PUBLIC VERSION

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In The Matter of:	)	
REVIEW OF FEDERAL COMMUNICATIONS	)	
COMMISSION'S TRIENNIAL REVIEW ORDER	)	Case No. 2003-00379
REGARDING UNBUNDLING REQUIREMENTS	)	
FOR INDIVIDUAL NETWORK ELEMENTS		

DIRECT TESTIMONY OF DR. MARK T. BRYANT

On Behalf Of

MCIMETRO ACCESS TRANSMISSION SERVICES, LLC

AND

MCI WORLDCOM COMMUNICATIONS, INC.

February 11, 2004

I. IDENTIFICATION OF THE WITNESS AND SUMMARY OF CONCLUSIONS

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Mark T. Bryant, and my business address is 4209 Park Hollow Court, Austin, Texas.

Q. PLEASE DESCRIBE YOUR QUALIFICATIONS AND EXPERIENCE AS THEY PERTAIN TO THIS PROCEEDING.

A. I am self-employed as an economist providing consulting services in telecommunications regulatory and policy matters. I hold the Ph.D. degree from the University of Texas at Austin, and have over twenty years of experience in the telecommunications industry. Exhibit MTB-1 is a detailed description of my educational and professional qualifications.

Q. ON WHOSE BEHALF WAS THIS TESTIMONY PREPARED?

A. This testimony was prepared on behalf of MCIMetro Access Transmission Services, LLC and MCI WorldCom Communications, Inc. (hereafter "MCI").

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to provide an economic analysis of the impairment issue with respect to mass market switching in the state of Kentucky. I will discuss the economic framework and tools that should be applied to the analyses of triggers and the potential deployment of switch-based local exchange service by competitive local exchange providers ("CLECs"). I will also describe an analytic tool that can be used to provide estimates of the potential revenues and costs for a hypothetical switch-based CLEC considering entering local markets in Kentucky. This tool illustrates the economic impairment that would exist under

most sets of assumptions if the unbundled network element platform ("UNE-P") were no longer available, as well as to demonstrate how much the forecasted results are driven by the assumptions used. UNE-P, or unbundled network element platform, is a combination of all unbundled network elements required, in conjunction with other functions supplied by the CLEC, to offer a complete local exchange service. At issue in this proceeding is whether unbundled switching will continue to be available for use by CLECs in individual markets. Without access to unbundled switching, the CLEC would no longer have access to UNE-P, and would be required to self-supply the local switching function in order to offer a complete local exchange service.

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS AND RECOMMENDATIONS.

A. I recommend that the Commission adopt the incumbent local exchange carrier ("ILEC") wire center as the relevant market for analysis both of existing competitive switching supply (the "triggers" analysis) and of the potential for deployment of CLEC switching in Kentucky. Economic theory and practice, as well as the FCC's guidance in its *Triennial Review Order*, all suggest that the wire center is the most appropriate starting point for an analysis of whether CLECs are impaired without access to unbundled switching for mass-market customers. Use of the wire center as the basic building block for analysis accomplishes the FCC's goals of a granular analysis that maximizes accuracy of results, subject to the constraints of practicality. *Report and Order and Order on Remand and Further Notice of Proposed Rulemaking*, 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. 96-989); Deployment of Wireline Services Offering Advanced Telecommunications Capability (CC Docket No. 98-147*)*, FCC No. 03-36, (rel. Aug. 21, 2003) (hereinafter, "*Triennial Review Order*"), ¶ 130.

I also discuss an analysis of the economic factors that affect the potential deployment of switching capability by CLECs in the absence of the availability of UNE-P. This analysis illustrates that the profitability of CLECs offering local exchange services in the absence of unbundled switching is highly uncertain. A wide range of outcomes is possible, depending on the assumed value of a number of critical inputs to the analysis, including the market share achieved by the CLEC, the average expected time that a customer will remain a customer of the CLEC, the cost to the CLEC of handling "hot cut" migrations from the ILEC to the CLEC, and the average revenue per customer achieved by the CLEC, among others. Under the most optimistic assumptions, the analysis can illustrate that a CLEC may achieve profitability in some, but by no means all, wire centers in Kentucky. Under less optimistic assumptions, the analysis can illustrate that no wire center in Kentucky would be profitable for CLEC entry in the absence of UNE-P.

Because of this uncertainty, I urge the Commission to proceed cautiously both in the analysis of the actual deployment "triggers" and in the analysis of potential deployment of CLEC switching capacity. As I discuss in more detail in

the body of this testimony, an erroneous finding of no impairment with regard to access to unbundled switching in the mass market could have dire and irreversible consequences for Kentucky consumers, while an erroneous finding of impairment would entail far less serious consequences, and would likely be a self-correcting error.

II. INTRODUCTION

A. Impairment Must Be Decided Within The Specific Context Of The Industry And The Established Goals Of The Telecommunications Act Of 1996

Q. WHAT IS YOUR UNDERSTANDING OF THE FOCUS OF THIS PROCEEDING?

A. The Commission must determine whether unbundled switching and, therefore, the so-called "UNE Platform" or "UNE-P" should continue to be available as a vehicle for competitors to offer local telephone service to residential and very small business customers ("mass-market customers") in Kentucky. The Telecommunications Act of 1996 ("Act") provides certain guidelines for that determination, but it is up to the Commission to interpret those guidelines and determine whether the continued availability of unbundled switching in Kentucky is consistent with the established goals of the Act and the specific context of the telecommunications industry in this state.

Q. PLEASE BRIEFLY DESCRIBE THE RELEVANT INDUSTRY CONTEXT.

A. The Commission must consider how best to achieve the Act's pro-competitive goals in the context of today's telecommunications industry. More and more, competing telecommunications providers are offering consumers *bundles* that combine local, long distance, and Internet services, rather than marketing these services individually. In Kentucky, for example, MCI offers "The Neighborhood," a bundle of local and long distance calling, with optional calling features and Internet access, BellSouth offers "BellSouth Answers," a bundle of local and long distance calling, with optional calling features, Internet access, and wireless service, and Z-Tel offers "Z-Line Home Unlimited," a bundle of local and long distance calling with advanced calling features. And more and more, consumers are opting for "one-stop shopping," buying bundled services from a single provider. This is especially true in states where the ILEC is now able to offer interLATA long-distance services along with the local and intraLATA services for which it was previously the monopoly supplier. The increasing popularity of bundling—and the ILEC's ability to provide a complete bundle of services—makes viable local competition an essential precondition for preserving competition in the long distance and Internet services markets.

The strong consumer demand for bundled products puts a monopoly provider of local service in a good position to leverage its monopoly into other services. ILECs such as BellSouth stand poised to re-monopolize the competitive long-distance markets made possible by the divestiture of the former Bell System

and to extend the former Bell monopoly into newly emerging, and initially competitive, Internet services markets as well.

Supply-related considerations also encourage the creation of service bundles and provide the ILECs with potential monopoly power. For example, ILECs are adding broadband capability to the steadily increasing percentage of lines served via fiber feeder and Digital Loop Carrier ("DLC"). **BEGIN CONFIDENTIAL MATERIAL ***% END CONFIDENTIAL MATERIAL** of all BellSouth loops in Kentucky currently are served via fiber feeder and DLC. At the ILECs' urging, the FCC in its *Triennial Review Order* eliminated any requirement under Section 251 of the Act for incumbents to provide competitors with unbundled access to the newly added capabilities of their fiber-fed loops. *Triennial Review Order* ¶ 213. This strategic management of technology allows ILECs to bundle narrowband and broadband services for the millions of customers served over fiber-fed loops in a manner that competitors cannot readily replicate.

This is no accident. ILECs are well aware that customers who obtain their broadband Internet access and their local service from a single provider are more "sticky"—*i.e.*, they are less likely to switch carriers. For example, SBC announced recently that:

- "Adding long distance to an access line reduces the company's churn rate by 9 percent.
- "Churn drops by 61 percent when a DSL line is added to an SBC bundle.

- "Together, long distance and DSL reduce churn by 73 percent."

SBC press release, "SBC Communications Provides Progress Report On Major Growth Strategies, Outlines Broad Service and Cost Initiatives," November 13, 2003. Thus, the inability to match an ILEC's bundle of broadband and narrowband services puts CLECs at a severe disadvantage not only as potential providers of broadband service, but also as competitors for basic voice-grade local service.

Moreover, the ILEC strategy targets less densely populated suburban and rural areas in which it is particularly difficult for CLECs to find or build alternatives to the ILEC network. SBC touted Project Pronto as extending its broadband services to customers beyond the reach of traditional DSL-over-copper solutions, typically, customers located more than 18,000 feet from the central office. (SBC Investor Briefing No. 211, October 18, 1999). There is no simple, inexpensive alternative for competitors to deliver high-quality, ubiquitous broadband service to such customers without using the ILECs' fiber-fed loops. Hence, the ILECs' broadband-over-fiber strategy jeopardizes rural customers' right to a meaningful choice of service providers.

B. State Impairment Decisions Must Also Be Meaningful within the Context of the Triennial Review Order*'s National Findings concerning Mass-Market Switching*

Q. WHAT NATIONAL FINDING OR FINDINGS DID THE FCC MAKE WITH RESPECT TO UNBUNDLED SWITCHING IN ITS *TRIENNIAL REVIEW ORDER*?

A. The FCC found on a national level that requesting carriers are impaired without access to unbundled local switching when serving mass market customers. *Triennial Review Order* ¶ 419.

Q. WHICH END-USER CUSTOMERS DID THE FCC INCLUDE UNDER THE HEADING OF MASS-MARKET CUSTOMERS?

A. The FCC has defined mass-market customers to include all residential customers as well as very small business customers. *Triennial Review Order* ¶ 127. The FCC did not identify a specific cutoff for the size of businesses considered to be part of the mass market; however, it did provide some guidance on this point. I will discuss this matter further below, in the section of my testimony that addresses market definition issues

Q. WHAT WAS THE BASIS FOR THE FCC'S NATIONAL FINDING OF IMPAIRMENT FOR MASS-MARKET SWITCHING?

A. The FCC identified a number of factors that contribute to CLEC impairment without access to unbundled local switching. These factors include the difficulty faced by CLECs in transitioning customers from UNE-P based service to UNE-L based service:

> Inherent difficulties arise from the incumbent LEC hot cut process for transferring DS0 loops, typically used to serve mass market customers, to competing carriers' switches. These hurdles include increased costs due to non-recurring charges and high customer churn rates, service disruptions, and incumbent LECs' inability to handle a sufficient volume of hot cuts. Accordingly, based on those barriers, we make a national finding that competitive carriers providing service to mass market customers are impaired without unbundled access to local circuit switching.

Triennial Review Order ¶ 422. The FCC also noted that other operational issues, such as delays in ILEC provisioning of loops and collocation facilities or difficulties in obtaining cross-connects, as well as economic issues such as the relationship between revenues and the cost of obtaining unbundled network elements and the cost of overcoming operational difficulties, may affect the potential deployment of CLEC switches to serve mass market customers. *Triennial Review Order* ¶¶ 456-458.

C. The Commission's Tasks

Q. WHAT DECISIONS MUST THE COMMISSION MAKE IN THIS PROCEEDING?

A. The Commission must conduct a market-by-market investigation into whether barriers to entry "are likely to make entry into a market uneconomic." *Triennial Review Order* ¶ 84. As I noted above, the FCC made a national finding that CLECs are impaired without unbundled access to ILEC local switching to serve mass-market customers. The Commission must consider detailed evidence at a more granular level to determine if this finding is overcome in some markets in Kentucky.

Q. PLEASE DESCRIBE THE PROCESS THE COMMISSION SHOULD FOLLOW IN REACHING THESE DECISIONS.

A. The first step in the analytical process, logically (although it need not be procedurally), is to define the markets in which the Commission will consider evidence of impairment on a "granular basis to each identifiable market." *Triennial Review Order* ¶ 495.

I recommend that the Commission adopt a market definition that permits the most unambiguous and accurate answer to the question of whether CLECs are impaired without access to unbundled switching in a given market. Implicitly, therefore, the market definition and every step of the subsequent analysis should allow the Commission to assess whether there is evidence that clearly demonstrates that the basis for the national finding of impairment does not apply in a specific defined market.

Once the Commission has defined the relevant markets, it must then "identify where competing carriers are not impaired without unbundled switching, pursuant to the triggers and analysis of competitors' potential to deploy." *Triennial Review Order* ¶ 473. Both the "trigger" analysis and the analysis of potential deployment apply on a market-by-market basis, and the FCC has specified that states must use the same market definition in conducting both analyses. *Id.* ¶ 495. Hence, the task before the Commission in this phase is to determine what market definition is most appropriate, given that the same definition will be used to conduct both "trigger" and potential deployment analyses.

1. Analysis of Triggers

Q. PLEASE DESCRIBE THE FCC'S REQUIREMENT FOR ANALYSIS OF "TRIGGERS."

A. The FCC found actual marketplace entry to be the most compelling evidence of the lack of impairment. *Triennial Review Order* ¶ 498. This was so for two reasons: (1) where significant competition already existed in a particular market, customers already have a real choice among competitors, and (2) the existence of multiple competitors actually providing service in a market demonstrates that other competitors also are likely able to enter the market. Therefore, the FCC established two actual marketplace entry "triggers" that could constitute evidence of lack of impairment in a particular market: one relating to the number of carriers that self-deploy switches to serve the mass market, and the other relating to the number of carriers that provide wholesale switching to other carriers for use to serve the mass market. The trigger is reached in a particular market if there are at least three carriers self-deploying switching or two carriers providing wholesale switching. *Id.*, ¶¶ 501, 504. In each case, a carrier only counts toward the trigger in a particular market if that carrier is unaffiliated with the incumbent; carriers affiliated with one another, but not the incumbent, only count as a single carrier toward satisfying the pertinent trigger. *Id.*, ¶ 499. CMRS (wireless) carriers do not count toward either trigger. *Id.*, n. 1549.

Q. WHAT IS THE PURPOSE OF THE TRIGGER ANALYSIS?

A. The FCC prescribed an analysis of triggers to provide "bright-line rules" that "can avoid the delays caused by protracted proceedings and can minimize

administrative burdens." *Triennial Review Order* ¶ 498. The most reasonable interpretation of this objective is that triggers are intended to deal with the "no brainer" cases in which it is virtually certain that the national finding of impairment does not apply to a particular local market because the customers in the market already have significant alternatives and other competitors can readily enter.

But, the trigger analysis only makes sense in a rationally defined market. If a market is defined too large, a commission might (if a carrier were not required to serve a geographically dispersed customer base to qualify as a trigger) find no impairment even where many customers have no current choice of alternative providers and it is not certain new competitors can enter. If, for example, a market is defined to include both Louisville and Frankfort, the presence of CLEC collocations in Louisville could lead to a finding of non-impairment in Frankfort even though customers in Frankfort currently have fewer if any choices among different providers. The ILECs may say that customers in Frankfort will in the future have a choice of different providers. But that is a question of potential deployment that cannot be answered by a bright line inquiry based on the triggers. As will be discussed further below, it certainly is not clear that in the future customers in Frankfort will have a choice just because customers in Louisville have such a choice. In general, these sorts of questions are the subject matter of the economics of market definition, and the FCC delegated the task of market definition for the state of Kentucky to the Commission. *Id.* ¶ 495.

Q. HOW DOES YOUR TESTIMONY ADDRESS THE PROPER MARKET DEFINITION FOR A TRIGGER ANALYSIS?

A. Because the FCC requires that the same delineation of the state into markets must be used for both the trigger analysis and the analysis of potential deployment, *Triennial Review Order* ¶ 495, I have considered both purposes in the market definition section below. Market definition is crucial to the outcome of the Commission's trigger analysis; if the market is not defined correctly, the trigger analysis is likely to produce an incorrect result.

For instance, if the FCC had determined that each state constitutes an appropriate market, it is likely that many states would have three retail CLECs using their own switches somewhere in the state, and the retail trigger would arguably be satisfied (again, if there were no requirement that the potential triggering carrier's customer base be geographically dispersed) throughout the state even though this would say nothing about whether most customers had alternatives or were likely to do so. For the reasons discussed at some length in my Market Definition section, defining the entire state as a market is an approach that clearly would not make sense, and the FCC correctly required that state commissions conduct a market-by-market analysis at a more granular level. *Id.*

Q. WHAT ARE THE CONSEQUENCES OF THE TWO POSSIBLE OUTCOMES OF THE COMMISSION'S DECISION REGARDING SATISFACTION OF THE TRIGGERS IN A GIVEN MARKET?

A. When considering evidence as to whether the triggers are satisfied in a particular market, the Commission should bear in mind the consequences of the two

alternative outcomes. If the Commission finds three qualifying self-provisioning CLECs in a market, suitably defined, and finds that the CLECs serve a sufficient number of customers in the market (as well as meeting the other trigger criteria discussed in the Direct Testimony of Joseph Gillan), a finding of no impairment is required, and UNE-P competition is terminated. In areas within the market in which self-provisioning CLECs are competing, existing UNE-P customers will then have the choice of migrating to one of these CLECs (or another CLEC that enters) or migrating back to the ILEC.

Customers in other areas within the market may end up with no alternative. If existing self-provisioning CLECs do not already serve the entire market, as defined, they may be unable, for whatever reason, to expand, and other CLECs may not share the Commission's conclusion that they can self-provision facilities to compete with the ILEC without access to the ILEC's local switching UNE. In this case, UNE-P competition will have made a false start, and customers will have to return to the ILEC.

In contrast, if the Commission's trigger investigation fails to reach a finding of no impairment, the consequence is simply that the investigation must proceed to the more detailed analysis of potential deployment, as called for in the *Triennial Review Order*. This more detailed analysis affords the Commission a better chance of being certain that a finding of no impairment will truly be in the interest of Kentucky consumers, while at the same time providing ample opportunity to find no impairment if none truly exists. Hence, there is little

downside—and a substantial upside—to a decision that the triggers do not justify a finding of no impairment.

For all of these reasons, I urge the Commission to conduct any trigger analyses in a manner that errs on the side of caution in protecting the interests of Kentucky consumers. Any decision to overturn the national finding of impairment for mass market switching based on triggers should rest on incontrovertible evidence that competitive carriers are today able to offer Kentucky's residential and small business customers competitive choices, even without access to UNE switching.

2. Analysis of Potential Deployment

Q. PLEASE DESCRIBE THE ANALYSIS REQUIRED TO EVALUATE THE PROSPECT OF POTENTIAL DEPLOYMENT.

A. In the absence of clear evidence of no impairment in the form of actual self-provisioning by CLECs that satisfies the "bright-line rule" of the FCC's prescribed trigger analysis, the Commission must proceed to the question of the market's "suitability for multiple, competitive supply." *Triennial Review Order* ¶ 506. This analysis is addressed to the definition of impairment in ¶ 84: "We find a requesting carrier to be impaired when lack of access to an incumbent LEC network element poses a barrier or barriers to entry, including operational and economic barriers, that are likely to make entry into a market uneconomic." This is essentially a test based on the Commission's prediction about a CLEC's investment decisions. Namely, will a CLEC decide to deploy facilities to substitute for UNE switching, after evaluation the potential for profit and the need

to overcome the barriers to entry? Of course, these barriers are not just economic barriers. Operational barriers pose a threshold test of whether UNE-L competition is feasible, and that test is addressed in the accompanying testimony of James Webber and Sherry Lichtenberg. These operational barriers also affect the economic analysis. Even if a CLEC determines that operational barriers are not insurmountable in and of themselves, the CLEC must take account of the expected cost and extra risk associated with overcoming these barriers in making a decision of whether to enter. The economic analysis below very conservatively assumes no risk and cost in overcoming these barriers.

Q. PLEASE DESCRIBE THE CONSEQUENCE OF THE TWO POSSIBLE OUTCOMES OF THE ANALYSIS OF POTENTIAL DEPLOYMENT.

A. In any given market, the Commission could make a finding of no impairment, or could find that the evidence presented is insufficient to overcome the FCC's national finding of impairment. In the event of a finding of no impairment, UNE-P competition will be terminated, and all consumers currently served by UNE-P CLECs will be forced to make a change in their telephone service: either switching back to the ILEC, switching to a UNE-L CLEC, or switching to their existing CLEC's new UNE-L facilities. If the Commission's finding of no impairment is incorrect, the customer's only option will be to switch back to the ILEC. On the other hand, if the FCC's national finding of impairment is not overcome by the evidence of potential deployment in a particular market, the ILECs will still have additional opportunities to demonstrate no impairment. They can show the Commission that the existing impairment could be overcome

by some form of "rolling access" to unbundled local switching for a limited period. And if new evidence shows either potential or actual deployment, they can come back to the Commission and make their case again. Ultimately, a finding of continued impairment maintains the status quo until new, more compelling evidence is presented.

I expect that with the passage of time, existing barriers to entry will diminish in importance to the point that the evidence will confirm either that the triggers have been met or that potential deployment is likely. Nonetheless, there may be some markets for which unbundled switching will be essential to competitive entry for many years to come.

D. Decision Criteria

Q. WHAT CRITERIA SHOULD THE COMMISSION APPLY WHEN REACHING DECISIONS IN THIS PROCEEDING?

A. Although the decisions the Commission must reach in this proceeding are clear – whether CLECs impaired without access to unbundled switching to serve mass-market customers – the Commission must exercise its judgment as to the weight given to conflicting evidence and analytical methods. As I will show in my analysis below, the evidence on which the Commission must ultimately rely will demonstrate that there is significant uncertainty as whether the CLECs will be able to survive in most markets as switched-based providers of service in the mass market.

In this circumstance, the Commission should consider the consequences of alternatives when assigning weight to the evidence supporting the alternative

decisions. As discussed above, the consequences of a finding of no impairment are very different from the consequences of the alternative, both at the stage of trigger analysis and in the analysis of potential deployment. A finding of no impairment, at whatever stage of the analysis, is essentially irreversible and initiates a process of wrenching change in the local exchange market. A decision that the available evidence does not overcome the national finding of continued impairment is a provisional finding at whatever stage of analysis it is made.

Q. IN WHAT SENSE IS A FINDING OF CONTINUED IMPAIRMENT "PROVISIONAL?"

A. Whenever the Commission determines that the available evidence does not overcome the national finding of continued impairment, that determination is always subject to reconsideration. If the Commission finds that the triggers are not satisfied in a particular market, the Commission must reconsider the implied *provisional* finding of continued impairment when it examines evidence of potential deployment in that market. *Triennial Review Order* ¶ 506. If the Commission determines that evidence regarding potential deployment does not overcome the national finding of continued impairment, that *provisional* decision will be reconsidered in the context of any proposals to overcome existing impairment by rolling access to unbundled local switching for a limited time period. *Id.* ¶ 521. If the Commission determines that no proposal for limited "rolling access" suffices to overcome existing impairment in a particular market, that *provisional* decision is always subject to reconsideration on the basis of new evidence. *Id.* ¶ 526.

Indeed, insofar as existing barriers to entry diminish in importance, I expect that the increasing provision of service via UNE-L will naturally create a body of evidence supporting a finding of no impairment in a growing number of markets. A determination that the evidence for a particular market does not yet overcome the national finding of continued impairment is always provisional in the sense that the Commission can always revisit the state of evidence in that market and make a finding of no impairment as soon the level of actual or potential facilities-based competition in that market justifies such a finding.

Q. IN WHAT SENSE IS A FINDING OF NO IMPAIRMENT IRREVERSIBLE?

A. A finding of no impairment will initiate a period of substantial changes in the market, both for consumers and for providers. CLECs that cannot justify using their own scarce capital resources or cannot secure outside capital sources to invest in self-provisioned switching will have to go out of business, or change their business plans and focus on other parts of the markets, *e.g.*, serving enterprise customers. Consumers will be left with few or no alternatives to the ILECs, until and unless CLECs invest in switching. Although it is conceivable that the CLECs could reenter the market if technology changes to improve the prospect of earning profits, this may not happen for some time. Furthermore, once a CLEC exits the market, it will face a significant new barrier to entry – the cost of establishing a brand name and acquainting a new generation of customers with a competitive local telecommunications market.

Q. IS IT APPROPRIATE FOR THE COMMISSION TO CONSIDER THE IRREVERSIBLE CHARACTER OF A FINDING OF NO IMPAIRMENT AND THE PROVISIONAL CHARACTER OF A FINDING THAT THE EVIDENCE DOES NOT YET OVERCOME THE NATIONAL FINDING OF CONTINUED IMPAIRMENT?

A. Yes, I believe it would be a grave error for the Commission not to consider these implications of its decisions. In particular, the Commission should recognize, and attempt to minimize, the consequences of the two kinds of decision-making errors that are possible in this proceeding.

First, the Commission could determine that CLECs are not impaired without access to unbundled switching when, in fact, they are impaired. (This would constitute what statisticians call a "Type I" error.) As I noted above, such a decision would do irreversible harm to the prospects for local exchange competition in Kentucky and would therefore deprive mass-market consumers in Kentucky of the benefits of such competition. Moreover, with the increasing prevalence of bundling, any decision that impedes local exchange competition will have spillover effects in the long-distance market. Long distance carriers that are unable to offer a bundled local/long-distance product will find it difficult to survive in the marketplace. This could lead to an outcome where there are few or no alternative to the ILEC for long distance and local service. Kentucky consumers would lose the benefits of the long-distance competition that they have enjoyed for many years.

Second, the Commission could judge that CLECs are impaired when, in fact, they are not. (This would constitute what statisticians call a "Type II" error.) As I explained above, there is a good chance that such an error would be self-correcting. If CLECs are not impaired without access to UNE switching, I would expect more CLECs to self-provision switching in the relatively near future. Thus, for any particular market definition, the number of self-provisioning carriers will increase until the three-carrier trigger is met. The incumbent would certainly bring this fact to the Commission's attention at the first available opportunity in one of the follow-on trigger reviews.

Decision theorists use a "loss function" to capture the perceived cost of each type of error. The loss function quantifies the cost, in terms of lost societal (both consumer and producer) welfare, incurred for a given regulatory action and a given set of facts about CLECs' true ability to enter without access to unbundled switching. Because a false finding of no impairment would cause irrevocable harm, whereas a false finding of impairment has only temporary consequences, the cost to society of the former (Type I) error is far greater than the cost of the latter error.

There are many cases where the modeling proves unambiguously that self-provisioning of switching by the CLECs is unprofitable and will remain so for the foreseeable future. In this case, there is no need to introduce a complicated decision rule; the CLECs are certainly impaired. Where the ability of CLECs to serve mass market consumers without access to unbundled switching is ambiguous, however, the Commission should makes its decision in a way that

minimizes the expected consequences to Kentucky consumers and the Kentucky economy by erring on the side of caution, and applying the strictest possible standard before making a finding of no impairment in any Kentucky market.

Q. YOU STATED ABOVE THAT GROWTH IN UNE-L BASED SERVICE WOULD NATURALLY PROVIDE GROWING EVIDENCE OF NO IMPAIRMENT AS EXISTING BARRIERS DIMINISH IN IMPORTANCE. IS IT POSSIBLE THAT UNDERPRICED ACCESS TO UNE-P LEAVES NO INCENTIVE FOR CLECS TO PROVIDE SERVICE VIA UNE-L?

A. No, there are several reasons to believe this is not the case. The CLECs are new entrants into a market that has been monopolized for a century or more. They have much to gain by limiting their dependence upon the incumbent. Eliminating dependence on ILEC facilities will allow the CLECs to better differentiate their services and improve their appeal to customers, without having to cut prices to the bone. Moreover, if the systems are in place to handle hot cuts and other interfaces between the CLEC and ILEC, the CLECs will have more control over the quality of service that they can offer their customers, and be able to offer redundancy to the ILECs' facilities. This factor has been a major factor in stimulating demand for the CLECs' transport services, and led to significant investment in facilities, even though leasing was still available as an option.

Q. HOW IS YOUR ANALYSIS OF THE TYPES OF POTENTIAL ERRORS IN FINDING NO IMPAIRMENT WITH REGARD TO MASS-MARKET SWITCHING AFFECTED BY THE DESIRABILITY OF FACILITIES-BASED COMPETITION?

A. The ILECs' response to these, and other concerns, will no doubt be a repeat of the mantra of encouraging "real" (*i.e.*, facilities-based) competition. As an economist, I recognize the benefits of facilities-based competition, but question the merits of any attempt to force a "one-size-fits-all" approach to competition.

The Act sets a framework for local competition and provides for three entry vehicles: (1) total service resale priced at the incumbent's retail prices less an avoided cost discount; (2) unbundled network elements (including UNE-P) priced at cost, which the FCC has defined as forward-looking economic cost; and (3) facilities-based entry. 47 U.S.C. § 251(c). The Act does not give preference to any of these forms of entry, and neither should the Commission.

Certainly, there is no economic basis for such a preference. In non-regulated competitive markets, there are many different viable firm structures, ranging from firms that specialize in retailing (pure resellers) to firms that own and control every step of the process from the extraction of raw materials to the sale of finished goods and services. There is no single optimal level of what economists call vertical integration.

The ILECs themselves have changed their levels of vertical integration over time. For example, pre-divestiture, the Bell System was a vertically integrated amalgam of a research and development arm (Bell Labs), an equipment manufacturer (Western Electric), facilities-based local service providers (the various local operating companies, which were spun off as the Regional Bell Operating Companies, or RBOCs) and a facilities-based long distance provider (AT&T Long Lines). Post-divestiture, the RBOCs have become resellers of other

manufacturers' equipment, have spun off their own jointly owned and operated research and development arm (the former BellCore, now Telcordia) and have chosen to re-enter the long-distance business by leasing facilities from other carriers.

The last example is particularly instructive. The RBOCs are *not* building their own nationwide long distance networks; instead, they are relying on renting others' networks out of region on competitive terms. Yet, in complete contrast to their advocacy concerning local entry via UNE-P, the RBOCs have vigorously argued before state and federal regulators that their entry into the long-distance business will deliver significant consumer benefits, even though they rely extensively on others' facilities.

The RBOCs are able to compete fully in the long-distance retail market without building their own nationwide networks because, prior to their entry, the long-distance *wholesale* market was already well-established. The Operations Support Systems ("OSS") were already designed to accommodate multiple carriers using the same networks, and price competition had driven wholesale prices well below historic/embedded costs.

CLECs should have the same opportunity to procure network inputs at competitive prices, as well. But, in stark contrast to the long-distance wholesale market, where there are multiple carriers from which the RBOCs can obtain capacity, CLECs generally have no choice but to lease facilities from the former local monopolist in each area. The ILECs have little incentive to offer potential competitors favorable wholesale prices. As I demonstrate further in the following

sections, absent a continued requirement to make UNE-P available at prices based on forward-looking economic cost, the ILECs can and undoubtedly will exploit their monopoly leverage over local networks to forestall competitive entry.

E. Steps in Analysis and Organization of Testimony

Q. PLEASE DESCRIBE THE STEPS FOLLOWED IN YOUR ANALYSIS.

A. My analysis follows four steps. First, I define markets on the basis of principles that apply to both trigger analysis and the analysis of potential deployment. This market definition provides the necessary foundation for the Commission's review of evidence purporting to show that triggers are met in certain markets.

The remaining three steps of my analysis relate to the potential deployment question that the Commission must address for markets in which triggers are not met. In the second step, I quantify the various costs that a CLEC would consider in evaluating the feasibility of deploying facilities to provide UNE-L based services. Then, I quantify revenues that a CLEC could expect to receive after deploying facilities to provide UNE-L based service. Finally, I consider the results of my calculations in a way that recognizes the uncertainty associated with many of the inputs necessary for the calculations.

Each of these steps is discussed below, and an electronic copy of the analysis tool on which I rely is provided as Exhibit MTB-2. In the final section, I describe the conclusions I draw from the reported results.

III. MARKET DEFINITION

Q. YOU INDICATED ABOVE THAT THE MARKET DEFINITION SHOULD PERMIT THE MOST UNAMBIGUOUS AND ACCURATE ANSWER TO

THE QUESTION "ARE CLECS IMPAIRED WITHOUT ACCESS TO UNBUNDLED SWITCHING IN THIS MARKET?" PLEASE EXPLAIN IN MORE DETAIL WHAT YOU MEANT BY THAT STATEMENT.

A. The FCC has observed that "[i]t is fundamental to our general impairment analysis to consider whether alternative facilities deployment shows a lack of impairment in serving a particular market." *Triennial Review Order* n. 1536. This means that the markets as defined should be sufficiently uniform that evidence of (actual or potential) facilities-based competition in any part of a given market implies the ability to provide service to all (or nearly all) customers in that market without access to unbundled switching.

Q. HOW DOES THE FCC REQUIRE MARKETS TO BE DEFINED FOR THE PURPOSE OF DETERMINING IMPAIRMENT?

A. At the outset, it is essential to recognize that, "because we measure alternative 'switching' in a given market, not switches located in that market, the physical location of the switch is not necessarily relevant to defining the geographic market. For example, a switch located in Rhode Island could satisfy the switching trigger in Massachusetts if it is serving customers in the relevant market in Massachusetts." *Triennial Review Order* n. 1536.

The FCC clearly intends for state commissions to conduct a more granular impairment analysis than was possible at the national level, and market definition is crucial to that analysis. *Triennial Review Order* ¶ 495.

Specifically, the *Order* calls for the Commission to conduct its investigation "on the most accurate level possible, while still preserving

administrative practicality." *Id.* ¶ 130. Accuracy is essential to carrying out the pro-competitive purposes of the Act. If markets are not defined correctly, the Commission could mistakenly find no impairment where, in fact, customers are left without competitive alternatives; or, a faulty market definition could lead the Commission to find impairment where none exists.

Q. HAS THE FCC ESTABLISHED ANY GUIDELINES OR PARAMETERS FOR CHOOSING AN ACCURATE AND ADMINISTRABLE MARKET DEFINITION TO BE USED IN TRIGGER AND POTENTIAL DEPLOYMENT ANALYSES?

A. Yes. The rules that the FCC adopted in its *Triennial Review Order* specify that:

> A state commission shall define the markets in which it will evaluate impairment by determining the relevant geographic area to include in each market. In defining markets, a state commission shall take into consideration the locations of mass market customers actually being served (if any) by competitors, the variation in factors affecting competitors' ability to serve each group of customers, and competitors' ability to target and serve specific markets profitably and efficiently using currently available technologies. A state commission shall not define the relevant geographic area as the entire state.

47 C.F.R. § 51.319(d)(2)(i). The *Order* also presents examples of the factors that may vary geographically, such as "how the cost of serving customers varies according to the size of the wire center and the location of the wire center, and the variations in the capabilities of wire centers to provide adequate collocation space and handle large number of hot cuts." *Triennial Review Order* ¶ 496. Significantly, these criteria for market definition are not limited to variations in potential profitability that might be captured, at least in part, by grouping together wire centers that fall into

the same UNE and/or retail rate bands. Instead, consistent with the operational basis for the FCC's national finding of impairment for mass-market switching, the FCC points to many factors that vary among wire centers: (1) locations of customers actually being served; (2) variations in cost between wire centers; (3) variations in capability to provide collocation space; and (4) variations in the ability of wire centers to handle large numbers of hot cuts. Because each of these factors varies among wire centers, a market definition bigger than the wire center will be inaccurate. The ongoing ability of the ILECs to perform hot cuts as mass-market customers change carriers (only one or a handful of lines per location, but potentially and collectively hundreds of lines each day in a given wire center), for example, is critical to the success of switch-based competition and must be considered at all phases of the impairment analysis, beginning with market definition. Moreover, the FCC states that, "where switch providers . . .are identified as currently serving, or capable of serving, only part of the market, the state commission may choose to consider defining that portion of the market as a separate market for purposes of its analysis," *Triennial Review Order* ¶ 499 n. 1552, again emphasizing the importance the FCC placed on granularity.

Q. DOES ECONOMIC THEORY PROVIDE ANY GUIDANCE WITH RESPECT TO MARKET DEFINITION?

A. Yes. There is a body of economic analysis that applies to the question of defining markets. Much of the economic literature on market definition has focused on

facilitating the assessment of market power in merger and antitrust proceedings. The FCC noted in its *Triennial Review Order* that the market power question is somewhat different from the impairment question before the Commission in this proceeding. *Id.* ¶¶ 74, 109. Nonetheless, the FCC also acknowledged that the market definition literature developed in the context of merger and antitrust analyses provides helpful guidance for market definition in the impairment context. *Id.* n. 439. Hence, as I describe in more detail in a following section, I have taken this economic literature into account in developing my recommended market definition.

The essential economic criterion for whether a product belongs in a relevant market is whether the product can serve as an alternative to consumers in that market. Thus, for example, an apartment in Louisville is not in the same geographic market as an apartment in Frankfort, because the Frankfort apartment does not serve as a meaningful alternative for Louisville consumers.

Q. HOW HAVE YOU APPLIED THE GUIDANCE IN THE *TRIENNIAL REVIEW ORDER* AND ECONOMIC THEORY CONCERNING MARKET DEFINITION?

A. This section sets out in more detail the economic principles that should be followed in defining markets for the purposes of the impairment analysis, which are consistent with those prescribed by the *Order*, and concludes that criteria of "accuracy" as well as "practicality" argue for the Commission to begin its analysis with the presumption that wire centers establish the appropriate level of granularity. ILEC wire center boundaries are the most natural geographic

boundaries for purposes of defining markets for several reasons. First, the costs of providing service vary widely from one wire center to another and it is not possible draw conclusions about one wire center from an analysis of another wire center. Second, once a CLEC is serving some customers in a wire center, it will face relatively lower cost of serving other customers in the same wire center, compared to the cost of entering a new wire center market. Third, it is administratively feasible to administer the requirements of the *Order* on a wire center basis, because data on CLEC activity, including collocation, and other cost information is available on this basis. I have demonstrated this point with the impairment analysis tool.

A. Market Definition Must Be Applied in Two Different Contexts

Q. FOR WHAT PURPOSES MUST THE COMMISSION DEFINE SPECIFIC MARKETS?

A. For the local switching UNE, the FCC asks the Commission "to assess impairment in the mass market on a market-by-market basis." *Triennial Review Order* ¶ 493. Thus the Commission's market definition task is to divide the mass market customers of the state into separate "markets."

This set of "markets" that the Commission will define provides the starting point for two types of investigation: (1) the identification of qualifying market participants for the wholesale and self-provisioning "triggers" and (2) the analysis of "potential deployment." As I mentioned above, the Commission must use the same set of "markets" for both of these investigations (*id.* ¶ 495), so the markets being defined must be appropriate for the purely structural trigger

analysis as well as for the analysis of entry decisions and business plans required to reach conclusions on potential deployment.

Q. PLEASE ELABORATE ON THE FIRST USE OF THE MARKET DEFINITION IN THIS PROCEEDING.

A. The separate markets defined by the Commission will first be used to identify market participants that may count toward satisfaction of self-provisioning and wholesale triggers. The *Order*'s trigger analysis is intended to provide "bright-line rules" that "can avoid the delays caused by protracted proceedings and can minimize administrative burdens." *Triennial Review* Order ¶ 498. The correct functioning of these "bright-line rules" depends crucially on the markets the Commission defines for use in "market-by-market" analysis.

In particular, for the trigger analysis to correctly serve its function, markets must be defined so that "[i]f the triggers are satisfied, the states need not undertake any further inquiry, because no impairment should exist in that market." *Id.* ¶ 494. That is, markets must be defined so that if the triggers are satisfied and the Commission reaches a finding of no impairment for a market, customers in the market have real choice, and competitive carriers are not impaired in their ability to reach the customers in the defined market. Otherwise, as explained above, the triggers could be satisfied when customers have no alternative choice of providers and indeed where competitors are impaired. The FCC made clear the importance of firms serving as actual alternatives when it explained that existing firms can only be counted toward satisfaction of a trigger

if they are "currently offering and able to provide service, and likely to continue to do so." *Id.* ¶ 500.

The triggers merely identify whether CLECs in a market are clearly not impaired without access to the local switching UNE. Failure to meet the triggers results in further analysis of potential deployment.

As a result, the role of market definition in the trigger analysis should be to identify the scope of telecommunications services and locations for which a market participant's switching capacity clearly shows the absence of impairment because customers already have real alternatives. Market definition should ensure that a qualifying market participant provides an acceptable alternative to qualifying service provided at a geographic location that actually serves the customers in the market. The new entrant's service must be an acceptable substitute, and the location at which service is offered must encompass the areas in which the customers require service. Successful entry into a different market, where the entrant's offering is not a close substitute for service provided with the incumbent's local switching or where the entrant is unable to provide service to the customers, offers no such evidence of non-impairment. Only if the qualifying participant has succeeded in overcoming operational and economic barriers to entry into a properly defined market, which recognizes buyers' product and location substitution possibilities, can the Commission be confident that the new entrant offers evidence of no impairment in provision of the specified service at the specified location.

Q. PLEASE ELABORATE ON THE SECOND USE OF THE MARKET DEFINITIONS.

A. If the triggers are not satisfied in a market, analysis proceeds to the possibility of potential deployment to test whether barriers to entry without unbundled access to a network element are "likely to make entry into a market uneconomic, " or whether the market in question is "suitable for 'multiple, competitive supply.'" *Triennial Review Order* ¶¶ 84, 506. This analysis, which is the central topic of my testimony, must also be conducted on a "market-by-market" basis, analyzing the same markets that are used in the trigger analysis. At this stage of the analysis, the Commission must consider any local switching capacity of market participants identified in the trigger analysis in concert with analysis of operational and economic barriers to entry. As with the triggers, it is critical that markets not be defined too broadly or the Commission will end up finding non-impairment in many areas in which competitors are in fact impaired, leaving customers with no choice among providers.

Q. IS YOUR RECOMMENDED APPROACH TO MARKET DEFINITION EQUALLY APPLICABLE TO BOTH THE WHOLESALE AND SELF-PROVISIONING TRIGGERS?

A. Yes. The same approach to market definition applies to evidence of no impairment presented with respect to wholesale and self-provided switching.

B. Market Definition Analysis Starts with a Specific Service or Product Offering in a Narrow Geographic Market and then Expands the Relevant Market to Incorporate Substitutes

Q. HOW DO ECONOMISTS TYPICALLY DEVELOP MARKET DEFINITIONS?

A. The process of defining a market invariably requires answering questions as to whether a particular product or location belongs in the market, or falls outside its boundaries. These questions are properly answered by considering the extent to which customers regard the various products and locations as substitutes or alternatives.

The normal way to begin the analysis is with a single firm's product, offered at a specified location and then to expand beyond this point to see if products from the expanded product set or geographic area serve as alternatives. Normally, the initial market definition of a specific location and product will turn out to be too small because buyers have acceptable alternatives, or substitutes, outside of the product and location. If buyers regard another firm's product, possibly offered at a different location, as an acceptable substitute, then the market definition should be expanded to include the other firm's product and the other location.

Q. IS THIS APPROACH TO MARKET DEFINITION APPLICABLE IN THE CONTEXT OF THE TRIGGER ANALYSIS REQUIRED BY THE FCC?

A. Absolutely. Although most economic analyses have developed market definitions in the context of calculating market shares or other measures of market

concentration, the conventional approach is also correct for the identification of competitive facilities qualifying for the trigger analysis prescribed in the *Order*. Market definition is a preliminary step in *any* structural analysis of markets, and the same analysis is implied for the identification of market participants to calculate indicia of concentration in a market, or to conduct a trigger analysis.

Moreover, this approach is consistent with the specific criteria the FCC provides for defining markets. The *Triennial Review Order* specifically requires state commissions "to define each geographic market on a granular level and direct[s] them to take into consideration the locations of customers actually being served by competitors, the variation in factors affecting competitors' ability to serve each group of customers and competitors' ability to target and serve specific markets economically and efficiently using currently available technologies." *Id.* n. 1536.

Q. IS THE APPROACH YOU PROPOSE USED IN ANY OTHER REGULATORY CONTEXT?

Yes, the market definition approach I have presented is the same as the one used in the Horizontal Merger Guidelines ("HMG") of the U.S. Department of Justice and the Federal Trade Commission. The HMG states that "a market is defined as a product or group of products and a geographic area in which it is produced or sold such that a hypothetical profit-maximizing firm, not subject to price regulation, that was the only present and future producer or seller of those products in that area likely would impose at least a 'small but significant and not

transitory' increase in price, assuming the terms of sale of all other products are held constant."

Although the FCC rejected certain applications of the HMG for purposes of an impairment analysis, the *Triennial Review Order* explicitly endorses the relevance of the HMG to the market definition that must underlie any impairment analysis: "We take this lesson of geographic granularity from the HMG without adopting the HMG wholesale." *Triennial Review Order* n. 439. This makes sense because the HMG have authoritative status in industrial organization economics.

Q. HOW DO THE MERGER GUIDELINES APPROACH THE PRACTICAL ASPECTS OF DEFINING A MARKET?

A. The HMG describe an approach similar to the one I just described where they "begin with each product (narrowly defined) produced or sold by each merging firm" for the product dimension and "the location of each merging firm (or each plant of a multiplant firm)" for the geographic dimension. HMG 1.11 Product Market Definition General Standards and 1.21 Geographic Market Definition General Standards.

This initial tentative market definition is expanded by asking whether consumers regard other products or locations as close enough substitutes that a price increase in the narrowly and tentatively defined market would be met by consumers switching to other products or locations. The notion of "close enough" substitutes is given precision by asking whether a "small but significant and nontransitory" price increase in the narrowly and tentatively defined market would be met by a strong enough substitution response by consumers to make the

price increase unprofitable, if it were implemented by a hypothetical monopoly provider controlling all of the products and locations in the tentatively defined market. The tentative market definition is too narrow if it fails to incorporate substitutes that consumers regard as "close enough," as measured by consumers switching in response to a price increase. If a tentative market definition is found to be too narrow, the definition is expanded to incorporate the next best products or locations that consumers regard as "close enough" substitutes.

In short, the analysis of market definition under the HMG is essentially the same as the one that I have proposed. A CLEC serving a group of customers in a specific geographic area would not be counted as a participant in another geographic market if it was not now offering service in that market and it would not extend service to that market in response to a "small but significant nontransitory" price increase.

1. Product Markets and Geographic Markets for Local Telecommunications Services

Q. HOW DOES THE ECONOMISTS' VIEW OF MARKET DEFINITION APPLY TO LOCAL TELECOMMUNICATIONS SERVICES?

A. Applying the conventional market definition procedure described above to local telecommunications services begins with identifying the product and geographic starting point for a tentative market definition. In the present case, the starting point is the product and customer location that a requesting CLEC now serves with unbundled access to the incumbent's local switching network element, and for which we will seek evidence of no impairment in the form of actual or potential deployment of competitive switching capacity in the same market. "In

the same market" means that consumers must find the identified competitive offering to be an acceptable substitute for the offering possible with access to the local switching UNE.

The analysis then proceeds to expand these tentative product and geographic markets to include other products or locations that consumers will regard as "close enough" substitutes. The *Triennial Review Order* contains specific discussions of many possible substitutes and provides guidance for the Commission about the appropriateness of including each of these substitutes within the market definition.

Q. HOW SHOULD THE COMMISSION IDENTIFY THE PRODUCT OR PRODUCTS INCLUDED IN THE RELEVANT MARKET?

A. The Commission should identify the product or products included in the initial tentative market based on the *Order*'s discussion of qualifying services: in short, "those services that have been traditionally the exclusive or primary domain of the incumbent LECs." *Triennial Review Order* ¶ 135. As I will discuss below, it may be necessary to subdivide the ILECs' customers into two different markets, residential and business, even though most of the same products are sold to these two classes of customers. The reason is that price discrimination is enforced between the two market segments. In addition, the products are marketed and sold differently, and are serviced by different organizations within the telephone company's organization.

Q. BASED ON THE ABOVE DISCUSSION, WHAT PRODUCT MARKET DEFINITION DO YOU RECOMMEND FOR COMMISSION ADOPTION?

A. In the product market dimension, the Commission should include any alternative to the ILEC's local switching UNE that affords access to the incumbent's loops to provide local voice service, including vertical features and access service. This product definition excludes CMRS, fixed wireless and cable telephony, but includes packet switched local service when it meets the requirements of the Triennial Review Order's impairment analysis.

Q. DOES THE TRIENNIAL REVIEW ORDER DISCUSS WHETHER INTERMODAL PROVIDERS ARE IN THE SAME PRODUCT MARKET?

A. Yes, the *Order* states:

> As in the impairment triggers for high-capacity loops and dedicated transport, states also shall consider carriers that provide intermodal voice service using their own switch facilities (including packet and soft switches) that meet the requirements of these triggers and Part V above. ... In deciding whether to include intermodal alternatives for the purposes of these triggers, states should consider to what extent the services provided over these intermodal alternatives are comparable in cost, quality, and maturity to incumbent LEC services.

Triennial Review Order n. 1549.

The *Order* further suggests that CMRS is not a close enough substitute to be included in the market, but packet switches providing voice services should be included, if they "meet the requirements" of the triggers and the *Order*'s Part V, Principles of Unbundling. *Id.* Fixed wireless has "not proven to be viable or deployable on a mass market scale," suggesting that it may not be a "close

enough" substitute to require expansion of the tentative market definition. *Id.* ¶ 310.

Cable telephony fails to serve the "crucial function" of affording access to the incumbent's loops (*id.* ¶ 439), and therefore "provides no evidence that competitors have successfully self-deployed switches as a means to access the incumbents' local loops, and have overcome the difficulties inherent in the hot cut process." *Id.* ¶ 440. Further, cable telephony's strategy is to "bypass the incumbent LECs' networks entirely." *Id.* ¶ 439. This strategy is only available to a single firm in any market because cable TV companies, due to "unique economic circumstances of first-mover advantages and scope economies, have access to customers that other competitive carriers lack." *Id.* ¶ 310. As a result, neither cable telephony nor CMRS "can be used as a means of accessing the incumbents' wireline voice-grade local loops. …. Accordingly, neither technology provides probative evidence of an entrant's ability to access the incumbent LEC's wireline voice-grade local loop and thereby self-deploy local circuit switches." *Id.* ¶ 446. Any competitive facilities that allow access to some local loops but not others clearly cannot be regarded as probative evidence of no impairment concerning those loops that cannot be reached by the competitive facilities.

Q. HOW DO YOU RECOMMEND THE COMMISSION DETERMINE THE RELEVANT GEOGRAPHIC MARKETS?

A. In the geographic dimension, it takes only a moment's reflection to recognize that consumers of qualifying telecommunications services will not accept any

substitutes that do not deliver service to the customer's premises. Because qualifying services provided to a location other than to a customer's own premises will not generally be a satisfactory substitute, expansion of the tentative market definition to include other locations is not appropriate; the "most accurate" level of granularity must address switching capability for particular customer premises. The relevant points at which qualifying services are provided, analogous to the HMG's "location of each plant" (HMG 1.21), are the Network Interface Devices ("NIDs") that comprise the physical point of interconnection between the incumbent and a customer. Thus, each NID or customer premises is a "location," or "plant," for purposes of defining initial tentative markets.

Fortunately, certain aggregations of consumers can be accomplished to achieve "administrative practicability," as I discuss below. Further, the Commission can respond to the FCC's concern that markets not be defined so narrowly as to preclude the realization of economies of scale and scope (*Triennial Review Order* ¶ 495) by requiring that each aggregation of customer locations must be economically and operationally "includable" in a serving area large enough to afford economies necessary to compete.

Q. WHAT IS THE SIGNIFICANCE OF THE LOCATION-SPECIFICITY OF THE DELIVERY OF TELECOMMUNICATIONS SERVICES?

A. This location-specificity of the delivery of services is one of the unique characteristics of markets for telecommunications services, and it is crucial to the task of defining markets in which the prescribed trigger analysis reflects evidence

of actual economic entry into relevant markets without access to the incumbent's local switching UNE.

The *Triennial Review Order* recognizes this location-specificity in several ways. For example, in defining the geographic markets for application of trigger analysis to enterprise loops, the *Order* requires a "customer-by-customer location basis." *Id.* n. 1536. Although mass market customers are tied to their locations just as tightly as enterprise customers, the FCC observes that considerations of practicality will not permit a customer-by-customer analysis, for at least some mass market investigations. *Id.* ¶ 309.

I demonstrate below that it is possible to aggregate mass market customer locations in such a way (by wire center) as to preserve much of the accuracy of customer-by-customer analysis, while achieving a high degree of practicality. Identifying large groups of customers that are capable of being served using uniform technologies and techniques, but recognizing that those techniques must be applied to deliver service at the customer location, results in market definitions that remain "accurate" but achieve "administrative practicality."

Q. ARE THERE ANY SPECIFIC CONCLUSIONS THAT FOLLOW FROM THE RECOGNITION OF LOCATION-SPECIFICITY?

A. Yes. Recognizing that each customer comprises a unique geographic market would lead to a "market-by-market" analysis that recognizes that "an important function of the local circuit switch is as a means of accessing the local loop." *Triennial Review Order* ¶ 429. Or, "a crucial function of the incumbent's local circuit switch is to provide a means of accessing the local loop." *Id.* ¶ 439. The

crucial characteristic of loops is that they terminate in the customer's premises, which is the geographic location at which qualifying services are provided and the only geographic point at which customers will accept delivery of services.

A market definition that ignored location specificity would fly in the face of the entire foundation of antitrust and regulatory economics. It is nonsensical to ignore the costs and entry barriers faced by CLEC wishing to expand service to unique locations and define away these important cost differences by simply declaring a large group of customers to be in the same geographic market. The location is the market, and multiple locations cannot be aggregated without an analysis of the specific facts that govern supply conditions in the market.

2. Accuracy and Practicality

Q. FROM THIS "MOST ACCURATE" LEVEL OF GRANULARITY, WHAT IS REQUIRED TO ACHIEVE "ADMINISTRATIVE PRACTICALITY" (*TRIENNIAL REVIEW ORDER* ¶ 130)?

A. Market definition at the most accurate level of granularity, whether for application of the prescribed triggers or for analysis of potential deployment, would be conducted on a customer-by-customer basis, recognizing that customers will not generally accept a substitute for the incumbent's wireline service if that service is not delivered to the customer's premises. That is, the relevant geographic market for local telecommunications services is customer location specific. Nevertheless, subject to certain important limitations discussed below, it is possible to analyze customer-specific locations in large numbers, achieving practicality with little or no loss of accuracy.

Q. WHAT AGGREGATIONS OF CUSTOMER LOCATIONS MAKE SENSE FOR AN IMPAIRMENT ANALYSIS?

A. Impairment analysis for mass market switching must identify substitutes to the incumbent's local circuit switch "as a means of accessing the local loop." *Triennial Review Order* ¶ 429. Wire centers are the centers of outward-radiating ILEC loop facilities, and determine the point at which access to the incumbent's loops must occur. Because impairment regarding the local switching UNE is so closely related to access to the incumbent's loops, the wire center provides a natural unit of analysis. Insofar as an entrant in a particular wire center is not impaired in its ability to expand service to all customers served by loops in that wire center, it is reasonable to aggregate customers and consider impairment issues at the wire center level.

Q. WHAT LIMITATIONS MUST BE IMPOSED ON THE AGGREGATION OF CUSTOMER LOCATIONS TO THE WIRE CENTER LEVEL?

A. The crucial limitation is that a UNE-L CLEC's entry at a wire center must afford that CLEC the opportunity to expand to serve any customer in that wire center. The failure of this condition implies that aggregation of customers to the wire center level will introduce misleading evidence and lead the Commission to mistaken conclusions about impairment. The nature of this requirement is explained in the following quotation from a popular antitrust law text:

> "Competitors, supply substitution, and entry. (a) Expansion by immediate competitors.] The demand for Alpha Company's product is obviously affected by the ability of its direct competitors to deliver the same product. But if the others

are to limit Alpha's actions, they must be able to expand their production when Alpha increases its prices because consumers cannot turn to other suppliers if those suppliers are unable to expand their output." Antitrust Analysis: Problems, Text, and Cases, Fifth Edition, Phillip Areeda and Louis Kaplow, Copyright 1997 by the President and Fellows of Harvard College, page 570, ¶342

I will discuss below several specific conditions that can limit the ability of a CLEC in a particular wire center to serve certain customers in that wire center, but aggregating customers to the level of the wire center presumes the absence of one overarching limitation on the CLEC's ability to expand. That overarching limitation is the possibility that there are operational barriers to the CLEC's expansion. If a CLEC that has entered a particular wire center cannot adequately expand its operations in that wire center, due to the presence of operational barriers, then it is not reasonable to aggregate customers and consider the question of impairment at the wire center level.

Q. ARE THERE OTHER FACTORS THAT SUPPORT A MARKET DEFINITION AT THE WIRE-CENTER LEVEL?

A. Yes. In most cases, CLEC self-provisioning of local switching will require collocation at each wire center the CLEC intends to serve. In those cases in which all competitive facilities deployed are available to serve any loop in the wire centers in which they offer service, trigger analysis can proceed with the wire center as the geographic market definition. In such cases, analysis of the prescribed triggers can proceed at the wire-center level with little or no loss of accuracy.

For several reasons, the wire center also provides a natural unit of analysis for the investigation of potential deployment. First, because a portion of the costs of establishing service in a previously unserved wire center will be sunk costs, CLEC entry decisions will have to be justified at the wire center level. This justification will require the CLEC to compare the stream of net operating income projected for a wire center to the sunk cost that must be incurred to establish the collocation or other arrangements needed to offer service in the wire center. Further, various costs and revenues that must be considered in analysis of potential net operating revenue vary, sometimes dramatically, between wire centers. To mention only two: 1) potential revenue from serving a wire center will vary with the number of lines in the wire center and the profile of the typical customer at the wire center, and, 2) the cost of backhauling traffic from the wire center will vary with the wire center's proximity to other elements of the CLEC's network.

Q. IS IT MOST PRACTICAL TO CONDUCT IMPAIRMENT ANALYSIS AT THE WIRE-CENTER LEVEL?

A. Yes. For the analysis of triggers, the logical data to rely on initially – facilities in place in the incumbent's wire centers, capabilities of competitors' facilities, capacity available for expansion – are data that are available and most accurately interpreted at the wire center level. ILEC tariff data needed for the impairment analysis – UNE loop zones and retail rates – is also readily available on a wire center basis. Also, information on customer demographics can be obtained on a

wire center basis, either from the data collected for universal service models or from other public sources.

Q. IS IT IMPORTANT TO CONDUCT AN IMPAIRMENT ANALYSIS AT A LEVEL AS GRANULAR AS THE WIRE CENTER?

A. Yes. Because the CLEC's entry decision will be made at the wire-center level, examination of pertinent data at a higher level of aggregation will be less helpful at best, and very possibly misleading.

For example, it would be an error to conclude that entry is feasible in two wire centers because the present value of potential revenues net of operating costs in the two wire centers exceeds the sunk costs of entering the two wire centers. The two wire centers may be like a bucket of ice water and a bucket of boiling water, which, on average, are a comfortable temperature. The fact that entry is feasible in one wire center but not the other will not be revealed from examination of average or total costs for the two wire centers. If the Commission finds no impairment in both wire centers, the result will be that end users in one of the wire centers will lose the competitive alternatives that would be available to them if CLECs were to retain unbundled access to the incumbent's local circuit switch.

If the Commission conducted its trigger analyses under a market definition that lumps together more than one wire center, it would need criteria to determine whether competitive facilities satisfy the requirement of the trigger or not. The analysis would nevertheless be likely to result in error. The trigger analysis treats each qualifying competitive carrier as evidence that barriers to entry have been overcome and no impairment exists. In fact, in a collection of two wire centers, a

competitive switching provider that is offering service to customers in one wire center does not show absence of impairment in the other wire center. As suggested above, analysis of potential deployment in the wire center, which has not experienced actual deployment, may show that competitive entry without access to the local switching UNE is extremely unlikely because of the cost and revenue characteristics of the wire center. A finding of no impairment in such a wire center, based on actual deployment in another wire center, would result in customers in that wire center losing competitive alternatives based on availability of the local switching UNE, with no prospect of switch-based competitors actually overcoming operational and economic barriers to entry. I will show later in this testimony that two wire centers located in the same exchange area may have dramatically different results in terms of the potential for profitable CLEC entry.

Q. SOME WOULD ARGUE THAT MANY OF THE CLEC'S COSTS, SUCH AS OPERATIONS SUPPORT SYSTEMS, SWITCHES, AND SOME MARKETING COSTS, ARE INCURRED AND ARE USEFUL OVER RELATIVELY LARGE MARKET AREAS. DOES THE EXISTENCE OF THESE COSTS COMPEL A MORE EXPANSIVE MARKET DEFINITION THAN THE INDIVIDUAL WIRE CENTER?

A. No. While there is no question that it is in the interest of the CLEC to spread the cost of large fixed investments over as broad a customer base as possible, the decision to deploy facilities to provide connectivity to the CLEC's network still is conducted on a very granular basis. As the manager of a CLEC, I may want to add

as many customers as possible to lower the cost of my fixed investments, but I gain nothing, and lose much, if the customers in a particular wire center produce negative net revenue. In deciding whether to obtain or construct collocation facilities in an individual wire center, the CLEC manager must consider the number of customers that reasonably can be expected to subscribe to the CLEC's services, the amount of revenue that will be produced by those customer, and must compare the anticipated revenue to the investments and operating expenses associated with adding those collocation facilities to the CLEC's network. If the wire center cannot contribute to the bottom line, it simply will not make sense for the CLEC to offer services to customers in the wire center. For the reasons that I outlined above, I recommend that the Commission adopt the wire center as its principal unit of analysis for determining whether competitors are impaired without access to unbundled switching.

Q. DO ALL CUSTOMERS IN A WIRE CENTER NECESSARILY FALL INTO THE SAME MARKET?

A. Not necessarily. There are two circumstances when a finer level of disaggregation may be necessary. The first is where the CLEC is unable to offer the same package of services as the ILEC. The second is where there is a longstanding practice of price discrimination between two groups of customers.

Q. PLEASE EXPLAIN THE CIRCUMSTANCES UNDER WHICH THE CLEC WILL BE UNABLE TO OFFER THE SAME PACKAGE OF SERVICES AS THE ILEC.

A. The *Triennial Review Order* determined that the ILEC does not need to unbundle its network to enable a competitive carrier to offer Digital Subscriber Line ("DSL") service on ILEC loops that are provisioned with Digital Loop Carrier ("DLC") equipment. *Id.* ¶ 213. This will place the CLEC at a competitive disadvantage relative to the ILECs, which in many cases have deployed DLC equipment capable of providing their own retail customers with DSL service.

3. Price Discrimination

Q. PLEASE EXPLAIN THE ROLE THAT PRICE DISCRIMINATION PLAYS IN DEFINING MARKETS.

A. Basic economic principles require a departure from the ordinary process of market definition in the presence of price discrimination – "charging different prices for the same product, for example." *HMG 1.12 Product Market Definition in the Presence of Price Discrimination*. If the characteristics of the product and its buyers permit profitable price discrimination, then market definition must recognize "particular use or uses by groups of buyers" and "particular locations of buyers" that would be targeted for higher prices. *HMG 1.12 Product Market Definition in the Presence of Price Discrimination, and HMG 1.22 Geographic Market Definition in the Presence of Price Discrimination.*

This situation arises whenever the hypothetical monopolist in a tentatively defined market "can identify and price differently to those buyers ("targeted

buyers") who would not defeat the targeted price increase by substituting to other products." When this situation arises, the tentative market has been defined too broadly, and must be divided to recognize "targeted buyers," whether identified by location, by the nature of their use of the product, or by membership in an identifiable group of buyers.

Q. HOW DOES THE POSSIBILITY OF PRICE DISCRIMINATION AFFFECT THE MARKET DEFINITION YOU HAVE JUST DESCRIBED?

A. As I discussed above, market definition in the presence of price discrimination must treat as separate markets those groups of "targeted buyers" who cannot effectively avoid a "targeted price increase by substituting to other products." *HMG 1.12 Product Market Definition in the Presence of Price Discrimination.* The price difference between small business customers and residential customers receiving essentially identical service is a classic example of this form of price discrimination.

The FCC specifically directs state commissions to recognize, for market definition purposes, that "competitors often are able to target particular sets of customers." *Triennial Review Order* n. 1539 (interpreting accompanying text at ¶ 495). CLECs provisioning their own switches can, and do, target business customers, even to the exclusion of residential customers. This is partly because the characteristics of business customers, even very small ones, are different than residential customers, suggesting differences in CLECs' abilities to serve these different groups of customers – a factor the Commission must consider in defining markets. Further, because of the long-standing ILEC practice of targeting

business customers for higher rates than residence customers, CLECs can also target this group and price differently. The customer class distinction was upheld in the 96-98 First R&O with regard to resale (962) and in the UNE Remand Order. *Triennial Review Order* ¶126.

While the Commission need not find that residential and small business customers constitute separate markets, it must recognize that the provision of local exchange services to small businesses – where relatively high revenues per customer and a relatively low number of customers are the rule -- differs from the provision of local exchange services to residential customers, where the average revenue per customer is lower and where a much larger number of customers is involved. In particular, evidence that a CLEC is providing switch-based services only to small business customers, without also providing services to residential customers -- should not be taken as evidence that residential customers would have access to competitive alternatives in the absence of UNE-P.

IV. THE CLEC'S DEPLOYMENT DECISION

Q. PLEASE DESCRIBE THE CONSIDERATIONS THAT ENTER INTO A CLEC'S DECISION TO DEPLOY SWITCHING FACILITIES.

A. To determine whether to enter a particular market using UNE-L, a CLEC must first assess the operational barriers. A CLEC obviously will not even consider making the substantial investment involved in UNE-L service until it is persuaded that available systems are sufficient to provide the service, and until it is able to evaluate the costs involved in overcoming operational barriers.

The most substantial of these operational barriers are analyzed in the testimony of James Webber and Sherry Lichtenberg submitted in this proceeding. As detailed in that declaration, the OSS required for processing CLEC orders for UNE loops are significantly more complex than those required for UNE-P orders, and the prospect of shortcomings in those systems impose great risks on the revenues and costs that enter into the feasibility of deploying facilities for UNE-L based service. Whereas UNE-P orders can be handled electronically, with no rearrangement of physical components of the network required, an order to change a customer's service from the ILEC to a UNE-L based CLEC requires orders to (1) disconnect the customer's loop from its termination on the ILEC's switch and connect that loop to CLEC equipment in its collocation space, (2) change the customer's record in the number portability database to reflect that the customer's number is now associated with the CLEC's switch, and (3) update 911 and 411 records. Additional internal CLEC processes are required to establish connectivity from the collocation space to the CLEC's switch, and to establish the customer's service within the CLEC's switch and in its billing systems.

Further, it is critical that these processes be closely coordinated. Failures of coordination can lead to disruption to the customer's telephone service. It is likewise critical that the operations support systems in place to process these orders be reliable and predictable, and that they be scalable to allow for a large-scale transition of customers from UNE-P to UNE-L based service, and to handle subsequent migration of customers among competing carriers. In addition to the costs incurred to ensure that this process works smoothly, a CLEC considering

self-deployment of switching facilities will evaluate the possibility of failures in operational coordination, and the risks associated with such failures.

The cost of these systems and the risk that such costs may not be recoverable constitutes a substantial barrier to entry. Some of these systems, such as systems for tracking the assignment of transport trunks and systems for entering customer records into CLEC switches, will be related to the CLEC's overall operations, and will be usable in each geographic market that the CLEC decides to enter. The cost of other systems, such as interfaces to the number portability and 411 and 911 databases, may vary from region to region. In making its evaluation of the profitability of a UNE-L based local service, the CLEC will consider whether its potential customer base, both nationally and in specific geographic markets, is sufficiently large that the CLEC can reasonably expect to recover the costs of developing and implementing its operational support systems.

Q. HOW ARE OPERATIONAL BARRIERS CONSIDERED IN YOUR ECONOMIC FEASIBILITY ANALYSIS?

A. In the analysis that follows, I assume that these operational barriers all are overcome. My understanding, however, is that many of these barriers have not been overcome, and that this assumption is counter-factual. I stress, therefore, that unless and until these operational issues have been addressed both as a technical matter and as a cost matter (that is, that the costs of addressing these operational barriers is accounted for in some competitively neutral manner), no further analysis is necessary – if UNE-L service cannot be provided in a way that meets the consumers' legitimate demands for high-quality service, any rational carrier

would be extremely unlikely to make the investment necessary to provide that service. Moreover, even if these issues have been addressed sufficiently to permit entry, the CLEC will have to take any remaining difficulties into account in assessing the risk of entry.

Q. APART FROM OPERATIONAL BARRIERS, WHAT OTHER CONSIDERATIONS INFLUENCE A CLEC'S DECISION TO ENTER THE MARKET?

A. In order to come to a decision to enter a particular market, the CLEC must conclude that it has a reasonable prospect of obtaining sufficient revenue from its customers both to defray its operating expenses and to recover any investments that it must make to enter the market. In other words, the CLEC must determine that it will make a profit taking into account likely revenues and costs. The CLEC must also take account of the risks that it will not make a profit despite its best estimate that it will. The greater the uncertainty of entry, the less likely the CLEC is to enter.

The economic calculus may differ between the "hypothetical efficient entrant" that does not already have some investment in network facilities and in its establishment of collocation facilities to serve a particular wire center and an actual carrier, such as MCI, that may already have some sunk investment in place. The *Triennial Review Order* requires analysis of a generic hypothetical efficient entrant, which is the construct underpinning the analysis that follows. *Id.* ¶ 517. In a subsequent section, I will address certain issues relevant to a carrier with sunk investments.

Q. PLEASE PROVIDE AN OVERVIEW OF YOUR ANALYSIS OF THE FEASIBILITY OF POTENTIAL DEPLOYMENT.

A. My analysis separately assesses costs and revenues in order to determine whether entry in a particular wire center is likely to be profitable under a variety of scenarios. The scenarios are used to determine the likelihood of profitability.

In order to assess cost of entry using a UNE-L strategy, I used an analytical tool adapted from a model constructed by Dr. David Gabel on behalf of the National Regulatory Research Institute. Dr. Gabel's model, while quite detailed and comprehensive, did not consider several aspects of the cost problem facing the CLEC. The model has been extended to provide flexibility to consider a wide range of services, including services for small business, services for large enterprise customers, and ADSL services provided both to residential and business customers. The structure of the model also was modified to permit a very granular analysis of the individual cost components that contribute to the total per-line and total per-wire center costs faced by the CLEC. A number of different scenarios are considered, including virtual, cageless, and caged collocation options, and unbundled dedicated transport, special access, and EEL transport options. Among these options, the impairment analysis tool chooses the least-cost combination of options, and compares the cost of providing a range of services with the revenues derived from customers for those services in order to calculate the net revenue available to a CLEC contemplating facilities-based entry into each wire center.

A. CLEC Costs

Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR TESTIMONY?

A. In this section I will describe the costs that a CLEC would incur to obtain switching to support entry under a UNE-L strategy. I will also describe which of these costs are fixed and sunk, and which of these costs provide the ILEC with a cost advantage over the CLEC.

I begin by describing those costs that are identical (or similar) for a CLEC and ILEC. I then describe those costs that a CLEC would incur that an ILEC would not incur. To do this, I will compare the processes that the ILEC and CLEC must undertake to connect the exact same loops to their switches. It will be readily apparent that it costs the CLEC a great deal more than it does the ILEC to connect the loop to the switch, greatly raising the CLEC's costs. This is important, because, as explained above, it is well recognized that cost differences can be an important barrier to entry. *Triennial Review Order* ¶¶ 87-90 (barriers include scale economies, first-mover advantages and absolute cost disadvantages). I also describe which costs are sunk, as sunk costs can pose a particularly formidable barrier to entry. *Id*. ¶ 88. Finally, I'll describe in general terms the calculations that the analytical tool performs in estimating the costs that will be considered by a CLEC considering the deployment of facilities to offer service on a UNE-L basis.

Q. WHAT CATEGORIES OF COSTS MUST BE CONSIDERED?

A. The broad categories of cost to be considered are loops, switches, the connection between the loop and the switch, collocation of the CLEC's facilities in the

ILEC's wire center, the cost of digitization, concentration and aggregation, transport to the CLEC's switch, and the cost of cutting over the loops. As a rule, I estimate TELRIC costs.

Q. WHY IS IT APPROPRIATE TO USE TELRIC COST ESTIMATES?

A. The TELRIC standard has been designed to estimate the cost that would be incurred by an efficient carrier serving the relevant demand in the relevant market, using the most efficient currently available technologies and methods. As such, it comports with the FCC's directive that, in considering potential deployment of switching and transport facilities, the cost that would be faced by an efficient carrier be considered.

Q. PLEASE DISCUSS YOUR TREATMENT OF THE COST OF LOOPS.

A. The cost of loops used in the model is the rate established by the Commission in each of the three UNE rate zones. Thus, for each wire center the UNE rate applicable to the rate zone to which the wire center is assigned is the cost to the CLEC of providing the loop portion of local exchange service. In addition, the cost of interconnection between the ILEC's facilities and the CLEC's collocation space, or to Enhanced Extended Loop ("EEL") facilities is considered.

Q. PLEASE DISCUSS THE COST OF SWITCHES.

A. A CLEC evaluating the possibility of deploying facilities to provide UNE-L service must consider the cost of the switch. Switches are readily available from the various switch manufacturers as well as in secondary markets. Unlike many of the other costs faced by the CLEC, the cost of the switch is predictable and consistent (for any given level of demand) for all geographic markets that the

CLEC might contemplate entering. And, although much of the price of a switch constitutes a fixed cost, since it is necessary to purchase an entire switch processor and switch matrix to serve even one customer, it is not a sunk cost. (As discussed below, however, the cost of installing and configuring the switch may be a sunk cost.) For these reasons, the purchase of the switch itself does not in and of itself constitute an insuperable entry barrier.

Although local exchange switches are readily available and can be rapidly deployed, the CLEC must evaluate, on a market-by-market basis, whether the potential customer base is sufficiently large that the costs that are sunk in installing and configuring a switch may reasonably be expected to be recovered. Parts of modern switches (*e.g.,* line units and line cards) are designed to be scalable to customer demand; thus, the corresponding portion of the cost of switches is variable with respect to the number of customers served. Nevertheless, there may still be significant sunk costs incurred before the first customer can be served. These costs include engineering costs; the costs of purchasing, transporting, and installing the switch; the costs of acquiring space to house the switch and to supply it with power, climate control, and necessary testing equipment.

In the impairment analysis tool -- Exhibit MTB-2 -- I use the default values for per-port switching investment presented by Dr. Gabel in his CLEC cost model as the input for the CLEC's switching cost. I would note that the switch investment inputs used in the Gabel model result in a per-line monthly cost roughly the same as the unbundled local switching rate established by the

Commission. By using a per-line investment input (with a simple mark-up for land and building investments and other ancillary costs), I have ignored any economies of scale that may be present in provision of the switching function. In effect, I am assuming that CLEC customers can be served by a switch located in such a way as to take full advantage of economies of scale in switching, without regard to the actual location of those customers. This approach obviates any concern that my wire-center market definition might be too narrow to allow the CLEC to take advantage of pertinent economies of scope and scale in switching.

Q. PLEASE DISCUSS THE COST OF THE CONNECTION BETWEEN THE LOOP AND THE CLEC SWITCH.

A. In addition to the costs of the loop and the switch, the CLEC must incur substantial costs to connect the leased loop to its switch – costs that the ILEC does not have to incur. These costs will vary for every wire center. These costs include the cost of establishing the collocation space and equipping that space with the necessary electronics to terminate purchased UNE loops, and the cost of establishing transport facilities to carry customer traffic from each collocated ILEC wire center to the CLEC's switch location. In both instances, the costs include non-recurring charges by the ILEC for establishing collocation and transport arrangements, as well as costs incurred by the CLEC for engineering and purchasing loop termination and transport equipment. These costs too are both sunk and fixed costs. Moreover, they are costs that are not incurred by the ILECs. In what follows, I describe the costs in more detail.

Voice telephone service has traditionally been provided by connecting a customer's premises to the ILEC's central office with a twisted pair of copper wires (i.e., the local loop). The local loop terminates in the central office on a Main Distribution Frame ("MDF"). The local loops terminate on one side of the frame, the "customer facing side." On the other side of the frame – the "network facing side," short wires (referred to as "jumper wires") connect to ports on the ILEC's switch. This configuration allows for easy and flexible connections between loops and the local switch. The connection between the local loop and the ILEC switch consists of a single jumper wire, running from 15 to 100 feet in length. The cost of providing this jumper wire is very small, probably on the order of 2¢ a month.

This simple, inexpensive connection to the ILEC's switch is possible because the local network architecture was specifically designed and engineered to permit efficient and economical loop access to a monopoly local carrier. The placement of ILEC central office, and the configuration of the wires that connect these offices to the homes and businesses they serve, was based in part on engineering considerations. The ILECs' networks were designed to limit the length of most copper loops to 15,000 to 18,000 feet, to avoid having to add equipment to enhance the quality of the voice signal. Outside of rural areas, this allowed the ILECs to deploy switches that were sufficiently large to take advantage of scale economies.

To provide comparable service, the CLEC offering UNE-L service must substitute for this jumper wire a much more complex physical connection

between the MDF and its own switch. This is so because the CLEC switch will never be located as the ILEC switch is, 15-100 feet from the ILEC main distribution frame. It would be economically impossible for a CLEC to install a switch of its own at or near each ILEC central office, because those CLEC switches would serve too few customers to be cost-effective. Neither is it possible to collocate Class 5 switches in the existing ILEC offices, both because of space limitations and because existing rules do not permit it. Hence, unlike the ILEC, the CLEC cannot use an inexpensive 100-foot copper jumper to connect the local loop to its own switch. Rather, a CLEC must locate its switches in central locations and transport the traffic from the loop to that centralized location.

That transport involves a great deal more than simply connecting a very long jumper wire to connect the loop to the CLEC switch, for two reasons. First, for technical reasons, the signal would be unlikely to survive this form of transport to the distant CLEC switch. Second, even if this technical limitation were ignored, it would be very costly and inefficient to run so many wire pairs from the various central offices the entire distance to the CLEC's centralized switch.

Instead of a connecting a simple jumper cable, the network operations necessary for CLECs to connect UNE loops to CLEC switches involve four stages. First, the CLEC must rent space in the ILEC's central office to "collocate" its own network equipment. Second, the CLEC must purchase and install electronic equipment in the collocation space that converts the analog loop signal into a digital signal, and at the same time aggregates and concentrates multiple

loops into more efficient copper or fiber transmission facilities. Third, the CLEC must purchase or construct transport facilities to carry the traffic to its switch location. Fourth, when all of these connections are established, the ILEC and CLEC must coordinate a "cut over" of the loop from the ILEC's main distribution frame to the "POTS bay" at the CLEC's collocation space. I will describe each of these processes and discuss the type and nature of the costs involved in each step. The FCC recognized that an analysis of each of these costs is important to determine whether entry is economic. *Triennial Review Order* ¶¶ 481, 484 n. 1497, 520.

Q. PLEASE DESCRIBE THE COST OF COLLOCATION.

A. The first thing a CLEC must do to provide UNE-L telephone service is to obtain collocation space at the ILEC central office at which the customer's loop terminates. Collocation is basically the rental of a small portion of central office space. There are three forms of collocation—(1) physical, caged collocation, (2) physical, cageless collocation, and (3) virtual collocation. Physical collocations are space assigned within an ILEC central office in which a CLEC can deploy its own hardware and equipment. This space is generally caged (*e.g.*, enclosed by meshed wire), to provide security. In physical, cageless collocation, a CLEC is generally assigned space in the ILEC's common equipment room where the CLEC can deploy its own equipment, but this space is not enclosed. In virtual collocations, CLECs purchase equipment; however, the ILEC takes ownership of the equipment (and responsibility for maintenance) and installs the hardware in the ILEC's equipment lineup. The type of collocation selected by a CLEC is often

driven by the availability (or lack thereof) of space in a given central office. Establishing the collocation involves a number of activities that will vary depending on the type of collocation established.

Q. PLEASE DESCRIBE THE ACTIVITIES INVOLVED IN ESTABLISHING A COLLOCATION.

A. In general, these activities include: (1) obtaining the necessary space in the ILEC's central office; (2) engineering the collocation; (3) arranging with the ILEC to provide the collocation (for physical caged collocations) as well as fire protection, heating, ventilation and air conditioning ("HVAC") and power, or, in, the case of a virtual collocation, to install the necessary equipment in ILEC-controlled space; and (4) establishing and pre-wiring the "POTS bay," which enables loops from the ILEC MDF to be connected to the CLEC's equipment at the collocation. While the cost of each element of establishing or continuing in a collocation arrangement is usually well defined by a tariff, Statement of Generally Available Terms and Conditions ("SGAT"), or interconnection agreement, determining the cost of collocation for a particular entry plan may be difficult and subject to substantial uncertainty. For instance, for a "cageless" collocation, some of the ILEC make-ready work is unnecessary. CLECs need to obtain direct current ("DC") power and emergency power from the ILEC to operate collocated equipment, and the nature of these arrangements can vary substantially. The specific equipment needed to provide this functionality includes the battery distribution fuse bay ("BDFB") and the DC power cabling that is extended from the BDFB to the collocation arrangement. The BDFB is a large fuse bay or

junction point where a large feed of DC power from the ILEC's power plant is broken down into smaller power units. The DC power cabling, consisting of copper cables in protective sheaths, is necessary to complete a power circuit from the BDFB to the collocation arrangement. In some cases, the CLEC may install its own BDFB in the collocation arrangement. In cases where it does not, it will usually install its own fuse and alarm panel in the collocation cage. It can cost the CLEC in the range of $75,000 to $150,000 to establish a collocation, and up to several thousand dollars in monthly fees to use a collocation. The impairment analysis tool calculates the cost of collocation by considering the number and type of lines that must be connected from the ILEC's main distribution frame and DLC systems to the CLEC's collocation space, and calculates, based on the ILEC's UNE tariffs, interconnection agreements, or SGATs, as appropriate, the cost not only of establishing and equipping the collocation space, but also the cost of connecting individual customer lines from the ILEC to the CLEC. Some of these costs are incurred as monthly recurring costs, and are incorporated into the cost analysis directly as a monthly cost per line. Other costs are incurred either as non-recurring charges imposed by the ILEC, or are incurred by the CLEC as capital investment. In some cases, these costs are treated as a one-time expense that is amortized over a user-adjustable period of time. In other cases, particularly in the case of capital investments, the asset is depreciated over an appropriate economic depreciation life, and the capital carrying cost of the asset is included as a part of the monthly cost per line.

Q. PLEASE DESCRIBE THE CHARACTER OF THESE COSTS AS SUNK, FIXED, ETC.

A. A substantial portion of collocation costs is fixed, i.e., there is a large cost associated with providing service to the first UNE-L customer served. Moreover, most of the up-front costs are sunk, which means they cannot be recovered if the CLEC exits the market. As discussed in the *Triennial Review Order*, the existence of substantial sunk costs creates a significant entry barrier, which has profound effects on UNE-L competition.

Q. PLEASE DISCUSS THE COSTS OF DIGITIZATION, CONCENTRATION AND AGGREGATION.

A. As a consequence of the CLEC's need to place its switch at a substantial distance from the ILEC's wire center, in order for the CLEC to be able to carry the traffic from its collocation space all of the way to its switch, it must install in its collocation space equipment that digitizes and encodes the analog signals delivered over the customers' loops to that collocation space. The equipment used to perform this function is sometimes referred to as DS0 (that is, voice grade) equipment infrastructure. This equipment includes DLC equipment, high capacity digital cross-connection frames (DSX or DACS), power distribution and remote test equipment.

The DLC equipment is the equipment that receives the analog communications from the loop via the POTS bay and both digitizes and concentrates the communication for transmission to the CLEC's switch. Digitization of the analog signals from the loop is necessary in order to interface

the signal efficiently with the fiber optic transmission facilities that are used in interoffice transmission paths. Concentration of the signal permits the CLEC to more efficiently use interoffice transmission capacity. The DLC also interoperates with the CLEC switch to provide and receive signaling necessary for call supervision, including the provision of dial tone and ringing current, digit reception and related functions.

The CLEC must also install other equipment at the collocation to provide UNE-L service. A digital cross connection frame (or DSX-3) is needed to connect the DLC and the transport facility. In addition, a CLEC needs to install equipment that enables it to monitor its collocation equipment remotely, thereby permitting the CLEC to maintain its equipment and to diagnose and subsequently repair any service disruptions that may occur.

As in the case of the collocation costs, there are substantial fixed costs associated with these functions. The largest costs are for the DLC equipment, which even at its smallest size costs approximately $20,000. This input, as well as many of the other investment inputs used in the impairment analysis tool are those proposed by Dr. Gabel in the original version of the NRRI model. These in turn were derived from a variety of industry sources, including the FCC's synthesis model and various *ex parte* presentations made to the FCC by representatives of both CLECs and ILECs. And even if a CLEC can utilize the smaller DLC equipment efficiently, it will not be able to operate at the lowest possible cost unless it can achieve sufficient volume to capture the scale economies inherent in DLC technology.

The engineering and installation cost for these functions are sunk once they are committed to a particular central office. The purchase prices of the DLC and other equipment are not sunk with respect to the provision of service at a particular location, because they could be moved elsewhere. Nevertheless, if the CLEC were to exit the market entirely, it might have a hard time recovering substantial portions of the equipment cost if UNE-L-based service failed to succeed across much of the CLEC industry.

Q. PLEASE DISCUSS THE COST OF TRANSPORT TO THE CLEC'S SWITCH.

A. Once the CLEC customers' signals have been prepared for transport to the CLEC switch, the CLEC must arrange for transmission facilities to deliver traffic from the collocation to its switch. In most cases, a CLEC will not be able to use its own network facilities to connect the collocation to its switch because the traffic volumes present at a given collocation are typically too low to afford the economies of scale necessary to justify CLEC construction of transport facilities solely for this purpose. Rather, the CLEC will use the ILECs' transport facilities to connect its collocation either directly to its switch or to a "hub" location at which traffic from several sub-tending collocations in the area are aggregated and subsequently transported to the CLEC's switching location. Given appropriate traffic volumes, this hub location may be connected to the CLEC's switching office via the CLEC's own optical fiber transport facility. In either case, whether purchased from the incumbent or self-provisioned by the CLEC, a CLEC must

procure transport facilities between its collocations and switching locations to backhaul customer loops to its switch.

There are some sunk costs associated with providing transport for UNE-L based local service. If the CLEC leases transport from the ILEC, there will be sunk costs associated with any nonrecurring charges, term commitment plans, and any costs associated with "grooming" circuits to handle increased and/or changed traffic demand. If the CLEC has transport facilities already in place, then its costs were sunk before it decided to provide UNE-L based local service.

The CLEC will face significant scale effects on transport leased from the ILECs. Most transport tariffs provide substantial volume discounts, and unless the CLEC has enough traffic to utilize a DS3 or higher circuit, it will pay a high per unit cost for using DS1 circuits. Also, because transport circuits are provided in "lumpy" amounts (for example a DS1 circuit can carry 24 voice grade circuits, but the next larger size circuit, a DS3, carries 672 voice grade circuits), a CLEC will be less likely to use transport facilities efficiently, the smaller its total demand for transport.

Q. PLEASE DISCUSS THE PROCESS AND COSTS ASSOCIATED WITH CUTTING OVER THE LOOP SERVING A CUSTOMER CHOOSING TO BE SERVED BY A UNE-L BASED CLEC.

A. Once the necessary network infrastructure is in place, the CLEC is in a position to connect individual customer loops to its collocation (and ultimately to its switch). To accomplish this, the CLEC must arrange for what is typically referred to as a hot cut. The hot cut process involves multiple activities that require coordination

among both CLEC and ILEC personnel and includes, among other things (1) physically moving the CLEC customers' loops from the ILEC MDF to the POTS bay at the CLEC collocation and (2) coordinating the porting of the customer's telephone number to the CLEC's switch so that calls dialed to the customer's number can be properly completed. Once the hot cut has been successfully completed, a CLEC can then provide service to its end-user using its own switch.

In calculating the costs a CLEC would have to pay the ILEC for a hot cut, I used the rates established by the Commission for a hot cut. In calculating the internal costs for a CLEC to oversee a hot cut, I assume that the CLEC will incur costs of $10.00 per line as a baseline input.

The cost of the hot cut required to serve a particular customer amounts to an investment the CLEC makes to acquire the stream of revenue it expects from that customer. As such, the investment loses its value entirely if the customer switches to another provider. The CLEC must therefore recover this cost within the period over which it can expect to retain the customer. Thus, the average period over which a CLEC can expect to retain a customer is the appropriate amortization period for customer acquisition costs, including hot cut costs. As such, the average customer life, or retention period, is a crucial element of the cost that a CLEC must evaluate in deciding whether to deploy facilities for UNE-L service or not. This average customer life is conceptually related to the concept of "churn" experienced by telecommunications even in a monopoly environment, as customers enter and leave the provider's serving area, and move from place to place within the serving area. Estimates of churn can be significant in some

conventional cost studies, but churn in a monopoly environment is relatively stable and subject to fairly reliable approximations. Very much to the contrary, average customer life in a competitive environment depends on the nature of competition. In this case, the competitive environment to be considered is the environment after UNE-L based entry. While we have good reason to believe that the character of competition will be significantly different after UNE-L based entry – because a UNE-L competitor will have incurred greater sunk costs and face much lower marginal costs than a UNE-P based competitor – the precise character of that competition, and its implications for average customer life, must remain subject to a great deal of uncertainty. While conventional economic models are available to approximate market prices, hence expected revenues after entry, conventional economic modeling has little to say about the likely dynamics of competition after entry. This uncertainty is relevant, not only to the present modeling exercise, but to the CLEC's evaluation of risk associated with potential deployment of facilities to support UNE-L based service.

Q. PLEASE DISCUSS THE OTHER IMPORTANT INPUTS TO THE TOOL.

A. As I noted earlier, many of the inputs used in the impairment analysis tool are those proposed by Dr. Gabel in the original version of the model he developed. Where additional inputs were needed in connection with services or collocation elements not considered in Dr. Gabel's model, a variety of sources were consulted, including prominently the HAI Model and the HAI xDSL Adjunct Model. The sources of the inputs used in the model are documented within the model itself, in the form of comments attached to the description of each input

cell. Most of the costs we have described in this section are both sunk and fixed. It is difficult, if not impossible, for the CLEC to recover these costs from anyone other than the customer who ordered the service. Also, because the ILEC does not incur most of these costs to serve its embedded base, these costs fall within the classic definition of an entry barrier: namely, a sunk cost that the incumbent never had to incur.

Q. PLEASE DESCRIBE THE IMPAIRMENT ANALYSIS TOOL'S CALCULATIONS.

A. The analysis tool is organized as a set of four worksheets that provide inputs to its calculations, a number of worksheets that calculate various cost components, and two (or three) worksheets that summarize its calculations. Inputs are contained on the worksheets entitled "Inputs," "Tariff Tables – KY," and "WC Inputs." The "WC Inputs" worksheet contains detailed information on each wire center in the ILEC's operating area, including the number of lines in each of several service categories, and the distance from the wire center to a CLEC switch assumed to be located near the largest ILEC switch in each LATA. The "Tariff Tables –KY" worksheet contains detailed information on the rates charged by the ILEC for all aspects of collocation and interconnection arrangements. This information was compiled by MCI and provided to me for use in this model. Finally, the "Inputs" worksheet contains a large number of user-adjustable assumptions that are used in the analysis tool to calculate costs. These include the assumed market share captured by a single CLEC for each of several services, estimates of CLEC internal costs for activities such as accepting hot cuts and customer acquisition

and retention, and estimates of the purchase price of various items of equipment required by the CLEC in providing UNE-L based local exchange service, including DLC equipment, switches, DSL-related equipment, and digital cross-connect equipment.

Several worksheets perform calculations relating to the costs of establishing and operating a collocation space in each wire center. This includes all recurring and non-recurring costs incurred in establishing the collocation space, the costs of interconnection between the ILEC's loop facilities and the collocation space, and the capital costs incurred by the CLEC in equipping the collocation space. The analysis tool develops costs in each worksheet for virtual collocation, cageless collocation, and caged collocation. In addition, the worksheets calculate the cost of concentration and cross-connection equipment located in the ILEC wire center where EEL transport is used by the CLEC. These worksheets are:

1) "Collocation" – which calculates the collocation costs associated with voice grade residential and small business services;
2) "ADSL Collocation" – which calculates the combined collocation costs associated with voice grade services as well as ADSL services for residential and small business customers, and;
3) "DS1-DS3 Combined Collocation" and "DS1-DS3 Only Collocation" which calculate the collocation costs associated with the provision of DS1 and DS3 services in combination with voice grade and ADSL

services, and collocation costs associated with the provision of DS1 and DS3 services only, respectively.

Another set of worksheets performs calculations relating to the costs of acquiring transport facilities in order to carry traffic from each ILEC wire center to the CLEC's switch or hub. A number of possible scenarios are considered, including DS1 and DS3 unbundled dedicated transport, DS1 and DS3 special access transport, and EEL transport. For each form of transport, the non-recurring and recurring charges imposed by the ILEC for cross-connection, multiplexing and transport fixed and per-mile components are calculated, and non-recurring charges amortized as appropriate to produce a monthly per-line cost for each scenario. These worksheets are:

1) "Transport" – which calculates the transport costs associated with voice grade services for residential and small business customers;
2) "ADSL Transport" – which calculates the transport costs associated with voice grade services as well as ADSL services for residential and small business customers, and;
3) "DS1-DS3 Transport" – which calculates the cost of transport associated with DS1 and DS3 services.

A final set of worksheets is used to summarize the outputs of the collocation and transport worksheets and to select a least-cost alternative. These worksheets are:

1) "Minicost" – which summarizes collocation and transport costs pertaining to voice grade services for residential and small business customers;
2) "Minicost ADSL" – which summarizes the collocation and transport costs pertaining to voice grade services combined with ADSL services for residential and small business customers, and;
3) "ADSL Increment" – which determines the additional costs incurred as a result of a decision to offer ADSL services and restates those results as a per-DSL line cost.

Finally, the results of the calculation worksheets are summarized in the worksheet "Summary Calcs." This worksheet brings together the results of the various collocation, transport, and hot cut worksheets and, for each type of customer calculates the monthly cost per line and the total monthly cost. The results are presented for each transport type. The analytical tool determines whether the least-cost alternative is to configure transport facilities as DS1 or DS3 facilities, and selects the least-cost alternative among the various collocation types. These costs are compared to the monthly per-line revenues for each service type, and a total net revenue per line per month and a total net revenue per month is calculated for each service type for each wire center. As a final step, the "best case" is presented for the CLEC, choosing among the various transport and collocation options.

While ADSL costs and revenues are calculated for each wire center, the ADSL service is included in the net revenue and "best case" results only where

the net revenue for ADSL is positive. In some wire centers, where very few ADSL customers are available to the CLEC, the cost of the transport facilities needed to support the service cannot be justified given the available revenues. In such cases, it assumed that the CLEC would decide not to offer ADSL services to customers in that wire center.

A final summary worksheet – "Sims" – compiles information computed in the "Summary Calcs" worksheet and permits analysis of the variation in profitability among wire centers given variations within a range of inputs to the impairment analysis tool. As I have previously explained, considerable uncertainty must attend any analysis of the dynamic competitive situation that will be faced by a CLEC attempting to provide local service using its own switching facilities. Accordingly, the impairment analysis tool is designed to present a range of possible outcomes. Any two wire centers can be entered into the worksheet for comparative analysis. Six of the most important inputs to the analysis tool are shown on the worksheet and, for each, a range of possible variation is provided. A button on this electronic worksheet – "Generate Random Scenarios" – activates a macro procedure that populates the analytical tool input with random numbers within the specified range, calculates the result for 250 random scenarios, and presents the results graphically as a histogram showing the net revenue for each of the two wire centers. This permits a view of the range of possible outcomes in each wire center, with the most likely outcomes represented by the net revenue categories with the highest frequency.

B. Anticipated Revenues

Q. PLEASE PROVIDE AN OVERVIEW OF THE PROCESS YOU USE TO ESTIMATE REVENUE.

A. First, it should be clear that the revenue estimate that is relevant to a CLEC considering potential deployment will be the revenue the CLEC expects to recover in the market as it will exist after UNE-L based competition has become established. Thus, an appropriate estimate of revenue to evaluate potential deployment is an estimate of future revenue in a different competitive environment than exists today. My judgment as to a reasonable estimate begins with existing prices, and is informed by simulations based on two widely used models of competitive interactions. These models are based on the costs faced by the ILEC and the CLECs, differentiating among costs that are fixed, sunk, or marginal, and specifying the nature of consumer demand for local exchange service. After forming estimates of costs and revenues that may obtain after deployment of facilities for UNE-L based provision of service, a CLEC considering potential deployment would compare future net revenues to the initial cost of entering the market; my calculation mimics the CLEC's investment decision.

Q. YOU STATED THAT REVENUE PROJECTIONS SHOULD BE BASED ON FUTURE REVENUES UNDER A DIFFERENT COMPETITIVE REGIME. PLEASE EXPLAIN.

A. To determine whether to serve a market using UNE-L, the CLEC must consider not only its costs, it must also consider the likely revenues from the services it

offers, including all categories of potential revenues. *Triennial Review Order* ¶¶ 484-85. Economic theory predicts that a CLEC will enter and compete against the ILEC only if the CLEC can expect to earn sufficient profits post-entry to enable it to earn an adequate return on the cost of the capital that it must commit to enter the market, recognizing the risk associated with the investment. Given the CLEC costs discussed above, and given the retail rates the competitor will be able to charge, the competitor may or may not be able to recover the costs it would have to incur to enter the market in the first place, in addition to the incremental cost of providing service.

In other words, before it enters a market, a competitor would need to understand its costs, estimate the revenue it would expect to receive, and determine whether entry would be profitable. Its revenue projections would be based on the rates it could charge, accounting for the effect of entry on competition, and the number of customers it expects to purchase its services. And, its rates are highly dependent upon the rates the other market participants would charge for substitutable services. The CLEC's price must be competitive with the ILEC's if the CLEC is to be successful. A CLEC considering potential deployment cannot rationally assume it will be able to charge $40 for phone service in the BellSouth region if BellSouth is likely to respond to entry by offering a similar service for $35.

Q. IS IT REASONABLE TO BEGIN YOUR ANALYSIS OF ANTICIPATED REVENUE WITH THE ILEC'S EXISTING RATES?

A. Yes, but only as a starting point. The ILEC's existing rates represent the highest conceivable rates that a CLEC might hope to charge after entry, and for reasons discussed below, it is not really plausible that those rates could be maintained after UNE-L competition becomes established.

Because a new entrant must generally offer rates that are no higher than those currently charged by the incumbent, existing retail rates are an optimistic starting point for any analysis of anticipated CLEC revenue. But, analysis of existing rates is only the starting point. Firms contemplating entry into new markets rationally base their entry analysis on the prices they expect will prevail after they enter, and not on current prices. This proposition is widely accepted in industrial organization economics, and the FCC understood it to be an important factor in an impairment analysis. *Triennial Review Order* ¶ 88 ("an entrant that knows that an incumbent LEC has incurred substantial sunk costs may be disinclined to enter a market because the incumbent LEC is likely to drop its prices, possibly to levels below average cost, in response to entry). See also *id*. ¶¶ 75 n. 250, 83; 157 ("telecommunications prices are not static, and will change over time in response to increased competition"). Consideration of post-entry prices in calculating potential revenue is particularly important in the case at hand because the entrant (or entrants) will be adding new capacity to a market (new switches and new transport); unless other firms are willing to watch their facilities operate well below capacity, prices will have to fall, following the well

understood rules governing supply and demand. Because there is no reason to believe that other firms in the market will act unilaterally to reduce output to fully offset the increase in capacity by the new entrants, prices certainly will fall unless the firms in the market collude to constrain capacity.

Q. ARE THERE REASONS SPECIFICALLY RELATED TO A TRANSITION FROM UNE-P COMPETITION TO UNE-L COMPETITION THAT SUGGEST LOWER PRICES AFTER ENTRY?

A. Yes. There are two reasons related to marginal costs of the ILEC and CLECs that strongly suggest price reductions as UNE-L competitors become established and replace UNE-P competitors. First, the costs of providing UNE-P service largely take the form of monthly charges for the required UNEs. These costs are not fixed or sunk costs, but vary with the number of customers served. These variable or marginal costs create a floor, below which a UNE-P competitor will never allow price to fall. If the UNE-P competitor cannot recover its marginal costs, which comprise the bulk of its costs, it will not offer service. On the other hand, a UNE-L competitor faces a substantially different cost structure. For a UNE-L competitor, a large portion of costs is sunk, and the marginal costs, those that vary with the number of customers served, comprise a smaller fraction of total costs. Thus, once the initial costs of entry have been "sunk" into the business, a UNE-L competitor will be willing to reduce price down to its lower marginal cost in order to acquire or retain customers. The urgency of covering the sunk cost of entry, which can only be accomplished by having customers that contribute something, even a small amount, above marginal cost, creates a competitive environment that

is much more likely to involve substantial price reductions, than is the environment of UNE-P competition. So, assuming that UNE-L competition is economically and operationally feasible, CLECs face lower marginal costs and are under pressure to recover sunk costs by increasing volume.

When UNE-L competition becomes established, the ILEC also has a stronger incentive to win, or retain, a customer instead of having that customer served by a competitor. This is the case because the ILEC receives revenues related to a customer in two forms: If the customer chooses the ILEC at the retail level, the ILEC receives the retail price the customer pays for service. If the customer chooses a CLEC at the retail level, the ILEC still receives revenue for this customer, in the form of wholesale UNE revenue from the CLEC chosen by the end user customer. But the ILEC receives more UNE revenue from a UNE-P customer than from a UNE-L customer, as the UNE-P customer pays the ILEC for both switching and loops. In other words, the ILEC is worse off when a customer leaves it for a UNE-L CLEC than for a UNE-P CLEC and has a greater incentive to win the customer back. As a result, the ILEC is likely to cut prices further in the face of UNE-L competition than UNE-P competition.

Finally, as the market matures, CLECs' offerings should come to be regarded as closer and closer substitutes to the traditional ILEC's offerings. In the early days of competition consumers' lack of familiarity with CLECs' services provides a source of product differentiation that leads to a less rigorous form of competition. As the different providers' offerings come to be regarded as perfectly good substitutes for each other, price takes on greater importance as the

locus of competition, and entrants must anticipate corresponding reductions in market price. Potential entrants will also have to consider whether other firms will also enter the market at the same time that they do. More entry, at least when there are few firms in the market, generally will result in more aggressive price competition and lower market prices, which further reduces the post-entry profit margins of the entrants (as well as of the incumbent).

Q. BEYOND THE RELATIVELY SIMPLE NOTION OF "MARKET PRICE," WILL POTENTIAL ENTRANTS CONSIDER OTHER FACTORS?

A. Yes. A CLEC must consider what the prices are likely to be for particular types of customers in particular geographic markets. The revenue a CLEC is likely to earn is strongly affected by the ability of the incumbent to cut prices selectively in response to entry. The more the incumbent can fine tune its prices and target only those customers (by geographic area or other marketplace characteristic) where entry has occurred or is threatened, the lower the cash flows an entrant can expect. When the incumbent has greater ability to price discriminate, it has a greater incentive to cut prices in response to initial, small-scale entry. The reason is that the incumbent does need not to lose profits by "unnecessarily" cutting prices to customers who have no competitive alternatives.

Q. WOULD SUCH SELECTIVE PRICE CUTTING AMOUNT TO PREDATORY PRICING?

A. Not necessarily. It is important to recognize that the incumbent does not need to set prices at predatory levels to deter future entry. The conventional definition of predatory pricing defined it as pricing below variable or marginal cost, with the

intention of driving competitors out of the market. In a case where entry requires substantial fixed and sunk costs and the incumbent can target price reductions, however, the incumbent can set prices at a level at which the entrant can recover its variable costs, but will not be able to recoup its sunk costs. In that situation, while the entrant will remain in the markets to which it already has committed, it will not recover its sunk costs in those markets, and will learn not to enter new markets and challenge the incumbent.

Once the CLEC has estimated the price the ILEC likely will charge for services when faced with competitive entry, the CLEC must consider the extent to which it will be required to offer service at a discount from whatever price the ILEC is willing and able to charge, or incur the cost of developing additional features to differentiate their product, in order to take business away from the incumbent. Customers cannot be expected to switch from the incumbent to the new entrant simply because the new entrant has entered the market. New entrants can only obtain customers from incumbents by pricing their services below the level of the incumbent's prices or by offering distinctive services at a higher cost. At lower prices, all else equal, the entrant will earn lower margins (i.e., will receive less cash flow) from each of its customers than will the incumbent. The higher costs associated with product differentiation likewise will result in lower margins for the new entrant.

Q. HOW DO YOU FORM AN OPINION AS TO THE EXTENT OF PRICE AND REVENUE REDUCTIONS A CLEC WOULD PROJECT IN EVALUATING POTENTIAL ENTRY ON A UNE-L BASIS?

A. In addition to observing the nature of competition now in progress, I consider two formal models of the process in which prices change as a result of competitive entry. That is, it is possible to show how an ILEC, seeking to maximize its profits, will adjust its rates in response to competition from a new entrant. And, it is equally possible to show the prices that CLECs would charge in response, so that they too would maximize profits. It is then possible to calculate the revenue the competitor would receive if it charged those prices to the customers it would attract by offering those prices.

Based on modeling of the competitive interactions among the carriers following entry by CLECs as UNE-L-based providers, I would expect prices to decline somewhere in the range of 11% to 20% over the course of time following entry by UNE-L based CLECs. Some of the price decline should happen very quickly, with continued declines occurring over time.

Armed with this information, it is then possible to make a realistic assumption about whether competitors will enter the market given the costs to provide service and the expected revenues that would be gained by a competitor. That is, my ultimate aim is to compare those expected revenues with projected costs. If projected revenues are below projected costs, then a competitor would not enter the market, because it would lose money if it did. If, on the other hand, the projected revenues allowed the competitor to recover its sunk costs, cover its

operating expenses, and earn a reasonable rate of return on its investment, it would enter the market (although the competitor might enter the market only in a limited way, charging relatively high prices to relatively few customers).

Q. ARE YOU CONFIDENT OF THE PRECISION OF YOUR ESTIMATES REGARDING THE COMPETITIVE ENVIRONMENT AFTER UNE-L BECOMES ESTABLISHED?

A. No, it is inevitable that substantial uncertainty must accompany any estimates of the nature of competition after substantial UNE-L entry. For one thing, it is important to recognize that a formal model may overestimate the opportunity for CLEC entry. In calculating CLEC costs and revenue opportunities, we have to make simplifying assumptions about the way in which a CLEC would operate in a world in which it relies on the ILEC to provide UNE loops and other network functions, but utilizes its own switches. For example, my quantitative analysis assumes that the ILECs provide UNEs to the CLECs on terms that are indistinguishable from their self-provisioning of these same elements. If this assumption is violated, then it is not possible to draw any conclusions from a quantitative analysis, for two separate and important reasons. This point cannot be overemphasized.

First, deficiencies in ordering or provisioning of UNEs will raise the CLECs' costs above our estimate levels, possibly by a very large amount. Second, if ILECs provide poor service to the CLECs, then the CLECs' customers will perceive that the CLECs' services are inferior to the ILECs. I note that opportunities for things to "go wrong" and result in inferior service for CLECs are

much greater in the more complicated UNE-L arrangement than with UNE-P. This will reduce the demand for the CLECs' services and force the CLECs to either set lower prices or sell less service. My quantitative analysis assumes that customers do not perceive any actual difference in the quality of ILECs' and CLECs' services.

The specific conditions that must be satisfied for my quantitative analysis to be applicable to the Commission's determination of impairment include the following:

- Customer cutovers from ILECs to CLECs and from CLECs to CLECs must be seamless. Cutovers must be available in a short time frame, and there should be virtually no possibility of cutting off service to a customer.
- All the UNEs still provided by the ILEC must be available on a non-discriminatory basis, to include TELRIC pricing, efficient and rapid ordering, provisioning, support and post-installation quality of service (e.*g.,* static, cross-talk, downtime, echo, dial-up modem throughput, *etc.*).
- OSS must be robust enough to support a much larger volume of customer orders than would be apparent from the size of the CLECs' customer base. Systems must allow for significant customer turnover that is likely to occur as the ILECs engage in vigorous "winback" programs.

If these conditions are not met, the possibility of CLEC entry is likely to be much less than is shown by my analysis.

C. Impairment Analysis Tool Results

Q. WHAT ARE THE RESULTS OF THE ANALYTICAL PROCESS THAT YOU HAVE UNDERTAKEN?

A. I will first provide a snapshot view of the results of the analytical process. For any given set of input values, the impairment analysis tool produces the monthly cost per line for each wire center in the state of Kentucky. This cost estimate includes all of the fixed and variable costs associated with serving the residential and business customers served out of a wire center. Fixed costs are amortized over the expected lifetime of the equipment, or serving arrangement (in the case of nonrecurring fees), or customer life (in the case of customer acquisition and hot cut costs). I also assume that the CLEC constructs an optimal-sized network to serve the expected customer base, and that the "steady-state" customer base is reached immediately.

The cost inputs selected for the base case are mostly from the original model prepared by Dr. Gabel. As explained above, I have added revenues and costs from business customers and DSL service. Other key inputs in this case are:

- Market Share: 5% across all markets and services (business and residential, voice and DSL). This is based on an assumed 15% market share for the CLEC industry, spread evenly across three CLECs. The range of market share considered in the model is between three and eight percent.

- Revenue: The impairment analysis tool uses data on residential revenue by wire center compiled by TNS Telecoms, based on surveys of actual subscriber bills. I have calculated the average number of lines per residence location for each wire center in Kentucky, and used this factor to convert the TNS household spending data to an average expenditure per line. Business revenue is based on the calculation of the differential between the bundled price for residential and business services sold by MCI in Kentucky.
- The range of variation in revenue considered is between 85% and 95% of current spending for both residential and business voice services. This is not based on a specific result of the analysis of expected price declines in the market, although I expect UNE-L-based competition to drive prices down to the low end of this range.
- Customer life is twelve months, which is based on the recent experience of MCI. The range in variation considered is between eight and sixteen months.
- Customer acquisition costs are set at $130, which a range between $110 and $150 considered.
- CLEC costs to accept hot cut transitions from the ILEC to the CLEC's service is estimated at $10.00, with a range considered between $7.00 and $13.00.

The results for each wire center market are reported in the impairment analysis tool on the "Summary Calcs" worksheet.

Q. ARE THE RESULTS OF THE BASE CASE SENSITIVE TO THE INPUTS THAT YOU SELECTED?

A. Yes. The results are highly sensitive to the inputs selected. To illustrate this point, I have selected two wire center markets in the same LATA in Kentucky, and run the analysis tool using a range of plausible inputs. This demonstrates that the CLEC will face significant uncertainty as to its prospects of recovering its sunk cost investment in most markets.

I have selected two wire centers in Kentucky to illustrate how the impact of input selections will itself be a function of the characteristics of the wire center, including: the number of residential and business customers; the extent to which customers are served by DLC, which forecloses the CLEC from providing DSL service; and the distance to the CLEC switch. Exhibit MTB-3 shows how average net revenue varies in response to changes in the inputs.

In this chart, the results of the impairment analysis tool are shown for two wire centers in Louisville, both in UNE rate zone 1. The histogram displays the number of cases, out of 250 scenarios, where the net revenue per line for the wire center fell into each of 57 categories, ranging from $(40.00) or less per month to $15.00 or more per month. While the LSVLKYBE wire center tends to be somewhat more profitable than the LSVLKYTS wire center, it still produces negative net revenue in 102 of the 250 scenarios (40.8%). The LSVLKYTS wire center produces positive net revenue per line in only 49 of the 250 cases.

Note that although the two wire centers are both located in the same exchange area and rate zone, the characteristics of each wire center cause dramatically different results given the same set of inputs. This reinforces the point I made at the beginning of this testimony; that the ability of a CLEC profitably to provide local exchange services in one wire center is not proof that other wire centers in the same exchange, the same metropolitan area, or the same LATA also can be served.

V. MCI IS DIFFERENT

Q. WOULD YOUR CONCLUSIONS ABOUT THE HYPOTHETICAL CLEC BE DIFFERENT FOR AN ACTUAL CLEC, SUCH AS MCI, THAT WAS NOT STARTING FROM SCRATCH?

A. Under many circumstances my analysis of the hypothetical CLEC would apply to the case of an existing CLEC like MCI. There are other circumstances in which an actual CLEC would face a different business case than the base case of the hypothetical CLEC, which I have shown in the impairment analysis tool. The main factors that would cause the situation of the actual CLEC to differ from the hypothetical CLEC are: (1) the CLEC is already serving large business customers in the same wire center with special access or UNE transport; (2) the CLEC is already collocated in the wire center; and, (3) in addition to being collocated, the CLEC also is connected to the collocation with its own transport facilities.

In the case of a CLEC already serving business customers at that wire center, but not yet collocated, there is the potential that it could build a new collocation to serve enterprise and mass market customers. The benefit to the

CLEC is that it could take advantage of any economies of scale (or scope) in the costs of collocating and transport. This may cause some collocations that are marginally unprofitable for UNE loops alone to become profitable. The impairment analysis tool has been built with the capability of measuring the economies of scope between the enterprise market and the mass market. Therefore, if I were to be given information on the number of DS1 and DS3 circuits at every wire center in Kentucky, I could run scenarios to test whether entry conditions are much more favorable for a CLEC already serving enterprise customers.

If a CLEC were already collocated in a wire center, it could benefit from certain economies of scale and scope. For example, some nonrecurring costs associated with the establishment of the collocation could be spread over a larger volume of business, and per-unit costs therefore may be lower. Also, it is possible that in the short-term the CLEC would have excess, unused capacity for some components, e.g. racks that are used for the DS1 and DS3 customers. Even so, the CLEC would still have to have enough UNE-L customers to achieve economies of scale in many of the cost components related to its mass market service. For example, DLC equipment is not used for DS1 and DS3 customers, and the CLEC would need enough customers to achieve scale economies in the use of this equipment. As in the first case mentioned above, it would be possible to measure the impact of existing collocations on a CLEC's costs using the model that I have developed for the UNE-L business case of a hypothetical CLEC.

The third case listed above would be even more favorable to UNE-L based entry by the CLEC. The reason is that the incremental cost to the CLEC of transporting traffic from UNE-L customers would be lower than when it must lease transport from the ILEC. Once again, this does not mean that the CLEC will always enter the UNE-L market, because it still must invest in additional collocation space and DLC equipment. Whether this would alter the outcome in a specific case can only be answered with the aid of the model and additional information on the capabilities and capacity of the CLEC's fiber ring.

Q. WHAT STEPS CAN THE KENTUCKY PUBLIC SERVICE COMMISSION UNDERTAKE TO ENCOURAGE FACILITIES BASED COMPETITION BY COMPANIES LIKE MCI THAT ALREADY HAVE ESTABLISHED SOME LOCAL FACILITIES?

A. I earlier identified certain operational problems that must be overcome before any consideration of the economics of UNE-L based service to mass market customers by any CLEC can take place. These include rapid and seamless cutovers from ILECs to CLECs and from CLECs to CLECs, the nondiscriminatory availability and efficient provisioning of the unbundled elements that the ILECs are still required to provide at TELRIC-based prices, and the development of robust operations support systems capable of handling large volumes of customer migration.

The economic analysis that I have presented shows that perhaps the most crucial factors affecting the economic viability of UNE-L based local service to mass market customers are the level of cost for customer-specific investments and

nonrecurring charges and the period of time over which those costs may be recovered. The FCC specifically cited economic impairment resulting from hot cut costs as a concern and requires future hot cut processes to be implemented by the state public utility commissions be more efficient and have lower costs than the processes currently in place. See, for example, *Triennial Review Order* ¶ 473. While it is not my intention here to recommend a specific price rate elements related to hot cuts, I do recommend that the Commission determine hot cut costs based upon the most efficient, least-cost technologies, processes and procedures which can be utilized in order to effectuate seamless transitions between carriers switches. Moreover, I recommend the Commission consider whether costs incurred by ILECs in performing hot cuts are most appropriately recovered through nonrecurring charges, or whether some other rate structure would reduce the likelihood of impairment. The Commission could, for example, contemplate the development of a competitively neutral cost recovery mechanism whereby the costs of implementing loop portability sufficient to eliminate impairment can be spread across all participants who may benefit from such portability similar to equal access or LNP cost recovery mechanisms.

VI. CONCLUSION

Q. WOULD YOU PLEASE SUMMARIZE YOUR CONCLUSIONS AND RECOMMENDATIONS?

A. Yes. I have shown that the most appropriate definition of the relevant market both for the purpose of the actual deployment "triggers" analysis and for the purpose of analyzing potential deployment of CLEC switching facilities in the absence of

UNE-P, is the wire center. While economic theory would compel a market definition at the level of the individual customer location, administrative practicality as well as the nature of CLEC deployment decisions strongly indicate the wire center as the appropriate level of analysis, rather than some larger aggregation of wire centers such as the exchange, the metropolitan statistical area, the LATA, or the UNE rate zone. CLECs may decide to offer local exchange service in a larger market area, but whether individual customers will actually have a choice among competitive carriers depends upon the economic characteristics of the wire center in which each is located. That local exchange service can profitably be offered in one wire center is not proof that the same service can be located in nearby wire centers – CLECs will not choose to offer services in those wire centers that will reduce profitability.

Any analysis of the profitability of CLEC local exchange service in the absence of UNE-P must make a number of assumptions regarding the situation that the CLEC will face. Market share and customer "churn" may be highly dependent upon the marketing activities and "winback" programs undertaken by the incumbent LEC (and by other CLECs). Average revenue per customer likewise will depend upon the aggressiveness of the incumbent in cutting prices and upon the discount that the CLEC must offer to attract new customers. The external and internal costs of migrating customers from UNE-P to UNE-L service are only partially under the control of the CLEC, and any systemic problems in implementing hot cuts may affect churn, market share and average revenue.

Each of these factors is crucial in determining the profitability of CLEC UNE-L based local exchange service. Each is, to a greater or lesser extent, interdependent with the other factors. And each is only partially under the control of the CLEC. Given the uncertainty faced by the CLEC in a post-UNE-P environment, no one can say with certainty that any wire center in Kentucky is feasible for economic deployment of CLEC local exchange service in the absence of UNE-P. At best, one might say that some wire centers in Kentucky might be profitable under some set of optimistic assumptions. At worst, one would be forced to conclude that no wire center in Kentucky can profitably be served by UNE-L based CLECs.

As I explained at the beginning of this testimony, the consequences of an erroneous finding of non-impairment are serious and irreversible. The consequences of an erroneous finding of impairment are minor and largely will be self-correcting. In view of the uncertainty surrounding any analysis of the potential deployment of CLEC UNE-L based local exchange service, I believe the Commission must find that the FCC's finding of CLEC impairment in the absence of access to unbundled switching should be sustained.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.