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January 8, 2003

By Electronic Filing

Marlene H. Dortch, Secretary
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, D.C. 20554

Re: *Written Ex Parte*
UNE Triennial Review – CC Docket No. 01-338
Local Competition – CC Docket No. 96-98
Deployment of Advanced Wireline Services – CC Docket No. 98-147

Dear Ms. Dortch:

Attached for inclusion in the record of the above-referenced proceedings pursuant to 47 C.F.R. § 1.1206(b) is a letter from Donna Sorgi, Vice President of Federal Advocacy for WorldCom, Inc., to William F. Maher, Chief of the Wireline Competition Bureau of the Federal Communications Commission, regarding modeling the cost of serving residential customers using UNE Loops.

Sincerely,

/s/ Gil M. Strobel
Gil M. Strobel

Attachments

cc:

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January 8, 2003

William F. Maher, Chief
Wireline Competition Bureau
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, D.C. 20554

Re: Modeling the Cost of Serving Residential Customers Using UNE Loops

Dear Mr. Maher:

During the past three months, the future of the unbundled network element platform (UNE-P) has become vigorously contested in this proceeding. Competitive carriers have shown that continued access to UNE-P is critical if the Commission is to realize its goal of bringing widespread local competition to residential and small business customers. WorldCom here supplements its previous analysis with empirical facts concerning the economic case for UNE-L competition. Specifically, WorldCom has commissioned an economic analysis of the costs of providing service without access to incumbent local exchange carrier (LEC) unbundled switching and instead using WorldCom's own switches in an arrangement known as "UNE-L." This analysis yields two conclusions. First, given current incumbent LEC practices and charges, competing carriers seeking to provide residential service would be impaired if they were denied nondiscriminatory access to unbundled switching. Second, if certain operational and economic barriers are addressed, UNE-L might prove to be a feasible alternative to UNE-P in some central offices, particularly those with relatively large numbers of residential lines.

I. APPLICATION OF THE IMPAIRMENT ANALYSIS TO SWITCHING

As explained below, competitive carriers today face economic and operational barriers that are not common to new entrants in other industries and that typically make it impossible for them to serve mass market customers without UNE-P.[1] If these economic

[1] In previous filings in this proceeding, WorldCom has described an impairment standard that is consistent with both the D.C. Circuit Court of Appeals' decision in *United States Telecom Ass'n v. FCC*, 290 F.3d 415 (D.C. Cir. 2002) ("*USTA*") and the pro-competitive goals of the Communications Act. *See, e.g.*, WorldCom Reply Comments at 10-19; Letter from Ruth Milkman to Marlene Dortch attaching "Legal Issues Presented in the UNE Triennial Review" (Oct. 23, 2002). (Unless otherwise noted, all Comments and *ex parte* filings referenced herein are found in CC Docket No. 01-338.)

and operational issues can be resolved, new entrants may be able, over time as market share develops, to rely on UNE-L to serve residential customers, at least in certain areas. But the nature and magnitude of the barriers new entrants face vary from state to state and from central office to central office, making a uniform rule on whether competitive LECs are impaired without access to UNE-P impossible and indefensible.[2] The FCC therefore should outline the conditions necessary for UNE-L competition to develop and direct state commissions to conduct the factual analysis needed to determine whether these conditions have been met on a central-office-by-central-office basis.

A. Economic Barriers

In order to determine whether it is possible for new entrants to serve customers economically via UNE-L, competitive carriers' costs must be compared to the incumbent LECs' costs of serving retail customers. If competitors' costs are higher than those of the incumbent LEC, then the incumbent can reduce its retail prices and undercut the competitive carriers' offerings.

WorldCom asked Microeconomic Consulting and Research Associates (MiCRA) to develop a model that estimates all of the major costs that WorldCom would incur in serving residential customers via WorldCom's own switches. These costs include: acquiring and constructing collocation space; migrating customers to UNE-L (hot cut costs); digitizing and concentrating analog signals received over unbundled loops; transporting traffic to WorldCom's switch; establishing additional switching functionality; and establishing and maintaining new systems to process and manage UNE-L customers.[3] The model examines all BOC central offices, dividing them into three categories: (1) offices where WorldCom already has a collocation arrangement and transport on its own network from the central office to an existing switch; (2) offices where WorldCom has a switch in the LATA but does not have its own on-network transport between its switch and that central office; and (3) offices where WorldCom does not have any facilities (collocation, transport, or switch).[4]

To determine whether requiring new entrants to rely on UNE-L would create a competitive disadvantage relative to the incumbent LECs, MiCRA calculated competitive LECs' costs of providing service using UNE-L and compared these costs to UNE-P rates

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[2] This is especially true in light of the *USTA* court's emphasis on the need for a geographically granular approach to unbundling. *See USTA*, 290 F.3d at 421.

[3] The model is based on the costs of connecting customers to WorldCom's existing local network, but the methodology and cost relationships are likely to apply to other competitive LECs pursuing a strategy of serving a large base of residential customers. *See* Microeconomic Consulting and Research Associates, "The Cost of Serving Residential Customers Using UNE-Loops" at 1 (Jan. 8, 2003) ("MiCRA Analysis"), attached as Attachment A to this letter.

[4] For a more complete description of the model and its results, *see* MiCRA Analysis.

charged by the incumbent LECs.[5] MiCRA used UNE-P rates as a surrogate for the incumbent LECs' costs of serving their retail customers because they are publicly available and verifiable. By doing so, MiCRA actually provides a conservative estimate of the magnitude of any cost disadvantage the CLECs have in using UNE-L.[6]

Even with the conservative assumptions made by MiCRA, however, the MiCRA model demonstrates that competing carriers seeking to provide residential service are severely disadvantaged relative to the incumbent LEC if they must use UNE-L. The model shows that, even with a 7% share, in Case 1, in which WorldCom already owns and operates switching, collocation and transport facilities, the UNE-L cost per month exceeds the UNE-P cost by 56%; in Case 2, in which WorldCom already has a switch in place, but must construct collocation in most cases, and must obtain transport, the UNE-L cost exceeds the UNE-P cost by 178%; and in Case 3, in which WorldCom must purchase switching, collocation and transport, the UNE-L cost exceeds the UNE-P cost by 301%.[7] Thus, given current incumbent LEC charges, even new entrants achieving a 7% share would not be able to compete in serving residential customers.[8]

Clearly, the impairment at issue here concerns far more than the impairment faced by any new entrant in any new business, and the impairment continues to exist even when a competitor has built up a substantial share. For the most part, the incumbent LECs' cost advantages are not based on an ability to provide switching facilities or transport more efficiently than competitors. Rather, the incumbents' advantage, and the competitors' impairment, is a result of the high charges assessed by incumbent LECs for collocation space and hot cuts, and the economies of scale associated with digitizing, aggregating and transporting traffic.

Economies of Scale. Many of the costs involved in providing local service to residential customers are fixed costs (*i.e.,* costs that do not vary with the number of lines being served or minutes of use) that by their nature create substantial economies of scale in production. Switching, for example, has high fixed costs that must be spread over a large number of customers if a competitive carrier is to achieve cost efficiencies similar to those enjoyed by the incumbent LECs. To use its switch efficiently, a competing carrier must therefore be able to aggregate traffic from customers served out of multiple incumbent LEC central offices and transport that traffic to the switch in a cost-effective

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[5] In determining UNE-P rates, MiCRA used average UNE-P rates across the country. In individual states, or individual zones within a state, the comparison of UNE-L costs to UNE-P rates will vary from the results provided here.

[6] For a more complete explanation of these factors and the impact they have on the MiCRA analysis, see "The Conservative Nature of MiCRA's Comparison," attached as Attachment B to this letter.

[7] MiCRA at 6.

[8] As a point of comparison, WorldCom's local share in its most mature market, New York, where it has been offering local service since December 1998, is less than 8%.

manner. Aggregation of traffic, in turn, under present conditions requires a competing carrier to collocate in each central office in which it has customers, to install digitization and concentration equipment, and either to install its own transmission facilities or to lease transport from the incumbent LEC. The costs of collocation also are largely fixed. In addition, interoffice local transmission networks exhibit economies of scale. These economies of scale and the absence of UNE combinations priced at TELRIC create severe cost disadvantages for competitive carriers when they seek to backhaul traffic to their own switches.[9]

Sunk Costs. The cost of hot cuts and collocation, including non-recurring charges and the competitive carrier's internal costs, are "sunk" costs, which cannot be recovered if the competing carrier exits the market.[10] The combination of substantial sunk costs and economies of scale create an entry barrier, and so affect the decision of whether to begin offering a particular service, because they greatly increase the risk involved in entering a market. Specifically, a potential entrant will be much less likely to enter a market where it must incur substantial sunk costs, because of the increased risk that it will lose money through stranded investment if the incumbent firm lowers prices in response to entry, or if the entrant is unable to achieve sufficient market penetration. Under the analysis required by the *USTA* decision, the cost of hot cuts and collocation result in cost disadvantages for competing carriers that must be reduced substantially for there to be any prospect of sustainable UNE-L competition for mass market customers.[11]

Costs Unique to Competitive Carriers. Unlike in most other industries, in the local telecommunications industry, the incumbent LECs begin with a huge advantage that results from their historical monopolies, with the result that new entrants face many costs not faced at all by the incumbents. Because loops are hard-wired into incumbent LEC switches, for example, competitive LECs, but not the incumbents, must incur hot cut costs. Because competitive LECs have far fewer customers and thus must deploy fewer switches, competitive LECs, but not incumbent LECs, must incur costs to aggregate traffic and transport it to the switch. Because loops cannot be unbundled and passed to competitive LECs in digital form, at least according to the incumbent LECs, competitive LECs, but not incumbent LECs, must pay to turn digital traffic at the incumbent LEC central office into analog form and must then install digital loop carrier (DLC) equipment to turn the traffic back into digital form.

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[9] *See* Letter from Kimberly Scardino, WorldCom, to Michelle Carey, FCC, attached to letter from Ruth Milkman to Marlene Dortch (Nov. 13, 2002).

[10] Switching also involves significant sunk costs. The costs incurred in installing a switch cannot be recovered even if the switch can be redeployed.

[11] The model assumes incumbent LEC non-recurring charges of $35.00 for hot cuts, which is consistent with Verizon's claim that hot cut charges average $36 in Verizon's territory and that 80% of all UNE-P arrangements exist in states where the hot cut rate is $35. *See* Letter from W. Scott Randolph, Verizon, to Marlene Dortch, FCC (Dec. 23, 2002).

Possible Solutions. Some of the cost disadvantages that new entrants face can be offset or ameliorated by changes to incumbent LEC practices. For example, UNE-L would be more feasible in many areas if competitive carriers could obtain:

- Volume discounts for hot cuts;
- Lower transport rates (by making UNE-transport available without use restrictions); and
- Lower collocation charges, or alternatives (other than collocation) for accessing the loops, such as enhanced extended links (EELs).[12]

As the Appendices to the MiCRA Analysis show, with lower hot cut, transport, and collocation costs, new entrants would be able to use UNE-L to serve residential customers in more locations (assuming that operational barriers were also eliminated). Even if hot cut, transport and collocation costs were lowered, however, the model shows that for some central offices, the costs of using UNE-L are so high that new entrants will not be able to compete in the foreseeable future by deploying their own switches to serve residential customers in those central offices. A decision to eliminate UNE-P in these situations would be irrational and would be tantamount to a decision to consign consumers in less densely populated areas to monopoly phone service.

B. Operational Barriers

In addition to the cost disadvantages discussed above, there also are operational barriers that currently prevent new entrants from using UNE-L to serve mass market customers. The most prominent of these operational barriers is the incumbent LECs' use of manual hot cuts, rather than electronic provisioning, for transferring loops from the incumbents' switches to a competitive carrier's switch. The manual hot cut process is not suitable for mass market customers because the incumbents simply cannot handle the necessary volume of transactions – the hot cut process permits a few thousand transactions per month, not the millions needed to bring competition to the mass market. Because of the manual hot cut process, provisioning takes considerably longer for UNE-L customers than for UNE-P customers (or for long distance customers). The provisioning delays caused by manual hot cuts place new entrants at a significant competitive disadvantage relative to the incumbent LECs, which are able to offer local/long distance packages to customers almost immediately after they receive a customer's order. Therefore, in the absence of electronic loop provisioning, UNE-P must continue to be available for customer acquisition.

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[12] One way to alleviate the effect of high collocation charges is to require incumbent LECs to provide unrestricted access to DS0 EELs with concentration at TELRIC-based rates. Access to DS0 EELs with concentration would eliminate the need for new entrants to collocate in many central offices.

Something short of electronic loop provisioning that could enable a transition to UNE-L would be "project" cut-overs. A project cut-over process, if it can be developed, may allow competitive carriers to acquire customers via UNE-P and then, where economically feasible, to transfer those customers to the competing carrier's switch (UNE-L). Even with a project cut-over process in place, however, competitors still will need to be able to rely on UNE-P to serve new customers for some period of time following acquisition. As explained below, at least three factors make this transition period necessary: high churn rates; the time required for new entrants to deploy the facilities necessary to serve customers via UNE-L; and the time required for incumbent LECs to provision hot cuts.

The high customer turnover WorldCom experiences with new customers (50% churn within 6 months of acquisition)[13] makes UNE-L infeasible as an acquisition vehicle. Because hot cut fees and other costs are so high, in many cases a competitive carrier will not be able to recover its costs before the customer switches to another provider. Consequently, UNE-P must not only be available for acquisition of new customers, it also must remain available for each new customer for six months after acquisition. This transition period could be shortened if hot cut fees were to be reduced significantly.

UNE-P must also continue to be available for a period sufficient to enable new entrants to deploy the facilities necessary to serve a customer via UNE-L. In those areas where a competitive carrier does not already have facilities, there will be a considerable delay before the competitor can establish the collocation arrangements needed to begin transitioning customers from UNE-P to UNE-L. Simply obtaining the collocation space, constructing the cage and making sure the collocation is ready to accept new lines will take about 14 months, a period that does not include the time required for the incumbent LEC subsequently to transition the lines from UNE-P to UNE-L.[14] Even in central offices where a competitive carrier already has collocation, switching and transport facilities in place, it would take approximately eight months to obtain the additional collocation space and install and test the new equipment (*i.e.* digital loop carriers) needed to serve residential customers out of that central offices.[15]

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[13] *See* Letter from Kimberly Scardino, WorldCom, to Michelle Carey, FCC, at 1 (Nov. 15, 2002). After six months, the average churn rate drops substantially, to about 4-6% per month. *Id.*

[14] *See* "Transitioning to Unbundled Loops: Case Study" at 12, attached to Letter from Ruth Milkman to Marlene Dortch (Nov. 18, 2002).

[15] *Id.* at 8. In any event, incumbent LECs cannot reasonably expect competitive carriers to transition customers from UNE-P to UNE-L until the incumbents have established a scalable cut-over process that can accommodate the large number of orders that eliminating UNE-P would entail.

C. Role of the State Commissions

The MiCRA model proves that the viability of UNE-L as a method of serving residential customers varies from central office to central office. The key cost and operational barriers highlighted by the model (*e.g.*, hot cut costs and processes, collocation costs, transport costs, etc.) vary from state to state and even from office to office. State commissions are therefore in the best position to evaluate whether the relevant barriers have been removed (or at least sufficiently reduced) and other conditions exist to make UNE-L a feasible alternative to UNE-P in a particular central office. This also is true because impairment turns on a comparison of incumbent LEC costs, which vary from central office to central office. Accordingly, the Commission should identify the relevant factors to be considered as part of the UNE-P impairment analysis, but direct individual state commissions to gather and examine the relevant facts and determine whether a transition from UNE-P to UNE-L is appropriate in any given central office. A national, one-size-fits-all solution would be inconsistent with the record evidence concerning the way impairment operates, and also inconsistent with the *USTA* decision's remand order concerning the need for granular analysis.

A legally defensible rule therefore would require state commissions to examine the situation present in each central office to evaluate impairment, weighing multiple factors, including customer density. If the Commission chooses to draw a bright line based on customer density, however, 25,000 residential lines is a reasonable demarcation point because that is the point at which DS3 transport is most efficiently utilized (assuming a 10% share). Below that point, competitive carriers will either have to make inefficient use of DS3s or use DS1s at a substantially higher cost per circuit. In either case, the lack of customer density raises the competitor's costs by limiting its ability to exploit economies of scale. Given these very substantial handicaps confronting competitive LECs seeking to enter areas served by central offices with fewer than 25,000 residential lines, the Commission could reasonably conclude that the cost of conducting a central-office-by-central-office impairment analysis regarding access to local switching far outweighs any perceived benefits. Accordingly, the Commission could reasonably conclude, in view of that analysis, that in central offices with fewer than 25,000 residential lines, the cost of UNE-L will constitute an insurmountable barrier to entry and competition, even if there are significant reductions in incumbent LEC charges and the outstanding operational difficulties are resolved. States could then perform the necessary analysis for central offices in which there are more than 25,000 lines to determine whether or not impairment exists.

II. CONCLUSION

WorldCom's analysis demonstrates that today, competing carriers seeking to provide residential service today are impaired without non-discriminatory access to local switching and that under present conditions, UNE-L does not permit sustainable mass market competition. The analysis also shows that if certain operational and economic

barriers are addressed, UNE-L may prove to be a feasible alternative to UNE-P in some central offices with large numbers of residential lines.

Respectfully submitted,

/s/ Donna Sorgi
Donna Sorgi

Attachments

ATTACHMENT A

The Cost of Serving Residential Customers Using UNE Loops

Microeconomic Consulting and Research Associates (MiCRA)

January 8, 2003

MiCRA was requested by WorldCom Inc. to analyze the incremental cost – relative to UNE-P -- to a CLEC of serving residential customers using its own switching. MiCRA conducted this analysis by constructing a cost model ("MiCRA UNE-L Cost Model") that estimates all major components of a UNE-L-based local serving arrangement. The Model estimates the costs of taking the transmission provided over an analog unbundled loop and transporting the traffic to a CLEC switch, where calls are processed and sent to their destination. The major categories of costs include: collocation, digitization and concentration, transport, and switching. The model also includes the costs that the CLEC will incur to establish and maintain systems that process and manage UNE-L customers, as well as the internal costs associated with and the nonrecurring fees paid to the ILECs to migrate customers from UNE-P to a CLEC's own switch. The MiCRA Model estimates only the costs that are incremental to a UNE-P configuration, and excludes all of the internal costs borne by a CLEC when it offers UNE-P-based local service, such as marketing and customer service. The model also excludes the cost of the UNE loop, which is generally the same regardless of whether the CLEC is using UNE-P or UNE-L to serve the customer.[1]

The MiCRA UNE-L Cost Model estimates the cost of providing UNE-L-based service to residential customers in each BOC central office. The serving arrangements modeled in the study are based on the costs of connecting subscribers to the existing WorldCom local network. We believe, however, that the methodology and cost relationships are broadly applicable to other CLECs pursuing a strategy of serving a large base of residential customers. A key parameter in the model is the market share of residential customers obtained by the CLEC. This parameter can be adjusted to reflect the situation of a specific CLEC, and indeed we present results for a range of market shares.

This report presents the methodology of the MiCRA model, the data sources and assumptions used in the model, and the results. The basic conclusions of the model are: (1) The cost of using UNE-L is very sensitive to a wide range of factors, including market share, customer density at the end office, and the distance between the end office and the CLEC switch; (2) Unless the prices charged by incumbent LECs for collocation space and other services needed for UNE-L arrangements are reduced by regulatory action, it will be very difficult for CLECs to compete in any part of the residential market; (3) Although the cost of using UNE-L is sensitive to a wide range of factors, and therefore should be analyzed central office by central office, for administrative ease, it would be reasonable to treat the cost of UNE-L as an insurmountable barrier to entry and competition in central offices with fewer than 25,000 residential lines.

[1] UNE loop rates are higher in a few states when not purchased as part of UNE-P, because the ILECs do not make loops provided over IDLC (integrated digital loop carrier) available except as part of the UNE-P bundle.

I. Methodology

The underlying "unit of analysis" of the model is a central office. Data were collected for every BOC central office in the continental United States on:

- The number of residential customer lines served out of the office
- The geographic location of the central office (V&H coordinates)
- The LATA containing the central office

In addition, data were collected on all WorldCom collocations, and whether the collocation is served by the WorldCom network. Also, we were provided with the list and location (V&H coordinates) of all WorldCom local switches.

The data set was divided into three Cases, representing the following service configurations:

- Case 1: BOC central offices with existing WorldCom collocations that are passed by and connected to WorldCom's existing local fiber networks (*i.e.,* on-net offices).
- Case 2: BOC central offices, not served by WorldCom's existing local fiber network, but within a LATA where a WorldCom local switch is presently located (*i.e.,* off-net offices, in-LATA).[2]
- Case 3: BOC central offices within a LATA where WorldCom does not presently have a local switch (*i.e.,* off-net offices, outside of LATA).

In all three Cases, we assumed that the CLEC would have to build or expand collocation space and lease unbundled local loops from the ILEC. The CLEC would then purchase and install digital loop carrier (DLC) equipment in the collocation space that converts and concentrates analog transmissions.

Transport to the CLEC switch would be handled in different ways depending on the serving arrangement defined in each Case. In Case 1, the CLEC would carry the traffic on its own fiber network to its nearest switch. In Case 2 and 3, the CLEC would use either Special Access or UNE Transport facilities to carry the traffic to its nearest switch. Since there was no CLEC switch within the LATA in Case 3, we assumed that the CLEC would build a new switch within one mile of the largest BOC central office in the LATA.[3]

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[2] WorldCom is presently collocated in some of the central offices included in Case 2, although these offices are not on WorldCom's local network. We did not report results separately for these offices because the cost of serving residential local service customers in these offices is no different than the cost where WorldCom is not presently collocated. The reason for this is that even where WorldCom is collocated, it would have to expand its collocation space. Moreover, in WorldCom's experience, the ILECs' charges for expansion are the same as charges for a new build out of collocation space.

[3] We define "largest" as the BOC central office with the most residential lines.

Switching costs per line were assumed to be constant in Case 1 and Case 2. Our reasoning was that the fixed and per-line costs of the switch should be recovered equally from all lines. This involved a rough balancing between circumstances where there might be excess switching capacity (and the incremental cost of serving some residential customers would be lower than average cost) and other circumstances where a new switch would have to be deployed and utilized at a sub-optimal level (which would mean that incremental costs for those customers would be in excess of our estimate of average cost). In Case 3, we "built" a new switch that was the most efficient size for the total number of CLEC lines in the LATA.

Other costs included in the model were: one-time costs to the CLEC of building a new system to provision service using UNE-L; annual costs of upgrading the provisioning system; recurring costs of operating the UNE-L systems; the non-recurring charges imposed by the BOC for cutting over UNE-P customers to UNE-L ("hot cuts"); and the internal cost to the CLEC of managing the hot cut process.

II. Assumptions and Data Sources

Data on BOC central offices, including an estimate of the number of residential lines and the V&H coordinates, were obtained from Version 5.1 of the HAI model. Data on WorldCom collocations and locations served by WorldCom's local fiber networks were provided by WorldCom. Other inputs were obtained from publicly available sources, wherever possible, and otherwise from internal estimates provided by WorldCom. All capital costs were amortized over their expected life, using a capital cost factor based on a debt cost of 8%, equity cost of 15%, debt ratio of 45%, and income tax rate of 38%. All other costs are described in the paragraphs and tables below.

A. CLEC Internal Costs

Most of the CLEC's incremental internal costs fall into three sub-categories: switching, digitization, and OSS (or "SDO"). First are the costs of building, upgrading, and operating the systems necessary to provision UNE-L based local service and handle back-office operations. These are shown in Table 1.

Table 1: OSS Costs

Input	Unit	Cost	Source
CLEC OSS one-time system	System-wide	$30 million (7 year life)	WorldCom internal estimate
CLEC OSS upgrades	System-wide, annual	$1 million	WorldCom internal estimate
Recurring system operating costs	Per Line, monthly	66¢	WorldCom internal estimate

A second sub-category is the cost of digitizing the analog signal carried on the unbundled loop provided by the ILEC. Digital loop carrier equipment must be installed

in the collocation space leased from the ILEC. The cost of this equipment is lumpy, meaning that a large investment must be made to handle a block of lines.

Table 2: Digitization Costs

Input	Unit	Cost	Source
Digital loop carrier equipment	Per central office	$36,000 for each block of 576 lines (10 year life) 0.167 monthly maintenance	WorldCom internal FCC USF Model Input Order

A third sub-category is the cost of end-office switching provided by the CLEC. Cases 1 and 2 spread the fixed cost of an 80,000 line switch, including land and building costs, and assume that CLECs will utilize switches at 85% of capacity. In addition to this cost, there is an $87 per line incremental cost, which represents the per line cost of a switch, such as line cards, and is based on the HAI model. The reason for including fixed costs was to reflect the fact that many of WorldCom's switches are either fully utilized, or would not have the excess capacity to handle a large number of residential customers. Therefore, we include a portion of fixed costs to reflect the long run incremental cost of adding to existing switch capacity, even though short run incremental cost may be above or below the long run measure. In case 3, as stated earlier, we "build" the optimal size switch to serve residential customers in each LATA. These costs are described in Table 3 below.

Table 3: Switching Costs

Input	Unit	Cost	Source
Case 1 and 2: Incremental Switching Cost	Per Line	$122 investment (16 year life) 0.50% monthly maintenance	HAI
Case 3: Fixed and Per Line Switching Cost	Fixed Cost Per Switch Based on Lines Served lines<25K 25K<lines<80K per additional 80K Plus Cost Per Line	(including land and building) $1.2 million $2.4 million $468,000 $87 (16 year life) 0.50% monthly maintenance	HAI

B. Transport Cost

The second broad category of inputs is the cost of transporting traffic between the collocation space and the nearest CLEC switch. In Case 1, the incremental costs of carrying the residential local loop traffic are limited to the per-unit costs of incremental

DS-3 electronics on an existing high capacity fiber facility. In Case 2 and Case 3, two scenarios are reported: one with transport provided on special access, the other with transport provided over UNE transport. Under both scenarios, either DS1s or DS3s are provisioned, depending upon which is cheaper. (In all cases, we assumed there would be a 4-to-1 concentration ratio between the number of subscriber lines served and the number of DS0 channels required for interoffice transport.) At this stage in the development of the model, we estimated and utilized a single set of nationwide average rates for special access and UNE transport. Adding state-specific data on these rates would be unlikely to change the overall results, but would capture the greater dispersion in the actual costs of doing business with UNE-L in different parts of the country.

Table 4: Transport Costs

Input	Unit	Cost	Source
Case 1: Incremental transport cost	DS3 (cost was divided by 672 to yield DS0 cost) Costs were assumed not to be lumpy	$8,742 investment 10 year life 0.167% monthly maintenance	HAI
Case 2&3: Special Access	DS1 DS3 Monthly cost NRC per DS1	$49 + $14 per mile $523 + $58 per mile (plus $200 for muxing) $200 (amortize over 10 years)	WorldCom ex parte of October 30, 2002. Typical charge
Case 2&3: UNE Transport	DS1 DS3 Monthly cost NRC per DS1	$45 + $1.50 per mile $526 + $23 per mile (plus $200 for muxing) $200 (amortize over 10 years)	WorldCom ex parte of October 30, 2002. Typical charge

C. Collocation Costs

The third broad category of costs relates to the costs of collocating in the ILEC central office, and also includes the costs of cross connects between the subscriber loop and the collocation space. These costs are shown in Table 5.

Table 5: Collocation Cost

Input	Unit	Cost	Source
Collocation build-out cost	Per Central Office, one time	$120,000 (10 year life)	WorldCom estimate based on actual charges paid for collocation
Collocation rental charges	Per Central Office, monthly	$2,500	WorldCom estimate based on actual charges paid for collocation
Cross connect	Per line, monthly	50¢	AT&T ex parte, Nov. 8, 2002

D. Hot Cut Costs

The fourth broad category of costs relates to the cost of converting existing UNE-P customers to UNE-L or converting retail customers to UNE-L. This cost will be driven by the process used by the ILEC for converting lines. At present, all conversions are handled on a manual basis, which imposes costs on the ILEC and CLEC. The non-recurring charges for "hot cuts" are established by state commissions.[4] Both the NRCs and the CLECs' internal costs are shown in Table 6.

Table 6: Hot Cut Costs

Input	Unit	Cost	Source
Hot Cut - ILEC Charge	Per Line, one time	$35 (amortize over 18 month customer life)	Estimate of nationwide average
Hot Cut – CLEC internal costs	Per Line, one-time	$10 (amortize over 18 month customer life)	WorldCom internal estimate

III. Results

We first provide summary statistics. All central offices are divided into one of the three Cases described above: Case 1: on-net; Case 2: off-net, in-LATA; Case 3: off-net, outside of LATA. The number of central offices and residential lines that fall into each of these cases is shown in Table 7. The table also presents the average monthly per-line-cost to the CLEC of providing UNE-L based local residential service – as an increment above UNE-P cost. As a baseline, we estimate that average per-line-cost

[4] In some jurisdictions, the hot cut charges are over $100.

for UNE-P is about $6.44 per month.[5] The UNE-P baseline cost and the costs shown in Table 7 exclude the cost of leasing UNE loops, since they would be the same in both cases.

Table 7: Average Cost per Month for Three Cases: CLEC Market Share of 7%

Category	Number of COs	Number of BOC Lines	UNE-L Cost (excludes loops)	UNE-P (excludes loops)	Cost Increment UNE-L over UNE-P
Case 1	431	12,557,038	$10.03	$6.44	56%
Case 2	4343	47,248,573	$17.92	$6.44	178%
Case 3	3164	19,487,802	$25.84	$6.44	301%

This table reveals several important aspects of the cost structure of UNE-L based service. First, taking current incumbent LEC practices and charges as a given, the cost of using UNE-L to provide residential service in each of the three cases is significantly higher than the cost of using UNE-P. This is a result of the high costs associated with collocation, hot cuts, and the diseconomies of scale associated with aggregating and transporting traffic. Even in Case 1, which covers about 15% of BOC lines, the increment in cost incurred by a UNE-L based provider is about three and a half dollars a month, or 56%. Much of this cost difference is associated with collocation and hot cut costs, which are outside the control of the CLEC. Second, costs are progressively higher for Case 2 and Case 3. This is a result of the much higher transport costs that the CLECs must incur, compared to when they can utilize their own interoffice transport facilities. The costs shown in Table 6 reflect use of special access. Where the CLEC can rely on UNE transport, the average costs are approximately two and a half dollars lower in Case 2 and four dollars lower in Case 3.

Economies of scale are critical to the level and structure of costs incurred by the CLECs. Almost all categories of cost are sensitive to scale, including collocation costs, DLC costs, transport, and switching costs. The importance of scale economies can be seen in two ways. First, a CLEC's costs will decline as its market share increases. This is shown in summary fashion in Table 8 below.

Table 8: Average Cost per Month at Different CLEC Market Shares

	5% Market Share	7% Market Share	10% Market Share	15% Market Share
Case 1	$11.08	$10.03	$9.22	$8.61
Case 2	$21.38	$17.92	$15.21	$13.03
Case 3	$32.07	$25.84	$21.03	$17.04

[5] This represents WorldCom's estimate of the UNE charges it faces across all BOC serving areas. It includes all transport cost necessary to terminate local calls, which is not included in the UNE-L costs estimated by the MiCRA Model.

It is important to recognize that the reduction in costs that accompanies achievement of a particular market share will not be realized until a CLEC's entire UNE-P customer base is shifted over to UNE-L. During the transition, as customers are gradually cut over to UNE-L, a CLEC will not be utilizing its newly installed switching, digitization, and transport facilities at maximum efficiency.

Economies of scale also drive the relationship between the costs of UNE-L based service and the density of residential population. It is much cheaper for a CLEC to serve a central office with a larger number of residential customers. The reason is that for any given market share the CLEC will have a much larger number of customers across which it can: spread the fixed costs of collocation, smooth out the lumpy costs of DLCs, and take advantage of the volume-sensitivity of transport costs. We can see this by comparing UNE-L costs in two hypothetical central offices, one with 2,400 ILEC residential lines, the other with 24,000 ILEC residential lines. In both cases, we assume: a CLEC market share of 7%; the offices fall into Case 2; and the offices are 25 miles from the CLEC switch.

Table 9: Cost Comparison in Two Case 2 Central Offices

CLEC customers	Collocation	Digitization	Transport
168	$27.21	$4.07	$4.77
1680	$2.72	$1.22	$1.17

A much fuller depiction of the importance of density and market share is shown in the Appendix to this report. Table 1 of the Appendix presents the cost of UNE-L based service disaggregated a number of ways. First, central offices are separated into the three different Cases. Second, within each Case, the offices are grouped according to density – defined as the number of residential subscriber lines served by the ILEC. Third, the results are shown at four levels of CLEC market share. Finally, the costs are broken down according to the four categories described in Section II of this report.

As described above, the cost of using UNE-L is sensitive to a range of factors, including density. In offices with fewer than 25,000 ILEC residential lines, the very high costs of UNE-L (relative to UNE-P) reflect the sub-optimal utilization by the CLEC of the facilities needed for digitization and aggregation of analog loop signals. This is a barrier that cannot be overcome, even in the moderate density offices, at least until a CLEC's market share rises significantly above 10%.

Table 2 in the Appendix provides information on the distribution of cost estimates across all central offices within the highest density grouping. The reasons for the wide spread in cost differences include: the differences in transport requirements across the three Cases (all of which are represented in central offices with more than 25,000 residential lines), the fact that mileage to the CLEC switch will vary across central offices, and that switch utilization will be different across LATAs. Moreover, the Model does not even capture the cost variability created by differences in state-specific rates for: collocation, transport, and hot cuts.

The final issue we attempt to address is whether policymakers can take steps to reduce economic barriers to entry with UNE-L. Table 3 in the Appendix provides some guidance on this issue. The chart depicts one bar for each of the three Cases – with separate colors representing the four categories of cost. A horizontal line representing the nationwide average UNE-P price is also shown. Even in the best possible circumstances, Case 1 in the densest central offices, the economic barriers to using UNE-L are substantial. Unless some of the costs controlled by regulation can be reduced, the CLECs will be unable to compete using UNE-L.

Regulators can facilitate UNE-L based local competition by reducing three of the four cost categories. (SDO costs are internal to the CLEC and cannot be reduced by regulation.) First, transport costs can be reduced substantially by requiring that UNE-transport be made available without any restrictions. Second, collocation costs, which are still far above economic cost, can be reduced. If the loop-transport combinations known as concentrated "EELs" are available on an unrestricted basis at TELRIC rates, these collocation costs could be avoided. Third, costs associated with cutting over UNE-P customers can and should be reduced by requiring the ILECs to offer batch processing, which would reduce manual labor for both the ILEC and the CLEC. The total effect of these regulatory actions (as well as the removal of any non-economic barriers to entry) can make it possible for CLECs to begin to compete with UNE-L in the densest regions of the country.

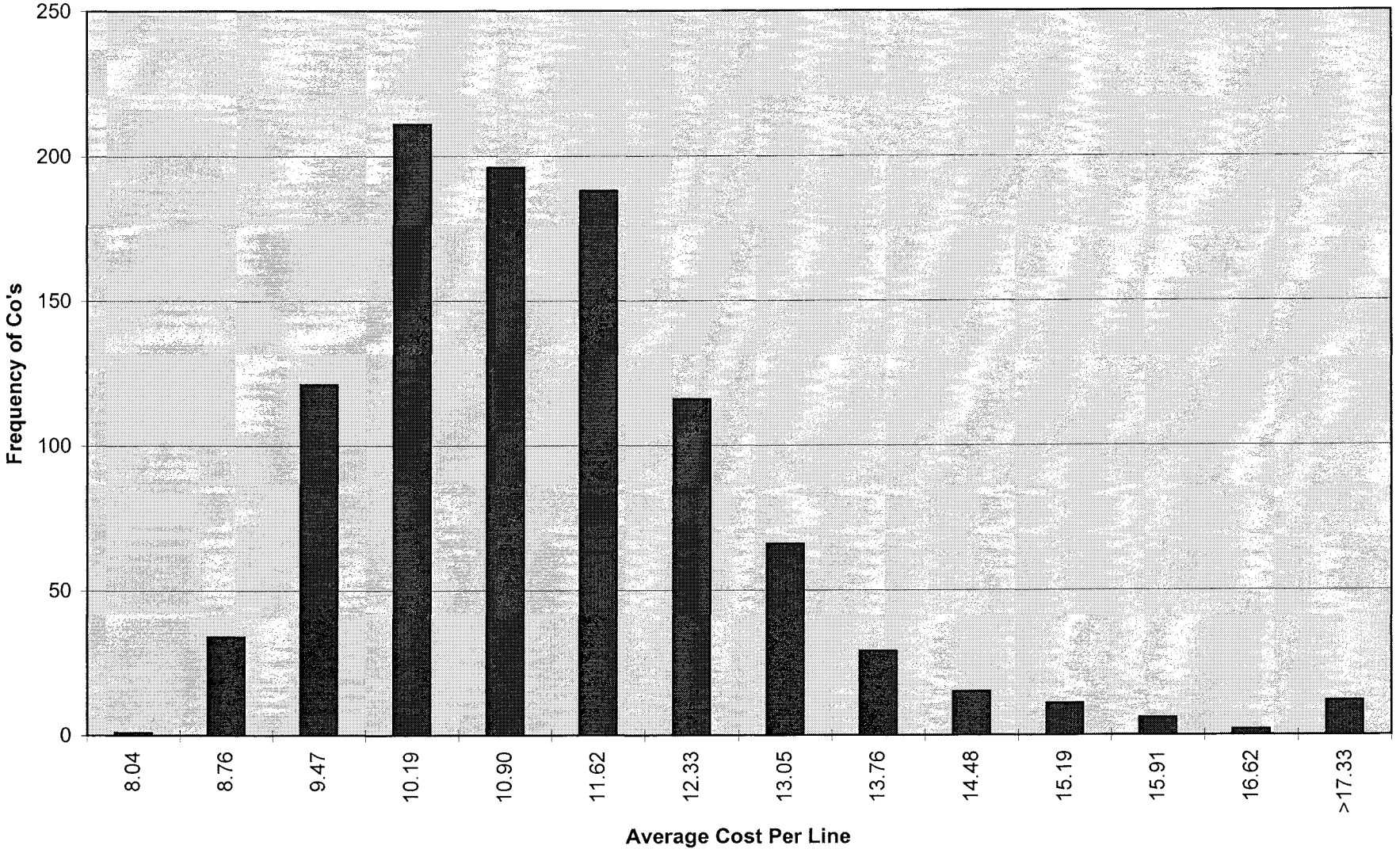
Appendix: Table 1

		5% Market Share					7% Market Share					10% Market Share					# of Obs	
		SDO	Trans	Collo	1time	Average	SDO	Trans	Collo	1time	Average	SDO	Trans	Collo	1time	Average	CO	Lines
Case 1	Lines>25k	4.73	0.07	2.66	2.50	**9.96**	4.61	0.07	2.05	2.50	**9.23**	4.51	0.07	1.58	2.50	**8.66**	229	9,675,499
	25k>Lines>15k	5.13	0.07	5.02	2.50	**12.72**	4.86	0.07	3.73	2.50	**11.17**	4.69	0.07	2.76	2.50	**10.03**	98	1,979,360
	15k>Lines>5k	5.66	0.07	8.94	2.50	**17.18**	5.37	0.07	6.53	2.50	**14.48**	4.91	0.07	4.73	2.50	**12.20**	77	832,337
	Lines<5k	8.46	0.07	35.56	2.50	**46.59**	7.64	0.07	25.60	2.50	**35.81**	6.97	0.07	18.11	2.50	**27.65**	27	69,842
	All	4.87	0.07	3.64	2.50	**11.08**	4.72	0.07	2.74	2.50	**10.03**	4.58	0.07	2.07	2.50	**9.22**	431	12,557,038
Case 2: SA	Lines>25k	4.76	1.93	2.89	2.50	**12.08**	4.63	1.52	2.21	2.50	**10.86**	4.53	1.21	1.70	2.50	**9.94**	619	23,647,711
	25k>Lines>15k	5.14	2.29	5.16	2.50	**15.09**	4.87	2.44	3.83	2.50	**13.65**	4.70	2.29	2.83	2.50	**12.33**	490	9,604,473
	15k>Lines>5k	6.02	6.36	10.59	2.50	**25.47**	5.53	4.87	7.71	2.50	**20.60**	5.09	3.74	5.55	2.50	**16.88**	1,079	9,756,196
	Lines<5k	10.09	18.39	46.50	2.50	**77.49**	8.58	16.04	33.45	2.50	**60.57**	7.53	13.50	23.62	2.50	**47.15**	2,155	4,240,193
	All	5.58	4.41	8.89	2.50	**21.38**	5.22	3.71	6.50	2.50	**17.92**	4.95	3.06	4.70	2.50	**15.21**	4,343	47,248,573
Case 2: UNE	Lines>25k	4.76	0.85	2.89	2.50	**11.01**	4.63	0.82	2.21	2.50	**10.15**	4.53	0.76	1.70	2.50	**9.49**	619	23,647,711
	25k>Lines>15k	5.14	0.99	5.16	2.50	**13.79**	4.87	0.97	3.83	2.50	**12.17**	4.70	0.95	2.83	2.50	**10.99**	490	9,604,473
	15k>Lines>5k	6.02	1.36	10.59	2.50	**20.47**	5.53	1.29	7.71	2.50	**17.02**	5.09	1.23	5.55	2.50	**14.38**	1,079	9,756,196
	Lines<5k	10.09	2.86	46.50	2.50	**61.96**	8.58	2.51	33.45	2.50	**47.03**	7.53	2.18	23.62	2.50	**35.83**	2,155	4,240,193
	All	5.58	1.17	8.89	2.50	**18.14**	5.22	1.10	6.50	2.50	**15.31**	4.95	1.02	4.70	2.50	**13.18**	4,343	47,248,573
Case 3: SA	Lines>25k	6.18	1.93	3.37	2.50	**13.98**	5.55	1.64	2.55	2.50	**12.23**	5.24	1.20	1.94	2.50	**10.87**	160	5,093,255
	25k>Lines>15k	6.36	2.24	5.20	2.50	**16.31**	5.70	2.35	3.86	2.50	**14.41**	5.29	2.24	2.85	2.50	**12.88**	247	4,802,388
	15k>Lines>5k	7.45	6.55	11.14	2.50	**27.65**	6.46	5.07	8.11	2.50	**22.14**	5.78	3.85	5.83	2.50	**17.96**	663	5,683,296
	Lines<5k	11.87	17.64	48.96	2.50	**80.98**	9.76	15.28	35.22	2.50	**62.76**	8.32	12.92	24.86	2.50	**48.60**	2,094	3,908,863
	All	7.75	6.53	15.30	2.50	**32.07**	6.70	5.56	11.08	2.50	**25.84**	6.03	4.59	7.91	2.50	**21.03**	3,164	19,487,802
Case3: UNE	Lines>25k	6.18	0.82	3.37	2.50	**12.87**	5.55	0.80	2.55	2.50	**11.40**	5.24	0.76	1.94	2.50	**10.43**	160	5,093,255
	25k>Lines>15k	6.36	0.96	5.20	2.50	**15.02**	5.70	0.94	3.86	2.50	**13.00**	5.29	0.92	2.85	2.50	**11.56**	247	4,802,388
	15k>Lines>5k	7.45	1.37	11.14	2.50	**22.47**	6.46	1.30	8.11	2.50	**18.37**	5.78	1.25	5.83	2.50	**15.36**	663	5,683,296
	Lines<5k	11.87	2.80	48.96	2.50	**66.14**	9.76	2.44	35.22	2.50	**49.92**	8.32	2.13	24.86	2.50	**37.82**	2,094	3,908,863
	All	7.75	1.42	15.30	2.50	**26.96**	6.70	1.31	11.08	2.50	**21.59**	6.03	1.22	7.91	2.50	**17.66**	3,164	19,487,802

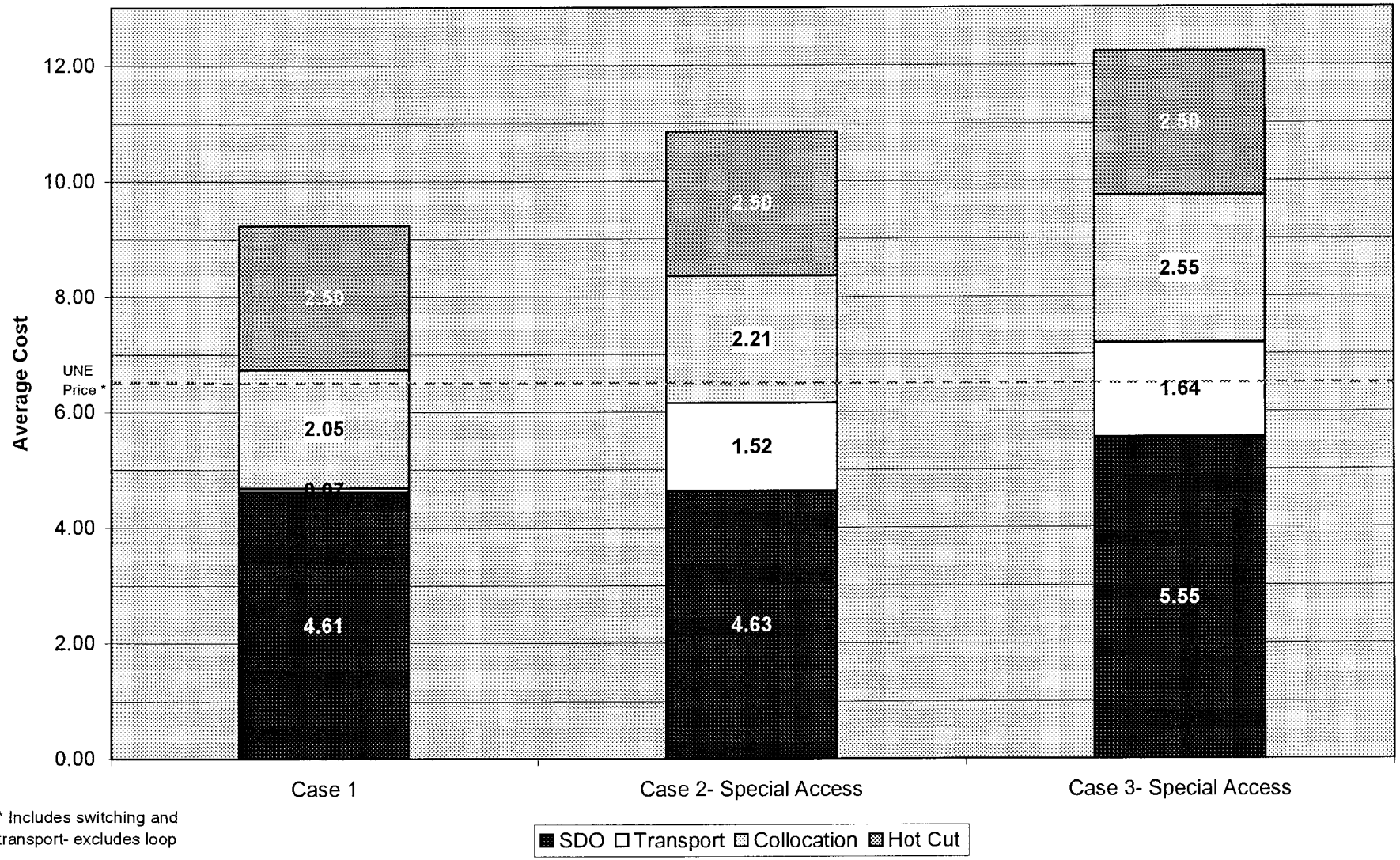
Appendix: Table 1 Continued

		15% Market Share					# of Obs	
		SDO	Trans	Collo	1time	Average	CO	Lines
Case 1	Lines>25k	4.45	0.07	1.22	2.50	**8.24**	229	9,675,499
	25k>Lines>15k	4.55	0.07	2.01	2.50	**9.13**	98	1,979,360
	15k>Lines>5k	4.77	0.07	3.32	2.50	**10.66**	77	832,337
	Lines<5k	6.01	0.07	12.25	2.50	**20.83**	27	69,842
	All	4.49	0.07	1.55	2.50	**8.61**	431	12,557,038
Case 2: SA	Lines>25k	4.46	1.09	1.30	2.50	**9.35**	619	23,647,711
	25k>Lines>15k	4.56	1.54	2.05	2.50	**10.66**	490	9,604,473
	15k>Lines>5k	4.84	3.25	3.87	2.50	**14.46**	1,079	9,756,196
	Lines<5k	6.49	10.68	15.94	2.50	**35.61**	2,155	4,240,193
	All	4.74	2.49	3.30	2.50	**13.03**	4,343	47,248,573
Case 2: UNE	Lines>25k	4.46	0.70	1.30	2.50	**8.95**	619	23,647,711
	25k>Lines>15k	4.56	0.88	2.05	2.50	**9.99**	490	9,604,473
	15k>Lines>5k	4.84	1.19	3.87	2.50	**12.40**	1,079	9,756,196
	Lines<5k	6.49	1.93	15.94	2.50	**26.86**	2,155	4,240,193
	All	4.74	0.95	3.30	2.50	**11.49**	4,343	47,248,573
Case 3: SA	Lines>25k	4.88	1.09	1.46	2.50	**9.93**	160	5,093,255
	25k>Lines>15k	4.85	1.51	2.07	2.50	**10.93**	247	4,802,388
	15k>Lines>5k	5.22	3.32	4.05	2.50	**15.10**	663	5,683,296
	Lines<5k	6.99	10.34	16.77	2.50	**36.60**	2,094	3,908,863
	All	5.40	3.70	5.44	2.50	**17.04**	3,164	19,487,802
Case3: UNE	Lines>25k	4.88	0.71	1.46	2.50	**9.55**	160	5,093,255
	25k>Lines>15k	4.85	0.86	2.07	2.50	**10.28**	247	4,802,388
	15k>Lines>5k	5.22	1.21	4.05	2.50	**12.98**	663	5,683,296
	Lines<5k	6.99	1.89	16.77	2.50	**28.15**	2,094	3,908,863
	All	5.40	1.13	5.44	2.50	**14.47**	3,164	19,487,802

Appendix: Table 2
7% Market Share Histogram
>25,000 Residential Lines



Appendix: Table 3
7% Market Share
>25,000 Residential Lines



* Includes switching and transport- excludes loop

ATTACHMENT B

ATTACHMENT B

THE CONSERVATIVE NATURE OF MICRA'S COMPARISON

After calculating competitive LEC costs of providing service using UNE-L, MiCRA compared these costs to UNE-P rates. MiCRA used UNE-P rates as a surrogate for the incumbent LEC costs of serving their retail customers because they are publicly available and verifiable.[1] By doing so, however, MiCRA actually provides a conservative estimate of the magnitude of any cost disadvantage the competitive LECs have in using UNE-L. In a true apples-to-apples comparison of incumbent LEC and competitive LEC costs, the input assumptions about switching cost for incumbent LECs and competitive LECs should be identical. But while MiCRA used the UNE switch prices set by the states as a surrogate for incumbent LEC switching costs, MiCRA used the HAI model to calculate the competitive LECs' switching costs. The model inputs used by the states to set UNE switch prices result in rates that are above the TELRIC costs as determined by the HAI model. Indeed, as a very rough estimate, they are $2.00 higher on average.[2] Thus, if identical assumptions were used to determine competitive LEC and incumbent LEC costs of switching, the cost difference between the incumbent LECs and competitive LECs would be approximately $2.00 greater than estimated by the model.[3]

The MiCRA analysis is conservative in other ways as well. The calculation of average UNE-P rates across the country assumes local usage of 1200 originating and 1200 terminating minutes per month. The incumbent LECs have repeatedly argued that this usage assumption is too high. If usage were lower, as the incumbent LECs argue, then UNE-P monthly per-line costs would be lower on average. As a result, the cost differential between UNE-L and UNE-P would be higher. In addition, in calculating UNE-L costs, MiCRA did not include all of the transport cost associated with the UNE-L serving arrangement. For example, MiCRA did not include the cost of terminating transport. Including this cost in the calculation would increase the cost differential between UNE-L and UNE-P even more.

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[1] In determining UNE-P rates, MiCRA used average UNE-P rates across the country. In individual states or individual zones within a state, the comparison of UNE-L costs to UNE-P rates will vary from the results provided here.

[2] The average UNE-P rate nationwide (excluding loops) is $6.44. The average non-loop costs as calculated through the HAI model is $4.32, a difference of $2.12. Because non-loop costs include transport costs, however, and because of different usage numbers in derivation of these numbers, this is not an exact measure of the extent to which states have overstated switching costs. But it provides some sense of the magnitude of the overstatement.

[3] This conclusion does not depend on the fact that states have set rates for switching above TELRIC, but rather on different methods used in calculating switching costs for UNE-P and UNE-L. If the UNE rates set by the states are set at TELRIC or below, that means the HAI model understates the cost of switching and the MiCRA estimate of the competitive LECs' cost of switching is similarly understated. If the estimate of competitive LEC switching costs were increased, the estimated difference between competitive LEC and incumbent LEC costs would also be greater than estimated by the model.