Attachment B

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers	)	CC Docket No. 01-338
	)	
Implementation of the Local Competition Provisions of the Telecommunications Act of 1996	)	CC Docket No. 96-98
	)	
	)	CC Docket No. 98-147
Deployment of Wireline Services Offering Advanced Telecommunications Capability	)	

DECLARATION OF RICHARD N. CLARKE
ON BEHALF OF AT&T CORP.

Based on my personal knowledge and on information learned in the course of my duties, I, Richard N. Clarke, declare as follows:

1. My name is Richard N. Clarke. My business address is 295 North Maple Avenue, Basking Ridge, NJ 07920.

2. I am employed by AT&T Corp. ("AT&T") as a Division manager in AT&T's Law and Government Affairs organization. In this position I am responsible for AT&T's economic policies related to the costing and pricing of local telecommunications services and network elements. I have directed AT&T's investigations into the structure of efficient pricing methods for telecommunications elements and services and AT&T's participation in the development of the HAI/Hatfield Model of forward-looking economic costs of local exchange networks and services. I also have extensive experience in evaluating other local exchange

network costing models and methodologies such as the BCPM and the Commission's Synthesis Model.

3. I have a Bachelor's degree in mathematics and economics from the University of Michigan, and Master's and Ph.D. degrees in economics from Harvard University. Prior to joining AT&T with Bell Laboratories in 1986, I was an Assistant Professor of Economics at the University of Wisconsin-Madison, and worked as an Economist in the Antitrust Division of the U.S. Department of Justice.

4. Over the past dozen years, I have provided testimony before numerous regulatory commissions, including those of Texas, Michigan, Wisconsin and this Commission, among others. Much of this testimony has dealt with economic, costing and pricing issues related to local exchange competition.

I. INTRODUCTION AND SUMMARY

5. The purpose of my declaration is to describe and estimate the economies of scale and scope that exist in the provision of the local unbundled network elements ("UNEs") required to offer basic and advanced telecommunications services to customers. If such economies are significant, they can provide incumbent carriers (who all enjoy extremely high market shares) with competitively decisive cost advantages over entering facilities-based carriers who have much smaller levels of market penetration. Note that my analysis addresses only the economic scale and scope barriers that entrants face in deploying local network facilities. Thus, I do not address any of the additional real-world hurdles that these entrants face in seeking to self-deploy facilities in competition with incumbent carriers.[1]

[1] These additional hurdles facing entrants include their extra costs in gaining access to necessary rights of way from municipalities or building access from landlords; and costs incurred in accommodating to incumbent network

(continued . . .)

6. I first discuss the engineering economics associated with the provision of each major UNE required to offer switched local services. I then use two of the forward-looking cost models that have been accepted either by the Commission or by state commissions to estimate the significance of the cost disadvantages that scale or scope economies impose on entrants. I do this under a wide-ranging set of possible broad-based market entry patterns by small facilities-based carriers.

7. Under any plausible broad-based market entry scenario, an entrant can expect to face total element long run incremental costs ("TELRIC") for its self-provisioned facilities that exceed significantly those faced by the incumbent local exchange carrier. Indeed, the forward-looking cost models employed in these analyses are likely to understate severely the economic cost disadvantages faced by entrants. This is because these models assume that costs are much more volume-sensitive than they actually are and because (absent input value adjustments) the model runs assume that a small entrant will pay the same prices for its equipment as large incumbents and will be able to utilize this equipment at the same high levels of "fill." Furthermore, although the own-cost relevant to a new carrier considering entry is TELRIC, the cost level that it must compete against is the incumbent's short-run marginal cost ("SRMC") – which, due to the sunk nature of many of the incumbents' network investments, likely falls substantially below its TELRIC.

8. The import of these analyses is that the cost disadvantages faced by an entrant relative to the incumbent are very severe. Even assuming impossibly nimble and effective

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(. . . continued)
architectures and rate structures that may be inefficient for entrants. As described in AT&T's Comments, these factors independently impair entrants that attempt to self-deploy facilities.

entry plans, the average cost disadvantage faced by a 10% to 20% market share entrant ranges from 35% to 250%. And even if an entrant can capture 30% of the market, its cost disadvantage remains in the 20% to 60% range. Furthermore, because of significant scope economies, these cost disadvantages cannot be avoided if entrants specialize by each producing only a subset of network elements. Thus, without the opportunity to secure a complete suite of UNEs from the incumbent at the incumbent's TELRIC, broad-based entry by facilities-based competitive local exchange carriers ("CLECs") cannot and will not occur.

II. <u>BACKGROUND ECONOMICS</u>

9. The Telecommunications Act of 1996 ("Act") provided CLECs with three paths to enter local telephone markets. One is through full facilities-based service enabled by incumbent local exchange carriers' ("ILEC") obligation to provide interconnection and call termination on cost-based, nondiscriminatory terms. Another is through the lease of a full or partial suite of UNEs from the ILEC, which the CLEC would combine with its own network and/or retailing facilities to provide finished telecommunications services of its own design to customers. This path is enabled by the obligations of ILECs (stated explicitly in Sections 251 and 252 of the Act) to offer interconnection and unbundled access on nondiscriminatory bases and at cost-based rates. A final path is through resale whereby a CLEC purchases (at a wholesale discount) existing ILEC telecommunications services and retails them to customers.

10. Because the fundamental economics of market entry differ in different segments of the market, all three of these entry paths are necessary for the entire local telecommunications market to be accessible to competition. The reason why these market entry economics vary is because of variations in the underlying cost structure of the telecommunications networks and support structures required to offer local service. The characteristics of these cost

structures that are most germane to a CLEC's decision as to which combination of entry paths to employ are economies of scale or scope in the provision of various pieces of local networks and their support structures.

11. A production process is characterized by levels of fixed and variable costs. Fixed costs, sometimes called "getting started" costs, are costs that must be borne upon entry to enable a carrier to offer service to customers, and that do not vary with the actual volume of telephone service sold. Variable costs are costs that rise as output volumes rise. A production process is said to display "economies of scale" if its unit cost (total cost divided by the number of units produced) declines as output volumes increase. A production process for a collection of products displays "economies of scope" if the total cost of producing the entire collection together is less than the sum of the costs that would be incurred if collection were broken up and its pieces produced separately. If the production process for a particular UNE or collection of UNEs displays significant economies of scale or scope, a CLEC cannot efficiently self-produce these UNEs unless it does so at the scale and scope levels enjoyed by the incumbent.

12. Whether a production process displays economies of scale depends on the character of the fixed and variable costs of the production process. Any level of fixed costs gives rise to economies of scale. This is the simple mathematical result from a fixed cost numerator being divided by ever increasing volume denominators. The larger these fixed costs are as a fraction of total costs, the more significant are the economies of scale generated by fixed costs. Furthermore, even when efficient getting-started costs rise based on designed output capacities, if these costs increase less quickly than output increases, economies of scale are still present. And in addition to these fixed cost sources of economies of scale, such economies also arise to the extent that a production process' variable costs increase more slowly than its output.

13. An example of the foregoing is as follows. Assume that an interoffice transport system linking two end-office switch locations requires the installation of a fiber cable plus lightwave electronics at each end of the fiber cable. The fiber cable may be considered a fixed cost that leads directly to economies of scale. If this transport route is expected to experience only moderate traffic, a basic single-mode fiber may be used. If the transport route is expected to carry very heavy volumes of traffic, multi-mode fiber (which is about twice as expensive as single-mode) would be installed. But because the multi-mode fiber can accommodate transmission capacities that are more than double those accommodated by the single-mode fiber, still further economies are enjoyed by the higher capacity installation. The electronic equipment at each end of the fiber cable that determines its actual transmission throughput can be considered a variable cost. For low traffic volumes, OC-3 add-drop multiplexers may suffice. But as traffic volumes increase, OC-12 add-drop multiplexers may be substituted at four times the capacity, but much less than four times the cost. Similarly, OC-48 or OC-192 add-drop multiplexers may be installed that each provide four times the capacity of the next lower system, but at much less than a fourfold cost increase. At even higher traffic demands, dense wave division multiplexing ("DWDM") lightwave equipment may be installed – assuming the connecting fiber cable is the multi-mode variety.

14. The above example also illustrates possible economies of scope. The fiber cable used to provide interoffice transport between two end-office switch locations must be placed in or on some outside plant structure – such as on a pole, in a trench or in a conduit. Because such structures can support both loop cables and interoffice cables at minimal extra cost, a carrier that provisions this interoffice transport system in concert with loop networks emanating

from the two end-office locations will have a cost advantage over a carrier that provides either only interoffice transport or only loops.

III. ENGINEERING ECONOMICS OF UNE PROVISION

15. For convenience, I divide the UNEs necessary to provide switched local services into several categories. The first are the UNEs that comprise the switching and interoffice facilities employed in local telecommunications. Such UNEs include end office switching, signaling, transport and tandem switching. The second category of UNEs are those that comprise the local loop. Together, loop and non-loop UNEs comprise the collection of network elements used to provision basic local service. This collection is also known as the UNE platform ("UNE-P").

16. The end office switching UNEs cover the costs of end office switches, their distributing frames, power systems and buildings. While the cost of distributing frames scales closely with lines, there are substantial fixed costs associated with switches, power systems and buildings. In particular, switch costs are commonly modeled on an a + b·x basis where "a" represents the getting-started costs of a switch (e.g., its central processor, right-to-use fees, etc.); "b" represents the per-line incremental cost of the switch (e.g., its line cards or units, frames, etc.), and "x" represents the number of equipped lines. The Commission's Synthesis Model's equations for switch costs are $486,700 + $87·x for host or standalone switches and $161,800 + $87·x for remote switches. This same pattern is largely followed in the HAI 5.1 model.

17. Signaling is produced through a combination of packet switches (called signal transfer points or "STPs"), databases (called signaling control points or "SCPs") and signaling links (interoffice data circuits). While there are some possibilities to size STPs and SCPs to fit demand, once this capacity is determined, almost all costs are fixed and do not vary with

traffic. Furthermore, the fixed costs of these pieces of equipment grow much more slowly than their signaling capacity grows. Similarly, even modest sized links can handle all of the signaling demand from large central offices. Signaling links display the cost characteristics of interoffice transport networks. Large fractions of costs associated with structure and cable are fixed, and smaller portions associated with transmission terminal equipment may vary with network traffic.

18. Transport between offices is typically provided over high capacity fiber optic circuits. The costs associated with these circuits lie in the structure that supports the cable routes, the actual fiber cables and the electronic lightwave equipment that transmits the signals over the fiber. In addition, there are costs for multiplexing and digital cross-connect systems at each office. Because a very large portion of the cost associated with interoffice transport is the outside plant structure that supports it, these network elements display very severe economies of scale. Furthermore, even the cost of the lightwave transmission equipment is largely fixed, and scales very little with increased capacity.

19. Efficient interoffice transport may also require tandem switching. As with end office switching, there are significant fixed costs associated with the switch's common equipment – and even minimally sized common equipment can handle large traffic volumes. Thus, while costs associated with trunk ports on the tandem switch may scale with the traffic served by the switch, the rest of the cost of a tandem switch is largely fixed, and displays significant scale economies.

20. There are two general technologies used in providing loops: an all-copper technology and a combination fiber/copper technology. Each displays significant economies of scale and density.

21. In the all-copper technology, a few large copper pair cables called feeder cables leave the central office and snake their way into the various neighborhoods served by the central office. In each neighborhood passed by the feeder cable, there is a cross-connect box (sometimes called a Serving Area Interface or "SAI"). At the SAI, a selection of the copper pairs from the feeder cable are cross-connected over to copper pairs in the smaller cables (called distribution cables) that leave the SAI and go up and down the neighborhood's streets, passing every customer premise in the neighborhood. When the distribution cable is adjacent to a customer's premise, its individual wire pairs serving that customer's lines are cross-connected at a terminal to a thin drop cable that crosses the customer's property and are terminated at a network interface device ("NID") inside or outside the premise.

22. In the combination fiber/copper technology, customer lines are carried out of the central office in multiplexed format on several large fiber feeder cables. As these fiber feeder cables pass through the various neighborhoods that they serve, several fiber strands from the cable are terminated at Digital Loop Carrier ("DLC") remote terminals that serve each neighborhood. At these terminals, the multiplexed customer lines destined for the immediate neighborhood and carried on these fiber strands are converted to electrical format, de-multiplexed and sent out on copper pair distribution cables to be terminated at the customer premises in the same fashion as above.

23. By far the largest fraction of costs associated with loops are their structure and cable costs. While loop structure cost increases as customers are located further from the wire center, it is insensitive to the number of these customers. This is because a minimum sized telephone pole or cable trench can accommodate large capacity cables as easily as it can accommodate small capacity cables. Thus, once a cable route is established, there are only very

small incremental structure costs to serving additional customer lines located along the route. Even when fiber/copper technology is used, this same characteristic holds. Although there are modest incremental costs associated with the line cards at the DLC remote terminal that scale with demand, an equally substantial portion of the cost of these remote terminals is fixed. In addition, because fiber cable costs scale even less with demand than do copper cable costs, the overall effect is to see similar economies of scale and density in the provision of fiber/copper loops as with all-copper loops.

24. Thus, because the technologies used to provision both the loop and non-loop portions of local telephone networks display such pronounced economies of scale and density, it is likely that small-scale entrants attempting to provision their own facilities will face unit costs that exceed greatly the unit costs enjoyed by an incumbent carrier that serves nearly the entire market.

IV. METHODOLOGIES TO MEASURE SCALE ECONOMIES

25. One way to estimate the significance of scale economies in local telephone networks is to use economic cost models that have been developed to measure, on a granular basis, the cost of providing telephone networks for specifically defined geographic areas and levels of demand. Two such models are the HAI 5.1 model developed for AT&T and WorldCom, and a UNE version of the Synthesis Model developed by the Commission.[2] While these models employ very similar assumptions in their engineering of the traffic sensitive (non-loop) portions of

[2] *See Ex Parte* letter from Robert W. Quinn, Jr., AT&T to Magalie Roman Salas, Federal Communications Commission, *In the Matter of Application by Verizon New England, Inc., Bell Atlantic Communications, NYNEX Long Distance Company and Verizon Global Networks to Provide In-Region InterLATA Services in Massachusetts*, CC Docket No. 01-9, (filed February 1, 2001) and the Commission's Memorandum Opinion And Order, *Application of Verizon for Authorization To Provide In-Region, InterLATA Services in Pennsylvania*, ("Pennsylvania Order") CC Docket No. 01-138 (September 19, 2001), n. 249.

local networks, they differ significantly in how they engineer loop plant and determine corporate overhead expenses.

26. The HAI Model engineers loop plant based on a database of neighborhood clusters that was generated predominantly from actual geocode points describing specific customer locations and demands for telephone lines. However, loop engineering is performed by the model assuming that the location of customers within these clusters follows several stylized configurations. The HAI Model engineers fiber or copper feeder cables to extend from existing wire center locations into each neighborhood based on specific routings. Within each neighborhood, either fiber feeder cables are terminated on DLC remote terminals and cross-connected to copper distribution cables; or copper feeder cables are cross-connected to copper distribution cables. These distribution cables are then engineered to run within the cluster based on the model's set of stylized customer configurations. Because its unit of analysis is the cluster, the HAI Model may be easily manipulated to model situations where an entrant carrier is able to serve only a fraction of customers in each cluster, or to focus its service on only a subset of the clusters surrounding a wire center.

27. The Synthesis Model engineers loop plant using a database containing a road surrogate location for every customer. It then clusters these customer locations into serving areas or "neighborhoods," and engineers fiber or copper feeder cables to extend from existing wire center locations fairly directly into each neighborhood. Within each neighborhood, either fiber feeder cables are terminated on DLC remote terminals and cross-connected to copper distribution cables; or copper feeder cables are cross-connected to copper distribution cables. These distribution cables are then engineered to connect to all of the customer locations within the neighborhood. All residence and business customer locations in a cluster are assumed to offer

the cluster average level of residence or business demand, respectively. Because its unit of analysis is the individual customer, the Synthesis Model may be used to model situations where an entrant carrier is able only to secure an arbitrary fraction of the individual customers within a neighborhood, or only a selection of the neighborhoods surrounding a wire center.

28. Both models follow similar procedures in engineering switching, signaling and interoffice transport networks. But they differ in their development of expenses. The Synthesis Model presumes that corporate overhead expenses scale with lines, while the HAI Model presumes these expenses scale with direct costs. In truth, some percentage of these expenses are relatively fixed, thus both models will underestimate the overall degree of scale economies from this category of cost. Similarly, both the HAI and Synthesis Models follow loop and transport engineering procedures that likely understate the level of scale economies in the provision of these network elements. Significant fractions of outside plant costs are in the planning and engineering of cable routes. While these costs do scale with the length of the route, they are relatively insensitive to the capacity of the cable placed on the route. But since both models add these costs as a flat percentage additive to per-foot cable costs, a larger cable will bear a higher engineering surcharge than a smaller cable. This will make the modeled levels of loop and transport costs appear to be more sensitive to lines capacity carried than they are in actuality.

V. WAYS IN WHICH AN ENTRANT'S PENETRATION CAN BE MODELED

29. Using the HAI and Synthesis Models, it is possible to determine per-line investments and monthly costs under several different assumptions about the scale of CLEC entry and the CLEC's ability to target particular customer groupings. In a 1997 filing made with the Commission concerning the severe cost disadvantages forced upon CLECs by a Texas law

requiring an entrant CLEC to build out its own facilities to minimum percentages of the entire state,[3] and more recently in an affidavit filed by Mark T. Bryant of WorldCom in the Commission's UNE Remand proceeding,[4] AT&T and WorldCom demonstrated using earlier versions of the HAI Model adjusted so that only given fractions of the total customers in each cluster would be served by a CLEC, that the unit costs faced by the CLEC in its self-provision of these local UNEs exceeded greatly the unit costs enjoyed by the incumbent monopolist. Even at a very substantial assumed CLEC entry penetration of 30%, the Bryant analysis found CLEC unit costs for loops to exceed incumbent New York Telephone's unit costs by 50%; for switching, the CLEC unit cost excess was 31%; and for transport, the CLEC disadvantage exceeded 100%.

30. In the results presented below, a similar analysis using the HAI 5.1 Model is performed for Southwestern Bell-Missouri ("SWB-MO").[5] As shown in Charts 1 and 2, if one assumes that an entrant secures an aggressive 30% market share in each cluster served by SWB-MO, the entrant's loop investments per line will exceed those of the incumbent by 70%, its per-line switching investments will exceed the incumbent's by 56%, and its per-line transport investments will exceed the incumbent's by 199%.[6] If the entrant attempts to self-provision the complete suite of switched UNEs or UNE-P, it will incur investment costs that are 74% higher

[3] *Ex Parte* letter from Albert M. Lewis, AT&T to William F. Caton, Federal Communications Commission, Petition for Declaratory Rulings Regarding Preemption of Texas Law, CCBPol 96-14 (filed September 10, 1997).

[4] Declaration of Mark T. Bryant, Ph.D. on behalf of MCI WorldCom, Inc. attached to Comments of MCI WorldCom in CC Docket Nos. 96-98 and 95-185 (filed May 26, 1999).

[5] These analyses are presented only for SWB-MO because it is time-consuming to run multiple model scenarios for the entire country. This is especially true in the case of the Synthesis Model because of the disaggregated nature of its customer location data files. SWB-MO was selected as a sample state because its geography, density and cost structures are very similar to national averages. It is unlikely that the results would be materially different if they were reported on a national basis. In addition, the results we find for SWB-MO match closely those previously developed for Texas and New York.

[6] Interoffice transport is defined as the collection of UNEs associated with signaling, tandem switching, transport and transmission facilities. These are aggregated based on their relative use by an average SWB-MO customer.

per line than the incumbent's. Measured on a monthly cost basis, the entrant's loop cost disadvantage is 57%, its switching cost disadvantage is 46%, and its transport cost disadvantage is 178%.[7] For UNE-P, the cost disadvantage is 61%. At much more realistic CLEC penetration rates of 10% or 20%, its UNE-P investment costs will be 272% and 126% higher than the incumbent's costs, respectively. And its UNE-P monthly cost disadvantage will be 224% and 104%, respectively.[8]

31. While the foregoing analysis assumed that the CLEC entrant would not be able to focus its marketing upon customers in particular clusters, even if this is feasible for the CLEC, it still faces substantial cost disadvantages. If instead of assuming that a CLEC gains a 30% market share in 100% of all clusters, we alternatively (and extremely implausibly) assume that the CLEC gains a 100% market share in 30% of all clusters. Charts 3 and 4 then demonstrate that in this polar case, the CLEC's loop cost disadvantage practically disappears (because in engineering loop plant, there are very few costs that are shared between clusters); but its switching investment and monthly cost disadvantages remains practically unreduced at 51% and 44%, respectively (because each switch continues to serve the same number of lines as in the previous scenario), but its transport investment and monthly costs rise to 237% and 214% more than those of the incumbent.

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[7] Note that although modeled percentage loop cost disadvantages may appear to be similar to, or less than switching cost disadvantages, this may not be really the case. Because a customer's loop is usually three to four times more costly than his switching, a given percentage loop cost disadvantage is of far greater economic significance than an equal percentage switching cost disadvantage. In addition, other factors such as delays in securing rights-of-way and building access may add to the competitive disadvantages a CLEC faces in self-provisioning its loops.

[8] Monthly cost disadvantages are generally slightly less than investment cost disadvantages because the operating and overhead expense components of monthly costs in both the HAI and Synthesis Models scale more closely with lines than do the investment components.

32. The reason for this rise in transport cost disadvantage is straightforward. There are economies of scope in the provision of loops and interoffice transport. Interoffice transport can share its outside plant structure with loop plant, and vice versa. For example, within a wire center's service boundaries, interoffice transport routes often follow the same path as that of the feeder cables emanating from the central office. Only when the interoffice route moves beyond the wire center's boundaries does it need its own structure. Because in this scenario the CLEC serves only 30% of the wire center's clusters and builds less loop structure, there is less opportunity for the CLEC's interoffice facilities to share structure use with its feeder facilities. Thus, interoffice transport must bear a greater level of structure costs. Overall, a CLEC's UNE-P investment and monthly costs in this scenario exceed those of the incumbent by 25% and 20%, respectively. If the CLEC targets only 10% or 20% of the incumbent's clusters (and still gains a 100% share in each), its UNE-P investment and cost disadvantages are 77% and 63% at 10% penetration, and 42% and 34% at 20% penetration, respectively.

33. But it is also extremely optimistic and implausible to expect that a CLEC can so surgically and effectively target its marketing to attack only a fraction of the incumbent's clusters, but secure 100% of the customer lines in each cluster attacked. More likely, a CLEC will focus its marketing on only a subset of the incumbent's clusters, but also only achieve a partial market share in these targeted clusters. If a CLEC targets 30% of the incumbent's clusters, and wins a 30% market share in each, Charts 5 and 6 show that its loop investment and monthly cost disadvantages will be 87% and 65% relative to the incumbent, its switching cost disadvantages will be 244% and 208%, its transport cost disadvantages will be 1065% and 923%, and its overall UNE-P investment and monthly cost disadvantages will be 168% and 139%. Even if the CLEC is able to raise its scale by targeting 50% of the incumbent's wire centers and winning

a 30% share of customers in these targeted clusters, its loop cost disadvantages remain at 77% and 60%, its switching cost disadvantages are 142% and 121%, its transport cost disadvantages are 553% and 487%, and its overall UNE-P investment and monthly cost disadvantages are 114% and 94%.

34. The Commission's Synthesis Model may also be adjusted to compute the cost of UNE self-provision to entrant carriers. First, because the default USF version of the Synthesis Model applies all corporate overhead expenses to the loop, it is necessary to extract these expenses out of the reported loop cost and to spread them across all UNEs in proportion to the direct costs of each. The methodology that I use to perform this adjustment matches the methodology that the Commission has used to compute UNE costs for the purpose of benchmarking UNE prices in one state to those established in another state for 271 purposes.[9] Second, we must specify the fractional collections of customer locations that the engineered local network of the CLEC is designed to serve. I assume two alternative entry scenarios. The first is to analyze a CLEC that attacks the same market universe as the incumbent, but gains only a partial share of all customers. The second is to assume that the CLEC can successfully target customers in a given fraction of all Census Block Groups (CBGs), and gains an impossibly optimistic 100% share of customers in these targeted CBGs.[10]

35. This Synthesis Model analysis is also performed for SWB-MO. To implement the first scenario, the Synthesis Model's data files containing its 1.85 million surrogate customer location data for SWB-MO's 213 wire centers were opened, and random selection was used to remove 50%, 60%, 70%, 80% and 90% of the customer location records. These files

[9] *See* note 2, *supra.*

[10] A CBG typically comprises several hundred contiguous housing units and may correspond to a neighborhood.

were then reconstituted with the remaining 50%, 40%, 30%, 20% and 10% random samples of customer locations to use as input data for the first set of adjusted Synthesis Model runs. To implement the second scenario, random selection was used to remove customer location records associated with 50%, 60%, 70%, 80% and 90% of the CBGs from the Synthesis Model's SWB-MO data files. The files were then reconstituted with the remaining 50%, 40%, 30%, 20% and 10% random samples of CBGs to use as input data for the second set of adjusted Synthesis Model runs. These adjusted location files were then clustered by the Synthesis Model and the Model's loop module, switching and interoffice module, and expense module were executed.

36. Under the first scenario, Charts 7 and 8 show that if an entrant gains a 30% share of all customer locations, it faces loop investments that exceed the incumbent's by 45% per line, and loop monthly costs that are 39% higher than the incumbent's. The entrant's switch investment and monthly costs will exceed the incumbent's by 46% and 38%.[11] And its interoffice transport investment and monthly costs are 166% and 200% higher. On a UNE-P basis, its investment and monthly costs are 60% and 50% higher than the incumbent's. If the CLEC achieves only 10% or 20% market share, its investment and monthly cost disadvantages are more severe. For UNE-P at a 10% share, the disadvantage is 177% and 169%; and at a 20% share the disadvantages are 86% and 82%.

37. If the CLEC is able to target its marketing to serve only customers concentrated into smaller, more contiguous areas, it is possible that its cost disadvantage will be a little less. The second scenario is where the CLEC can focus its network construction to serve

[11] Synthesis Model UNE costs for switching, signaling, transport and UNE-P are developed assuming the market basket of these elements purchased by an average customer. This market basket comports closely with that assumed by the Commission in its use of the Synthesis Model to benchmark UNE rates across states. *See* n. 252 in the Pennsylvania Order, *op. cit.*

only a select set of CBGs, but (implausibly) is able to capture 100% of all customer lines located in these served CBGs. In this case, Charts 9 and 10 show that if the CLEC targets 30% of all CBGs, its loop investment cost disadvantage is 5% and its loop monthly cost disadvantage is 2%. For switching, these disadvantages are 42% and 39%; for interoffice transport they are 182% and 265%; and 30% and 29% overall for UNE-P. If it is able to target only 10% or 20% of all CBGs, its UNE-P investment and monthly cost disadvantages widen to 105% and 110% and 43% and 46%, respectively.

38. The cost results from these Synthesis Model runs continue to display the scope economies that characterized the HAI results. If a CLEC is able to reduce its loop cost disadvantages by targeting its loop investments to serve only contiguous customer groups, this success makes it less possible for the CLEC also to enjoy low costs of interoffice transport provision. Thus, the only way the CLEC can evade significant cost disadvantages in at least one important UNE is to achieve a high market share across all UNEs and customer locations.

VI. CONCLUSION

39. My analysis uses two forward-looking models of local network costs to estimate conservative values for the cost disadvantages faced by CLECs who are forced to self-provision various network elements. Even with the most surgical targeting possible (and achieving an impossible 100% market share in targeted segments), the average cost disadvantage faced by a 10% to 20% market share entrant ranges from 35% to 250%. And even if an entrant has captured 30% of the market, its cost disadvantage remains in the 20% to 60% range. Because local network costs are such a significant portion of a CLEC's total costs, there is no way for a self-provisioning CLEC to enter successfully if it faces network cost disadvantages of

the magnitude that exist at 10%, 20%, 30% and higher market shares.[12] Furthermore, these cost disadvantages cannot be finessed by specializing in the production of a subset of network elements. Because of significant scope economies between loops and transport, unless an entrant is able simultaneously to build a large, efficient network for each, it will have a significant cost disadvantage. And because both the HAI and Synthesis Models used to generate these reported results tend to model costs more traffic-sensitively and scalably than they are in reality, the true levels of self-provisioning CLEC cost disadvantages are likely to be much higher than those reported here.

40. This concludes my Declaration.

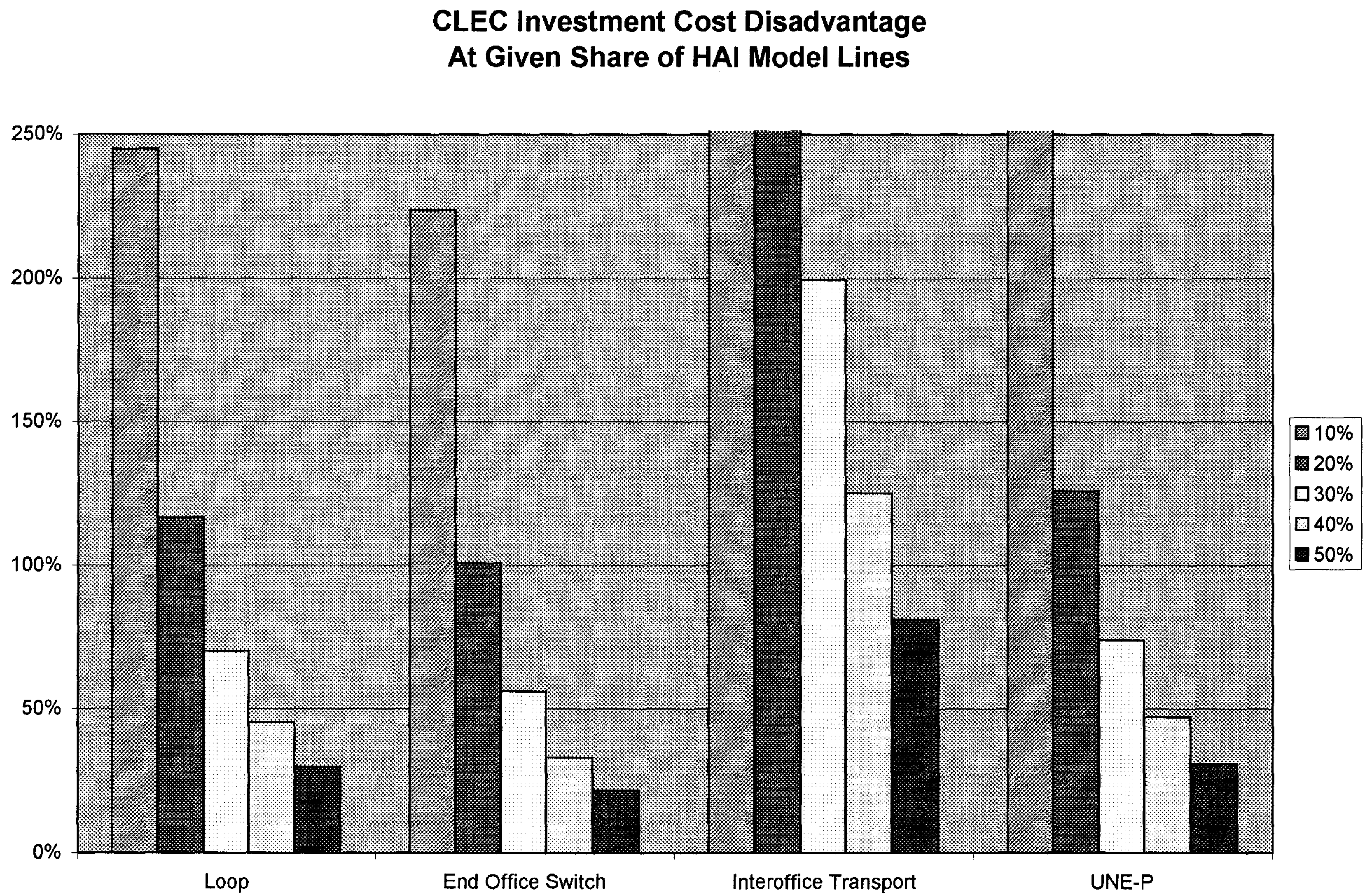
[12] Declaration of Richard N. Clarke on behalf of AT&T Corp. attached to Reply Comments of AT&T Corp. in Opposition to Verizon New England Inc.'s Section 271 Application for Massachusetts in CC Docket No. 01-9 (filed February 28, 2001).

I declare under penalty of perjury that the foregoing Declaration is true and correct.

Richard N. Clarke

Executed on: April 4, 2002

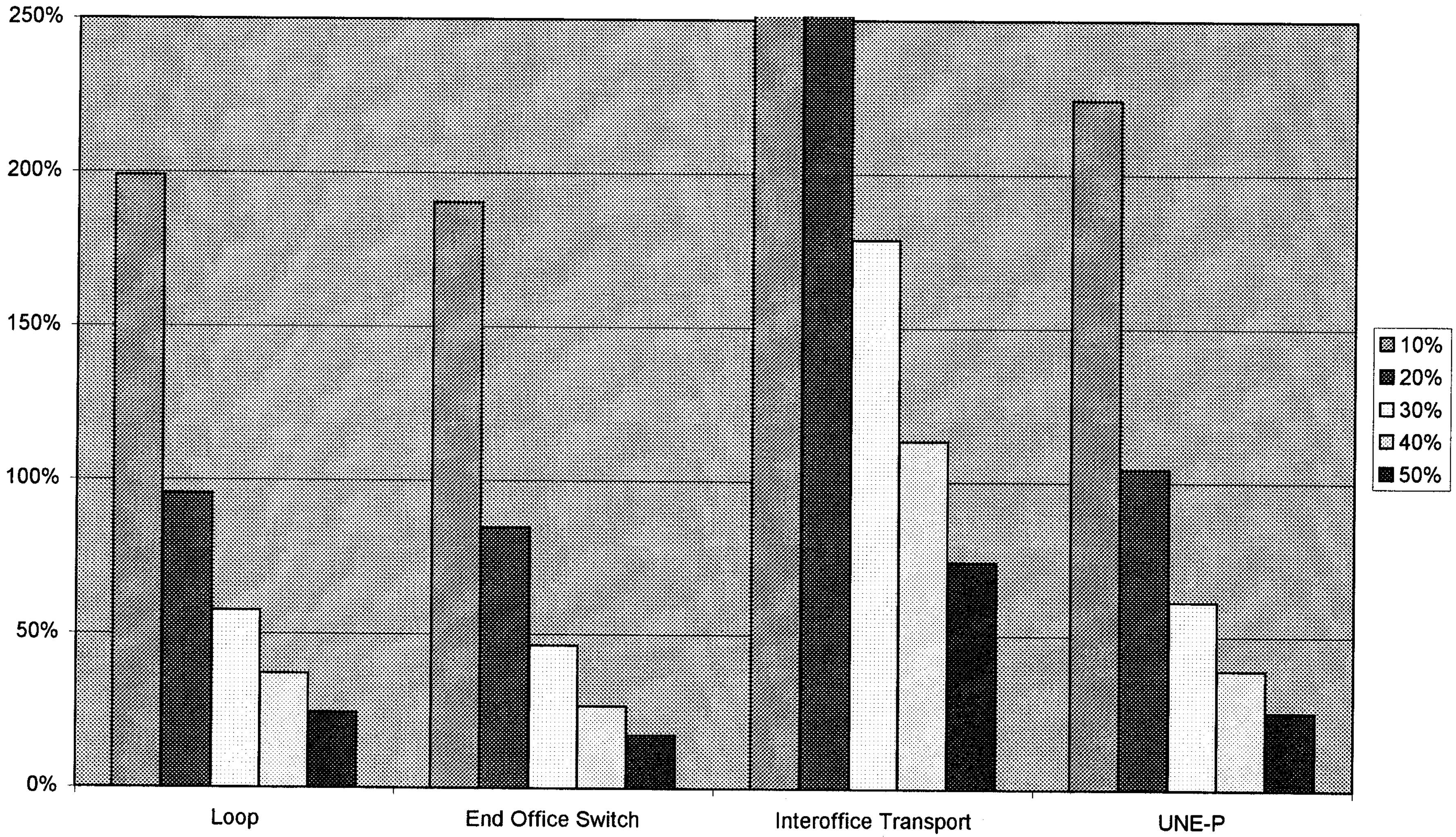
Chart 1



Interoffice transport cost disadvantages are off the scale at 10 and 20% market shares
UNE-P cost disadvantages are off the scale at a 10% market share

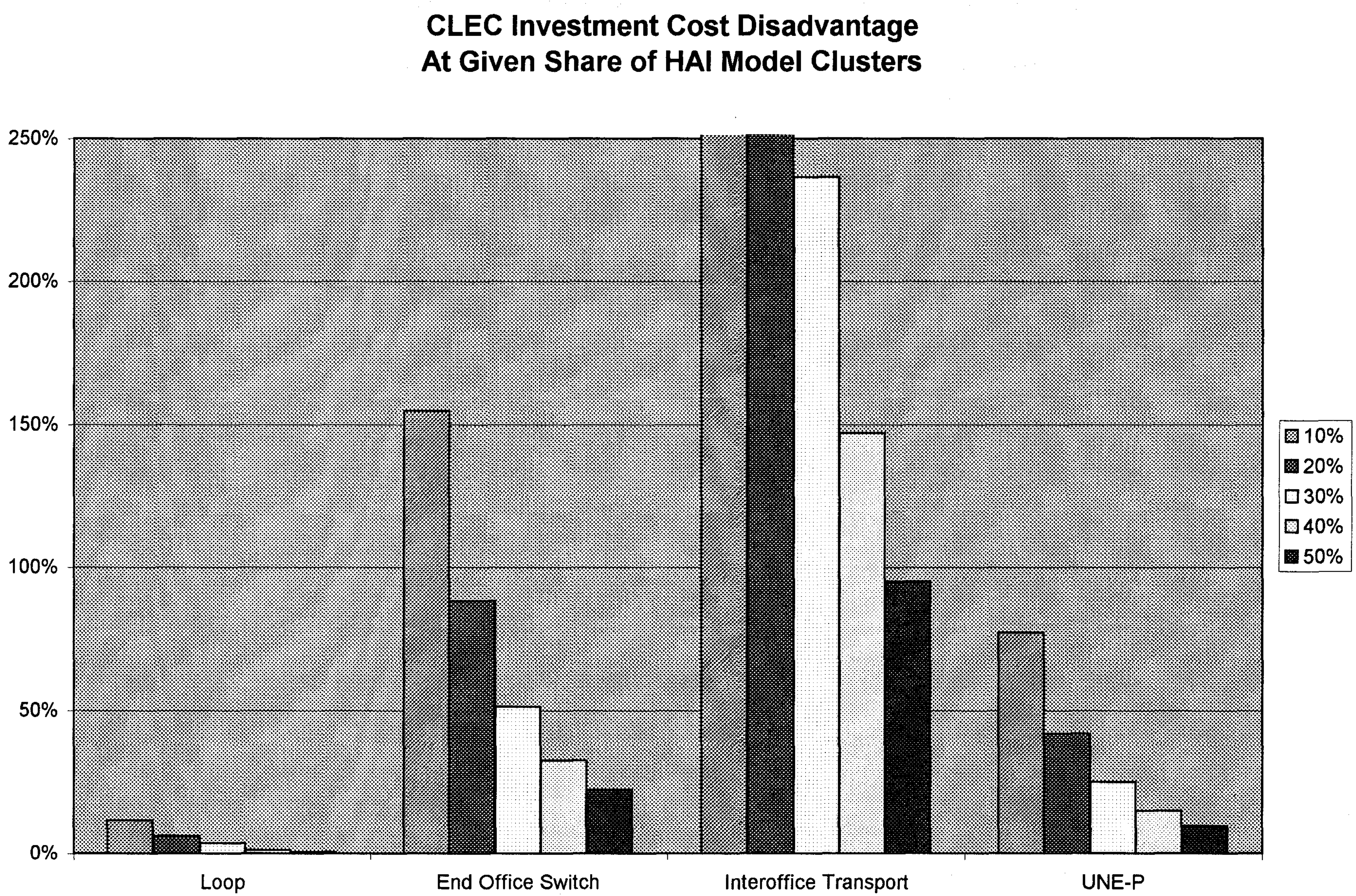
Chart 2

CLEC Monthly Cost Disadvantage At Given Share of HAI Model Lines



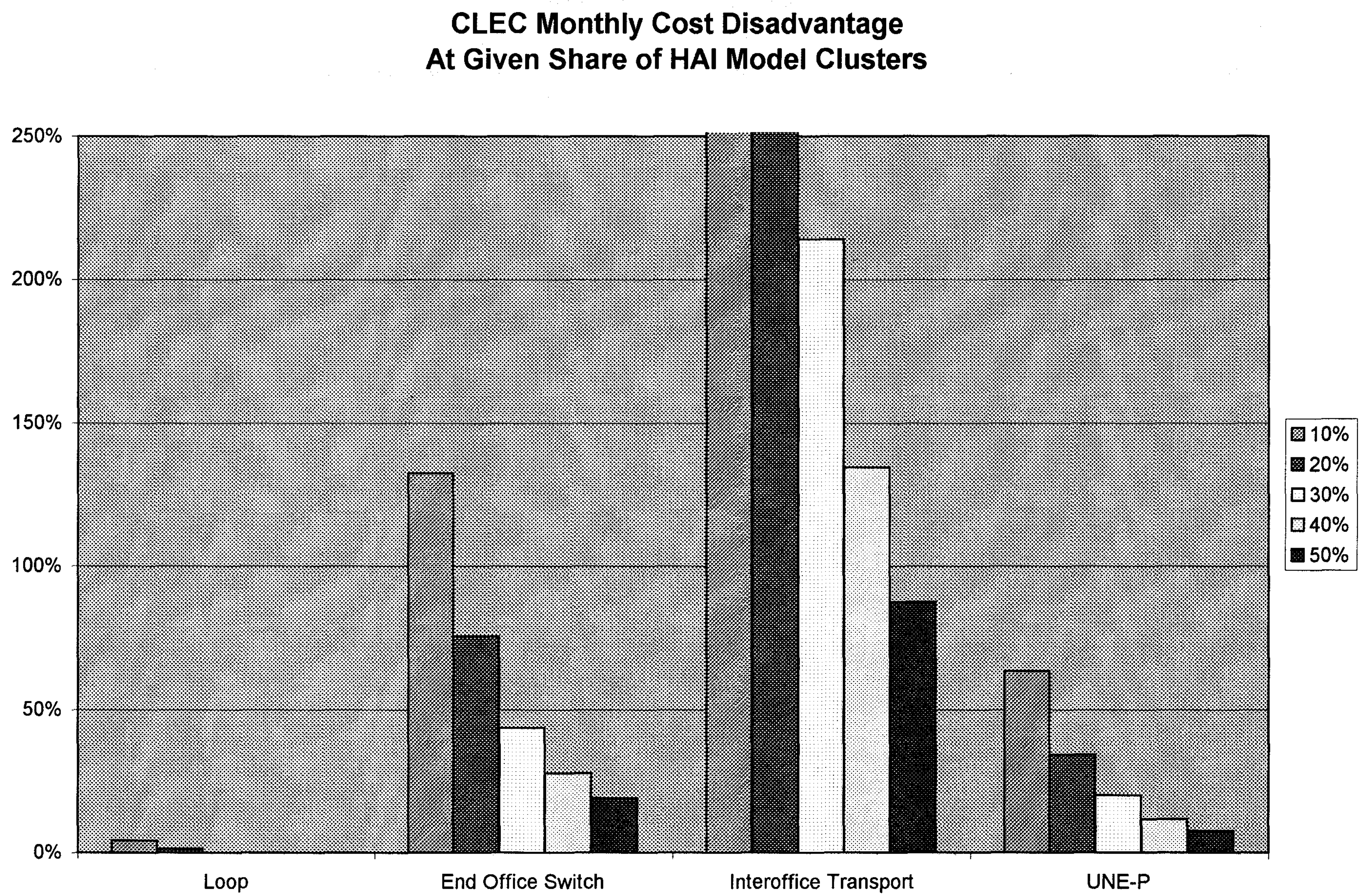
Interoffice transport disadvantages
are off the scale at 10 and 20% market shares

Chart 3



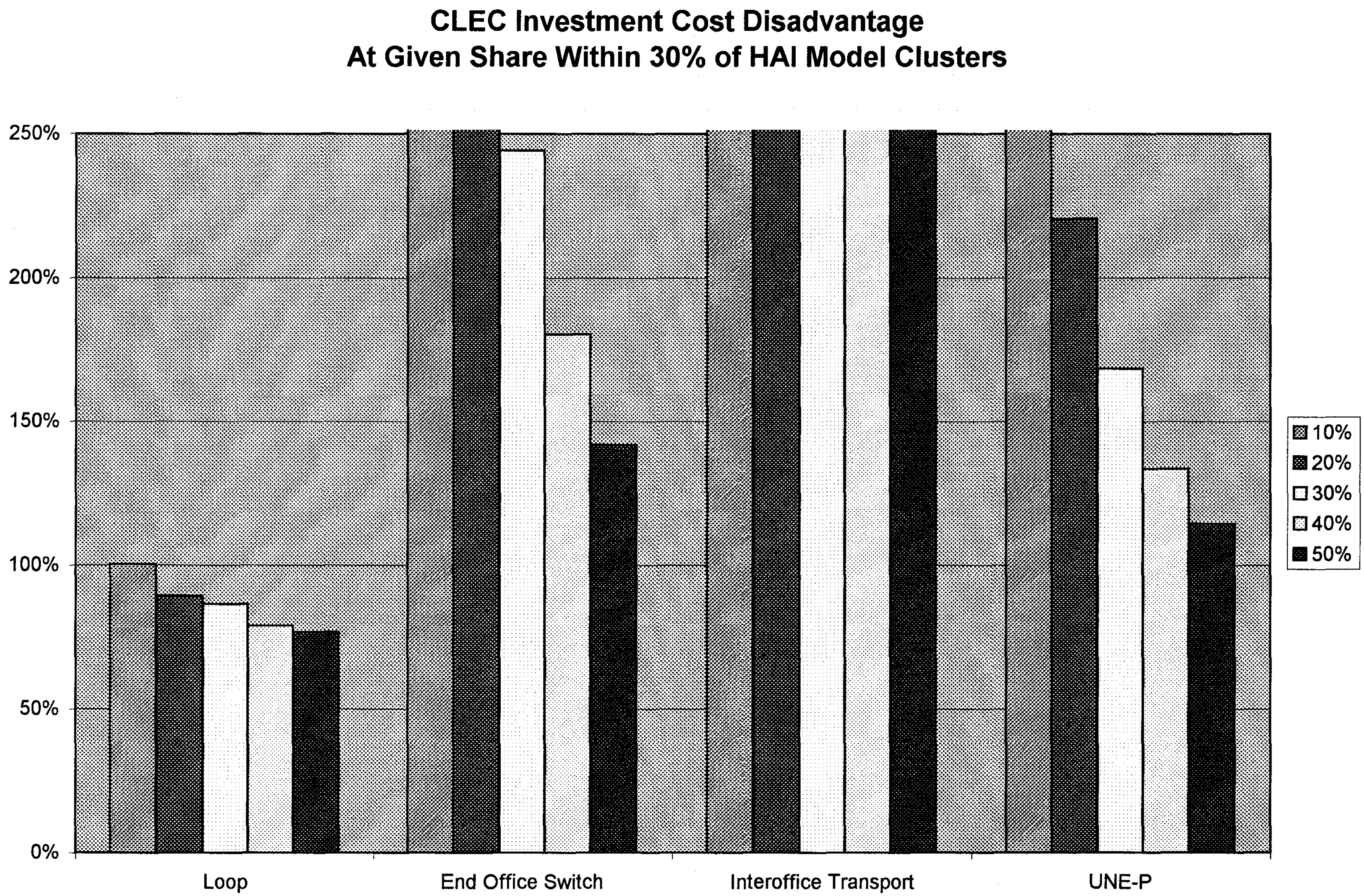
Interoffice transport cost disadvantages
are off the scale at 10 and 20% market shares

Chart 4



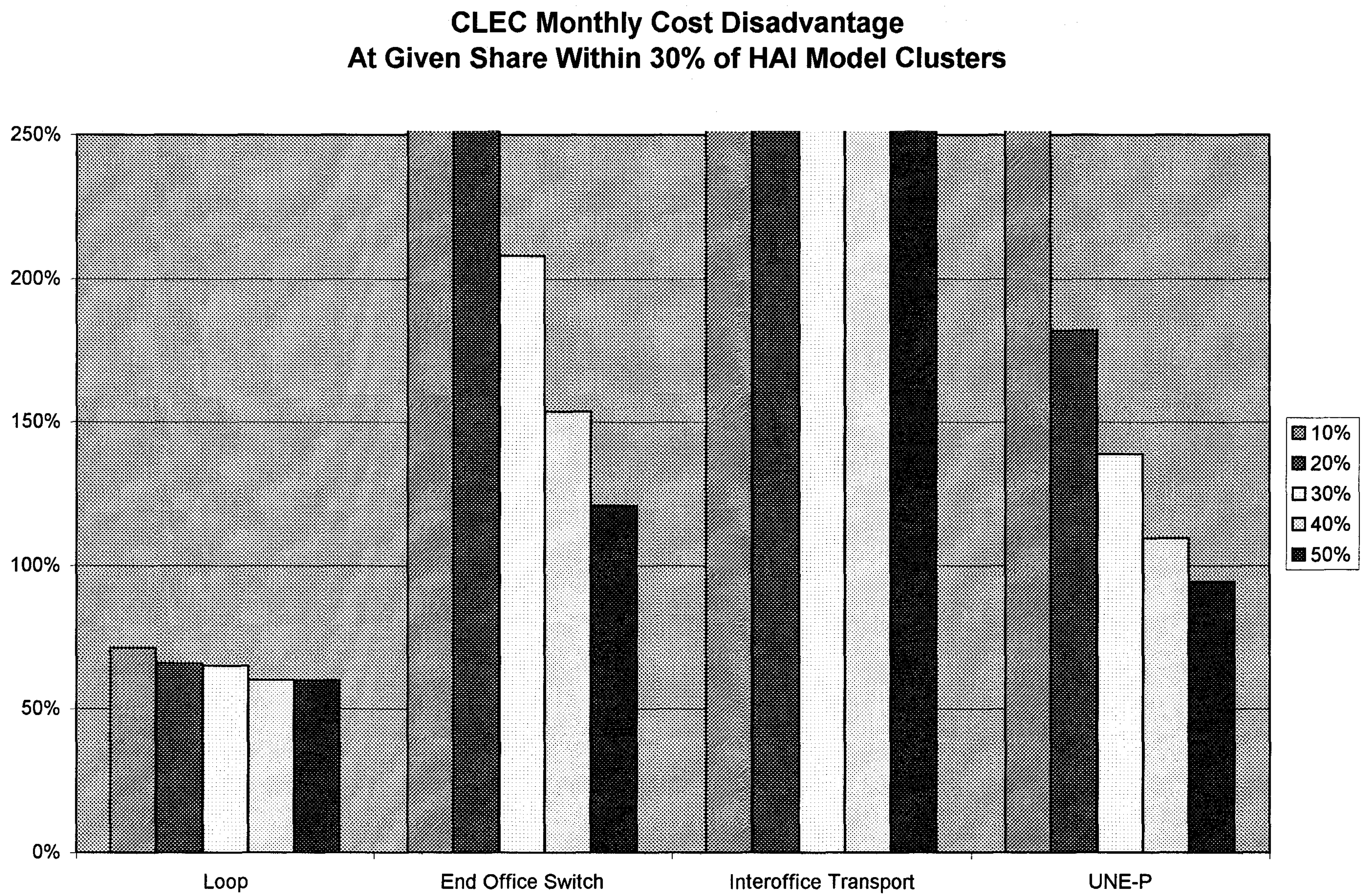
Interoffice transport cost disadvantages
are off the scale at 10 and 20% market shares

Chart 5



End Office Switch cost disadvantages are off the scale at 10 and 20% market shares
Interoffice transport cost disadvantages are off the scale at all market shares
UNE-P cost disadvantages are off the scale at a 10% market share

Chart 6



End Office Switch cost disadvantages are off the scale at 10 and 20% market shares
Interoffice transport cost disadvantages are off the scale at all market shares
UNE-P cost disadvantages are off the scale at a 10% market share

4

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 PP   PP  AAAA     NNN    NN  DD DD    RR   RR  OO OO   SS   SS
 PP   PP AA   AA   NNNN NN    DD   DD  RR   RR OO     OO SSS
 PPPPP   AA   AA   NN NNNN    DD   DD  RRRRR   OO     OO   SSS
 PP      AAAAAA    NN   NNN   DD   DD  RR RR   OO     OO     SSS
 PP      AA   AA   NN     NN  DD DD    RR   RR  OO OO   SS   SS
PPPP     AA   AA   NN     NN DDDDD    RRR   RR   OOO      SSSS
```

```
 2222    555555   3333
22  22  55       33  33
    22  55555        33
  222       55     333
 22         55       33
22  22  55  55   33  33
222222   5555     3333
```

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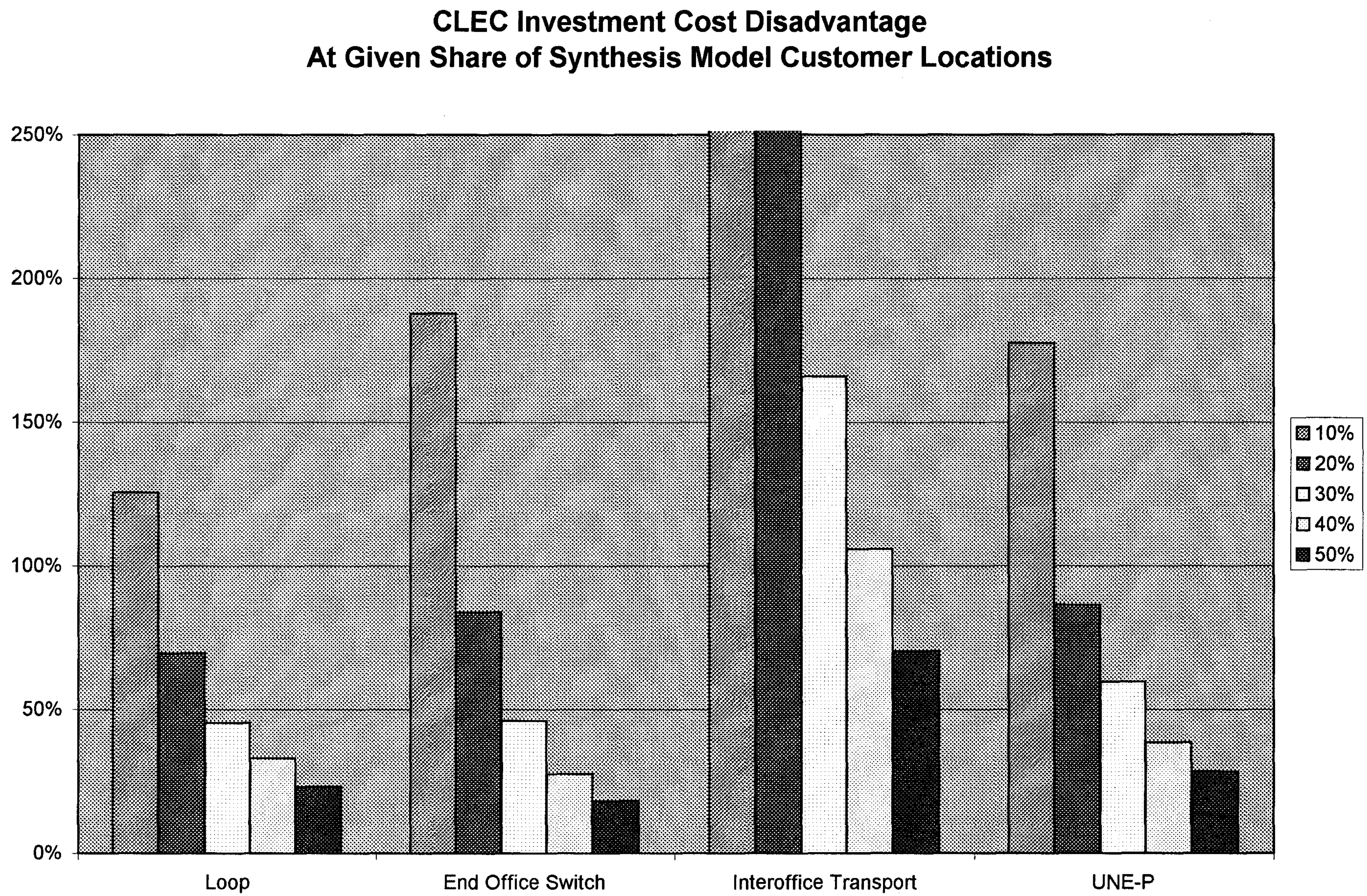
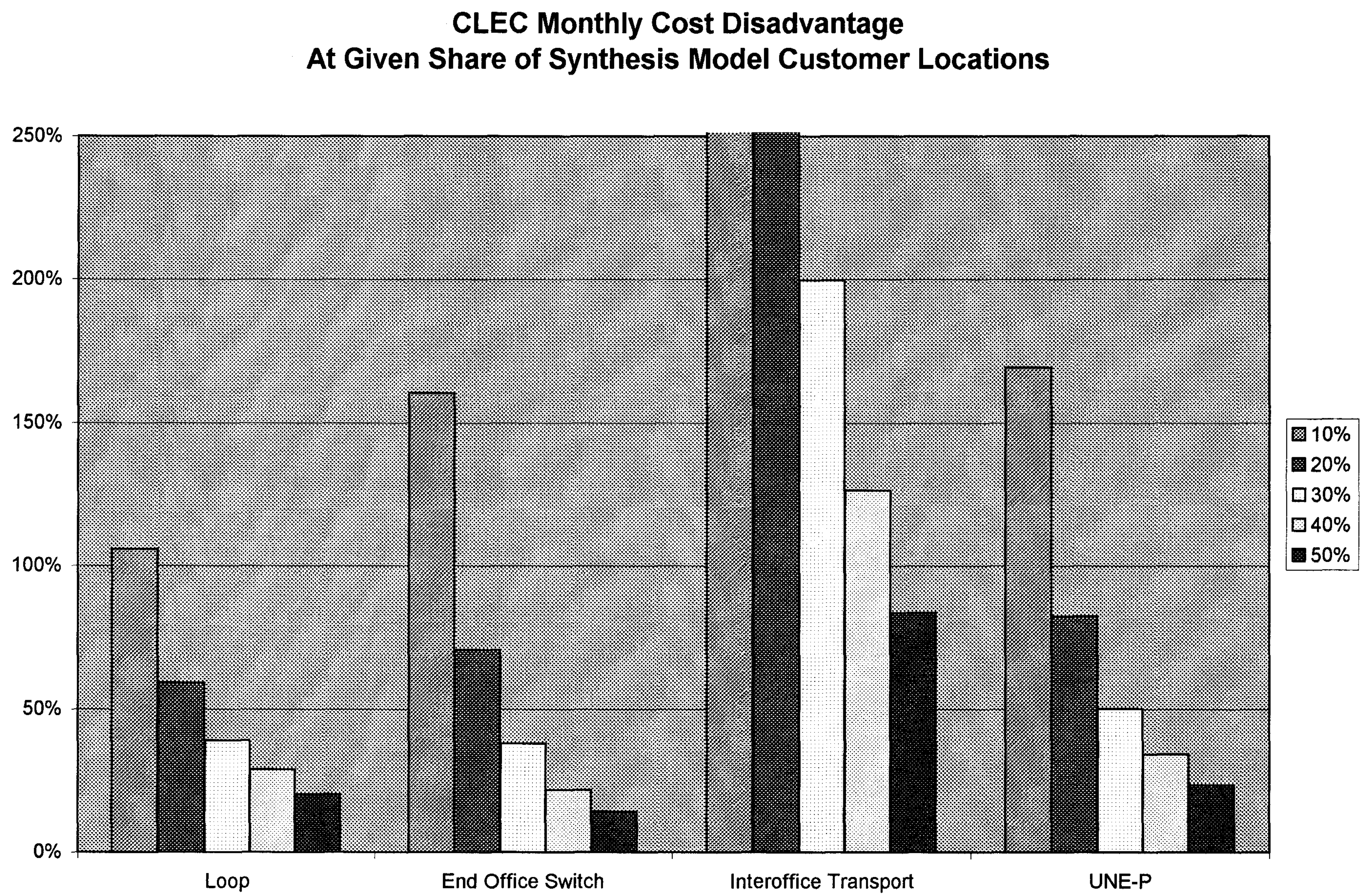
Chart 7



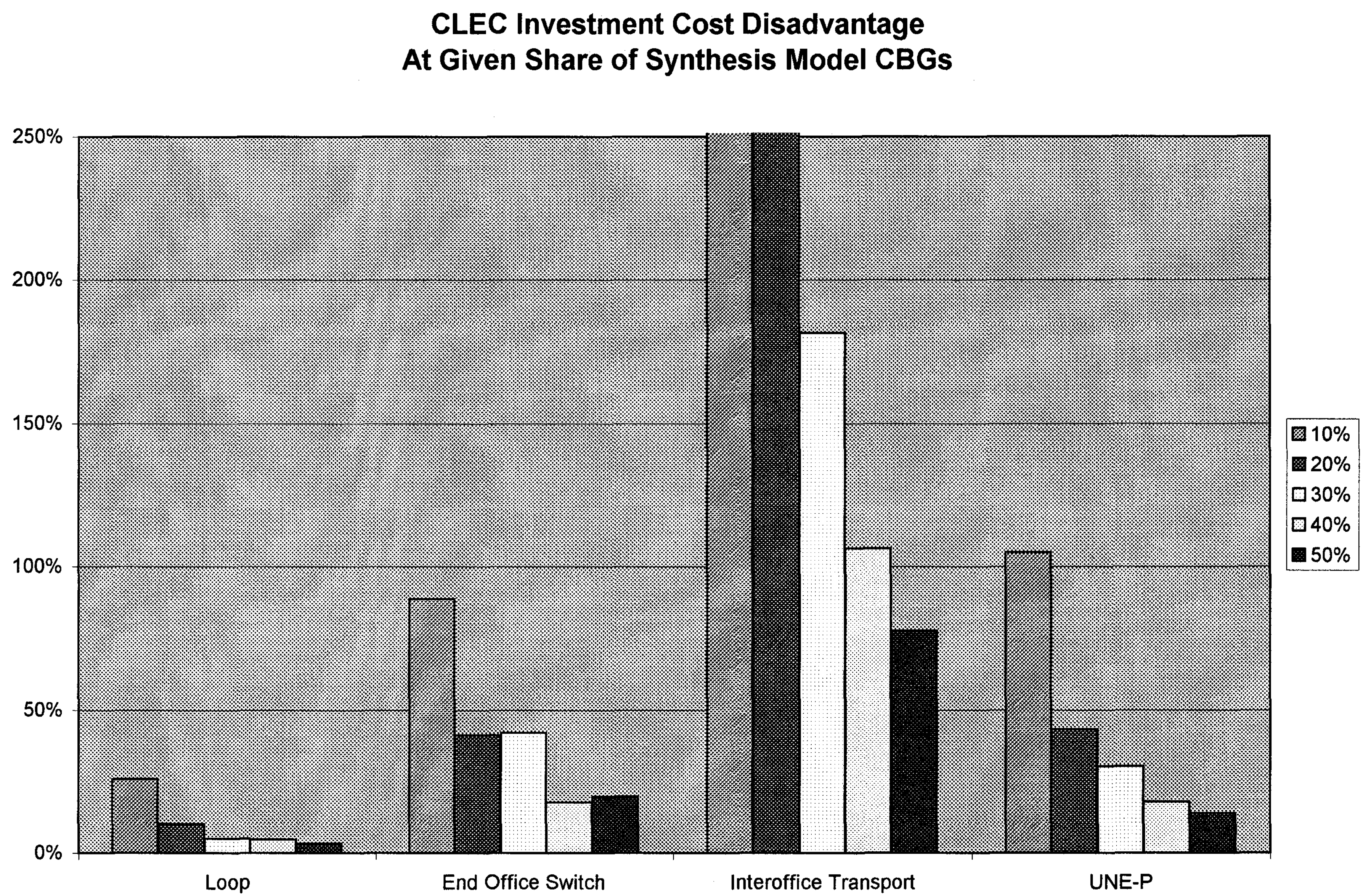
Interoffice transport cost disadvantages are off the scale at 10 and 20% market shares

Chart 8



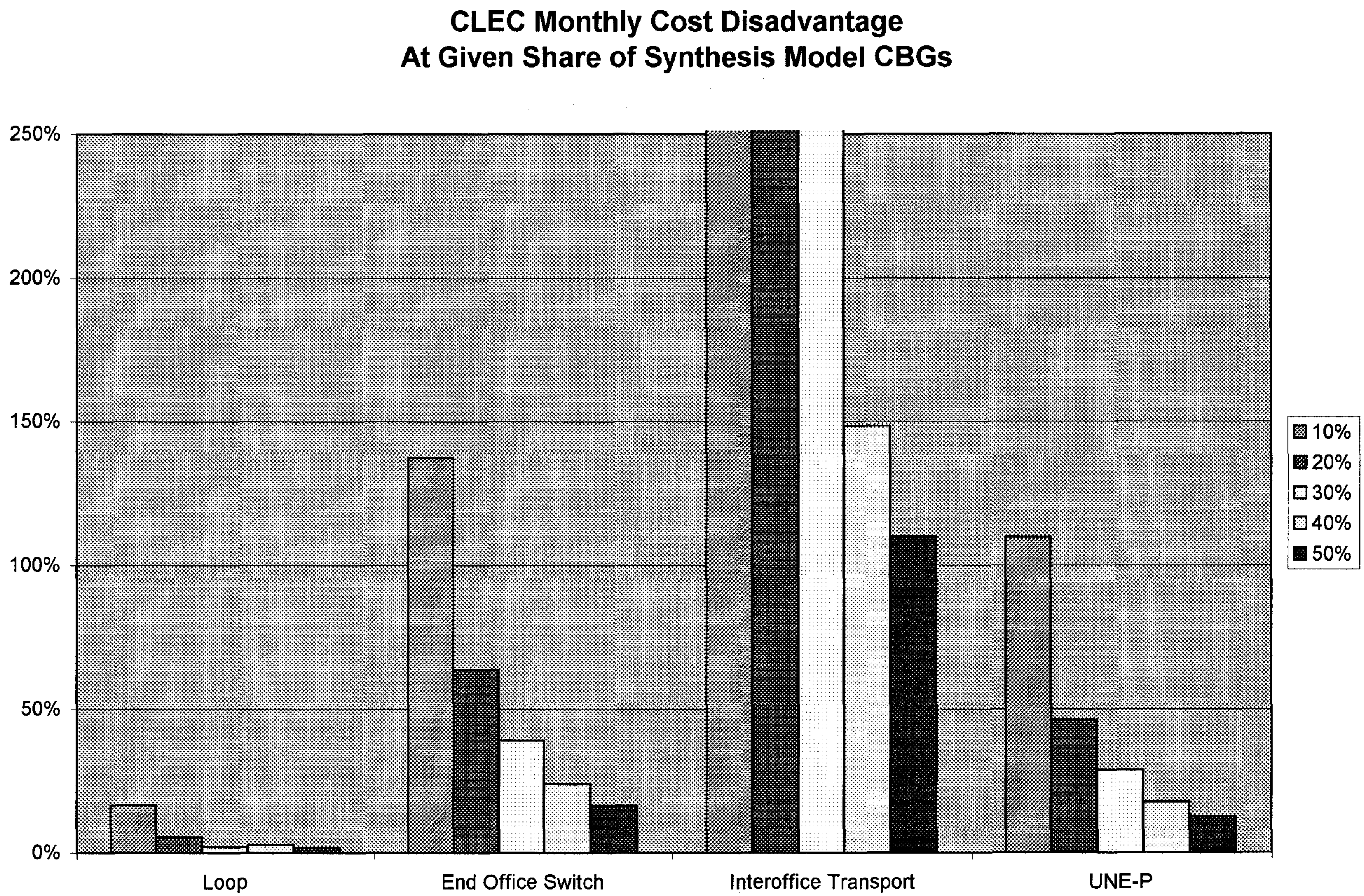
Interoffice transport cost disadvantages are off the scale at 10% and 20% market shares

Chart 9



Interoffice transport cost disadvantages are off the scale at 10% and 20% market shares

Chart 10



Interoffice transport cost disadvantages are off the scale at 10, 20 and 30% market shares