BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Implementation of requirements arising from Federal Communications Commission's triennial UNE review: Local Circuit Switching for Mass Market Customers.	DOCKET NO. 030851-TP

SURREBUTTAL TESTIMONY OF JAMES D. WEBBER

Network and Technology Impairment

On Behalf Of

MCI WORDLCOM COMMUNICATIONS, INC.

AND

MCIMETRO ACCESS TRANSMISSION SERVICES LLC

January 28, 2004

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS FOR THE RECORD.

A. My name is James D. Webber and my business address is: QSI Consulting, 4515 Barr Creek Lane, Naperville, Illinois 60564.

Q. ARE YOU THE SAME JAMES D. WEBBER WHO FILED DIRECT AND REBUTTAL TESTIMONY IN THESE PROCEEDINGS?

A. Yes, I am.

Q. ON WHOSE BEHALF WAS THIS TESTIMONY PREPARED?

A. This testimony was prepared on behalf of MCImetro Access Transmission Services LLC, and MCI WORLDCOM Communications, Inc. (collectively, "MCI").

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. My purpose is to respond to the Rebuttal Testimony of various BellSouth witnesses who address issues pertaining to (A) IDLC based loops, (B) EELs, (C) Automated Distribution Frames, and (D) collocation, with respect to Issues 4 and 5(c).

II. IDLC

Q. MR. AINSWORTH STATES AT PAGE 28 OF HIS REBUTTAL TESTIMONY THAT IDLC BASED LOOPS ARE AVAILABLE TO BE CUT VIA BELLSOUTH'S HOT CUT PROCESSES. DOES THIS STATEMENT ALLEVIATE YOUR CONCERNS WITH RESPECT TO THE AVAILABILITY OF LOOPS SERVED VIA IDLC FACILITIES?

A. No, it does not. Mass market customers are accustomed to provisioning intervals that are much shorter than what BellSouth provides with UNE-L. To make matters worse, BellSouth may require special construction involving delays and the assessment of additional charges. Further as I will discuss below, many customers would experience degraded service quality when they are moved off of IDLC.

Q. HOW DO UNE-P AND UNE-L INSTALLATION INTERVALS COMPARE?

A. BellSouth's loop provisioning intervals are substantially longer than the intervals CLECs currently experience with UNE-P migrations. Individual retail to UNE-L migrations are completed in approximately 3-5 days, while UNE-P migrations are typically completed in a single day.

Q. WILL BELLSOUTH PROVIDE UNBUNDLED LOOPS IN APPROXIMATELY FIVE BUSINESS DAYS UNDER ALL THREE OF ITS HOT CUT PROCESSES?

A. No. The company's bulk hot cut process, for example, requires a minimum installation period of 24 business days (7 days to negotiate, 3 days to complete a bulk request containing negotiated due dates, and a 14 day interval until the first due date is assigned). As stated at page 10 of Mr. Ainsworth's Rebuttal Testimony, due "to the nature of the batch hot cut process, there is negotiation that takes place within BellSouth to establish dues dates for the hot cuts." Neither Mr. Ainsworth nor any of the other BellSouth witnesses explains the reasons why this period is so long.

Q. HAS IT BEEN MCI'S EXPERIENCE THAT BELLSOUTH WILL ALWAYS PROVIDE UNBUNDLED LOOPS IN CIRCUMSTANCES WHERE CUSTOMERS ARE SERVED VIA IDLC FACILITIES?

A. No, it has not. Mr. Ainsworth describes as eight "conversion options" BellSouth allegedly uses to provide CLECs UNE-L loops when the customer is currently served on IDLC facilities. However, BellSouth did not offer any of those alternatives to MCI when it ordered UNE-L loops in Georgia for customers that were being served on IDLC. Moreover, in response to interrogatories, BellSouth could not even identify the number of IDLC based loops that have been provided to CLECs under each of its conversion options, calling into question the extent to which BellSouth's processes and procedures accommodate each of these alternatives.

Q. DO ANY OF BELLSOUTH'S IDLC CONVERSION OPTIONS CALL FOR SPECIAL CONSTRUCTION ACTIVITIES AND THE ASSOCIATED CHARGES?

A. Yes. In response to discovery in these proceedings, BellSouth has admitted that at least two of its conversion options call for special construction and associated charges.

Q. MR. TENNYSON ADDRESSES THE ISSUE OF DEGRADED DIAL-UP SERVICE IN HIS REBUTTAL TESTIMONY. DO YOU HAVE ANY COMMENTS?

A. Yes. First, however, I must note that Mr. Tennyson does not deny that customers whose services are switched from IDLC based loops to loops provided via its alternative methods will experience degraded dial-up modem performance. In fact, BellSouth admits in response to MCI's interrogatories that nearly all of its IDLC conversion options will negatively affect modem performance.

At pages eight through thirteen of his Rebuttal Testimony, Mr. Tennyson attempts to trivialize the impact BellSouth's IDLC conversion options will have on mass market customers who are moved from UNE-P based services to UNE-L based service, or from BellSouth's retail services to UNE-L based services. Among his arguments are the following: (1) the effect on dial-up services is not relevant because voice grade services are not affected; (2) solving degraded dial-up performance issues may be difficult; and (3) DS0 services must not necessarily provide for 64 kbps. Mr. Tennyson's arguments ignore the simple fact that BellSouth's current IDLC conversion options will, in many cases, negatively affect CLEC's ability to compete for mass market customers because they would provide CLECs with loops that are inferior to the loops used in BellSouth's retail operation or by CLECs using UNE-P.

Q. TO WHAT EXTENT DO MASS MARKET CUSTOMERS RELY UPON THE AVAILABILITY AND PERFORMANCE OF DIAL UP ACCESS IN ORDER TO REACH THE INTERNET?

A. Approximately 39% of Florida's residential customers utilize dial-up services in order to access the internet from their homes. Additionally, according to an August 4, 2003 article appearing on the NetworkWoldFusion website, more than 60% of home office users access the internet via dial-up services.[1]

Q. HOW WERE THE RESIDENTIAL FIGURES YOU MENTIONED CALCULATED?

A. According to a recent article appearing on the CyberAtlas website, 74% of all residential internet users use dial-up service. The remaining 26% use cable modems or DSL.[2] According to the U.S. Department of Commerce, National Telecommunications and Information Administration, approximately 53% of the

[1] http://www.nwfusion.com/news/2003/0804v92.html
[2] http://cyberatlas.internet.com/markets/broadband/article/0,,10099_2246061,00.html

residential households in Florida have PCs with internet access in their homes. I multiplied the percentage of residential customers who use dial-up (74%) services by the percentage of Floridian households with internet access (53%) in order to derive the 39% Florida specific figure.[3]

Q. IS IT YOUR POSITION THAT ILECs ARE REQUIRED TO GUARANTEE MODEM PERFORMANCE?

A. No. But Part 51.319(a)(2)(iii) of the FCC's rules does state that ILECs are required to "provide nondiscriminatory access, on an unbundled basis, to an entire hybrid loop capable of voice-grade service (i.e. equivalent to DS0 capacity)" in cases where alternative copper facilities are not provided. It is unclear whether anything less than DS0 capacity is consistent with the FCC's rules.

Q. WHAT IS A DS0 AND WHAT IS ITS CAPACITY?

A. Newton's Telecom Dictionary (19th edition) defines DS0 as follows:

> Digital Signal, Level Zero. DS0 is 64Kbps. As the basic building block of the DS hierarchy, it is equal to one voice conversation digitized under PCM. Twenty-four DS-0s (24x64Kbps) equal one DS-1, which is a T-1, or 1.544 Mbps.

The Voice and Data Communications Handbook (4th Edition) describes DS0 as:

> Eight thousand samples per second, with each sample requiring eight bits, generates a digital stream of data at a rate of 64,000 bits per second. We know this as the *digital signal 0* (DS0), the digitized equivalent of one voice channel. (See Bates, Regis J. "Bud" and Gregory, Donald W. (2001), 4th Edition, McGraw-Hill at p.85).

[3] http://www.ntia.doc.gov/ntiahome/dn/hhs/TableH1.htm

Q. WHAT WOULD BE THE EFFECT OF BELLSOUTH'S IDLC UNBUNDLING ALTERNATIVES ON THE QUALITY OF THE LOOP AVAILABLE TO CLECs?

A. When a V.90 modem is connected to a telecommunications path capable of supporting 64 kbps, data throughput at the end user's computer would be *limited* to about 53 kbps due power and signaling constraints. Observable data throughput rates are more likely to be in the range of 50 kbps. The issue addressed in my Direct Testimony pertains to BellSouth's IDLC unbundling options that involve additional Analog to Digital (A/D) conversions. These additional A/D conversions render the V.90 protocol completely unobtainable. Once an end user's service is moved off an IDLC based loop and placed onto one of these lesser capable loops, modems, which could otherwise benefit from the V.90 protocol, will fall back to the V.34 protocol, which has a maximum throughput of 33.4 kbps. I do not believe the V.34 protocol provides end users with service that is equivalent to the V.90 protocol.

Q. IS IT YOUR UNDERSTANDING THAT BELLSOUTH HAS TESTED IDLC UNBUNDLING TECHNIQUES?

A. Yes. Specifically, Mr. Tennyson's Rebuttal Testimony states that BellSouth has tested the performance and feasibility of the "hairpin," or "side door," IDLC unbundling technique described in my rebuttal. Based on one trial that examined two loops provided under this technique, BellSouth has concluded that the "hairpin," or "side door," technique is ineffective. Moreover, BellSouth appears unwilling to explore other options which would provide for the re-use of IDLC based facilities.

Q. UNDER WHAT CIRCUMSTANCES IS THIS TECHNIQUE APPLICABLE?

A. This form of IDLC unbundling may come into play in any circumstances where IDLC is deployed. The other form of IDLC unbundling described in my Direct Testimony was the use of interface groups. This form of loop unbundling would come into play only where GR-303 compliant IDLC is deployed.

Q. BASED ON MR. TENNYSON'S DESCRIPTION OF THE TEST BELLSOUTH CONDUCTED REGARDING THE VIABILITY OF THIS IDLC UNBUNDLING TECHNIQUE, SHOULD FURTHER TESTING BE FORECLOSED?

A. No. A significant portion of BellSouth's customer base and the CLECs' UNE-P customer base is served via IDLC based loops. It is evident from what has been discussed in this proceeding that "spare" copper facilities will not be available to support a competitive marketplace if that marketplace had to rely on UNE-L. In order to remove impairment, the ILECs must provide a workable solution that allows end-users to maintain a comparable level of service when they switch to UNE-L based facilities. Hence, the implementation of a solution that allows for the re-use of IDLC facilities that does not degrade service is critical.

Q. WHAT DO YOU SUGGEST?

A. BellSouth's test was performed on only two lines that were working in "Mode II" (*i.e.*, with concentration). A test on IDLC based lines operating without concentration is warranted. Testing another vendor's IDLC equipment also may be worth considering. Additionally, testing IDLC equipment terminating on switches other than the Nortel DMS 100 may yield different results for BellSouth and should be explored. Indeed, the FCC's *TRO* stated that other ILECs have successfully provided digital access to unbundled loops over IDLC based facilities using the hairpin technique. To the extent that IDLC based end-user loops will be unbundled on a going-forward basis in order that CLECs can serve the mass market, all reasonable alternatives should be explored.

Q. AT PAGES EIGHT AND NINE OF HIS REBUTTAL TESTIMONY, MR. TENNYSON STATES THAT UNBUNDLING NEXT GENERATION DIGITAL LOOP CARRIERS BY EMPLOYING GR-303 INTERFACE GROUPS IS IMPRACTICAL. PLEASE COMMENT.

A. My Direct Testimony described the use of GR-303 interface groups consistent with Telcordias's *Notes on the Network.* I am not aware of anything that demonstrates this unbundling technique is not feasible and I believe it should be considered as a potential solution to address IDLC unbundling related issues. It appears BellSouth's primary objections to the use of this technique are that GR-303 compliant IDLC comprise a relatively small percentage of BellSouth's network and that CLECs would be required to accept a DS1 hand-off. Thousands of customers receive services over such facilities and may be affected if their loops are moved from BellSouth retail services to UNE-L or from UNE-P to UNE-L. From MCI's perspective, a DS1 hand-off is preferable particularly when considering the alternative – degraded end-user services.

Q. PLEASE SUMMARIZE YOUR POSITION WITH RESPECT TO IDLC BASED LOOPS.

A. Based on BellSouth's provisioning intervals and its IDLC conversion methods, it is clear that if CLECs are restricted to UNE-L, their ability to provide services to customers who are served via IDLC based loops will be diminished when compared to their abilities when they are able to utilize ULS to access end-users. Provisioning delays and degraded service quality would hamper CLECs ability to compete for mass market customers if not corrected.

III. DS0 EELS AND HOT CUTS TO EELS

Q. MR. VARNER IMPLIES THAT DS0 EELS ARE CURRENTLY A VIABLE SOLUTION TO ADDRESS THE MASS MARKET. DO YOU HAVE ANY COMMENT?

A. Mr. Varner's testimony notes that the majority of the EELs BellSouth has provided in Florida are comprised of *DS1 loops* and then states that the company has some unspecified experience with DS0 based services, without providing any real data. While Mr. Varner implies that DS0 EELs are, or will be, available in a manner that allows CLECs to support mass market customers, his statement does not provide the information CLECs need to actually begin to utilize this method for providing service to their customers. Indeed, the facts demonstrate that DS0 EELs are not currently provided to CLECs in any significant volume and it is entirely unclear if, or when, CLECs will be able to utilize EELs in order to support the mass market. BellSouth's January 5, 2004 response to MCI's Second Set of Interrogatories (No. 217) states that there are only 18 EELs comprised of DS0 loops in the whole of BellSouth's territory in Florida.

Q. PLEASE DISCUSS THE EXTENT TO WHICH BELLSOUTH'S HOT CUT PROCESSES CAN BE USED WITH EELS TO CONVERT UNE-P LINES TO UNE-L.

A. At page 12 of his Rebuttal Testimony, Mr. Ainsworth confirms that BellSouth's batch hot cut process does not include cuts to EELs, stating that "BellSouth's product team is *developing an ordering process for UNE-P to EEL*" and that "if any CLEC actually ordered this, prior to mechanization, BellSouth will *develop a manual workaround.*" (Emphasis added). At this point, CLECs know very little about the "process" that BellSouth is "developing," when the process will be implemented, whether it will be mechanized, and the extent to which the process will be timely, seamless, and cost effective. Based on Version 12 of BellSouth's *Unbundled Dedicated Transport – Ordinarily Combined UNE Combinations CLEC Information Package, dated August 5, 2003,* it would appear that the ordering process may be manual whereas the UNE-P migration process is mechanized. It also appears that the process requires that multiple orders be placed to provision a single customer onto a DS0 EEL facility and that more information will be required to place such an order than would be required to place an order for UNE-P based services. Clearly, more detailed information should be provided in this regard.

At this point, however, and until the process to which Mr. Ainsworth alludes is implemented and tested, CLECs cannot fully ascertain the extent to which they will be able to utilize EELs to support the mass market. Early indications are that the processes will not be timely, seamless or cost effective.

IV. ADF

Q. MR. TENNYSON ADDRESSES ISSUES PERTAINING TO AUTOMATED DISTRIBUTION FRAMES IN HIS REBUTTAL TESTIMONY. DO YOU HAVE ANY COMMENTS?

A. My understanding is that Mr. Tennyson has concluded ADF technologies are not currently feasible either due to size or economic constraints. MCI has not recommended any one particular technology be implemented as a pre-condition to a finding of "no impairment." However, I understand that ADFs are being integrated into other carriers' networks including, for example, Verizon's network in New York and that those carriers intend to use those automated distribution frames to provide Hot Cuts. Such a deployment strategy may well be fruitful here.[4] Attached to this testimony as Exhibit JDW 12 is a whitepaper from NHC, an ADF technology vendor, describing the technology and its applications.

Based on these facts, it would seem unreasonable to completely dismiss the possibility that ADF technology can, or should, be used in the future to perform hot cuts on an automated basis.

V. COLLOCATION AND TRANSPORT

Q. MR. GRAY'S REBUTTAL TESTIMONY DENIES THE POSSIBILITY THAT ACCESS TO COLLOCATION SPACE AND FACILITIES COULD GIVE RISE TO IMPAIRMENT. DO YOU HAVE ANY COMMENTS?

A. Yes. Mr. Gray argues that BellSouth's performance with respect to collocation has been very good over the recent past and that the company is required to "provide collocation space to CLECs in accordance with Commission-ordered provisioning intervals or pay SEEMs penalties." This may or may not be true for the current competitive environment. However, Mr. Gray's argument is not germane to the issue at hand. If all impediments to UNE-L competition were removed and all CLEC demand for loops had to be supported through collocation and EELs, demand for collocation could increase dramatically. For example, the Hollywood – Pembroke Pine CO (HLWDFLPE) has approximately 27,300 UNE-P lines served by 54 CLEC carriers. And there are 19 companies collocated in

[4] Before the State of New York, Public Service Commission, *Proceeding on Motion of the Commission to Examine the Process, and Related Costs of Performing Loop Migrations on a More Streamlined (e.g., Bulk) Basis*, Case No. 02-C-1425, Public Transcript (pages 290-293), Testimony of Michael A. Nawrocki, On Behalf of Verizon New York, Inc.

that CO. Assuming UNE-P were supplanted by UNE-L, collocation may be requested by as many as 35 additional carriers. To the extent BellSouth, CLECs and collocation vendors are unable to meet demand of this nature on a timely basis, some CLECs may be impaired as a result of issues stemming from collocation whether it be in the Hollywood – Pembroke Pine CO or others like it.

Q. IS YOUR ORIGINAL RECOMMENDATION REASONABLE IN LIGHT OF THE POTENTIAL THAT COLLOCATION MAY GIVE RISE TO IMPAIRMENT AS SOME POINT?

A. Absolutely. In fact, I recommended that the Commission take action *if* collocation gives rise to impairment and not before that point. Hence, Mr. Gray's concerns are unfounded.

Q. DOES THIS CONCLUDE YOUR SUPPLEMENTAL REBUTTAL TESTIMONY?

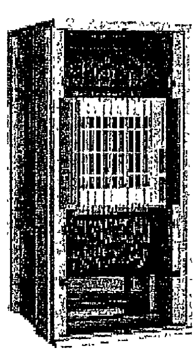
A. Yes, it does.

White Paper on MDF Management

ControlPoint™

MDF/IDF Line Management
in an ILEC Central Office or Remote Environment

February 2001



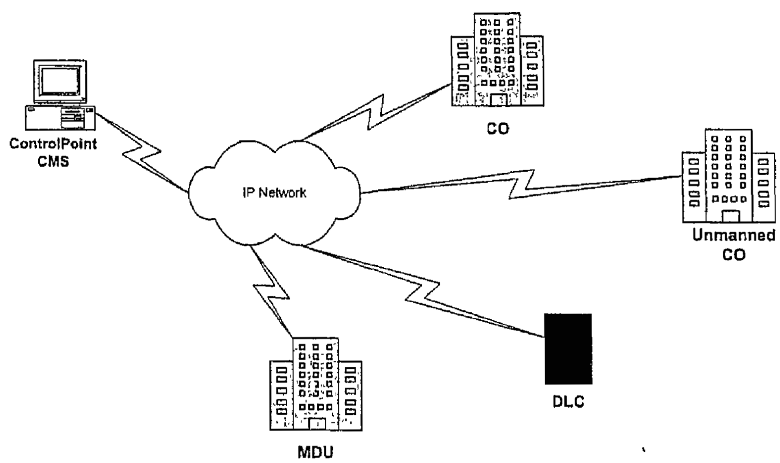
Introduction

The deregulation of telecommunications services and recent FCC rulings has changed the dynamics of the local loop. Collocation is an everyday reality in most central offices and potentially in many remotes. Connection management, as customers migrate between providers, is challenging and presents a "service strain" to the service provider. "Line sharing" rulings are expected to accelerate demand and pose new line-qualification challenges to the ILEC.

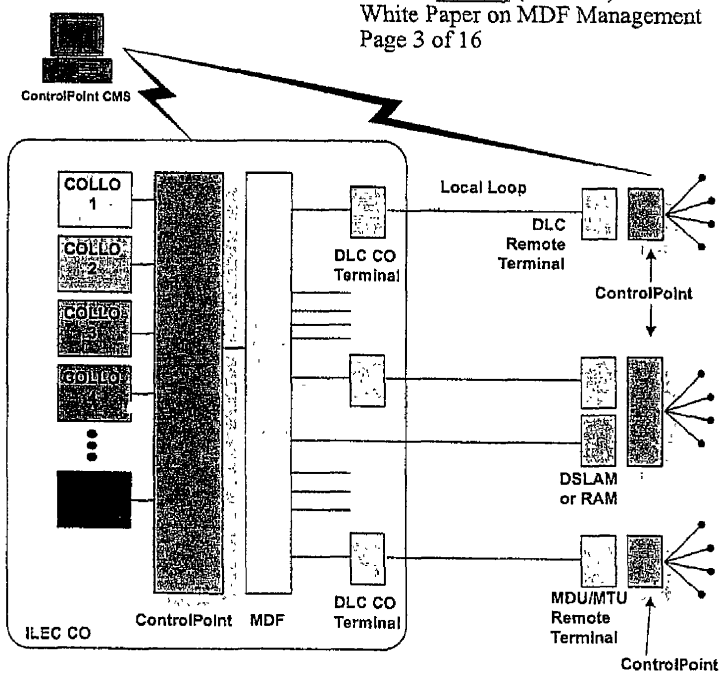
The dramatic increase in competition for the local loop increased the level of activity centering on connection, maintenance, and management of copper wire and wireline services. Given these high levels of activity in the loop, the traditional labor-intensive manual approach to cross-connect management is no longer viable via manual labor and processes. "Truck rolls" are too slow and expensive to be effective in today's competitive industry. The obvious answer: automate the provisioning process and provide intelligent wireline management at the physical layer.

NHC's innovative ControlPoint Cross-Connect System replaces labor intensive wiring, reducing operating costs and maintenance, improving service delivery cycles. ControlPoint dramatically reduces labor, space, and time of service versus conventional MDF/IDF and OSP distribution frames that require on-site wiring by experienced technicians. The NHC solution provides the ILEC with complete control over the entire service deployment cycle, and ensures quality of service (QoS) via fallback switching. ControlPoint works with all copper based services including POTS, ISDN, T1, xDSL and other voice and data protocols. The ControlPoint Cross-Connect Systems is deployable in:

- Manned central offices (CO).
- Small unmanned COs under 5,000 lines.
- Remote Terminal Cabinets housing Digital Loop Carriers (DLC).
- Multi-Dwelling and Multi-Tenant Units (MDU/MTU)
- OSP Feeder/Distribution Cross-Connect Frames



NHC's ControlPoint solution addresses the problem of automating the basic cross-connect function of provisioning, test access, service migration and fallback switching, in each of these locations. The purpose of this document is to show how NHC's ControlPoint Cross-Connect System can help the ILEC manage its MDFs more effectively.



The MDF marks the point at which the local loop meets the Telco's access service equipment. The myriad of connections that need to be made and remade due to new deployment and churn, are putting greater manpower pressures on the ILEC. Compounded by the fact that the ILEC must manage not only its own telecom lines but also the lines feeding to multiple co-locations (COLLOs), the ILEC is forced to look for new ways to automate some of the service provisioning and migration task.

The problem with subscriber churn is prompting ILEC's to seriously look at new technologies to control MDF management costs and improve quality of service (QoS). The following quotation from Telecommunications Magazine provides a idea of the scope of the problem.

"…. the average U.S. churn rate now hovers around 40 percent for most providers, with customer acquisition costs at about $400 per subscriber."….

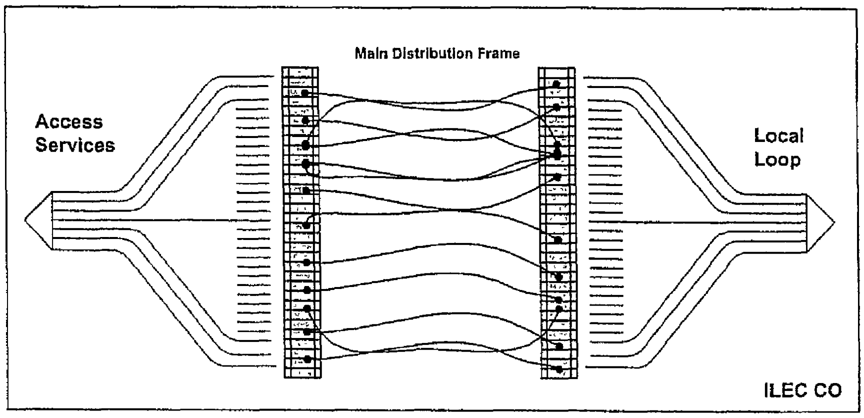
"But Europe also leads its New World counterparts in less positive statistical measurements. Subscriber churn in many markets now exceeds 3 percent a month, rising to near-disastrous rates of 35 percent to 50 percent on an annual basis. The expense of acquiring new European customers, which can cost up to $700 each, makes these high churn rates even more painful."…..

"Churn now costs European and U.S. telcos close to $4 billion each year, and the global cost of customer defection may well approach a staggering $10 billion."

Source: Telecommunications Magazine, February 1999, Jean Schmitt, chief executive officer of SLP InfoWare, a provider of churn-management and customer-retention software applications.

Services To Be Managed at the MDF

The MDF is the point of cross-connection for a wide array of telecom and datacom services. The type of services that require cross-connect management include POTS, ISDN, Centrex, T1, SDSL, ADSL, HDSL, HDSL2, TIE lines and dry copper pairs originating from residential and business users, MTU/MDU, Digital Loop Carrier (DLC) remote terminals and other CPE equipment. These lines terminate on the Main Distribution Frame and are then cross-connected to various equipment such as Class 5 switches, multiplexers, digital access cross-connects (DACs), DLC CO terminals, add/drop multiplexers, routers, POTS splitters and DSLAMs. The MDF provides the facility by which each copper subscriber pair gets connected to the correct carrier and service.



Manual Reconnection Work

Currently each connection requires a frame technician to manually re-terminate a patch cable between the subscriber line and the access equipment. A large taskforce is often reserved only for this task. In some unmanned COs, a technician must be sent on site every time a re-connection is required. As the number of COLLOs grows, the rate of churn increases, putting more pressure on the ILECs to connect and re-connect subscribers to high-speed services. ILECs are being forced to increase their manpower simply to move connections at the MDF. Consequently, they are searching for ways to offset this cost by automating some of the work. The type of connections being performed at the MDF include:

- Connecting the local user to a new access service.
- Migrating a subscriber to a new service.
- Re-connecting a subscriber from a faulty line card to a spare.
- Connecting subscriber lines to COLLO distribution frames.
- Connecting test equipment to the local loop.

Which Lines to Automate First

While the objective is to use ControlPoint to manage the entire MDF, from a logistics point of view it may be necessary to proceed in phases, beginning with the lines that have the highest churn rate.

Therefore the main problem facing the ILEC in deploying an automated MDF is identifying which lines and services to automate first. The main criteria in determining this is the rate of subscriber churn.

T1 or DSL subscriber loops that migrate several times per year present a higher priority to the ILEC in terms of managing them through ControlPoint. POTS lines on the other hand in general have a lower churn rate and therefore may not seem be immediate candidates for ControlPoint. However, the ILEC could elect to terminate large blocks of POTS lines immediately onto to ControlPoint in anticipation that they will migrate to higher speed services.

Therefore, the first task of the ILEC is to rank its local loop segments, services and carriers by "churn rate" and to assess whether any POTS loops should be pre-terminated onto an automated cross-connect for future service migration. Churn is usually measured as the percentage of lines that are moved or disconnected each month. This exercise provides an indication of where to focus efforts in automating the MDF.

As an illustration, the following table shows how this ranking might look for a particular CO. In the example, if the Sector D portion of the local loop is a prime candidate for migration to highspeed service (ie; because of its location, etc), then it could be pre-terminated earlier than other sectors that do not have this expectation for service migration.

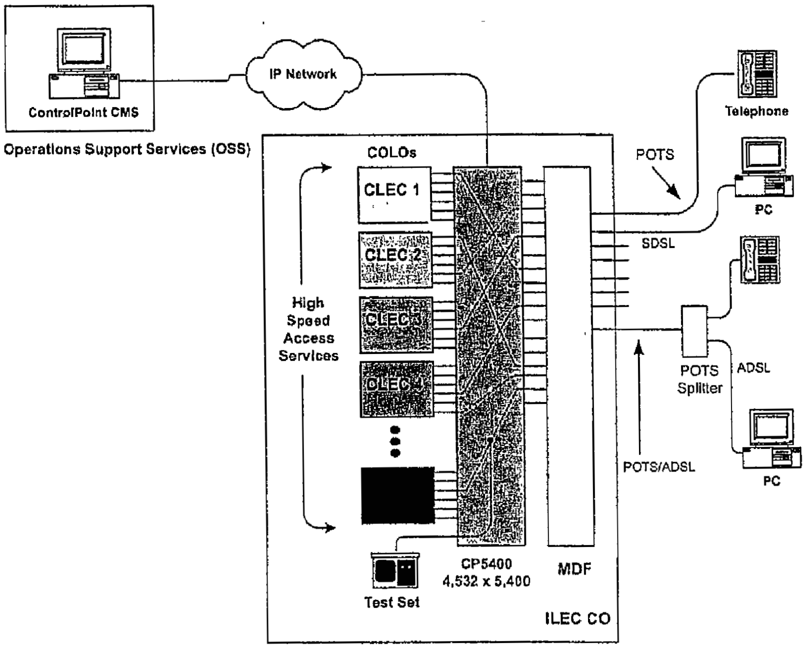
CO A - Monthly Churn Rates					
Carrier	% churn	Service	% churn	Local Loop	% churn
CLEC C	3%	T1	2.5%	Sector B	2.0%
CLEC B	2.5%	ADSL	2.0%	Sector A	1.9%
CLEC D	2%	HDSL	1.5%	Sector C	1.8%
CLEC E	1.3%	Centrex	1.0%	Sector D*	1.3%
ISP A	1.2%	POTS	.6%		
ILEC	1.0%				

*anticipate shift to DSL

From the above table, one approach would be for the ILEC to prioritize lines and services with churn rates of 2% per month or higher. Thus, CLEC C, B, E and services T1, ADSL and local loop sector B would be connected to ControlPoint first.

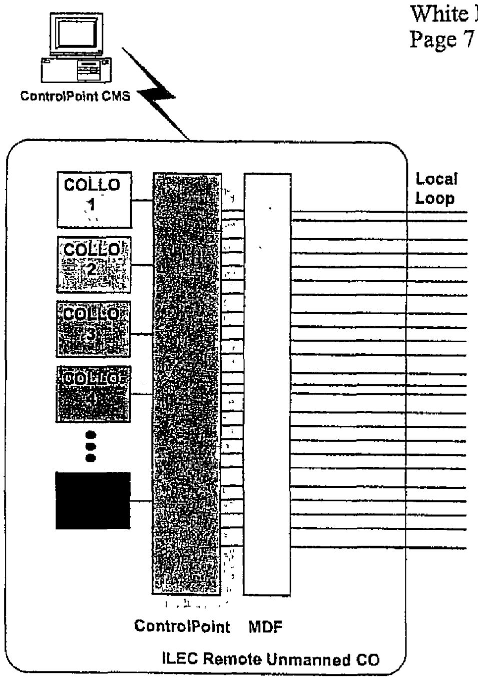
Managing High Speed Data Lines

In determining which part of a CO's MDF operation to automate first, the ILEC may choose to prioritize service connections that exhibit the highest overall churn rate, such as high speed data lines. These services would include T1, SDSL, ADSL, G.Lite, HDSL and HDSL2 among others. These services may be terminated on ILEC equipment or on CLEC distribution frames and may originate from multiple COLLOs or from the ILEC's own equipment. The following diagram shows how NHC's ControlPoint 5400 Crossconnect Switch (CP-5400) could handle the cross-connect function between multiple high-speed services.



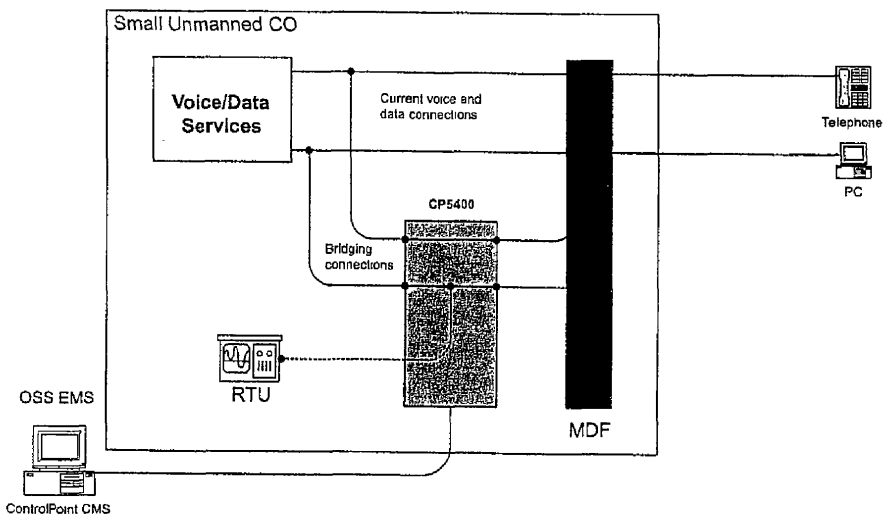
Small Unmanned COs Under 5,000 Lines

One of the ILEC's major problems is how to manage the numerous small unmanned COs in its territory. Large enough to require a facility-based MDF but not large enough to require a full-time on-site frame technician, these unmanned COs are often located far from the main CO and support under 5,000 lines, mainly simple dial tone offices with little or no COLLO. Consequently whenever a re-connection is needed, a technician has to travel significant distances to make a simple re-connection. Using ControlPoint, the ILEC could manage these MDFs remotely without having to send a frame technician on-site.

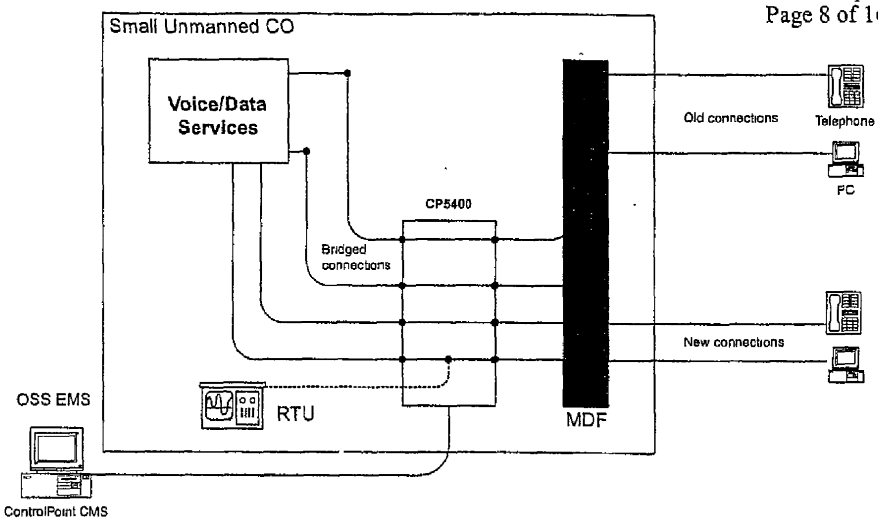


The cut-over would take place by first bridging the ControlPoint 5400 to the existing MDF. Once testing is completed and the CP5400 has been put into service, the MDF would be removed. New lines would be terminated directly onto the CP5400. The following diagrams show the cutover process.

The first stage would be to attach bridging adapters between existing voice/data services and the CP5400. An RTU connected to ControlPoint could be used to verify the lines before final cutover.

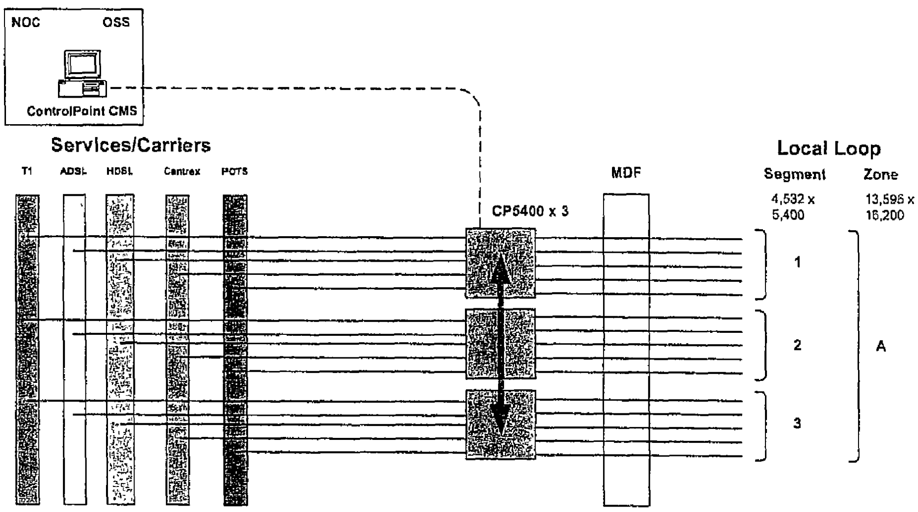


Once testing is complete the connections would be switched over to ControlPoint. The old connections would be removed. Subsequent connections would be managed exclusively via ControlPoint and all new services would be terminated directly onto ControlPoint, bypassing the conventional MDF.

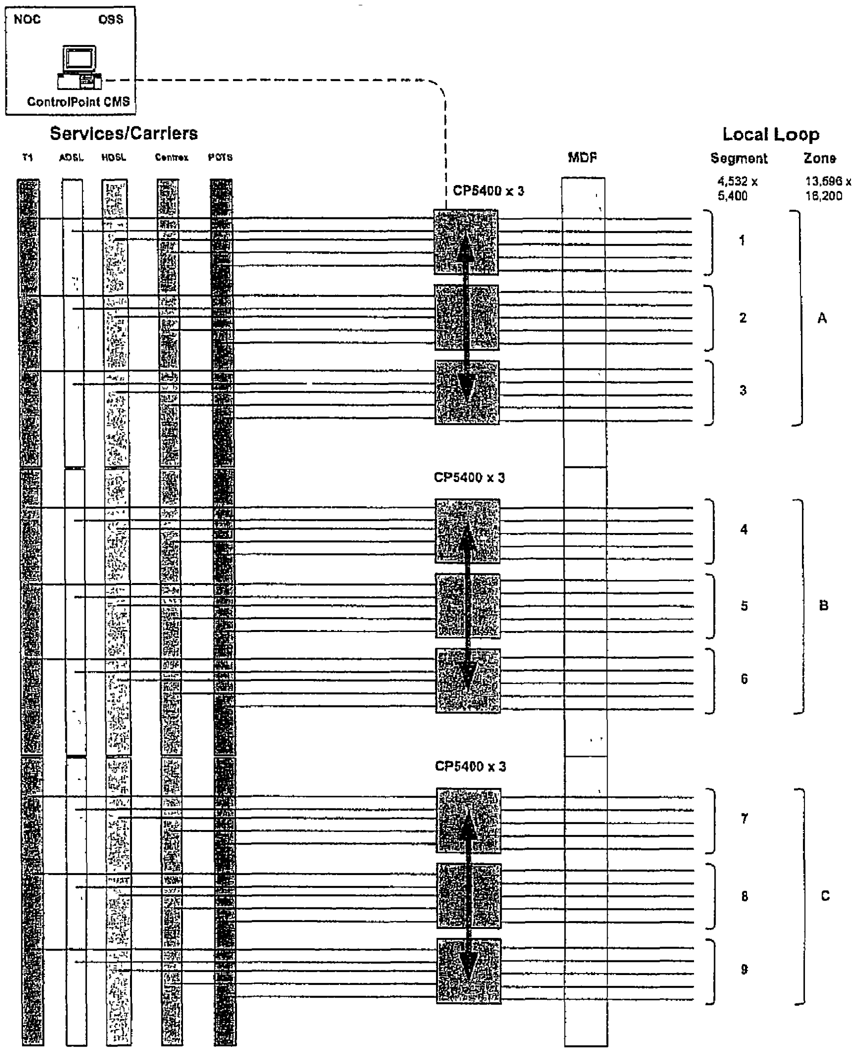


Managing an MDF of 50,000 lines

The management of larger MDFs would follow a process similar to an unmanned CO. The difference would be that in smaller COs, a single CP5400 (4532x5400) would be sufficient to handle all terminated lines and service access ports. On the other hand, in the larger COs where the number of lines exceeds the capacity of the CP5400, it would be necessary to partition the MDF into "zones" so that service access ports are available to any subscriber loop that is terminated onto any ControlPoint switch. Thus subscriber lines could be connected to any service regardless of which cross-connect switch they are connected to. The allocation of access ports to each switch would depend on the local loop subscriber profile of the CO. In the diagram below each ControlPoint is connected to a group of local loop pairs constituting a "segment".



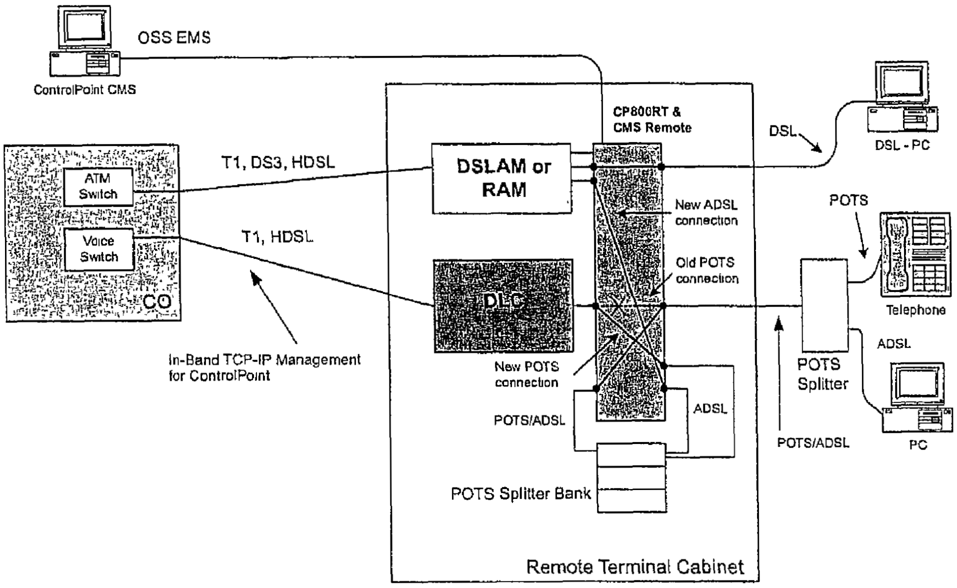
In order to handle matrices larger than 5,000, the CP5400 has the capability of being able to be cascaded to another CP5400 in order to create a larger, "any-to-any" blocking matrix. Fo: example three CP5400s can be cascaded to form a matrix of 13,596 x 16,200, of which 950 lines may be connected anywhere within a zone. These 16,200 lines would constitute an MDF "zone". Once these 950 lines are used up, the matrix is blocked and the cross-connect switch may need to be "reset" to free up some of these 950 cross-connect points. These 950 lines are basically to handle the disproportionate distribution of services versus subscribers. For example, if a subscriber needs access to a T1 line and there are no more allocated to the switch that he is connected to, then it would be possible to connect him to a different switch within the same zone. The following diagram illustrates the zoned approach.



Using a zoned approach, MDFs of even greater size could be managed in a similar way. The main problem is how to allocate subscribers and services to each MDF so that most cross-connections are handled within a given zone. This should be determined by gathering data about what the service profile is for each segment of the MDF. This information helps to determine how many service ports of each service class to allocate to each CP5400.

Remote Outside Plant Application - RT and MDU/MTU

The outside plant is another area in which ControlPoint could be used for local loop management. This includes Remote Terminals and MDU/MTUs. The Outside Plant Serving Area Cross-connects (SAC) contain DLC equipment that is traditionally used only for voice. Today, the RT's are being expanded to support highspeed data service and additional equipment such as DSLAMs, Remote Access Multiplexers (RAMs) RTUs, and POTS splitters are being installed. Tasks such as line qualification, service migration and fallback switching could be handled remotely with ControlPoint, eliminating the need to send a trained field service technician to the RT.



DEDICATED COPPER LINE

The ControlPoint switch would sit between the DLC/DSLAM and the termination frame. All local loops, DSLAM ports, DLC ports and POTS splitter ports would be pre-terminated on the switch. In the case where the CLEC owns the DSLAM, it would issue a request to the ILEC to provision a new copper pair to its DSLAM. The ILEC ControlPoint Operator could connect a remote test unit to the line via ControlPoint to qualify the line for highspeed data. Once the line was qualified, the ILEC could hand off the connection to the collocated DSLAM via ControlPoint. Depending on the number of lines to be managed, the appropriate size ControlPoint switch would be deployed; from the CP800RT (800 lines) up to the CP5400 (5400 lines).

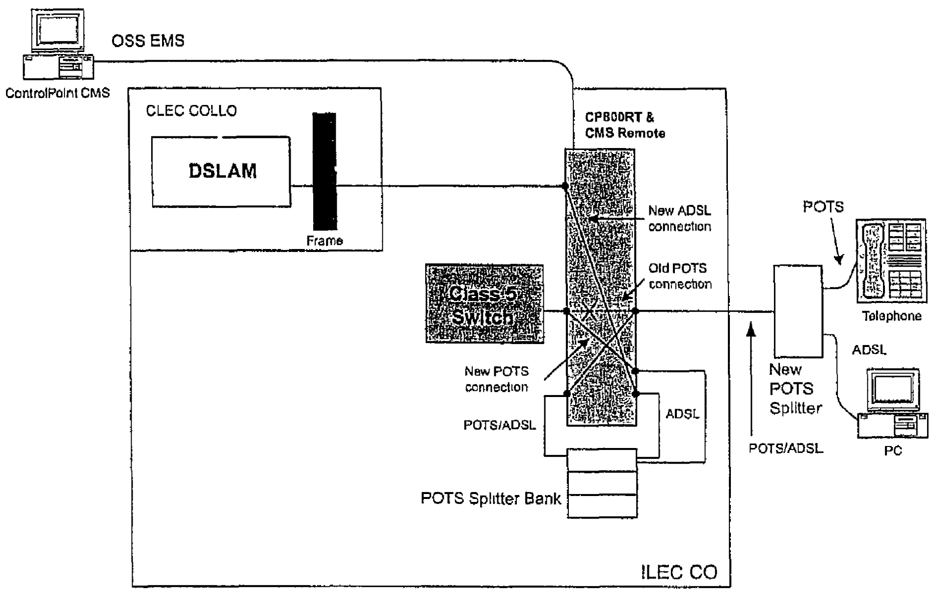
SHARED-LINE

In the case where the line is to be shared, the CLEC would install a POTS/DSL splitter at the CP. The ILEC would switch the CP's POTS service over to a POTS/DSL splitter located in the RT. The CP800RT would remotely make the necessary connection between the splitter, DLC and the local loop. Once the CLEC was ready, the ILEC would cut-over the data portion of the splitter to the CLEC's DSLAM or RAM. Pre-qualification could be handled by the ILEC in the same way as an unshared line, depending on the COLLO agreement.

Shared-Line Environment

In an unshared line environment there are dedicated copper pairs for POTS service and separate dedicated pairs for data. Mass deployment of ADSL has led to further FCC deregulation whereby the ILEC must allow a CLEC to share the ILEC's existing POTS lines in order that the CLEC can provide high-speed data service to the subscriber. This means that the ILEC (or CLEC) must install POTS/ADSL splitters that allow the data portion of the line to be handed off to a CLEC (or to the ILEC's own DSLAM) and the POTS service to be connected to the ILEC's Class 5 voice switch.

If the splitters are installed in the ILEC's wiring area, then connections to and from the splitter would need to be managed by ControlPoint in order to automate the cut-over from POTS-only service to POTS/ADSL service. The following diagram shows how this cut-over would take place.



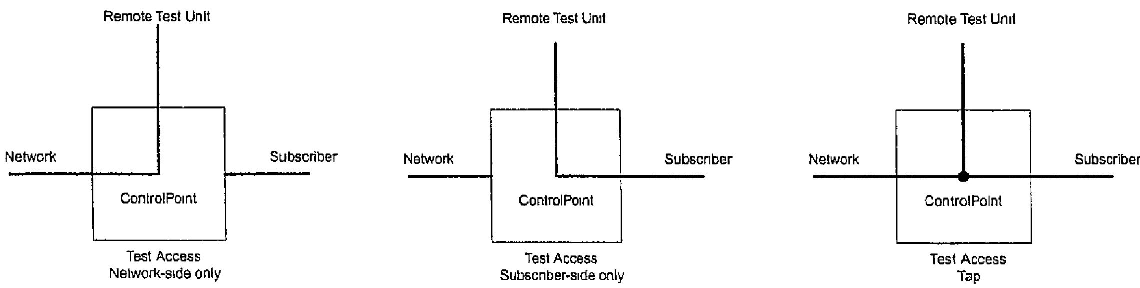
The provisioning process might be handled in the following way:

1. CLEC receives a service request from a subscriber to connect to its ADSL service.
2. CLEC requests ILEC to terminate the data portion of the subscriber's line on the CLEC's frame.
3. ILEC connects the subscriber's copper pair to a spare loop port on ControlPoint.
4. POTS/xDSL splitters pre-terminated on ControlPoint and on the Class 5 switch waiting for cutover.
5. ILEC performs full-spectrum line-testing and reports to CLEC (depending on COLLO agreement).
6. Class 5 Switch re-programmed to allow the subscriber to maintain current POTS service and number.
7. ControlPoint connects the subscriber to the POTS/xDSL port on the splitter.
8. ControlPoint connects the xDSL port on splitter to the CLEC data line terminating on the CLEC frame.
9. CLEC terminates the subscriber line on its DSLAM and commissions service.

Test Access

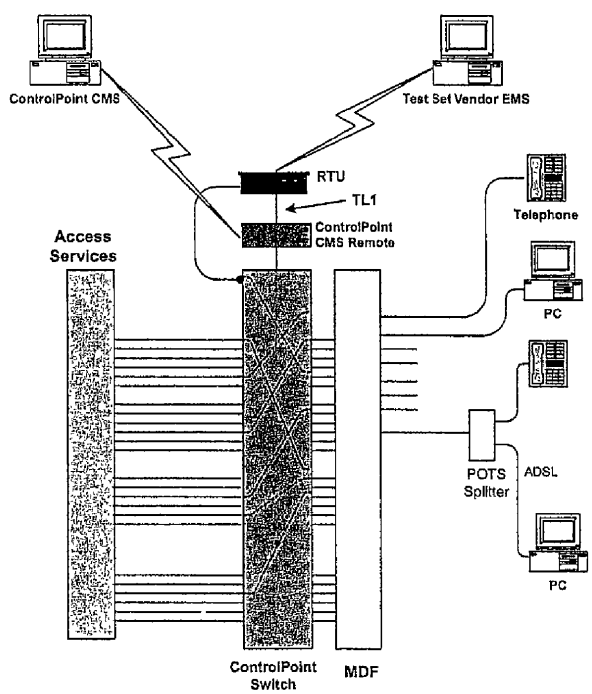
ControlPoint also operates as a metallic test access unit (MTAU) to allow the ILEC to conduct local loop line qualification at the MDF or remote terminal. ControlPoint features subscriber-side loopback and multipoint capability enabling the switch to support a variety of test configurations, including;

a) test access on subscriber-side only
b) test access on network-side only and
c) test access via center tap



ControlPoint will work in conjunction with third part test set vendors such as Hekimian, Tollgrade, Sunrise and Harris to support a variety of single-ended or dual-ended tests, providing a complete test access solution. In the current state, ControlPoint and third party test sets would be controlled via each vendor's respective EMS. Depending on the ILEC's needs custom APIs could be developed to further integrate the ControlPoint with the ILEC's preferred test set vendor.

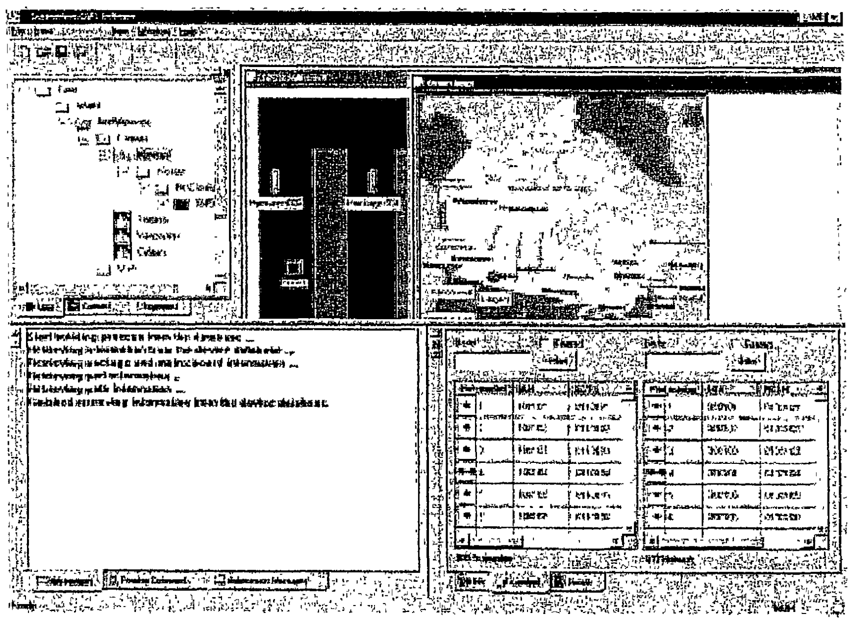
NHC is currently developing a TL1 interface to allow any third party RTU to control the ControlPoint Switch via its own LMS.



Software Capabilities

Initially, ControlPoint would be managed via NHC's ControlPoint Connection Management System (CMS) Software. The CMS Software is a Windows-based GUI interface that communicates with ControlPoint via NHC's ControlPoint CMS Remote SNMP Controller. The OSS would generate a work order that says "Connect subscriber line A to access service point B". A CO-based ControlPoint operator would call up the CMS software and instruct ControlPoint to make the changeover.

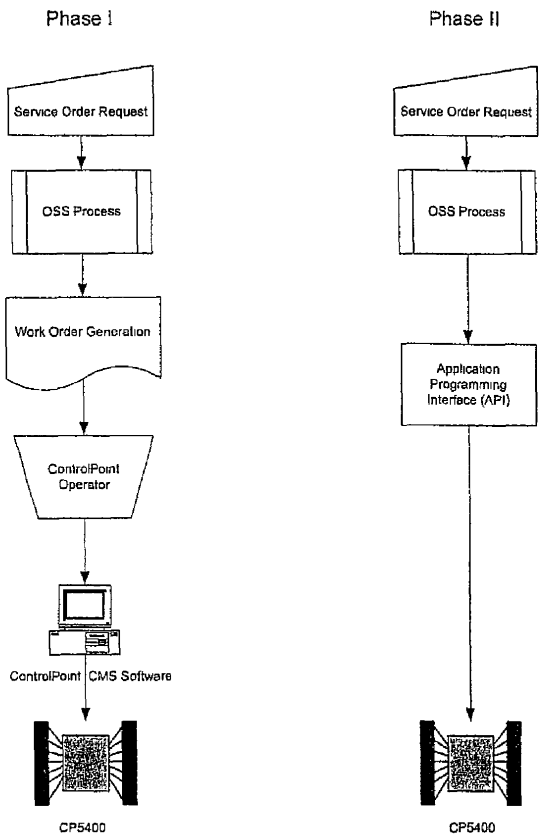
CMS provides real-time cable/connection records and communicates over an Ethernet 10/100 LAN via SNMP. Connecting and disconnecting ports using CMS is a simple drag & drop operation, providing all the controls required to manage the matrix switch. Locating and taking control of any matrix switch in a multi-switch configuration is handled graphically by clicking on switch icons or by clicking on leaves of a tree representing switches. In fact, the CMS software allows an operator to create multi-level geographical views of any installation, detailing countries, cities and buildings and represent them with icons and backdrop bit maps. By clicking on these icons the user can easily drill-down to locate and take control of any matrix switch on the associated network.



During the initial installation phase an operator can totally configure and test the matrix switch before installing the unit in its final location. Connection changes may be pre- programmed and saved for later execution. Once executed, a pre-programmed connectivity file can be left unattended, while the process continues until complete. In addition, the system allows the operator to interrupt this process to accommodate additions, deletions and changes. A backup procedure, allows connectivity and database information to be stored for later recovery should a failure occur.

Flow-Through Provisioning

Initially, ControlPoint would integrate with the ILEC's OSS through its usual service order process. When a service order is received, work orders would be issued and the ControlPoint operator would process the connection order as any other work order. ControlPoint CMS would be treated as a standalone Element Management System (EMS). Once this phase is operational, the second phase would be to streamline the flow-through provisioning process and have the ILEC OSS control the switch directly via a TMN-based Application Program Interface (API). This would allow the paper-based work orders process to be bypassed and connection changes made on-line. This interface may be developed with the ILEC directly or with one of the third party OSS vendors. The following diagrams illustrate the two phases.



Conclusion

With the dramatic increase in competition for the local access market, there is a significant increase in the level of activity focussed on connection, maintenance, and management of the copper wire and the services running over it. Given these high levels of activity in the loop, the traditional management approach is not viable;using manual labor and processes. Rolling trucks with trained technicians, is too slow and expensive to be effective in today's competitive industry. The obvious answer is to automate the provisioning process and provide intelligent wireline management in the physical layer.

The deregulation of services and recent FCC rulings has changed the dynamics of the local loop. Collocation is an everyday reality in most central offices and potentially in many remotes. Conr.ection management, as customers migrate between providers, is challenging and presents a "service strain" to
the service provider. "Line sharing" rulings are expected to fuel demand and pose serious challenges to the ILEC.

NHC's innovative ControlPoint Cross-Connect System replaces labor intensive wiring, reduces operating costs and maintenance, while greatly improving service delivery cycles. ControlPoint dramatically reduces labor, space, and time of service versus conventional MDF/IDF frames and OSP distribution frames, that require on-site wiring by experienced technicians. The NHC solution provides the ILEC with complete
control over the entire service deployment cycle, and ensures quality of service (QoS) via fallback switching. ControlPoint works with all copper based services including POTS, ISDN, T1, xDSL and others voice and data protocols. For more information, please contact NHC at 800-361-1965, 888-831-2077 or visit NHC at www.nhc.com.

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