire feeder plant varies between companies, but typically ranges from 4 to 15 years. Local geography and the locations of customers and rights of way determine the placement of feeder routes. Major highways are often paralleled by feeder routes. Many subfeeders or branch feeder routes emanate from the four or five major feeder routes leaving the typical office.

Distribution plant usually consists of smaller cables that connect the feeder plant to the customer's NI. Distribution plant is designed to meet the ultimate requirements for an area (meaning the greatest customer demand expected for the life of the plant being designed). Copper cables of 26 or 24 gauge are the predominant element of the distribution facilities. Rural distribution wire is sometimes used for long distances from cables to individual rural customers. Distribution network design requires more distribution pairs than feeder pairs, so distribution cables are more numerous, but smaller in cross section, than feeder cables.

Multipled, Dedicated, and Interfaced Plant

Design of the loop plant treats loops on an aggregate, instead of an individual, basis, so large cross sections of facilities are designed with similar transmission characteristics. This simplifies distribution network design, especially when multiple gauges of cable are used.

The major distribution network designs currently used by exchange carriers are multipled, dedicated, interfaced (serving area), and carrier serving area (CSA) plant. The CSA concept is designed to accommodate DLC and digital techniques such as ISDN; it is discussed later in the chapter.

ATTACHMENT JCD-3.4

DICTIONARY OF COMMUNICATIONS TECHNOLOGY

Terms, Definitions and Abbreviations
Second Edition

Gilbert Held

4-Degree Consulting
Macon, Georgia, USA

JOHN WILEY & SONS
Chichester · New York · Brisbane · Toronto · Singapore

ATTACHMENT JCD-3.5

breadth of inquiry code Defines the organizational bounds within which information can be made available about a Telemail user.

breadth of posting code Defines the organizational bounds within which a Telemail user may send messages.

breadth of receipt code Defines the organizational bounds from which a Telemail user may receive messages.

break A space (or spacing) condition that exists longer than one character time (typical length is 110 milliseconds). Often used by a receiving terminal to interrupt (break) the sending device's transmission, to request disconnection, or to terminate computer output.

Breakout Box (BOB) (EIA monitor) Digital test equipment that monitors the status of signals on the pins of an RS-232C connector and allows signals to be broken, patched, or cross-connected.

BRI Basic Rate Interface.

bridge 1. The interconnection between two networks using the same communications method, the same kind of transmission medium, and the same addressing structure: also the equipment used in such an interconnection. Bridges function at the data link layer of the OSI model. 2. The connection of one circuit or component to another. 3. An attaching device connected to two rings simultaneously to allow the transfer of information from one ring to the other. Rings joined together by bridges form multiple-ring networks.

bridge clip Clips that electrically interconnect two adjacent terminals for the purpose of providing a multiplying or testing point.

bridge lifter A device that removes, either electrically or physically, bridged telephone pairs.

bridge number In a local area network, the identifier that distinguishes parallel bridges that is, bridges spanning the same two rings.

Bridge Protocol Data Unit (BPDU) Packets periodically transmitted by bridges to determine the state of the network they are attached to. If a loop is encountered, one of the bridges causing the loop will stop transmission on the port causing the loop until it becomes necessary to reevaluate the state of the network.

bridge tap Is made when a technician bridges across the cable pair to bring it into a customer location. If the service is disconnected, the bridge tap may be left in place. Excessive bridge taps on a cable may be the cause of significant attenuation distortion.

bridged ringing A system where ringers on a line are connected across the line.

bridged tap An extra pair of wires connected in shunt to a main cable pair. The extra pair is normally open circuited but may be used at a future time to connect the main pair to a new customer. Short bridged taps do not effect voice frequency signals but can be extremely detrimental to high frequency digital signals.

Bridgemaster A local area network bridge marketed by Applitek Corporation of Wakefield, MA.

Bridgeport A trademark of NCR Comten (now AT&T) as well as the name for a series of token-ring bridges and related peripheral products from that vendor.

Bridge+Fiber A local area network bridge marketed by Raycom Systems, Inc., of Boulder, CO.

British Standards Institution (BSI) The organization responsible for the development of national standards in the United Kingdom.

British Telecom International (BTI) The major full-service international telecommunications provider in the UK.

BRN Business Radio Network.

broadband 1. In general, communications channel having a bandwidth greater than a voice-grade channel and potentially capable of much higher transmission rates; also called wideband. 2. In LAN technology, a system in which multiple channels

ATTACHMENT JCD-3.6

Bellcore

SPECIAL REPORT
SR-2275
ISSUE 3, DECEMBER 1997

Bellcore Notes on the Networks

ATTACHMENT JCD-3.7

12.1.4 Carrier Serving Areas

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 any conditioning or design, are capable of providing conventional voice-grade message service, digital data service up to 64 kbps, 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-gauge cables and 9 kft for 26-gauge cables. These lengths include any bridged-tap that may be present. The maximum allowable bridged-tap is 2.5 kft, with no single bridged-tap longer than 2.0 kft. All CSA loops must be unloaded and should not consist of more than two gauges of cable.

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

In addition to the CSA concept, the LECs also use the Serving Area Concept described above.

12.2 Metallic Loop Conditioning

The transport of digital signals carrying 56 kbps or more bandwidth may require additional design considerations. Restrictions on loss and bridged-tap, removal of build-out capacitors, introduction of echo cancelers and line equalizers, and coordination with other services in the same cable may be required.

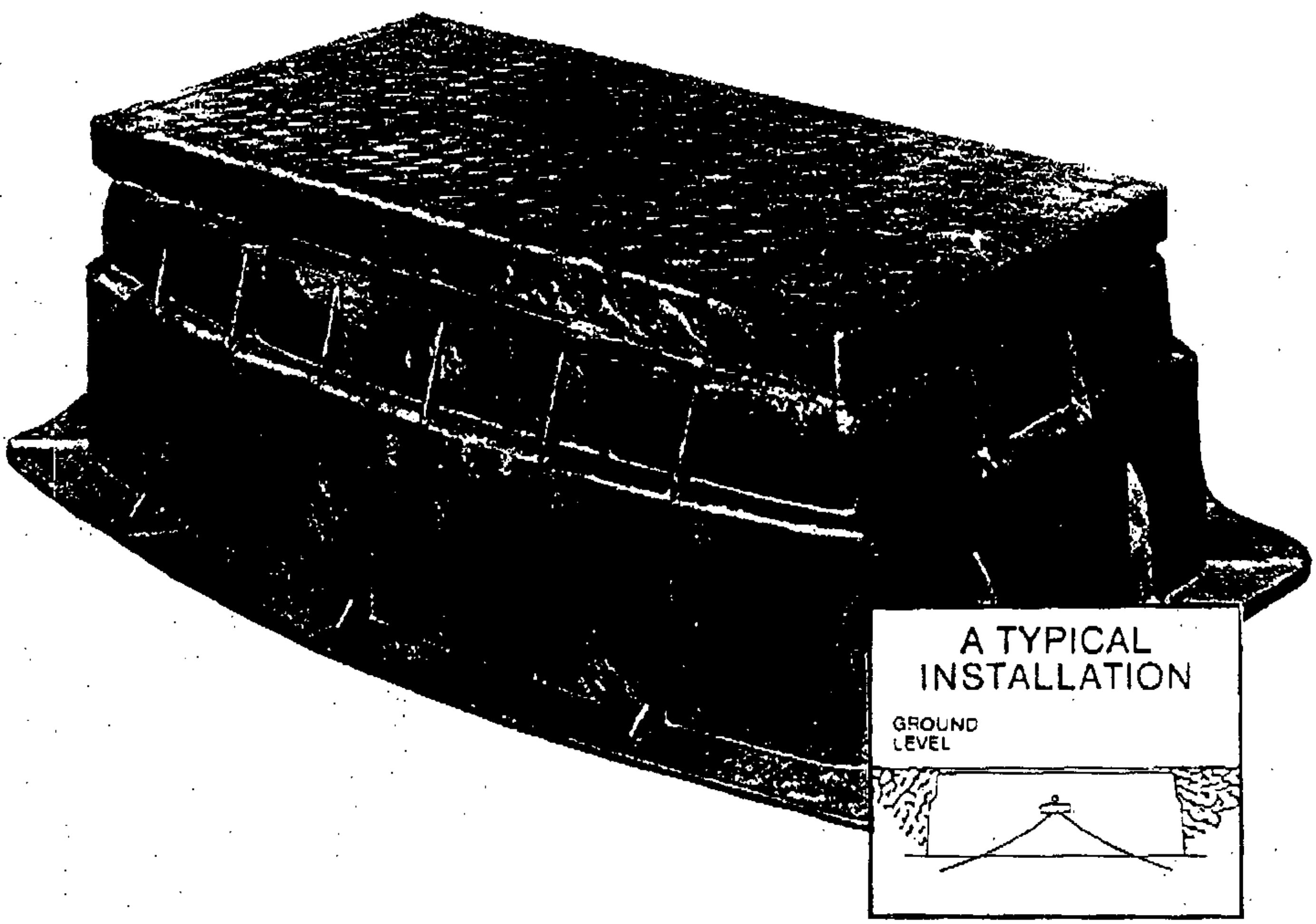
New digital signal-processing techniques, such as those used in the Integrated Services Digital Network (ISDN) Basic Rate Access (BRA) Digital Subscriber Line (DSL), permit the deployment of 160 kbps signals on most nonloaded loops ($\leq 1300\ \Omega$) without any conditioning.

Copper cables are the most widely deployed transmission media today. However, fiber-optic cables are usually the media of choice in the feeder plant for deployment of DLC. Fiber cables in the distribution plant may also be needed to handle the increasing bandwidth required for future services (Section 12.12). Radio transport is also used in selected routes.

ATTACHMENT JCD-3.8

PenCell

Type PE-36HD ● Buried Cable Enclosure ● REA Accepted



- Meets requirements of ELECTRIC, CATV, TELEPHONE and WATER SERVICE.
- Base made of strong, high density polyethylene structural foam.
- All stainless steel hardware, including captive bolt.
- Cover made of high density polyethylene.
- Rigid enclosure and cover weigh only 50 pounds.
- REA accepted.

PenCell PLASTICS, INC.
P.O. Box 309
New Egypt, N.J. 08533-0309
(800) 257-9448 ● (609) 758-3201 ● Fax: (609) 758-7945

ATTACHMENT JCD-3.9

PE-36HD

Grade Level Buried Cable Enclosure

Rectangular shape of this enclosure provides maximum usable working area. The unit is designed to accept the new larger splice enclosures. The unit is molded of a high density polyethylene, which has excellent environmental resistance. Reinforcing ribs are designed into the enclosure to withstand backfill operations. Flange around base prevents frost heaving or tilting. Units can be nested 60% for a minimum amount of warehouse storage space. The cover is secured to the base with a captive hex head bolt on each end. Units are offered in green molded-in color. Service identification (one inch letters) is molded into cover; company name or logo may also be included upon request. Units are shipped six to a pallet for easy handling and storage. Optional, one alnico magnet is supplied in top of enclosure for detection.

Recommendations on the application of our products are based on best available technical data and are offered as a suggestion only. Each user of the material should make his own tests to determine the material's suitability for his own particular use.

To order specify:

PE-36HD enclosure with H.D. polyethylene cover.
Identification (ELECTRIC, CATV, TELEPHONE, WATER).

Standard — (H) Hex Head Bolt

Options — (X) 3/8-16 Penta Head Bolt
— (B) Button Head Bolt.
— (M) One alnico magnet for detection.

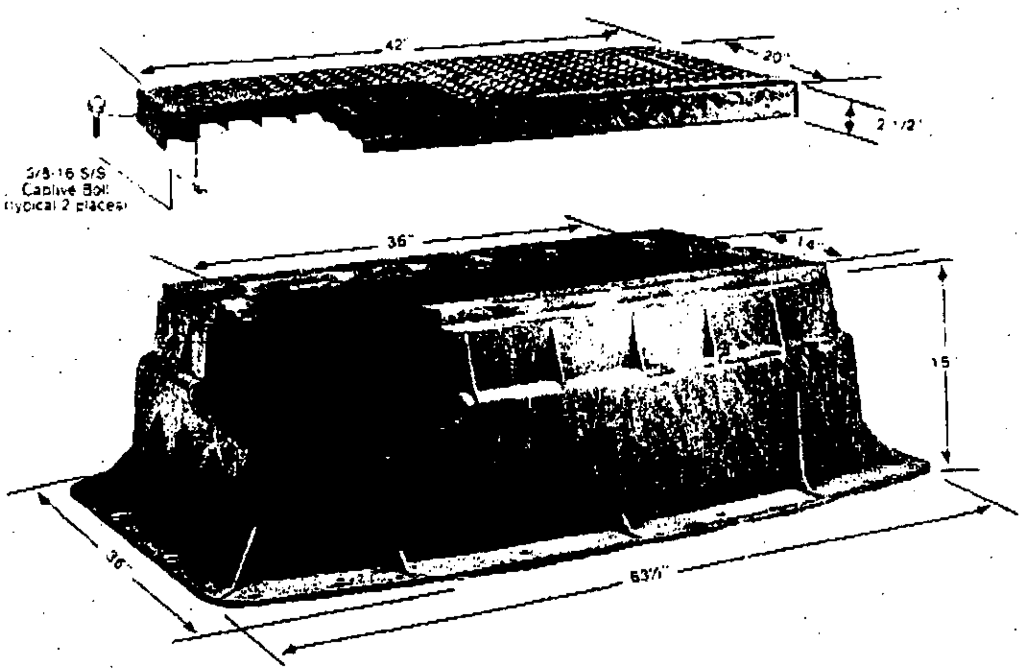
Example: PE-36HDHM
Enclosure with S/S hex head bolts plus one alnico magnet.

Test Results

Vertical Load on 10"x10", center of lid

Load in lbs.	3,000
Deflection	.750

No Breakage



PenCell PLASTICS, INC.
P.O. Box 309
New Egypt, N.J. 08533-0309
(800) 257-9448 • (609) 758-3201 • Fax: (609) 758-7945

ATTACHMENT JCD-3.10

Where form meets function

Instead of complaining that service providers are demanding that more equipment fit inside the same size pedestals, one company came up with an innovative way of doing something about it.

Engineers at Reltec, now Marconi Communications (North Ridgeville, OH), saw that as pedestals were becoming crowded there was not enough room for splice termination, bonding and grounding, and service-wire housekeeping. They also knew that consumers, already unhappy with the unattractiveness of traditional pedestals, wouldn't put up with larger versions of the same. They decided they would have to blend functionality with aesthetics.

Rather than relying on the traditional look of pedestals, the company started with a fresh approach. A professional industrial design firm was commissioned to help the mechanical engineers model the new ProFORM pedestal series to be functional but project a less intrusive presence.

The new ProFORM pedestal series from Marconi Communications has 15% more splicing capacity than corresponding round pedestals.

The industrial designers created the pedestal in a shape Marconi calls "obtangular," a combination of oblong and rectangular. By making the front and rear narrower than the sides, the unit appears much smaller than its actual dimensions.

After tackling the exterior appearance, the engineers began redesigning the internal working space and capacity. Because telecommunications companies may use the equipment in each pedestal to serve as many as eight residences, the ProFORM series incorporates a service-wire channel that accommodates up to 20 5-pair drop-wire cables. According to the company, by optimizing the service-wire, bonding, and termination areas, there is up to 15% more splicing capacity than corresponding round pedestals.

Because they are made of durable plastic, ProFORM pedestals can be used where nonmetallic construction and flood protection are considerations. The pedestals are available in various sizes and can be configured for buried distribution equipment, including splice and splice/fixed-count termination equipment. They are also offered for passive and active cable TV configurations, including taps, tap/directional couplers, line extenders, mini-bridgers, and amplifiers.

The pedestals also offer the capability for 360° access. The manufacturer customized pedestals for GTE to have drop ports on all four sides instead of the usual two. "It gives us the flexibility to come in on the other side if necessary," says Jesse Saenz, standardization manager for GTE Network Services (Irving, TX).

One of the functional features that attracted Saenz to the ProFORM models is that the unit ships in three parts—the base, mounting plate, and dome—and easily snaps together. A drive bar at the bottom pushes the unit into place and holds it down. Water and condensation flow off the unit, keeping the wiring protected.

Anita S. Becker,
associate editor of Integrated Communications Design, another PennWell publication.

ATTACHMENT JCD-3.11

ATTACHMENT JCD-4

REFERENCE LIST OF SWBT RESPONSES TO

COVAD DATA REQUESTS

CITED IN TESTIMONY

DR- 9

DR-23

DR-25

DR-27

DR-28

DR-37

DR-40

DR-68

DR-80