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Witness:	Aron
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SOUTHWESTERN BELL TELEPHONE, L.P. D/B/A SBC MISSOURI

CASE NO. TO-2005-0035

DIRECT TESTIMONY

OF

DR. DEBRA J. ARON

Evanston, Illinois
October 29, 2004

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

In the Matter of the Second Investigation into the State of Competition in the Exchanges of Southwestern Bell Telephone, L.P., d/b/a/ SBC Missouri.)	Case No. TO-2005-0035

AFFIDAVIT OF DEBRA J. ARON

STATE OF ILLINOIS)
SS
CITY OF EVANSTON)

I, Debra J. Aron, of lawful age, being duly sworn, depose and state:

My name is Debra J. Aron. I am presently Director of the Evanston offices of LECG, LLC, ("LECG") and Adjunct Associate Professor at Northwestern University.

2. Attached hereto and made a part hereof for all purposes is my direct testimony.
3. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct to the best of my knowledge and belief.

Debra J. Aron

Subscribed and sworn to before this 27th day of October, 2004

Notary Public

My Commission Expires: 6/25/07

Official Seal
Lesley Bates
Notary Public State of Illinois
My Commission Expires 06/25/07

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Schedule 1 – Curriculum Vitae

CASE NO. TO-2005-0035
SOUTHWESTERN BELL TELEPHONE, L.P. D/B/A SBC MISSOURI
DIRECT TESTIMONY OF DR. DEBRA J. ARON

I. INTRODUCTION AND QUALIFICATIONS

Q.1 PLEASE STATE YOUR NAME AND POSITION.

A.1 My name is Debra J. Aron. I am the Director of the Evanston offices of LECG, LLC, ("LECG") and Adjunct Associate Professor at Northwestern University. My business address is 1603 Orrington Avenue, Suite 1500, Evanston, IL, 60201.

Q.2 PLEASE DESCRIBE LECG, LLC.

A.2 LECG is an economics and finance consulting firm that provides economic expertise for litigation, regulatory proceedings, and business strategy. Our firm comprises more than 200 experts from academe and business, and has 28 offices in North America, Europe, Asia Pacific, and Latin America. LECG's practice areas include antitrust analysis, intellectual property, environmental and insurance claims, market and regulatory design, valuation analysis, and labor and employment, in addition to specialties in the telecommunications, financial services, and healthcare and pharmaceuticals industries.

Q.3 PLEASE DESCRIBE YOUR PROFESSIONAL QUALIFICATIONS.

A.3 I received a Ph.D. in economics from the University of Chicago in 1985, where my honors included a Milton Friedman Fund fellowship, a Pew Foundation teaching fellowship, and a Center for the Study of the Economy and the State dissertation fellowship. I was an Assistant Professor of Managerial Economics and Decision Sciences from 1985 to 1992, at the J. L. Kellogg Graduate School of Management, Northwestern University, and a Visiting Assistant Professor of Managerial Economics and Decision Sciences at the Kellogg School from 1993-1995. I was named a National Fellow of the Hoover Institution, a think tank at Stanford University, for the academic year 1992-1993, where I studied innovation and product proliferation in multiproduct firms. Concurrent with my position at Northwestern University, I also held the position of Faculty Research Fellow with the National Bureau of Economic Research from 1987-1990. At the Kellogg School, I have taught M.B.A. and Ph.D. courses in managerial economics, information economics, and the economics and strategy of pricing. I am a member of the American Economic Association and the Econometric Society, and an Associate member of the American Bar Association. My research focuses on multiproduct firms, innovation, incentives, and pricing, and I have published articles on these subjects in several leading academic journals, including the *American Economic Review*, the *RAND Journal of Economics*, and the *Journal of Law, Economics, and Organization*. I currently teach a graduate course in the economics and strategy of communications industries at Northwestern University.

I have consulted on numerous occasions to the telecommunications industry on competition, costing, pricing, and regulation issues in the U.S. and internationally. I have testified in several states regarding economic and antitrust principles of competition in industries undergoing deregulation; measurement of competition in telecommunications markets; the proper interpretation of Long Run Incremental Cost and its role in pricing; the economic interpretation of pricing and costing standards in the Telecommunications Act of 1996 ("TA96" or "the Act"); limitations of liability in telecommunications; Universal Service; and proper pricing for mutual compensation for call termination. I have also submitted affidavits to the Federal Communications Commission ("FCC") analyzing the merits of Ameritech Michigan's application for authorization under Section 271 of TA96 to serve the in-region interLATA market, CC Docket No. 97-137; explaining proper economic principles for recovering the costs of permanent local number portability, CC Docket No. 95-116; explaining the economic meaning of the "necessary and impair" standards for determining which elements should be required to be unbundled under TA96, CC Docket No. 96-98; and an analysis of market power in support of Ameritech's petition for Section 10 forbearance from regulation of high-capacity services in the Chicago LATA, CC Docket No. 95-65. I have consulted to carriers in Europe, the Pacific, and Latin America on interconnection and competition issues, and have consulted on issues pertaining to local, long distance, broadband, wireless, and equipment markets. I have conducted analyses of mergers in many other industries under the U.S. Merger Guidelines. In addition, I have consulted in other

industries regarding potential anticompetitive effects of bundled pricing and monopoly leveraging, market definition, and entry conditions, among other antitrust issues, as well as matters related to employee compensation and contracts, and demand estimation. In 1979 and 1980, I worked as a Staff Economist at the Civil Aeronautics Board on issues pertaining to price deregulation of the airline industry. In July 1995, I assumed my current position at LECG. My professional qualifications are detailed in my curriculum vitae, which is attached as Schedule 1.

Q.4 HAVE YOU TESTIFIED BEFORE THIS COMMISSION BEFORE?

A.4 Yes I have. In 2001, I testified in SBC Missouri's competitive declaration case on the economic principles that I believe should guide the Commission in its evaluation of the state of competition.[1] I also testified in 2001 on the appropriate competitive classification for SBC Corporation's long-distance subsidiary (SBC Southwestern Bell Communications Services, Inc.).[2] In 2002, I testified on the economic principles by which one should evaluate the competitive implications of term contracts,[3] and on the

[1] Direct Testimony of Dr. Debra J. Aron, before the Public Service Commission of the State of Missouri, Case No. TO-2001-467, June 28, 2001 (and related surrebuttal testimony filed September 2001).

[2] Direct Testimony of Dr. Debra J. Aron, before the Public Service Commission of the State of Missouri, Consolidated Case Nos. TA-2001-475 and TA-99-47, October 2001.

[3] Direct Testimony of Dr. Debra J. Aron, before the Public Service Commission of the State of Missouri, Case No. TT-2002-227, March 5, 2002 (and related rebuttal testimony filed March 25, 2002 and surrebuttal testimony filed April 8, 2002).

economic criteria for determining when price plans such as "winback" promotions should be viewed as beneficial to competition and consumers rather than anticompetitive.[4]

II. CONTEXT AND PURPOSE OF THIS PROCEEDING

Q.5 WHAT IS YOUR UNDERSTANDING OF THIS PROCEEDING?

A.5 I understand that under Missouri law, Southwestern Bell Telephone ("SBC Missouri") has the right to have its services declared competitive when certain criteria are met, which I will discuss below. The Public Service Commission of Missouri ("Commission") has the obligation to investigate to determine whether "effective competition" exists in the relevant markets.

In 2001, in the proceeding in which I testified as I indicated above, the Commission concluded its first investigation into the state of competition in SBC Missouri's exchanges. It found that certain SBC Missouri services should be designated as competitive, in some cases limited to specific geographic areas.[5] SBC Missouri is now requesting the Commission to investigate the status of competition for its business and

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4 Surrebuttal Testimony of Dr. Debra J. Aron, before the Public Service Commission of the State of Missouri, Case Nos. TT-2002-472 and TT-2002-473 filed August 23, 2002.

5 See, Report and Order, *In the Matter of the Investigation of the State of Competition in the Exchanges of Southwestern Bell Telephone Company*, Public Service Commission of the State of Missouri, Case No. TO-2001-467, 2001 Mo PSC Lexis 1770, December 27, 2001 (hereafter, *2001 SBC Missouri Competitive Reclassification Order*), pp. 33-36, 47-51 (which provides for competitive reclassification of core business switched services in the St. Louis and Kansas City exchanges, and core residential switched services in the Harvester and St. Charles exchanges.) The same order provides for the competitive reclassification of SBC Missouri's SS7 services in all of SBC Missouri's exchanges (pp. 70-71).

residential access lines, associated services, and directory services in its remaining exchanges.[6]

Q.6 WHAT IS THE RELEVANT LAW PERTAINING TO THIS PROCEEDING?

A.6 I understand that this proceeding is governed primarily by Section 392.245 of the Missouri Revised Statutes ("RSMo"). Mr. Unruh describes Section 392.245, including the price cap plan, and the process to classify services as "competitive."[7] In addition, Section 392.185 is important to this proceeding because it describes the purposes and goals of the RSMo. Finally, Section 386.020(13) is important because it provides four factors by which the Commission shall evaluate whether there is "effective competition."

III. PURPOSE AND ORGANIZATION OF TESTIMONY

Q.7 PLEASE EXPLAIN THE PURPOSE AND ORGANIZATION OF YOUR DIRECT TESTIMONY.

A.7 The purpose of my testimony is to provide the economic principles that I believe should guide the Commission in its evaluation of the state of competition in those exchanges where an alternative local exchange telecommunications company ("ALEC," also known

[6] Motion to Investigate the State of Competition in SBC Missouri Exchanges, before the Public Service Commission of the State of Missouri, Case No. TO-2005-0035, p. 1, footnote 2.

[7] Direct Testimony of Craig A. Unruh on behalf of SBC Missouri, before the Public Service Commission of the State of Missouri, Case No. TO-2005-0035. (Hereafter *Unruh Direct Testimony.*)

as a competitive local exchange carrier, or "CLEC") is certified to provide local exchange telecommunications services, as described in Section 392.245 of the RSMo. I put these principles into the context of the market today and the changes that have occurred since the last time I testified on these issues before this commission. I explain that adherence to these economic principles will promote the objectives of Missouri telecommunications policy and enhance the welfare of consumers of telecommunications services in the state of Missouri.

In the remainder of this section I explain how the context of this case differs from the previous competitive reclassification case in which I testified here in Missouri. In Section IV of my testimony, I discuss the criteria established in the RSMo for assessing "effective competition" in the context of a competitive reclassification proceeding. I use these criteria as the organizing principle of my testimony, as the following sections deal with the enumerated criteria. Hence, in Section V, I explain that applying the criteria articulated in the statute requires an assessment of which services and service providers compete with SBC Missouri's services, which is to say, the Commission must identify which services are "in the relevant market." Section VI applies the principles established in Section V to the consideration of resale, UNE-based CLECs, cable-based providers, wireless services, and Voice over Internet Protocol ("VoIP") technologies.

The RSMo also requires that the Commission assess barriers to entry. Section VII discusses the relevance of barriers to entry to an assessment of effective competition and how the evidence presented by other witnesses in this case are relevant to the

Commission's assessment of this criterion. I explain that modern economic theory and antitrust practice views the assessment of entry barriers to be of utmost importance – greater than a quantification of competitors' market share or other static measures of competitive participation.

In Section VIII, I discuss specifically the limitations of market share measures, from both a theoretical and practical perspective. The RSMo does not incorporate a market share criterion in its list of factors to consider in assessing effective competition, and I explain that applying a market share test or similar threshold could lead to erroneous conclusions, because market share is not a definitive measure of competitiveness, as this Commission has already recognized.

The RSMo also permits the Commission to consider other relevant factors that are not enumerated in the statute if they are necessary to promote the purposes of the statute. In Section IX, I explain that such other factors that the Commission should consider are the current retail prices relative to costs, and the trends in competition (as opposed to a static snapshot).

Section X puts the proceeding in context by explaining why lifting price cap constraints, when the criteria are met, advances the purposes of the RSMo, is consistent with the overall philosophy evoked by the statute, and advances consumer welfare in Missouri. My conclusions are contained in Section XI.

Q.8 DR. ARON, YOU NOTED THAT YOU TESTIFIED ON THE SAME ISSUES HERE IN 2001. HAVE THERE BEEN ANY NEW DEVELOPMENTS THAT SHOULD AFFECT THIS PROCEEDING SINCE YOU LAST TESTIFIED ON THESE ISSUES HERE?

A.8 Yes, there have been several developments that are relevant to this proceeding. First, not only has CLEC competition in Missouri continued to grow, as documented by Mr. Unruh and other SBC Missouri witnesses, but the development and expansion of alternative technologies, such as wireless, cable telephony, and VoIP telephony are expanding and redefining the market for voice services.

Second, since the time of my previous testimony regarding competitive reclassification of services under the RSMo, this Commission has issued two orders that are relevant to this proceeding – the aforementioned Report and Order in TO-2001-467, and the Commission's Report and Order in the subsequent Sprint reclassification proceeding.[8] Unlike the 2001 SBC Missouri reclassification proceeding, when the criteria for reclassification were being considered by the Commission essentially *de novo*, the Commission has now had the opportunity, twice, to reflect on the concepts expressed in the RSMo. The Commission's thinking, as articulated in these prior orders, sets the framework and groundwork for this proceeding.

[8] Report and Order, *In the Matter of the Investigation of the State of Competition in the Exchanges of Sprint Missouri, Inc.*, before the Public Service Commission of the State of Missouri, Case No. IO-2003-0281, Issued December 4, 2003. (Hereafter *2003 Sprint Missouri Competitive Reclassification Order.*)

Third, in the 2001 SBC Missouri reclassification proceeding, the Commission did reclassify some services as competitive. Specifically, it reclassified residential access line and associated services in the St. Charles and Harvester exchanges, and it reclassified business access lines and associated services in the St. Louis and Kansas City exchanges (as well as some additional services statewide). These services have now been provided by SBC Missouri under competitive classification for nearly three years (at the time of my prefiling this testimony), and the Commission has the opportunity now to review the experience and assess whether there have been any ill effects or unintended consequences. Mr. Unruh describes the price restructuring that was performed in response to competitive offerings, and testifies that there have been no customer complaints of which he is aware regarding the competitive reclassifications. The experiences in these exchanges should give the Commission comfort that their limited foray into competitive reclassification in the last proceeding has not created ill consequences for customers or competition, but instead has elicited the benefits to consumers of the sort that were anticipated.

Q.9 WHICH PORTIONS OF THE RSMO ARE MOST RELEVANT TO THIS PROCEEDING FROM AN ECONOMIC PERSPECTIVE?

A.9 Section 392.245 contains the specific language establishing the right to have services reclassified as competitive. That section provides for the determination of appropriate prices for telecommunications services. The section provides for this in two ways. First,

services that are not competitively classified are subject to the Missouri "price cap" plan. As I understand it from my review of the RSMo, under the Missouri price cap regulation, a firm may charge a price at or below a maximum price. This maximum price, or "cap," for basic services changes every year according to different formulae (i.e., either the CPI for telecommunications services as published by the Bureau of Labor Statistics or, if elected by the company, the GDPPI, another indicator of inflation, less a productivity and exogenous factor offset).[9] Non-basic services are subject to Section 392.245.11, which provides that these telecommunications services' maximum prices may increase by up to eight percent each year. Finally, Section 392.245.4(5) provides that a telecommunications company must file a tariff listing any new rate with the Commission, which shall be approved within 30 days, assuming that the proposed price is below or equal to the maximum price cap price.

The second way that Section 392.245 provides for the determination of appropriate prices for services is through the marketplace itself. Section 392.245.5 states that once a CLEC has been certified to provide basic local telecommunications service in a particular exchange and has provided such service in that exchange for five years, the services of the incumbent local exchange company ("ILEC") in that exchange shall be considered competitive and shall no longer be subject to the price caps.

Section 392.245.5 also says that the Commission is obligated to investigate and, after providing notice, hold a hearing, to determine whether effective competition exists

[9] RSMo § 392.245.2.

in the exchange for such service. If the Commission finds that "effective competition" does not exist in the exchange, the service is not to be reclassified as competitive and is not removed from price cap regulation.

Section 392.245 must be interpreted in light of Section 392.185, which describes the purpose and goals of the RSMo. Section 392.185 states that the goals are to:

1. Promote universally available and widely affordable telecommunications services;
2. Maintain and advance the efficiency and availability of telecommunications services;
3. Promote diversity in the supply of telecommunications services and products throughout the state of Missouri;
4. Ensure that customers pay only reasonable charges for telecommunications service;
5. Permit flexible regulation of competitive telecommunications companies and competitive telecommunications services;
6. Allow full and fair competition to function as a substitute for regulation when consistent with the protection of ratepayers and otherwise consistent with the public interest;
7. Promote parity of urban and rural telecommunications services;
8. Promote economic, educational, health care and cultural enhancements; and
9. Protect consumer privacy.

These objectives are largely consistent with the development of a vibrant and competitive telecommunications industry in the state, and consistent with the use of the marketplace instead of regulation as the primary vehicle for bringing the benefits of this

industry to Missouri consumers. The legislation specifically articulates a preference for competition over regulation, when consistent with the public interest. Indeed, the legislation speaks of "full and fair" competition, which I believe exists only when regulatory constraints on pricing are lifted (this permits "full" competition), and that regulation does not favor any one competitor or set of competitors, but rather promotes competition itself (i.e., competition is "fair").

IV. EVALUATING THE MEANING OF "EFFECTIVE COMPETITION"

Q.10 YOU NOTED THAT SECTION 392.245.5 OBLIGATES THE COMMISSION TO DETERMINE WHETHER THERE IS EFFECTIVE COMPETITION IN THE RELEVANT GEOGRAPHIC AREAS FOR SERVICES SEEKING RECLASSIFICATION. HOW DOES MISSOURI LAW DEFINE "EFFECTIVE COMPETITION?"

A.10 The RSMo provides guidance in determining what constitutes "effective competition." Section 386.020(13) states that effective competition "shall be determined by the commission based on" four specific factors:

> (a) The extent to which services are available from alternative providers in the relevant market;
>
> (b) The extent to which the services of alternative providers are functionally equivalent or substitutable at comparable rates, terms and conditions;

(c) The extent to which the purposes and policies of chapter 392, RSMo, including the reasonableness of rates, as set out in section 392.185, RSMo, are being advanced;

(d) Existing economic or regulatory barriers to entry.

The Commission may also consider other relevant factors that are necessary to implement the purposes and policies of Chapter 392.[10]

Q.11 FROM AN ECONOMIC PERSPECTIVE, ARE THE FOUR SPECIFIC CRITERIA IDENTIFIED BY THE MISSOURI STATUTE RELEVANT TO DETERMINING WHETHER EFFECTIVE COMPETITION EXISTS FOR A GIVEN SERVICE IN A GIVEN GEOGRAPHIC AREA?

A.11 Yes, I believe that they are, but they do not constitute an exhaustive list of the relevant factors, nor is any one completely dispositive of the presence or absence of effective competition, as the RSMo recognizes. I believe that is why the law permits the Commission in part (e) to consider other relevant factors that are appropriate to the purpose of the legislation.

V. DEFINING THE RELEVANT PRODUCT MARKETS

[10] RSMo § 386.020(13)(e).

Q.12 HOW DO YOU INTERPRET SECTIONS 386.020(13)(a) AND (b) THAT YOU QUOTED ABOVE?

A.12 I believe that a reasonable reading of these two criteria is that part (a) refers to an assessment of the availability of substitute services in the relevant *geographic* market, and (b) refers to an assessment of the availability of substitute services in the relevant *product* market. Moreover, in using the terms "functionally equivalent or substitutable..." in part (b), I believe the law recognizes that services that create effective competition for the incumbent's services need not be identical, either functionally or technologically, to the incumbent's services, but rather must be substitutable at comparable rates, terms, and conditions. From an economic perspective, this notion of substitutability is consistent with (indeed, it is the same as) the concept that products or services that provide effective competition for each other are in the same "relevant product market."

Q.13 WHY IS THE CONCEPT OF "RELEVANT PRODUCT MARKET" IMPORTANT TO THIS PROCEEDING?

A.13 It is important to this proceeding because it is this concept, as articulated in the section of the RSMo quoted above, that governs whether services that are not "identical" in some respect to those provided by SBC Missouri, such as those provided using different technologies, should be included in the assessment of "effective competition" in the relevant geographic market. Hence, this discussion is relevant to the Commission's

consideration of whether, or to what extent, wireless and/or VoIP, for example, should be considered as part of the assessment of effective competition to basic local wireline service; or whether PBX systems should be considered in the assessment of effective competition for SBC Missouri's "Plexar" service.[11]

Q.14 WHAT DETERMINES WHETHER TWO SERVICES ARE IN THE SAME RELEVANT PRODUCT MARKET?

A.14 When products or services are reasonably good substitutes, they are considered to be in the same product market and they compete with one another. Substitutable products serve to constrain one another's prices, because if one product were to experience a price increase, consumers would purchase other products that are close substitutes.

The standard economic approach to assessing whether two services are in the same market is to determine whether a substantial number of customers, over a period of time, would be willing to switch to the other service if the price of the service they are currently buying were to increase by a small but significant and non-transitory amount.[12] If customers would be willing to switch between the products in response to a relatively small, non-transitory price change, then the products are considered to be in the same

[11] As described in SBC's product description web site, "Plexar service is a full-service telecommunications system for businesses, that offers many of the features and functions of private branch exchange (PBX) or key systems." See, *SBC Products and Services* (product description of Plexar) at www01.sbc.com/Products_Services/Business/ProdInfo_1/1,,27--4-1-10,00.html. This service is sometimes called "Centrex" service in the industry.

[12] *Department of Justice and Federal Trade Commission Horizontal Merger Guidelines*, April 2, 1992, §1.11.

product market for purposes of assessing competition. That is, they are relevant substitutes.

There are a number of ways that one might assess whether two goods are relevant substitutes in the economic sense. One way would be to perform an econometric analysis of consumers' responsiveness in demand for one product due to price changes in the other. This approach, while practical and useful in some instances, requires that there be a sufficient history of demand for both of the services and that enough data are available to conduct a valid statistical analysis. Such an analysis also requires that the data permit one to control for other factors in the market that affect demand (e.g., improvements in product quality, availability and prices of other services, and so forth). Because of these stringent data requirements, this approach is not always methodologically feasible in market definition analysis. In the rapidly changing technological and regulatory environment in telecommunications, the econometric approach tends not to be practical or viable for purposes of assessing effective competition in proceedings such as this one.

Another valid approach to determining which services are reasonable substitutes for one another is to employ survey evidence in which customers are asked, using statistically valid techniques and questionnaires, about their willingness to substitute, or their actual market behavior in substituting, one service for another. Whether two services are in the same product market ultimately depends on whether customers view them as reasonable substitutes – that is, the assessment is driven by customers' subjective views and preferences. A valid survey can provide sound evidence of the degree to

which customers see the services as substitutable and whether, therefore, they are in the same product market. I understand that Mr. Shooshan has conducted a geographically specific survey to assess the degree to which customers in Missouri in fact view wireless service as a reasonable substitute for wireline local exchange service, and that he provides testimony regarding its results in this proceeding. It is entirely consistent with economic principles for survey evidence to provide guidance on the question of market definition before this Commission.

In many cases, it is difficult or impossible to determine quantitatively, through econometric analysis, survey evidence, or any other quantitative approach, how responsive consumers are in their purchases of one product to a change in the price of another. As a result, an alternative approach that is consistent with the economic concept of substitutability has been adopted in antitrust case law, by which the critical determinant of whether two services are in the same market is to assess their "reasonable interchangeability of use." This was the standard adopted by the Supreme Court in 1962[13] and has generally been adopted by courts since then.

Q.15 WHAT FACTORS ARE RELEVANT FOR DETERMINING "REASONABLE INTERCHANGEABILITY OF USE"?

A.15 *Factors that are relevant to determining whether services are reasonably interchangeable* in use – i.e., are relevant substitutes – include: whether the services appear to serve the

[13] *Brown Shoe Co. v. United States*, 370 U.S. 294, 325 (1962).

same or similar function from the customers' standpoint; whether customers view them as reasonably equivalent; and/or whether they are objectively similar from a technical standpoint.[14] Other relevant evidence includes whether they are sold in the same marketing channels, or whether competitors market their services as a substitute for one another.

Q.16 ACCORDING TO YOUR ANALYSIS, SHOULD THE INTERPRETATION OF "FUNCTIONALLY EQUIVALENT" OR "SUBSTITUTABLE AT COMPARABLE RATES, TERMS AND CONDITIONS" OF §386.020(13)(B) REQUIRE SERVICES TO BE IDENTICAL?

A.16 No. As I have indicated, the "reasonable interchangeability of use" standard that I described does not require that services or products be identical, or functionally equivalent, or even of equal quality, nor should it. For example, the courts have found that display advertisements in daily newspapers is not a market in itself, because "door-to-door delivery, direct mail and the weekly papers [were] viable substitutes;"[15] that "premium" ice cream is not a market in itself, because all grades of ice cream compete for customer preference and for retailers' freezer space (in other words, lower-quality ice cream is a relevant substitute for premium ice cream);[16] and that glass jars and metal cans

[14] Again, technical similarity is not necessary for services to be substitutes, but is relevant because if services are technically similar they are likely to be substitutes.

[15] *Drinkwine v. Federated Publications*, 780 F.2d 735, 738 n.3 (9th Cir. 1985), *cert. denied*, 451 U.S. 911 (1981).

[16] *In re* Super Premium Ice Cream Distrib. Antitrust Litig., 691 F. Supp. 1262 (N.D. Cal. 1988), *aff'd mem. sub nom.* Haagen-Dazs Co. v. Double Rainbow Gourmet Ice Creams, Inc., 895 F.2d 1417 (9th Cir. 1990).

are sufficiently interchangeable in use to be in the same product market.[17] Similarly, the courts have found that "passive visual entertainment," including cable television, satellite television, videocassette recordings, and free over-the-air television are all substitutable enough to be in the same product market.[18]

There are numerous other examples of products that are not functionally identical or equivalent and yet have been found by the courts to be sufficiently substitutable to exert competitive pressure on one another.[19] What is critical from an economic standpoint, and what the courts have recognized, is that the ultimate determinant of whether products are competitive substitutes is whether they "have the ability – actual or *potential* – to take significant amounts of business away from each other."[20] (Emphasis added.) Thus, when determining the relevant market in this proceeding, and when determining whether a particular service "counts" as competition or not, one needs to determine, from the consumer's viewpoint, the extent to which one service may displace another and thereby serve as a constraint on pricing.

Q.17 IS THE CONCEPT OF "REASONABLE INTERCHANGEABILITY OF USE" UNIQUE TO THE ANTITRUST ARENA?

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17 *United States v. Continental Can Co.*, 378 U.S. 441, 453-57 (1964).

18 *Cable Holdings v. Home Video, Inc.*, 825 F.2d 1559, 1563 (11th Cir. 1987).

19 See ABA Section of Antitrust Law, *Antitrust Law Developments* (4th ed. 1997), pp. 500-508.

20 *SmithKline Corp. v. Eli Lilly & Co.*, 575 F.2d 1056, 1063 (3d Cir.), *cert. denied*, 439 U.S. 838 (1978).

A.17 No. The FCC has established an approach similar to that of the courts in its analysis of the competitive constraints imposed by non-identical, alternative services. For example, the FCC's 1998 report on competition in the multichannel video programming distribution ("MVPD") market states: "The cable industry's large share of the MVPD audience is a cause for concern, in large part, only to the extent it reflects an inability of consumers to switch to some comparable source of video programming."[21] The report proceeds to "identify and discuss alternative sources of multichannel video programming, as well as regulatory and technological developments that have enhanced, or soon may enhance the competitive significance of alternative providers."[22] The number of alternative technologies considered was substantial and included the following: traditional cable television, free-to-air television, Direct Broadcast Satellite (DBS) services, Wireless Cable Systems, electric utilities, and Internet video.[23] Finally, the FCC states that the determination for a technology's inclusion in the market "depend[s] on the substitutability or relative attractiveness (including the price, equipment, and installation charges) among the MVPD choices delivered to the household."[24]

Q.18 CAN SERVICES PROVIDED OVER DIFFERENT TECHNOLOGIES BE IN THE SAME PRODUCT MARKET AS VOICE TELEPHONE SERVICE?

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21 Federal Communications Commission, *Fourth Annual Report*, CS Docket No.97-141 (January 13, 1998) ("*FCC 4th Annual Cable Report*"), ¶ 8.

22 *FCC 4th Annual Cable Report*, ¶ 8.

23 Federal Communications Commission, *Fifth Annual Report*, CS Docket No.98-102 (December 23, 1998) ("*FCC 5th Annual Cable Report*"), ¶ 12.

A.18 Certainly. The same principles apply to voice telephone service as to any other product or service that I have discussed. The underlying technology is not determinative of whether two services are substitutes; rather, what matters is whether customers see them as reasonable substitutes and whether they have the potential to take significant amounts of business away from one another. If these conditions hold for services provided over different technologies, they are in the same product market and are substitutes from a competition standpoint.

Q.19 **DR. ARON, YOU HAVE EXPLAINED THAT SERVICES PROVIDED OVER DIFFERENT TECHNOLOGIES CAN BE EFFECTIVE COMPETITION FOR ONE ANOTHER AND THEREBY SATISFY THE CRITERIA ESTABLISHED IN THE RSMO. DO YOU BELIEVE THIS PRINCIPLE IS CONTROVERSIAL IN MISSOURI?**

A.19 No. I believe that in its prior decisions, this Commission has recognized both as a general matter and in specific instances that effective competition for incumbents' services can be provided over alternative technologies. In its Sprint decision, the Commission agreed with Sprint's argument that services are substitutable "if they have the actual or potential ability to take away significant amounts of business from each other,"[25] which is, in my view, a correct characterization of the economic principles that I

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24 *FCC 5th Annual Cable Report*, ¶ 124.

25 *2003 Sprint Missouri Competitive Reclassification Order*, p. 40. (Citing to testimony of the Sprint witness.)

am describing. In the SBC Missouri decision, the Commission concluded "that it is appropriate for the Commission to consider these services [such as wireless, voice over cable TV facilities, Internet service providers, fixed satellite providers, and customer premises equipment manufacturers] when evaluating all the relevant factors of effective competition."[26] Again, the Commission's apparent willingness to consider such evidence appropriately applies the principles of market definition that I am describing (although, in the SBC Missouri case, the Commission concluded that insufficient information on Missouri-specific alternatives were provided,[27] so the Commission did not make a fact-based determination as to the substitutability of these other service platforms). Moreover, the debate that occupied a fair amount of attention in the SBC Missouri case over whether services that are not "telecommunications services" under the definition of RSMo can be considered by the Commission in its assessment of effective competition was, I believe, put to bed by the Commission in its decision where it observed that such services can be considered if proper evidence is supplied.[28]

Regarding specific findings in the SBC Missouri proceeding, the Commission accepted cable telephony as providing effective competition sufficient to justify reclassification of residential services in two exchanges, St. Charles and Harvester.[29] Similarly, in the Sprint decision, the Commission appears to have accepted that cable

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26 *2001 SBC Missouri Competitive Reclassification Order*, p. 25.

27 *2001 SBC Missouri Competitive Reclassification* Order, pp. 25-26.

28 See, generally, *2001 SBC Missouri Competitive Reclassification Order*, pp. 24-26.

29 *2001 SBC Missouri Competitive Reclassification Order*, p. 50.

provides a substitute service to wireline service, though it appears to have considered it effective competition in the particular instances before it only if the cable provider also provided video.[30]

In addition, the Commission observed in the Sprint decision that wireless service provides competition, though it found that in the case before it, insufficiently detailed evidence was provided to make a determination of how effective that competition is.[31] In fact, the Commission also accepted in the SBC Missouri decision that non-traditional products can be substitutes and provide competition to telecommunications services when it observed that the Internet provides competition for 800 services.[32] I would also note that while the Commission (erroneously, in my view) failed to accept PBX systems as sufficient substitutes for Plexar service in the SBC Missouri case,[33] it correctly recognized that PBX is an effective substitute for Centrex (which is Sprint's name for what SBC Missouri calls Plexar) on a statewide basis in the subsequent Sprint case.[34]

Q.20 DO *ALL* CUSTOMERS HAVE TO VIEW THE SERVICES AS "REASONABLY INTERCHANGEABLE" FOR THE SERVICES TO BE IN THE SAME RELEVANT MARKET OR TO PROVIDE EFFECTIVE COMPETITION?

30 *2003 Sprint Missouri Reclassification Order*, pp. 9-10 and 35.

31 *2003 Sprint Missouri Reclassification Order*, pp. 15 and 32.

32 *2001 SBC Missouri Competitive Reclassification* Order, pp. 63-64.

33 *2001 SBC Missouri Competitive Reclassification Order*, pp. 42-44.

34 *2003 Sprint Missouri Reclassification Order*, pp. 15-16 and 40-41.

A.20 No. All that is necessary is that a sufficient number of customers, over time, would be willing to switch between the services so that the producers potentially exert competitive pressure on one another.[35]

Q.21 HOW DOES THE INCLUSION OF ALTERNATIVE TECHNOLOGIES IN THE COMMISSION'S CONSIDERATION OF "EFFECTIVE COMPETITION" ADVANCE THE GOALS OF THE RSMO?

A.21 It is an explicit goal of the RSMo to promote diversity in the supply of telecommunications services and products throughout the state of Missouri.[36] This goal is consistent with the fact that consumers have varying communications needs and preferences, which may best be met by a market whose suppliers offer a variety of choices of different services. Consumers are capable of evaluating different kinds of services and making a choice based on attributes as well as price and, as a result, competitive alternatives may emerge from unexpected quarters, such as some of the newer technologies I will discuss shortly. These enhance the diversity in the supply of services.

[35] This also means that it is not necessary for *all* customers in a market to be "profitable" for a new service provider to exert competitive pressure on prices. As noted, only a sufficient number of such customers need to be attractive to producers so that producers exert competitive pressure on one another.

[36] RSMo § 392.185.3.

VI. APPLICATION OF THE ECONOMIC PRINCIPLES OF MARKET DEFINITION

Q.22 DO BASIC LOCAL EXCHANGE SERVICES OFFERED BY FACILITIES-BASED PROVIDERS USING EITHER THEIR OWN END-TO-END FACILITIES OR UNBUNDLED NETWORK ELEMENTS ("UNES") PURCHASED FROM THE ILEC SATISFY THE CONDITION OF BEING IN THE RELEVANT MARKET?

A.22 Yes. Both UNE-provided services and self-provisioned voice service offered by facilities-based CLECs are in the relevant product market and satisfy the condition of being substitutable as I have described the term. In my general experience of reviewing CLEC offerings on their web sites, reading their financial reports filed with the SEC, and reading investment analyst and market analyst reports, I conclude that CLECs using UNEs or self-provisioning represent their voice services to be comparable to the service provided by ILECs such as Southwestern Bell. Even if the services are not identical or of the same quality (higher or lower), the services are still reasonably interchangeable, and the UNE-based and facilities-based voice grade local telephone services are in the same relevant product market.

Q.23 DID THE COMMISSION FIND THIS TO BE THE CASE IN EARLIER DECISIONS?

A.23 Yes, it did. In the 2001 SBC Missouri order, the Commission considered evidence of CLEC activity from all of the entry methods: resale, UNEs (including UNE-P), and self-provisioned facilities, and it drew conclusions that explicitly recognized that UNE-based and self-provisioned facilities-based local exchange services were functionally equivalent or substitutable. For example, in its discussion of residential services (and line-related services) in the Harvester and St. Charles exchanges, the Commission concluded that telephony provided over cable facilities, a type of self-provisioning, was functionally equivalent to or substitutable for SBC Missouri's service. [37] In fact, the Commission considered as evidence of competition SBC Missouri's estimates of CLEC market share that included UNE and self-provisioned lines served by CLECs.[38] In its discussion of business lines and line-related services, the Commission acknowledged that services produced via UNEs and self-provisioned networks such as fiber networks were substitutes for SBC Missouri's lines and line-related services.[39]

Similarly, in its 2003 Sprint Missouri order, the Commission considered lines and line services from cable television facilities to be in the relevant product market.[40] There was no question that the services offered via cable platforms were, in fact, in the relevant product market. Rather, the discussion focused on whether there was sufficient competition from this source to deem an exchange "effectively competitive."

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37 *2001 SBC Missouri Reclassification Order*, p. 48.

38 *2001 SBC Missouri Reclassification Order*, pp. 22-24.

39 *2001 SBC Missouri Reclassification Order*, p. 34.

Q.24 DO RESOLD AND UNE-P-BASED SERVICES BELONG IN THE RELEVANT PRODUCT MARKET FOR EXCHANGE SERVICE?

A.24 Yes. Resold services are functionally and technically equivalent to the ILEC's services, because, while the billing, marketing, and other retailing functions may differ, the underlying service to the customer is the same. UNE-P-based service is also functionally equivalent insofar as it rides the same network end-to-end as the incumbent's service. While some UNE-P-based carriers attempt to differentiate their service by offering unique features or functionalities (such as advanced voice mail capabilities), the basic local exchange services certainly remain direct competitors for one another. The accepted standard for "reasonable interchangeability of use" does not require the services to be identical, of the same quality, or even functionally equivalent, as I explained earlier. Hence, just as "regular" ice cream is considered to be in the same market as premium ice cream and cable television is in the same market as free over-the-air television, I think it is clear that resold and UNE-P-based services are in the same market as the ILEC's own services.

Q.25 DO RESOLD SERVICES PROVIDE COMPETITIVE DISCIPLINE ON AN ILEC?

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[40] *2003 Sprint Missouri Reclassification Order*, pp 7-14 and 33-35. The Commission noted that competitors in the exchanges it evaluated used either their own facilities (cable telephony) or resale. Provisioning via UNEs did not appear to occur in those exchanges.

A.25 Yes, to an extent. Although the wholesale price paid by resellers is tied formulaically to the incumbent's resale price, losing a customer to a reseller damages an ILEC in a more subtle and long-term sense than the short-run direct effect on revenues. Resellers can use resale as part of a larger strategy to migrate customers to their own facilities, and/or to provide customers with a bundle of many telecommunications services. Once an ILEC loses the customer relationship to the reseller, the reseller can easily migrate the customer to its own facilities or to UNE-based provision when the facilities are ready. At that point, the ILEC loses all of the wholesale revenues from vertical features and enhanced services, and the revenues from access, as well as the wholesale revenues from the line itself.

In addition, resellers that compete by providing bundled services have an incentive to leverage their relationship with the customer to sell that customer additional services and thereby further displace the ILEC. Once the customer contact is broken, the CLEC reseller is in the driver's seat for migrating that customer to its own facilities and selling its own bundles. Therefore, I believe that these dynamic considerations discipline the ILEC because the ILEC will want to avoid losing customers to resellers, even though its short-term profits with respect to local service narrowly viewed might, in some cases, be little affected by such a loss.

Q.26 DID THE COMMISSION RULE IN PREVIOUS CASES ON THE ROLE OF RESALE IN PROVIDING EFFECTIVE COMPETITION?

A.26 Yes. The Commission found that resale is a "form of substitutable service" but that its "mere presence" is not "substantial evidence" of effective competition.[41] While the Commission was correct to recognize that resale is in the relevant product market (i.e., it is a substitute service) and therefore is a factor to be considered, the question of what weight to place on it need not be resolved here because I understand from Mr. Unruh's testimony that very little of the competition in Missouri is resale-based.[42]

Q.27 ARE THE TELECOMMUNICATIONS SERVICES PROVIDED BY CABLE TV COMPANIES IN THE SAME PRODUCT MARKET AS TRADITIONAL LOCAL EXCHANGE SERVICE FOR BUSINESS AND RESIDENTIAL CUSTOMERS?

A.27 Yes, and as I noted earlier, the Commission's analysis in its 2001 SBC Order found, appropriately, that cable telephony can provide a functionally equivalent or substitutable residential basic local service.[43]

Q.28 ARE TELECOMMUNICATIONS SERVICES FROM WIRELESS PROVIDERS IN THE RELEVANT PRODUCT MARKET WITH BUSINESS OR RESIDENTIAL ACCESS LINE SERVICE?

A.28 I defer to Mr. Shooshan to provide evidence from his study of wireless substitution in Missouri specifically. However, I can speak to the literature on wireless substitution

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41 *2001 SBC Missouri Competitive Reclassification Order*, p. 36.

42 *Unruh Direct Testimony.*

43 *2001 SBC Missouri Competitive Reclassification Order*, p. 48.

more generally. The most recent studies suggest that, although wireless and wireline telephony are not always substitutes, the two types of technology do compete in the market for voice services.

In its most recent report on wireless competition, the FCC noted that although only a small portion of customers have replaced their wireline telephone service with a wireless subscription, the growth of mobile telephone service has had an impact on wireline carriers, reflected in lost revenues and loss of access lines.[44] The FCC also recognized that there is increasing evidence that "consumers are substituting wireless service for traditional wireline communications,"[45] and listed in its report a number of findings that suggest that wireless providers compete directly with wireline carriers:

- 23 percent of voice minutes in 2003 were from wireless services, compared to seven percent in 2000.[46]
- Wireless service has become cheaper than wireline, especially for long distance calls and for calls made when traveling.[47]
- Wireless providers are increasingly offering plans "designed to compete directly with wireline local telephone service," with unlimited local calling.[48]
- Some wireless providers have claimed that many of their customers do not have a wireline at home.[49]

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44 Ninth Report, *In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, FCC WT Docket No. 04-111, Released September 28, 2004, ¶ 213. (Hereafter *FCC 9th CMRS Report.*)

45 *FCC 9th CMRS Report*, ¶ 213.

46 *FCC 9th CMRS Report*, ¶ 213. During this same time period, interLATA minutes on wireline have decreased, which suggests that the 23% increase in wireless minutes is not simply due to an increase in wireless minutes while wireline were unaffected. See, *Trends in Telephone Service*, FCC Industry Analysis and Technology Division – Wireline Competition Bureau, May 2004, Tables 10.1 and 10.2.

47 *FCC 9th CMRS Report*, ¶ 214.

48 *FCC 9th CMRS Report*, ¶ 215.

49 *FCC 9th CMRS Report*, ¶ 215.

- Many wireless carriers offer "effectively unlimited" plans, with 1,000 "anytime minutes" and unlimited weekend minutes.[50] According to an analyst quoted in the report, "such plans were yet more evidence of the threat to the fixed line, which, for a similar price, offers unlimited local and long distance – without mobility."[51]

Industry analysts have found similar evidence. For example, in a recent survey by the Yankee Group, a technology forecasting firm, fifty percent of wireless households reported their wireless usage has replaced "some, a significant amount or all of their regular telephone usage."[52] Likewise, a recent report by In-Stat/MDR found that about 14 percent of U.S. wireless subscribers use their wireless phones as their "primary" phones, that five percent of households have already abandoned their wireline in favor of cell phones, and that by 2008, nearly 30 percent of wireless subscribers will not have a landline.[53]

Consumer surveys that were undertaken by analysts following the new rules on Local Number Portability for wireless carriers found further evidence of substitutability between wireless and wireline services. In a survey led by Standard & Poor's Equity Research Services, 10 percent of wireline users responded that they would take their wireline number to a wireless carrier based on the new rules.[54] Another study, led by

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50 *FCC 9th CMRS Report*, ¶ 217.

51 *FCC 9th CMRS Report*, ¶ 217.

52 "U.S. Consumer Long Distance Calling Is Increasingly Wireless, Says Yankee Group," Yankee Group News Release, March 23, 2004.

53 "Landline Displacement to Increase as More Wireless Subscribers Cut the Cord," InStat MDR Market Alert, February 25, 2004. See, also, Ron Orol, "The Ultimate Connection," *Newsweekly*, May 25, 2004.

54 "Trend of Consumers Switching From Wireline to Wireless-Only Phone Service to Intensify in 2004, Concludes S&P Telecoms Equity Analyst in New Report Nationwide," PR Newswire, December 11, 2003.

PriMetrica and Ernst & Young, found that nearly one-half of the surveyed households would switch from their primary wireline service to a family-share wireless plan.[55]

Some studies from the economic literature have also attempted to estimate the substitutability of wireline and wireless telephony using empirical evidence. Specifically, a number of studies have attempted to develop estimates of cross-price elasticities of demand between wireless and wireline services.[56] Sidak estimated the demand for wireless services based on data from 1999 to 2001 from TNS Telecoms Survey, and found that the coefficient measuring the cross-price elasticity of substitution between wireless and wireline long-distance services is positive and significant statistically.[57] This means that there is a measurable and statistically significant degree of substitutability between wireless and wireline long distance service, based on historical usage patterns. Using this same data source for wireless data and an alternative econometric model, Ward and Woroch found that wireless minute usage is a "moderate substitute" for wireline usage.[58] In particular, the authors found that, when a consumer has access to both platforms, a one percent increase in wireline prices leads to an increase in the share of wireless usage of between 0.13 percent and 0.33 percent. Finally, an

55 "Nearly Half of all U.S. Households Could Switch from Wireline to Wireless as FCC's Ruling Removes Barriers," PR Newswire, November 12, 2003.

56 A cross-price elasticity measures the response in the demand for one product when the price of another product changes, and therefore gauges substitutability between the products.

57 Gregory J. Sidak, "Is State Taxation of the Wireless Industry Counterproductive?," *American Enterprise Institute*, April 2003, pp. 19-20.

58 Michael R. Ward and Glenn A. Woroch, "Usage Substitution between Mobile Telephone and Fixed line in the U.S.," presented at the 32nd Research Conference on Communication, Information and Internet Policy, May 2004, p. 12.

earlier study by Rodini, Ward, and Woroch based on the same survey data, estimated the demand for a second fixed line. They found that the cross-price elasticity between a second fixed line and wireless service is positive but not statistically significant, *suggesting that these services are substitutes for one another.*[59]

I would note that these econometric studies were all based on data that ended in 2001. Given the steep increase in wireless usage and the price declines since that time, as well as the continued development of wireless networks and technology, I believe that the substitutability between wireless and wireline services has likely increased significantly since that time. Hence, I would expect current elasticities to be greater than those found in the econometric studies I have discussed.

Q.29 **ARE VOICE OVER INTERNET PROTOCOL (VOIP) TELECOMMUNICATIONS SERVICES IN THE RELEVANT PRODUCT MARKET WITH BUSINESS OR RESIDENTIAL ACCESS LINE SERVICE?**

A.29 Yes, some are. As its name implies, voice over Internet protocol may more appropriately be characterized as an application of a particular technology rather than merely a "service." In some instances that application offers a genuine substitute for traditional primary line voice service, such as the VoIP services offered by cable companies, while in others the application is somewhat removed as a substitute.

[59] Mark Rodini, Michael R. Ward, and Glenn A. Woroch "Going mobile: substitutability between fixed and mobile access," *Telecommunications Policy* 27 (2003), pp. 457-476.

One estimate is that as of the first quarter of this year, there were something on the order of 200,000 VoIP connections in the U.S.,[60] with substantial near-term increases expected. Also, about 20 percent of "enterprise" (that is, larger) business customers have either implemented VoIP or plan to implement it in the near future.[61]

Q.30 WHAT IS VOIP?

A.30 VoIP is a means of providing voice telephone service using "IP" or Internet protocol.[62] For purposes of my analysis in this proceeding, I will note that a distinguishing feature of VoIP is that the call does not traverse the caller's circuit-switched end office but instead is converted to Internet-conforming "packets" and routed (rather than switched) to the destination called party over the public Internet or a private packet network.

In such a scenario, a customer making a VoIP call would be connected to a packet network (either a private packet network, or the public Internet) via a broadband connection such as DSL, cable modem, or T-1 (via, say, a Local Area Network with

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60 Viktor Shvets, Nigel Coe, and Andrew Kieley, "Voice over IP: Loud Rumblings," Deutsche Bank Equity Research North America, February 25, 2004, p. 24. (citing a study by IDC Corporation.) (Hereafter *Deutsche Bank 2004*.)

61 *Deutsche Bank 2004*, p. 24.

62 There is some controversy regarding which segments of the call must use IP in order to qualify as VoIP. For purposes of my discussion of VoIP in the context of its competitive significance, I am restricting my discussion to VoIP services in which IP is used on the initiating end of the call and on the transport and routing of the call. In particular, I am not discussing here services that begin and end on the PSTN and only use IP for some or all of the transmission backbone. Moreover, I am not taking a position on whether VoIP is a "telecommunications service" or an "information service" for regulatory purposes.

Internet access,[63] or a WiFi network.[64]) The caller may be able to place the call using his standard analog telephone, albeit with an IP adaptor connected to it; or with an IP telephone handset; or the caller may place a call using his computer with special software and a microphone or headset.[65] For some services, the caller does not need a computer at all: just a broadband connection and a telephone handset (either a traditional analog phone with an adaptor, or an IP telephone).[66] Depending on the caller's VoIP service provider, the caller may be able to call anyone on the traditional public switched telephone network ("PSTN"), and the recipient would receive the call on her standard telephone in the standard way. In other cases, the VoIP service creates a "users' group" where individuals may place calls to, and receive calls from, only those who also use the particular VoIP software (and have appropriate equipment, of course).

Q.31 WHAT KINDS OF PROVIDERS ARE IMPLEMENTING VOIP?

A.31 There are a number of different kinds of VoIP providers, as I will explain. But among the most important players in the VoIP arena are the cable companies. Cable companies

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63 A Local Area Network ("LAN") is typically a closed user group such as an office, university, or government organization. LANs may also connect to the Internet (typically through firewalls) so that e-mail and files may be exchanged with those who are not on the local network.

64 WiFi refers to the various IEEE standards that permit wireless connections to a data line, such as a T-1. (See, generally, www.wi-fi.org.) As I describe later, WiFi connections to the Internet are available in many public locations, such as airports or cafes.

65 See, e.g., www.skype.com/store/accessories/. Those using Free World Dialup can use an IP-enabled WiFi phone that can access a user's WiFi LAN without routing through any PC. See, www.pulverinnovations.com/wisip.html.

66 Those using Cox's VOIP service do not need to subscribe to Cox's broadband offering. That is, one can subscribe to Cox's VOIP service without explicitly subscribing to, and having available for one's computer, Cox's broadband service.

already have network infrastructure provisioned to homes across the country that are capable of providing broadband service. In many cases, cable companies already provide bundled voice, video, and data services. It is thought that VoIP allows cable companies to provide voice service that requires less costly upgrades to their networks (especially, for example, where they have not yet provisioned traditional circuit switched service) and more flexible service offerings for their customers.[67] According to a Deutsche Bank investment analyst team, VoIP promises to make serious inroads into the traditional telecommunications market through cable companies:

> We will probably see VoIP spread nationwide in the cable industry over the next couple of years, which fits into our thesis that we will see the knee of the growth cable VoIP curve sometime during 2005. We expect the current 2.3 million cable telephony subscribers [to] expand to 24.7 million by the end of 2013, i.e., a more than 10-fold increase . . . In all likelihood, VoIP will drive the cable telephony subscriber base forward and thus mark a serious danger to the RBOCs and other incumbent telecom operators in the consumer market.[68]

The Yankee Group estimates even faster penetration of VoIP. Yankee estimates that close to 1 million residences nationwide will have VoIP service by the end of this year, and that 17.5 million residences will have VoIP service by the end of 2008.[69]

Such rapid growth of VoIP has precedent. VoIP use already has increased tremendously in the international direct dial ("IDD") market, as a response to the

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67 *Voice over Internet Protocol: Ready for Prime Time, Cox Communications' Successful Deployment of VoIP*, Cox Communications white paper, May 2004, p. 14. (Hereafter *Cox 2004*.)

68 *Deutsche Bank 2004*, p. 32.

69 "The Yankee Group Expects the Consumer Local VoIP Industry to Grow More Than 100 Times Its 2003 Size," The Yankee Group, News Release, August 30, 2004. (www.yankeegroup.com/public/news_releases/news_release_detail.jsp?ID=PressReleases/ news_08302004_cts.htm.)

flagrantly uneconomic regime of international settlement rates and the resulting high prices for international calling to and from some countries. Whereas VoIP usage in the IDD market was virtually zero in 1997, by 2002, it amounted to about 10 percent of IDD minutes, and it is expected to account for over half of IDD minutes within five years.[70]

Cable companies do not disagree with the growth thesis advanced by the Deutsche Bank analysts. Comcast Corporation already offers circuit-switched-based telephone service to about 1.3 million customers nationwide,[71] and it expects to offer telephone service, using VoIP technology, to all 40 million households that its network currently passes (nationwide) by 2006.[72] As a result, at least one prominent investment analyst expects Comcast to emerge as one of the nation's largest telephone companies.[73] In another instance, in the space of only 20 months, Cox Communications has positively revised its opinion on the future of VoIP in its own plans.[74] In a February 2003 white paper, Cox concluded that VoIP was "not yet viable for widespread deployment of

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70 *Deutsche Bank 2004*, p. 24.

71 Comcast Corporation 2003 Form 10-K, p. 6. This service was transferred to Comcast during its 2002 acquisition of AT&T Broadband. Comcast is the largest cable television providers in the nation, with 21.5 million cable subscribers passing nearly 40 million homes.

72 Michael Learmonth, "UPDATE 3 – Comcast to offer phone service to 40 mln in 2006," Reuters, 05.26.04. (Hereafter *Learmonth.*)

73 *Learmonth*, quoting UBS Warburg analyst John Hodulik.

74 Cox Communications is one of the nation's largest providers of voice service over cable infrastructure. Cox serves 53 percent of existing Cox cable TV customers in its Orange County California market, and has achieved a 19.6 percent share of telephone-ready homes in Cox's total geographic footprint nationwide. I understand that Cox Communications does not offer service in Missouri. However, Cox's analyses in the area of circuit- and packet-switched telephony provide an insight into the economics of this technology that is available to other cable carriers that do operate in Missouri.

residential, primary-line, lifeline phone service."[75] In that paper, Cox had concluded that VoIP offered unimpressive capital expenditure savings over circuit-switched cable telephony (on the order of 10 percent savings over circuit-switched technology on their own cable infrastructure).[76] Such savings were not sufficient, in Cox's view, to overcome other issues and to commit to an end-to-end VoIP approach. By the middle of 2003, Cox began moving its long-distance traffic onto its own core, Internet protocol backbone, but Cox remained committed to circuit-switched technology to connect to the end user.[77] Cox's interest in last-mile VoIP (i.e., to the business or home) was limited to a test market in Roanoke, Virginia,[78] as the company retained "significant reservations" about the technology to serve the last mile.[79]

However, by May 2004, Cox determined that true, carrier-class primary-line VoIP was feasible to homes and businesses and that this technology offered a capital cost advantage of over 40 percent per customer over the equivalent circuit-switched cable technology,[80] primarily due to the decline in the costs of Multimedia Terminal Adaptors (i.e., the box that converts an ordinary analog phone into an Internet-compliant digital

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75 *Preparing for the Promise of Voice-over Internet Protocol (VoIP): Cox Communications' Strategic Approach to Maximizing the Business of Cable Telephony*, Cox Communications, Inc. white paper, February 2003, p. i. (Hereafter *Cox 2003.*)

76 *Cox 2003*, p. 9. According to Cox, for purposes of its cost analysis, a "primary" line equivalent can access E911 and has at least four-hour standby power (e.g., a battery) provided by the service provider rather than the customer. See *Cox 2004*, pp. 4, 11.

77 Joan Engebretson, "ANALYSIS: Cox adopts VOIP at the core," America's Network Enews, June 19, 2003. (www.americasnetwork.com/americasnetwork/article/articleDetail.jsp?id=61041.) (Hereafter *Engebretson.*)

78 *Engebretson.*

79 Ben Charny, "Cox: VoIP ready for prime time," CNET News.com, May 18, 2004, 12:24 PM PDT. (Downloaded from news.com.com/2100-7352_3-5215211.html?type=pt&part=inv&tag=feed&subj=news.)

phone) and customer premises powering and network monitoring.[81] As a result, Cox revised its February 2003 assessment and concluded that VoIP *is* "ready for prime time." Cox envisions that the company will use VoIP as an adjunct with circuit-switched technology, especially to branch into new and smaller markets. For example, Cox recently added a VoIP telephony offering to its services in Tulsa, Oklahoma[82] and expects to add Lafayette, Louisiana, Baton Rouge, Louisiana and certain areas of Western Texas by the end of 2004, both using VoIP technology.[83] Cox's May 2004 study concluded that VoIP would permit the company to launch telephony in markets where the economics had not justified the cost of a circuit-switched architecture; permit the company to more efficiently deliver long-distance traffic over its own backbone and reduce its reliance on third-party providers; and enable the company to provide a three-service bundle (voice, video, data) in all of its markets.[84] This illustrates how rapidly the environment can change, especially in light of the fact that the last reclassification review for SBC Missouri was in 2001. It also illustrates that VoIP can increase the economically feasible footprint of the accessible market of cable carriers generally.

As a result, VoIP replacement lines will continue to exert competitive pressures on traditional telecom provider. The Deutsche Bank analysts note:

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80 *Cox 2004*, p. 11.

81 *Cox 2004*, pp. 11-12.

82 "Cox Digital Telephone in Tulsa," (www.cox.com/oklahoma/telephone/tulsa.asp), also, Ben Charny, "Cox brings VoIP service to more cities," CNET News.com, October 4, 2004, 12:22 PM PT. (news.zdnet.com/2100-1035_22-5395528.html.)

83 Ben Charny, "Cox Brings VoIP service to More Cities," CNET News.com October 4, 2004, 12:22 PM PT.

84 *Cox 2004*, pp. 14-15.

> [Incumbent telecom operators] will face severe pressure on revenue yields for their core local and long distance packages that will probably amount to at least $10 per month. They will also lose market share – we are reducing incumbent voice connections from 166 million at the end of 2003, to 143 million longer term, a 13% reduction. It could be even worse than this should the VoIP operators claim a substantial slice of the naked broadband market, an outcome that we are really not reflecting [in our empirical estimates] right now.[85]

Q.32 DR. ARON, YOU DISCUSSED CABLE-PROVIDED VOIP AS A REPLACEMENT FOR "PRIMARY LINES." ARE THERE OTHER WAYS THAT VOIP CAN EXERT COMPETITIVE PRESSURE?

A.32 Certainly there are. The examples that I have discussed so far employ packet-switched technology to offer a voice service that claims to be similar in quality to traditional circuit-switched voice service. This means that the customer would have the same (or possibly better) access to vertical features such as call waiting, voice messaging and the like, access to E911 service, and backup power in the event of a general power outage. These services work with regular, analog telephones (and a converter box), and the user has one or more regular, 10-digit telephone numbers associated with it.[86] As a result, these applications of VoIP technology are "primary line" substitutes. The cable company examples specifically are interesting because the service provider also provides the underlying infrastructure.

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85 *Deutsche Bank 2004*, p. 42.

86 A North American Numbering Plan ("NANP") number (i.e., a 10-digit telephone number) is required if others are to call a particular user or location via the PSTN.

Other "primary line" replacements are sold by parties who do not have local network infrastructure and are available to anyone, anywhere, who has a broadband connection.[87] For example, services such as Vonage[88] and AT&T's CallVantage[89] are designed to be primary phone line replacements in competition with the services offered by companies such as Cox and Comcast, and, of course, those offered by the ILEC. Products such as Vonage and CallVantage use the underlying broadband (DSL or cable) service that a subscriber might already have. The products are designed to offer E911 connectivity,[90] and, in some instances, number portability, and a variety of other features. Such products illustrate that VoIP permits unbundling of the application itself (voice call service) from the underlying broadband service, which opens an additional avenue for voice competition.

Q.33 COULD YOU PLEASE DISCUSS VOIP OFFERINGS THAT MIGHT BE CONSIDERED MORE NICHE OFFERINGS?

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87 There is no geographic limitation, but one may not be able to obtain a local telephone number for a particular area. For example, Vonage does not yet have area codes for: Idaho, North and South Dakota, Montana, Wyoming, Iowa, Nebraska, New Mexico, West Virginia, and Maine. (See www.vonage.com/avail.php) AT&T offers local area codes in 38 states (including Missouri.). Neither Vonage nor AT&T's CallVantage offers all of the area codes in Missouri. Vonage offers 314 (St. Louis area) and 636 (Harvester/St. Charles area). CallVantage offers 314, 636, and 816 (Kansas City area). (See, https://www.callvantage.att.com/signup/ServiceAvailabilityLite?soac=64525#tna.)

88 See, www.vonage.com. See also the review of Vonage by CNET (reviews.cnet.com/4505-3535_7-30865084.html?tag=also).

89 See, www.usa.att.com/callvantage/index.jsp?soac=75008, and associated review on Cnet.com (reviews.cnet.com/AT_T_CallVantage/4505-3535_7-30923419-2.html?tag=top).

90 Some VOIP phones are designed to "roam" with the user (i.e., a Vonage subscriber with a St. Louis number can take her phone to Colorado and make and receive calls as though local to St. Louis). This can confound 911 services.

A.33 Yes. There are many VoIP approaches that do not have all of the various capabilities of cable-provided VoIP service or the broad functionalities of Vonage's or CallVantage's offerings, but which can offer substitutes for second lines, local or long-distance calling and the like. Each of the following products differs in various aspects from traditional telephone service.

Skype and Free World Dialup require a user to download VoIP software onto his or her computer and use the audio capabilities of the computer itself as the telephone set.[91] Skype[92] and Free World Dialup[93] are software-based approaches that permit users to call other members of the same use-group (i.e., those using the same software), anywhere in the world, without charge.[94] Skype is based on the peer-to-peer computer file sharing approach that gave Napster its moment in the sun several years ago.[95] Skype's approach is that instead of sharing music (MP3) files, the program "shares" (i.e., establishes a link) between the calling and called parties. Thus, the same technology that practically brought the recording music industry to its knees (before retaliatory lawsuits halted the practices) is now being focused on voice communications.[96] Free World

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91 Alternatively, one can obtain a telephone handset that conforms to the particular protocol and use that handset either through the computer (via a USB port) or directly through the broadband connection.

92 www.skype.com.

93 www.pulver.com/fwd.

94 This feature is common to VoIP systems. It is also offered by Vonage, for example. (See, www.vonage.com/features.php? feature=subscriber_to_subscriber.)

95 In fact, Skype was created by the creators of "Kazaa," another peer-to-peer file-sharing program.

96 I am not aware that any of the intellectual property concerns that caused the demise of Napster would affect the voice application of Skype. For a discussion of presumably legitimate applications of file sharing technologies, see, e.g., Jefferson Graham, "File-sharing goes to the next level," USA Today, November 16, 2003 11:03 pm. (www.usatoday.com/tech/news/techinnovations/2003-11-14-peer_x.htm.)

Dialup is a program often used with a PC, but it can also be used with a specially configured IP-compatible phone.[97]

The instant messaging programs such as AOL's Instant Messenger and Yahoo!'s Messenger with "click to talk" capabilities also permit electronic voice communications, which is to say, the equivalent of a telephone call. These IM services permit users on a specific IM network to talk to other users on the same network, thereby bypassing both the local and long-distance telephone switches (and any associated calling costs), if they have microphones connected to their computers.[98] Indeed, Microsoft's X-Box game uses the same or similar technology to permit game players to chat, via their broadband connections, with up to 16 other X-Box game players.[99] (Of course, such an experience represents a conference call, though perhaps an unusually violent one.)

These IM and X-Box services are essentially "closed" users' groups in that voice service is limited to others using the same "network." In contrast, Free World Dialup has begun entering into peering (interconnection) arrangements with other software-based VoIP providers so that those using the Free World Dialup software can also talk to users

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97 For a description of Pulver's "WiSIP" phone, see, www.pulverinnovations.com/. See, also, The Free World Dialup: Technical Overview, PowerPoint presentation by Jeff Pulver, CEO and Dr. Ed Guy, CTO (pulver.com), First SIP.edu Implementors (sic) Workshop, Internet2 (Hosted by the University of Pennsylvania), June 16, 2004. (voip.internet2.edu/SIP.edu/200406-workshop/talks/20040616-guy.pdf.) (Hereafter *Pulver 2004 Presentation.*)

98 Readers who have IM enabled on their computers and a microphone can try the functionality by simply opening their IM window, clicking the "talk" button on the bottom of the window, and following the directions thereafter.

99 See, www.xbox.com/en-US/Live/about/default.htm. The X-Box is essentially a computer designed for game playing. The X-Box was designed with a hard drive, an Ethernet (broadband) port, and slots for voice service.

of (e.g.) Packet8, SipPhone, GlobalVillage, and other VoIP providers.[100] This, of course, enlarges the number of users that can be contacted without charge and thereby increases the value of the service and its viability as a competitive alternative to traditional phone service. Skype also permits calls to be placed *to* PSTNs,[101] though it does not yet permit calls *from* the PSTN.

Not only does the functionality of these niche VoIP products differ from traditional telephone service, the quality of the voice call can vary across the different services as well. As a result, I do not consider them to be reasonably interchangeable in use with traditional access line service at this time. However, they certainly have the potential to create pricing pressures on the traditional per-minute long-distance/access charge regime. They also illustrate (1) how an assessment of what is a substitute with traditional telephone service can change rapidly; and (2) how seemingly unrelated fields as e-mail, gaming, and file sharing provide fertile ground for the development of new voice services.

Continued innovation will improve VoIP's voice quality (though Cox, for one, claims that the voice quality problems for VoIP as they provision it are now solved and their service is indistinguishable from circuit-switched service) and will improve the capabilities of electronic communications beyond the voice call (for example, by permitting conference callers to observe a Powerpoint presentation). In fact, in the

100 *Pulver 2004 Presentation.*

101 This requires a per minute termination fee. The per minute fee is on the order of 2¢ per minute in the U.S., Canada, the U.K., and Australia. Termination charges to other countries are higher, reflecting their higher international settlement rates. (See www.skype.com/products/skypeout/rates/.)

course that I teach at Northwestern University in the Communications Systems Masters program, my class this spring will include not only traditional in-class students, but also several distance learners located in their own homes or offices around the country. They will attend through broadband connections; and not only will they be able to see me and the other students, see my presentation in real time, and make verbal comments, but the other students and I will be able to see and hear them, ask them questions, and respond to theirs. All of this will be done in a specially configured classroom using voice and video over IP technology.

Finally, by illustrating the flexibility of service development using the Internet protocol approach, these services also illustrate how VoIP can improve the diversity of electronic communications supply, as desired by the policy expressed in the RSMo. While some of these VoIP applications may never be intended to fully replicate the traditional primary access line, they can nevertheless exert competitive pressure on "second" lines and usage.

Q.34 DR. ARON, YOU'VE DESCRIBED THE SUBSTITUTABILITY OF VOIP FOR ACCESS LINES. WHAT ABOUT THE SUBSTITUTABILITY OF VOIP-BASED SERVICES FOR LINE-RELATED FEATURES?

A.34 VoIP offers a much richer and more flexible slate of features than does the traditional telephone network. For example, VoIP technology allows music or messaging on hold, it

provides for "unified messaging,"[102] multiple telephone lines (i.e., telephone numbers) on a single connection, multiple area code usage (which means that the user can implement his or her own "foreign exchange" service[103]), follow-me service, and so on. Some of these services may be of special interest to businesses, as well.

Q.35 DON'T ALL OF THESE VOIP APPLICATIONS ESSENTIALLY REQUIRE A BROADBAND CONNECTION?

A.35 Yes, and this will likely serve as a driver for broadband penetration. As of December 2003, in the U.S., there were over 28 million broadband lines, with about 26 million of those serving residences and small businesses.[104] This is an increase of about 20 percent from six months earlier.[105] Indeed, according to Nielsen/NetRatings, home broadband Internet connections now outnumber dial-up connections in the U.S.,[106] with cable leading DSL connections by about 1.7 to 1.[107] WiFi is making broadband widely

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102 For example, a voice message can be packaged as a sound file and sent to the user's personal computer, thereby "unifying" voice and text (e-mail) messages.

103 Foreign exchange is the name given to a service that makes a long-distance call appear to be a local call to the caller. For example, a florist that is physically located in the 816 area code of Kansas City can obtain a telephone line that has 314 (St. Louis) area code. Accordingly, those in the 314 area code could dial the number with the appearance that the florist was located in the 314 (local) area.

104 Federal Communications Commission Releases Data on High Speed Services for Internet Access, Press Release FCC, June 8, 2004, p. 1.

105 Federal Communications Commission Releases Data on High Speed Services for Internet Access, Press Release FCC, June 8, 2004, p. 1.

106 Jim Hu, "Study: Broadband leaps past dial-up," CNET News.com. August 18, 2004, 10:35 AM PT (/news.zdnet.com/2100-9584-5314922.html). Also, "U.S. Broadband Connections Reach Critical Mass, Crossing 50 Percent Mark for Web Surfers, According to Nielsen//Netratings," Nielsen Netratings press release, August 18, 2004.

107 High-Speed Services for Internet Access: Status as of December 31, 2003, FCC Industry Analysis and Technology Division – Wireline Competition Bureau, June 8, 2004, Table 1 (High-speed lines in at least

available away from home. WiFi connections are free at many coffee houses, cafes, and the like, and these and other sites are easily found via "hotspot locators" on the Internet.[108] In Missouri, as of December 2003, the FCC estimated that there were about 405,000 residential and small business broadband users.[109] AT&T recently entered into "broadband marketing pacts" with cable providers Comcast, Time Warner, Cox, Charter, and Adelphia wherein AT&T will refer potential "CallVantage" (AT&T's VoIP service) customers to these broadband providers to secure the underlying broadband connection.[110] Such creative joint-marketing efforts can create a virtuous circle that leads to deeper broadband penetration to the benefit of all parties. AT&T (which recently quit its UNE-P efforts and took up the VoIP baton[111]) believes it will benefit from increased broadband penetration in selling CallVantage, while the cable broadband providers believe that they will sell more video/data cable services in conjunction with AT&T's voice-over-Internet offering. This large and growing number of broadband connections increases the opportunities for VoIP applications.

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one direction). In Missouri, cable's lead over DSL is only about 1.2-to-1 in serving high speed lines in at least one direction (Table 7).

108 Indeed, one can purchase a WiFi locator fob that alerts the possessor of a WiFi link in the vicinity. See, e.g., Paul Boutin, "Warchalking 101," Forbee.com, June 29, 2004 (updated). (forbes.jiwire.com/warchalking-finding-open-networks.htm.)

109 High-Speed Services for Internet Access: Status as of December 31, 2003, FCC Industry Analysis and Technology Division – Wireline Competition Bureau, June 2004, Table 11.

110 Alan Breznick, "AT&T Inks Broadband VoIP Marketing Deals with MSOs Comcast, Time Warner, Cox, Charter & Adelphia Sign CallVantage Pacts, October 1, 2004.

111 In February, AT&T called UNE-P the "stepping stone to a VOIP future." See AT&T Chairman Says Competition Is The Key Driver For The Communications Industry, AT&T (press release), February 11, 2004. (See, www.att.com/news/item/0,1847,12867,00.html.)

Q.36 IS VOIP RELEVANT TO THE LOCAL EXCHANGE MARKET IN MISSOURI?

A.36 Mr. Unruh's testimony identifies specific providers offering VoIP service in Missouri and a map depicting where they are providing service. He also provides a map showing that cable modem service is available to the majority of customers in SBC Missouri's exchanges. This is important because where a cable provider is offering cable modem service, the customer has the capability of receiving VOIP services. That is, VoIP provided by cable companies is a competitive threat wherever those companies are providing broadband Internet access, whether or not they are providing VoIP in all those areas today.

VII. THE IMPACT OF ENTRY BARRIERS ON COMPETITION

Q.37 DR. ARON, THE RSMO ALSO SAYS THAT "ECONOMIC OR REGULATORY BARRIERS TO ENTRY" BEAR ON THE ISSUE OF EFFECTIVE COMPETITION.[112] WHAT IS A BARRIER TO ENTRY?

A.37 A barrier to entry can be defined as an attribute of a market "that make[s] entry unprofitable while permitting established firms to set prices above marginal cost, and to persistently earn monopoly returns."[113] Barriers to entry make it more difficult for new

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112 RSMo §386.020(13)(d).

113 Ferguson, James M., *Advertising and Competition: Theory, Measurement, Fact* (Cambridge: Ballinger, 1974), p. 10.

firms to enter a market, which may permit existing firms to price above competitive levels. The higher these barriers, the less likely it is that firms not currently producing the product in question will provide competitive discipline on the incumbent's pricing. The lower the entry barriers, the more likely firms that are not active now in the market can provide competitive discipline on the marketplace through the credible threat of entry in the future.

Barriers may be economic or technology-driven or they may be legal or regulatory in nature. An example of an economic entry barrier is, under certain conditions, when a new firm must make a large investment that would be "sunk" (i.e., could not be recovered if the firm were to exit the market). The reason this could be an entry barrier is that investors might decline to fund a firm that had to make a substantial investment in an asset or technology to enter the market, when that asset or technology is virtually without value in the event that the new firm were to fail and had to exit the market.

Not all large up-front investments should be considered entry barriers, however. A large up-front investment that is not sunk – that is, an investment that could then be sold off if the entrant decided to exit the market – is not an entry barrier. For example, someone getting into the airline business has a large up-front investment to make in the form of obtaining an airplane. Nevertheless, to the extent that the airplane can be resold in a reasonably efficient secondary market, its cost, though expensive to the entrant, would not normally be considered an entry barrier.

Moreover, not every economic entry barrier is inefficient or should (as a matter of policy) be eliminated. On the contrary, up-front investment requirements may be an efficient requirement of market entry. It is common for businesses to incur substantial up-front costs to enter a market. Such costs may be entry barriers if they discourage some new firms from entering the market, but they do not harm efficient competition, and, in fact, they promote efficient resource use. A new firm that cannot bear the up-front costs caused by its entry and still expect to make a profit should not, from a social perspective, enter the market, because the value of the resources that are needed to make the up-front investment exceed the value to consumers of having the additional firm in the market.

As I mentioned, entry barriers need not be imposed by technology. Some may instead be imposed by regulation. Indeed, according to Dr. Alfred Kahn, "No barrier to entry is more absolute than one imposed or enforced by the sovereign power of the state. All others are potentially subject to hurdling, erosion, or circumvention."[114]

Q.38 WHY IS IT IMPORTANT TO CONSIDER ENTRY BARRIERS IN EVALUATING WHETHER "EFFECTIVE COMPETITION" EXISTS?

A.38 As a general economic matter, when entry barriers are low, markets are often thought to be effectively competitive even if there is little observable competitive activity. Markets *can* be highly competitive even if entry barriers are substantial, which is why an

[114] Kahn, A.E., *The Economics of Regulation: Principles and Institutions*, Volume II (New York, NY: John Wiley & Sons, Inc., 1971), p. 116.

examination of entry barriers alone is not generally dispositive of whether effective competition exists. If entry barriers are substantial, one would tend to look to various measures of competitive activity to evaluate the degree of competitiveness. When entry barriers are low, however, such measures are less important, and other information – particularly that which tests the lack of entry barriers – is much more relevant.

Moreover, even when entry barriers exist, as they do to some extent in virtually any real market, they do not necessarily preclude or even limit effective competition. Firms can and do surmount entry barriers if those barriers are not so high as to render service unprofitable in the long run.

Q.39 **HAS THE COMMISSION RECOGNIZED THIS FACT?**

A.39 Yes, I believe it has, when in the Sprint Missouri reclassification order it correctly noted that even if barriers to entry exist, they are not necessarily insurmountable and do not necessarily constitute a failure of effective competition.[115]

Q.40 **CAN FIRMS THAT ARE NOT CURRENTLY PRODUCING THE PRODUCT OR SERVICE BEING STUDIED EXERT COMPETITIVE DISCIPLINE ON AN INCUMBENT FIRM PRODUCING THAT PRODUCT?**

A.40 Yes, even firms that are not currently producing the product at issue in the geographic market at issue can exert competitive discipline on that market. This is why the existence

[115] *2003 Sprint Missouri Competitive Reclassification Order*, p. 34.

of barriers to entry is fundamentally important to ascertaining the competitiveness of a market, especially when few firms (or only one) currently provide service in that market. When entry barriers are low, the threat of new entry can discipline incumbent firms to charge prices close to the competitive level, even in the absence of active competitors. Imagine a situation where only a single firm provides service in a market. If entry barriers are low, a significant and sustained price increase by the incumbent firm above a reasonably competitive level would invite competitive entry, the prospect of which would deter the price increase to begin with. Clearly, the more firms that provide service in an exchange, the greater the evidence of effective competition; but the opposite does not necessarily hold. The relative absence of CLECs does not preclude the existence of effective competition. This conclusion is supported by the RSMo, which does not appear to require any particular level of competitive entry as an essential element of effective competition.

Q.41 CAN "EFFECTIVE COMPETITION" THAT BENEFITS CONSUMERS EXIST WHEN COMPETITORS SERVE ONLY A NEGLIGIBLE PORTION OF THE CONSUMERS IN AN EXCHANGE?

A.41 Yes, if barriers to expansion or entry are low. One reason that competitors might serve only a negligible portion of consumers is that, at the prices currently charged to those consumers, the market might be unattractive. Hence, one must consider where the current regulated prices of service are relative to true economic cost. If the regulated

prices are close to, or even less than, cost, there is a reduced incentive for firms to enter the marketplace and compete for customers. Nevertheless, when entry barriers are relatively low, carriers can wait in the wings and enter if the profitability of the service improves (e.g., if the incumbent were to increase price). Hence, for example, CLECs that already serve business customers and who therefore have surmounted entry barriers, can leverage their assets into the residential marketplace if profitability in the latter market increases. In this way, for example, a CLEC that currently serves only business customers may exert discipline on prices in the residential marketplace.

Q.42 HAVE ENTRY BARRIERS TO THE LOCAL EXCHANGE MARKET BEEN AFFECTED BY TECHNOLOGICAL CHANGE?

A.42 Yes. Technology has had profound impacts on the nature and extent of competitive entry into the local exchange markets by reducing entry barriers. As I have discussed, services provided over a number of new technologies or alternative technologies are increasing competitive pressure on traditional ILEC wireline services. In some instances, entities that would have been considered non-traditional service providers a few years ago are now offering customers packages of new services which they claim to be directly competitive with those of traditional local service providers. Indeed, a consequence of this development is that it has reduced the "specificity" of the capital investment in communications facilities and thereby further diminished the sunk costs as a barrier to entry. For example, investment in cable facilities now can be expected to generate a

return not only from providing pay television services, but also from telephony and high capacity Internet access. Investment in mobile wireless facilities may soon generate significant revenues from Internet access. To the extent that public policy adopts a technologically neutral posture, these developments will encourage investment in alternative infrastructures where that is efficient, and promote intermodal competition.

Q.43 HOW DOES TA96 AFFECT BARRIERS TO ENTRY IN THE PROVISION OF LOCAL TELECOMMUNICATIONS SERVICES?

A.43 TA96 substantially reduced the barriers to entry into the local exchange business. Indeed, the reductions are remarkable in their scope and in their requirements for the incumbent to open the door and lend a hand to competitors.

Q.44 PLEASE DESCRIBE THE SPECIAL OBLIGATIONS THAT TA96, AND ITS INTERPRETATION IN REGULATIONS, HAS IMPOSED ON ILECS THAT REDUCE BARRIERS TO COMPETITIVE ENTRY INTO THE MARKETPLACE.

A.44 Incumbent LECs face special obligations to help their competitors beyond those normally imposed on unregulated firms. Under TA96, ILECs must interconnect with competing carriers; they must unbundle their networks and provide certain network elements to their competitors at cost-based rates; they must provide end-to-end service for the resale of telecommunications services to their competitors at avoided-cost wholesale rates; and

they must permit their competitors to collocate equipment in their central offices.[116] TA96 therefore created several avenues by which competitors can enter the local exchange market without making significant sunk investments. Each of these requirements reduces entry barriers and facilitates entry into the local exchange market. Indeed, the Commission correctly acknowledged in its SBC Missouri decision that resale, as well as UNEs and combinations of UNEs, provide "effective ways for CLECs to enter the market with little capital investment."[117] That is, they are relevant to a showing of lack of entry barriers.

Although many of us may be anesthetized to the extent and economic import of these various obligations and regulations, it is worth recognizing that requiring the incumbent to provide an extensive array of unbundled network elements or discounted resale services *at all* is itself an extraordinary obligation. These are all substantial obligations that substantially ease entry for new carriers.

Q.45 ARE THERE ANY INDICATIONS THAT BARRIERS TO ENTRY ARE IN FACT LOW IN MISSOURI?

A.45 Yes. I just discussed at length the new opportunities for entry via VoIP. In addition, I understand that the Commission recommended approval of SBC Missouri's application

116 *TA96*, § 251.

117 *2001 SBC Missouri Competitive Reclassification Order*, p. 28.

to provide in-region interLATA services under Section 271 of TA96.[118] During the 2+ year review, the Commission found that SBC Missouri had satisfied a federally mandated checklist intended, as I indicated, to reduce barriers to entry into the local exchange market. The Commission stated in its March 15, 2001 Order that "SWBT is providing competing carriers with all of the requisite checklist items in a nondiscriminatory fashion."[119] In providing this nondiscriminatory access to the checklist items, SBC Missouri showed that it had opened its network to competitors seeking to lease UNEs or to provide services by resale. In my opinion, this provides robust evidence that barriers to entry into the local exchange market are relatively low in SBC Missouri's territory.

The factual evidence provided by Mr. Unruh regarding the developments of competition in Missouri demonstrate that to the extent there are barriers to entry or expansion, carriers are actively overcoming them. Mr. Unruh demonstrates that, on a statewide basis, CLEC-served lines have increased substantially since mid-2001, and this includes increases in residential lines as well as business lines.[120] During the same period, SBC Missouri's retail lines decreased, so the CLEC expansion was faster than the state's growth as a whole. Mr. Unruh also notes that CLECs are serving a geographically

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118 State of Missouri Public Service Commission, *Order Finding Compliance with the Requirements of Section 271 of the Telecommunications Act of 1996*, Case No. TO-99-227, March 6, 2001.

119 State of Missouri Public Service Commission, *Order Regarding Recommendation on 271 Application Pursuant to the Telecommunications Act of 1996 and Approving the Missouri Interconnection Agreement (M2A)*, Case No. TO-99-227, March 15, 2001. Downloaded from < www.psc.state.mo.us >, June 26, 2001.

120 *Unruh Direct Testimony.*

diverse area and are serving customers in all of SBC Missouri's exchanges, without even considering the effects of other forms of competition, such as wireless and VoIP.

VIII. THE ROLE OF MARKET SHARE IN ASSESSING EFFECTIVE COMPETITION

Q.46 DR. ARON, YOU HAVE DISCUSSED THE ECONOMIC PRINCIPLES THAT THE COMMISSION SHOULD ADOPT IN DETERMINING WHICH SERVICES TO CONSIDER IN ASSESSING "EFFECTIVE COMPETITION. " IN PERFORMING ITS ASSESSMENT OF EFFECTIVE COMPETITION, DOES THE RSMO REQUIRE MARKET SHARE MEASURES TO EVALUATE THE EXISTENCE OF EFFECTIVE COMPETITION?

A.46 No, it does not.

Q.47 DO YOU BELIEVE MARKET SHARE IS A RELIABLE METRIC OF COMPETITION IN THE LOCAL EXCHANGE MARKET?

A.47 No, not necessarily. While market share information has its place in competition analysis, it can be both misleading and unreliable, particularly in a market with a regulated history. Measures of market share, if available, can be a starting point for a competitive analysis but are not an ending point. Market share data can mask the true competitive situation for several reasons, all of which apply to the local exchange markets in Missouri.

The first and most fundamental reason that market shares can be a misleading measure of competition is that they compose a static picture of the market that does not reflect the presence or absence of entry barriers into the market. As I have discussed, economists, the courts, and the federal antitrust agencies recognize that barriers to entry are critical to determining the ability of any firm in a market to exercise market power. If there are no significant barriers to entry, then market share is essentially irrelevant; no firm, no matter how large its market share, could exert significant market power for any length of time. Ease of entry, therefore, trumps market share.[121]

Second, market share is a particularly inappropriate measure of competition in a market that is emerging from a regulated monopoly environment, because an incumbent's market share tends to understate the degree of competition during a transition to competition, and tends to underestimate a competitor's future competitive significance.[122] A market that was, in recent history, a protected monopoly, may well be much more concentrated than an equally competitive market without a regulated history. Market shares are "path-dependent;" i.e., they depend upon past market shares, even if the market is now highly competitive. An incumbent that prices competitively need not lose customers to competitors; if the incumbent prices so as to reflect the competitive threat, there is no incentive for its existing customers to move. Customers nonetheless receive

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121 *Department of Justice and Federal Trade Commission Horizontal Merger Guidelines* ("*Merger Guidelines*"), April 2, 1992, §3.0. See also ABA Section of Antitrust Law, *Antitrust Law Developments* (4th ed. 1997), pp. 328-332.

122 The *Merger Guidelines* state that "recent or ongoing changes in the market may indicate that the current market share of a particular firm either understates or overstates the firm's future competitive significance." (§ 1.521)

the benefits of competition even if the incumbent's market share does not change significantly.

When a firm's market share reflects its regulatory legacy, it is often more informative to look at the trend or change in market share over time than to look at the level of market share. If a firm's market share is being eroded by competitors, that is typically viewed as evidence of decline of the incumbent's market power, and evidence of lively competition. Even this conclusion has exceptions, however, because, again, market share cannot capture the market characteristics that directly determine its competitiveness—namely, entry conditions.

Third, market share is extremely sensitive to – indeed, in this case is largely determined by – the market definition. For example, if wireless is considered to be "in the market," the market share of any wireline competitor, including SBC Missouri, would be a fraction of its market share in a narrowly defined wireline-only market. Similarly, market share can be highly sensitive to the choice of units in which share is to be measured. Market share can be and often is, depending on the context, measured in units of output, revenues, or capacity (among others). The correct metric would depend on the economic context and, in particular, which metric most accurately reflects the future competitive significance of the market participants. Measuring a UNE-based CLEC's share on the basis of capacity, however, would yield a far different result than measuring it on the basis of lines in service, since a UNE-based competitor has the entire capacity of the incumbent available to it, and that capacity is relevant to its future competitive

significance. My point here is not that market share is an entirely elastic concept, but rather that it is not a purely mechanical concept. Moreover, the economic questions that must be addressed in order to arrive at a meaningful market share – market definition, barriers to entry, and barriers to expansion – are the more fundamental issues that the RSMo and economic principles instruct the Commission to assess directly.

Finally, market share measurements are often difficult to make because they require knowledge not just of one firm's quantity of output (or, in our context, one carrier's lines in service or number of customers), but require knowledge of the quantity of output of all the other firms in the market as well. Typically, in any market, no one firm will know the outputs of its competitors, and that is true in telecommunications markets as well. Incumbent local exchange providers such as SBC Missouri may know the number of lines that they provide to their CLEC customers under resale or UNE agreements, but they do not know the number of lines that CLECs provision entirely over their own facilities (also known as "bypass" lines). In order to provide an estimated market share, one must, therefore, attempt to estimate the number of bypass lines provided by CLECs, a procedure which itself is subject to controversy.

Q.48 HAS THIS COMMISSION RECOGNIZED THAT MARKET SHARE IS NOT A DEFINITIVE MEASURE OF COMPETITION?

A.48 Yes, it has. In its 2001 SBC Reclassification Order, the Commission noted that specific market share loss tests are not required to determine whether effective competition

exists.[123] In its 2003 Sprint Reclassification Order, the Commission found that a particular type of statistic that is based on relative shares (and the number of firms), the Herfindahl-Hirschman Index, did not control the Commission's decisions in that case.[124] Indeed, in its Sprint Order, the Commission noted that one factor it considered was the ability of the competitor to *maintain and increase its market share in the future*.[125] This attention to trends in share is a more appropriate use of market share statistics, in that what is of primary importance in assessing the competitive pressure created by existing competitors is not how much of the market the carrier has, but whether there are significant barriers to those competitors' ability to expand.

Q.49 DO COMPETITION AUTHORITIES RECOGNIZE THAT MARKET SHARE IS NOT A DEFINITIVE MEASURE OF MARKET POWER OR COMPETITION?

A.49 Yes. As I indicated earlier, the fact that market share is fundamentally flawed as a measure of competition is well accepted among economists and antitrust authorities and is reflected in the U.S. Merger Guidelines and in numerous court decisions.

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123 *2001 SBC Missouri Competitive Reclassification Order*, pp. 18-19. The Commission noted that while market share thresholds are not required by the RSMo, the Commission found, in that order, that share was particularly determinative, when combined with other factors, of the extent of competition.

124 *2003 Sprint Missouri Competitive Reclassification Order*, p. 30.

125 See, e.g., *2003 Sprint Missouri Competitive Reclassification Order*, p. 33. In this discussion about competition for local exchange service in the Kearney exchange, the Commission evaluates whether one competitor, ExOp, can maintain and perhaps increase its market share.

Q.50 DO OTHER TELECOMMUNICATIONS PROVIDERS RECOGNIZE THAT MARKET SHARE IS NOT A DEFINITIVE MEASURE OF COMPETITION?

A.50 Yes. In a different venue, AT&T has observed that market share is a non-essential ingredient in demonstrating a market's competitiveness:

> The expert submissions made in this proceeding ... further acknowledge that market share statistics, standing alone, do not demonstrate the presence or absence of market power, and that other factors must therefore be examined to assess whether any carrier has market power ...These are not controversial assertions; to the contrary, there is a broad economic and legal consensus supporting each.[126]

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> Economists have known for a long time that the link between market concentration and market competitiveness is a tenuous one, and that measuring concentration is not a substitute for analyzing the factors that determine market performance. Salop, Brenner, and Roberts observe that '...market share, standing alone, does not determine the extent to which competition effectively constrains the exercise of market power.' [127]

Q.51 DOES THE FCC RECOGNIZE THAT MARKET SHARE IS NOT A DEFINITIVE MEASURE OF COMPETITION?

A.51 Yes, the FCC itself recognizes the significant shortcomings of market share as a measure of competition. In its 1996 order declaring AT&T non-dominant, the FCC wrote:

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126 *Reply Comments of American Telephone and Telegraph Company*, Federal Communications Commission, CC Docket No. 90-132, September 18, 1990, p.3 (footnotes omitted).

127 *Statement of Stanley M. Besen, Appendix B to Reply Comments of American Telephone and Telegraph Company*, Federal Communications Commission, CC Docket No. 90-132, September 18, 1990, p.2 (footnotes omitted).

> It is well-established that market share, by itself, is not the sole determining factor of whether a firm possesses market power. Other factors, such as demand and supply elasticities, conditions of entry and other market conditions, must be examined to determine whether a particular firm exercises market power in the relevant market. As we noted in the First Interexchange Competition Order, "[m]arket share alone is not necessarily a reliable measure of competition, particularly in markets with high supply and demand elasticities." [128]

Q.52 WOULD VARIATIONS IN MARKET SHARE FROM ONE EXCHANGE TO ANOTHER INDICATE VARIATIONS IN THE COMPETITIVENESS IN THOSE EXCHANGES?

A.52 No, not necessarily. Unlike the incumbent, CLECs have the ability to pick and choose among the exchanges, to penetrate those areas first that are likely to produce the most profits. Exchanges with the greatest revenue potential (relative to costs) or lowest costs (relative to revenues) would likely be the most attractive areas to pursue, and one would expect them to show the greatest competitive penetration. However, as those areas become more populated with competitors, other areas with less competitive activity therefore become more attractive. Hence, the fact that competitive activity, and market shares, are likely to vary across exchanges, is not evidence that *all* exchanges are not open to competition. Instead, it is consistent with the fact that competitors can and, rationally do, engage in cherry picking. Nevertheless, if the incumbent wanted to raise prices in only a particular exchange (and was able, from an administrative and billing

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[128] Order *In the Matter of Motion of AT&T Corp. to be Reclassified as a Non-Dominant Carrier*, Federal Communications Commission, FCC 95-427, October 12, 1995 (*"AT&T Reclassification Order"*), ¶ 68 (footnotes omitted).

standpoint to do so), that exchange would then become more attractive and invite entry – the prospect of which, in turn, serves to discipline price there.

Q.53 DR. ARON, IN THE SPRINT MISSOURI COMPETITIVE RECLASSIFICATION PROCEEDING, THE OFFICE OF PUBLIC COUNSEL ADVOCATED THE USE OF THE "HERFINDAHL-HIRSCHMAN INDEX" AS A MEASURE OF EFFECTIVE COMPETITION.[129] IS THAT A SOUND METRIC FOR PURPOSES OF THIS PROCEEDING?

A.53 No. As I explained in the 2001 SBC Missouri reclassification proceeding, and still holds true, the Herfindahl-Hirschman Index ("HHI") is not an accurate indicator of market power in the context of this proceeding. The HHI is another way of presenting and summarizing market share statistics; it is a measure of market concentration, calculated as the sum of each firm's squared market share, with higher HHIs representing more concentrated markets. Thus, because it is a summary of market shares, the HHI suffers from the same shortcomings as do the market shares themselves. As I have already explained in detail the shortcomings of market share as a measure of market power, I will not repeat them.

The HHI also suffers from additional shortcomings if applied in a proceeding such as this one. The HHI is used by the U.S. Department of Justice and the Federal Trade Commission to assess the effects of changes in market structure due to mergers,

[129] *2003 Sprint Missouri Competitive Reclassification Order*, pp. 29-31.

and it has its limited uses in that context. But in this context, it can be highly misleading because it is intended as a description of market concentration, not of any one firm's market power. For example, suppose the market in a particular exchange under consideration consisted of two competitors, SBC Missouri, and CLEC X. Suppose SBC Missouri had 55 percent of the market and X had 45 percent. That would result in an HHI of 5,050 (45 squared plus 55 squared). Now suppose that the Commission decided that 5,050 was too high to pass its HHI threshold for "effective competition," and suppose a year later, SBC Missouri had lost another ten points of market share, so that it had 45 percent of the market, and X had 55 percent. Rather than indicating a loss of market power, the HHI would be identical to what it was before – 5,050 – and SBC Missouri would, according to the HHI, be no closer to regulatory relief, despite having lost another ten percent of the market. Now, suppose in another year SBC Missouri had lost another five percentage points of share, so that it now had 40 percent and X has 60 percent. The HHI of the market would now be 5,200, which is interpreted to mean that the market is even more concentrated, and SBC Missouri would be further away from any pre-established HHI threshold for reclassification. Clearly, the HHI is ill suited for purposes of assessing effective competition as required in this proceeding.

Q.54 HAS THE COMMISSION REJECTED THE HHI IN PRIOR RECLASSIFICATION PROCEEDINGS?

A.54 Yes. The Commission specifically and correctly concluded in the Sprint case that the HHI is not relevant to its assessment of effective competition.[130]

Q.55 DR. ARON, YOU NOTED THAT THE PROCESS OF ESTIMATING MARKET SHARES CAN BE DIFFICULT. HAS SBC MISSOURI ATTEMPTED TO DO SO IN THIS CASE?

A.55 Yes, Mr. Unruh provides testimony in which he presents SBC Missouri's best estimates of CLEC market shares in the "traditional" landline market.

Q.56 HOW DID MR. UNRUH ESTIMATE THE NUMBER OF CLEC BYPASS LINES?

A.56 According to his testimony, he relied on E911 data.

Q.57 IS THAT A VALID METHOD FOR ESTIMATING BYPASS LINES?

A.57 Yes, to my knowledge it is the best method currently available for estimating CLEC bypass lines.[131] However, it does suffer from the deficiency that it generally will undercount the number of actual CLEC bypass lines.

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130 *2003 Sprint Missouri Competitive Reclassification Order*, p. 30

131 As noted by BellSouth, SBC, Qwest, and Verizon in their "UNE Fact Report" submitted in 2002 to the FCC, "[b]oth the FCC and the Department of Justice have repeatedly relied on E911 listings to estimate CLEC facilities-based lines in section 271 proceedings. No CLEC providing service to end-user customers has yet claimed that its facilities-based lines are actually lower than the totals produced by its E911 listings. Nor has any CLEC disputed that the E911 methodology undercounts lines served." See "UNE Fact Report," submitted by BellSouth, SBC, Qwest, and Verizon *In the Matter of Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carrier, CC Docket No. 01-33; Implementation of the Local Competition Provisions in the Telecommunications Act of 1996,CC Docket No. 96-9; and Deployment of Wireline Services Offering Advanced Telecommunications Capability, CC Docket No. 98-147*, April 2002, Appendix A, p. A-3 (footnotes omitted). (Hereafter, *UNE Fact Report*).

Q.58 WHY IS THAT?

A.58 Complex voice services such as a PBX may be only partially represented in the E911 database. In particular, it is my understanding that carriers typically report only the telephone numbers of one-way outbound and two-way PBX trunks or direct outward dial (DOD) lines. Carriers do not generally report telephone numbers associated with one-way inbound lines because an emergency call cannot be placed on them. For example, in my office at LECG in Evanston, Illinois, we have 16 PBX trunks, consisting of eight one-way outbound and eight one-way inbound trunks. Therefore, we have 16 lines to our office serving approximately 40 telephones. However, because only eight of these trunks have outward dialing capability, we would have only eight 911 numbers listed in the E911 database. Under this scenario, an estimate of lines based on E911 data undercount the total trunks to and from my office by a factor of two.[132]

Q.59 DID THE COMMISSION RECOGNIZE IN THE 2001 SBC MISSOURI RECLASSIFICATION PROCEEDING THE PROBLEM YOU HAVE DISCUSSED IN MEASURING CLEC FACILITIES-BASED LINES?

[132] CLECs have claimed in certain 271 proceedings that some of their residential E911 listings were for test lines and not for active customers, which could in some instances cause an over-reporting of residential lines. It seems, however, that these inactive E911 listings that occasionally appear on the database are a "*de minimis*" fraction of all CLEC listings. See, "UNE Fact Report," Appendix A, p. A-3, footnote 9.

A.59 Yes, citing in part to my testimony, the Commission acknowledged that the number of CLEC E911 listings may understate the number of CLEC facilities-based lines, and properly viewed SBC Missouri's estimates of CLEC lines as a minimum of the lines the CLECs actually serve.[133]

IX. ADDITIONAL FACTORS TO CONSIDER

Q.60 DR. ARON, YOU NOTED THAT SECTION 392.245.5 PERMITS THE COMMISSION TO CONSIDER OTHER FACTORS THAT ARE RELEVANT TO ITS RECLASSIFICATION INQUIRY. WHAT ADDITIONAL FACTORS WOULD YOU ADVISE THE COMMISSION TO CONSIDER IN ITS EVALUATION OF THE STATE OF COMPETITION IN SBC MISSOURI'S EXCHANGES?

A.60 I believe there are at least two additional factors that are relevant to the Commission's inquiry. First, the Commission should consider whether the current regulated rates are below the rates likely to prevail in a competitive market. The reason that this is important is that uneconomically low retail prices can mask the extent to which a market is truly open to competition. As I explained earlier in my testimony, a market may be fully open to competition but have little or no apparent competitive activity because the artificially low retail rates render the market unattractive to competitors. In such a case,

[133] *2001 SBC Missouri Competitive Reclassification Order*, pp. 23-24.

the lack of competitive activity signals a need to lift restrictions on retail rates so that rates will adjust to a level that attracts resources to the market and more properly reflects the value of the resources being consumed.

Second, the Commission should consider *trends* in competitive activity, rather than simply the level of competitive entry in an industry that is emerging from heavy regulation. When a market is moving from a protected monopoly environment to a competitive one, the absolute size of a competitor's activity is often a misleading measure of competition, because, as I explained above, market concentration is "path dependent."

Hence, the absolute *level* of a competitor's activity at a point in time tends to understate the degree of competition in markets undergoing deregulation, and tends to underestimate a competitor's future market significance. For this reason, it is sometimes more instructive to examine the growth of the competitive activity in the market. If competitors' businesses are growing steadily, it suggests that the market is open to competition. Moreover, it suggests that new customers to the market find the competitors' offerings attractive.

As I noted earlier, Mr. Unruh's evidence shows that CLECs in Missouri have substantially increased the number of lines that they serve since mid-2001, while SBC Missouri has lost lines. This means that the share of the lines served by CLECs in the SBC Missouri service territory (even looking at share limited to traditional wireline service) increased. Indeed, the SBC Missouri residential line loss far exceeds the gains

by these CLECs indicating, perhaps, as Mr. Unruh notes, that some of shift may be to non-traditional telecommunications replacements such as wireless or VoIP.

X. THE LIFTING OF SBC MISSOURI'S PRICE CAP REGULATION ADVANCES THE PURPOSES OF THE RSMO

Q.61 PLEASE SUMMARIZE THE PURPOSE OF THE PROVISIONS SET OUT IN SECTION 392.185 OF THE RSMO, AS YOU UNDERSTAND THEM.

A.61 My reading of Section 392.185 is that the provisions of Chapter 392 (including the Section 392.245 inquiry relevant to this hearing) shall be construed to promote several broad policy goals of the Missouri legislature. As I read it, the legislators, as expressed in the RSMo, seek to promote universally-available, efficiently-supplied, and reasonably-priced telecommunications services.[134] The legislation also seeks to promote diversity in the supply of telecommunications services, and to allow competition to function as a substitute for regulation whenever possible and consistent with the other goals of the Revised Statutes.[135] Finally, the legislation seeks to promote parity of urban and rural telecommunications services, promote economic and other enhancements, and protect consumer privacy.[136]

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134 RSMo §392.185 (1), (2), and (4).

135 RSMo §392.185 (3), (5), and (6).

Q.62 IS THE DEVELOPMENT OF COMPETITION CONSISTENT WITH THESE GOALS?

A.62 Yes. The law specifically articulates a preference for competition over regulation whenever possible and consistent with the statute's other goals. When there is competition in a market, it is both unnecessary and undesirable to impose artificial regulatory requirements on participants in the market. It is unnecessary because markets function more effectively to protect customers than can regulations. More importantly, it is undesirable because regulatory restrictions are not innocuous in competitive markets. By preventing or hindering providers from quickly raising, lowering, restructuring, targeting, bundling, or otherwise changing prices, providers are impeded in their ability to respond to competition, to differential cost conditions, to customer-specific demands and preferences, and to changing market conditions, to the detriment of social welfare and economic efficiency. Moreover, regulation can prevent a company from correcting prices that have been distorted by years of regulatory oversight. If such a company cannot price in response to these legitimate market factors, the company is restricted in its ability to effectively meet customer demand, and customers suffer.

Q.63 WHAT ARE THE BENEFITS OF COMPETITION?

A.63 One of the main benefits of competition can be summarized by the term "efficiency," which is one of the explicit goals articulated in Section 392.185 (2) of the RSMo.

[136] RSMo §392.185 (7) - (9).

Efficiency in the provision of services means that society is obtaining the greatest benefits from its resources and technologies. In discussing efficiency, I distinguish between "static efficiency" and "dynamic efficiency."

Static efficiency leads to the optimal allocation of society's resources in the sense that resources produce the products that consumers want in the proportions that they want them, given their willingness to pay for them. Static efficiency also means that the firms that are producing those products do so in a way that economizes on resource use, and that firms use a resource mix that is consistent with their relative values to society.

Dynamic efficiency refers primarily to how firms invest in innovation and technologies that help reduce costs, and that are capable of creating new kinds of products. Both static and dynamic efficiency drive society's ongoing economic progress.

Competition plays an important role in achieving both static and dynamic efficiency objectives. Competition provides the incentives, in the form of both rewards and punishments, for satisfying society's desires. Indeed, it is a fundamental tenet of economics that, under the proper circumstances, competition is the best way of providing the greatest welfare to society. Accordingly, it is crucial that policy engender true, efficient, competition that fosters society's goals of a robust telecommunications infrastructure, availability of new services and packages of services, and prices that are commensurate with the resources efficiently used in producing the services and consistent with market demand. All of these are goals of the RSMo.

Q.64 DOES LIFTING PRICE CAP REGULATION WHEN EFFECTIVE COMPETITION EXISTS IN AN EXCHANGE PROMOTE THE POLICY OBJECTIVES DISCUSSED ABOVE?

A.64 Yes, it does. It is particularly important for achieving dynamic efficiency that carriers are permitted enough pricing flexibility that it is feasible to justify investments in innovation, which are inherently risky.

Q.65 YOU INDICATED THAT ONE GOAL OF THE STATUTE IS TO PROMOTE REASONABLY PRICED SERVICE. WHAT WOULD YOU EXPECT TO BE THE CONSEQUENCE OF PRICE DEREGULATION ON PRICES IN THE MARKET?

A.65 One would expect prices to adjust in various ways in response to removal of price caps. As the Commission correctly noted in the Sprint decision, effective competition does not require that the competition "must have been effective in imposing price discipline on the market."[137] The Commission recognized that competition cannot fully perform its function in the presence of price cap regulation, because that regulation dampens the regulated carrier's ability to change its price in response to competition.

The effect on prices in the short run depends, to a great extent, on their current levels relative to costs and relative to the prices of competitors, and on their current structures relative to those of competitive offerings. Moreover, it depends on the changes

[137] *2003 Sprint Missouri Competitive Reclassification Order*, p. 31.

in the attributes of services offered in the market as competition drives services to be more responsive to consumer tastes and drives innovative offerings. Overall, however, I would expect there to be at least two effects on prices. First, I would expect there might be restructuring of some prices, as Mr. Unruh testifies was the case for some business services in St. Louis and Kansas City. Second, I would expect the geographic variation in prices to change. Some prices might become more uniform across the state, if uniformity is important to customers (as Ms. Acosta Fernandez testifies it is for some business customers[138]). Some prices might show more geographic variability, if the carrier tries to respond to competition in specific exchanges, and/or if geographic cost variations drive geographic price variability that differs from what is in place today. The Commission specifically found in the Sprint decision, in a passage that I presume would apply equally to SBC Missouri, that "as a company subject to price cap regulation, Sprint's ability to change its prices in specific exchanges in response to localized competition is restricted by statute."[139] Hence, the price cap regime acts as a straightjacket that precludes the incumbent from engaging in the nuanced pricing strategies that benefit consumers and invigorate competition. The increased ability to respond to localized competition that would come with competitive reclassification would also, I believe, lead to a greater proliferation by CLECs and the ILEC in pricing structures and plans, for the benefit of consumers.

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138 Direct Testimony of Sylvia Acosta Fernandez, before the Public Service Commission of the State of Missouri, Case No. TO-2005-0035.

139 *2003 Sprint Missouri Competitive Reclassification Order*, p. 31, citing RSMo Section 392.200.4.

Q.66 HOW DOES THE PROLIFERATION OF PRICE STRUCTURES BENEFIT CONSUMERS?

A.66 In general, pricing structures evolve in markets to respond to the range of customers' demands and needs, and to competitors' offerings that, in turn, are based on the competitors' assessments of customers' desires. In a competitive market, competition often delivers a panoply of offerings because customers' demands vary widely. Hence, a proliferation of offerings is the market's attempt to more closely respond to demand than can be achieved by a one-size-fits-all offering. In telecommunications markets, one important example of how carriers are responding to consumers' demand by modifying their pricing structures is the emergence of service bundles as an important competitive tool. Bundles of services not only offer consumers benefits of "one-stop shopping" and, in some cases, integrated services, but bundles have a more subtle benefit to consumers as well that *a la carte* competition may not. Head-to-head competition over bundled offerings may induce greater incentives for price reductions than does *a la carte* competition, because each carrier has more to lose when it loses a customer who buys a bundle of services, and therefore will compete more aggressively on price to keep its customers.

Q.67 DR. ARON, SBC MISSOURI IS ALREADY PERMITTED TO DECREASE PRICE UNDER ITS CURRENT PRICE CAP CONSTRAINTS. HOW DOES REMOVAL OF PRICE CAP REGULATION AFFECT THE INCENTIVES OF THE INCUMBENT TO DECREASE PRICES?

A.67 I believe that removal of price cap constraints would encourage price decreases. The reason is that, as I mentioned earlier, the current regime requires that SBC Missouri announce its price change 30 days in advance of a tariffed price change. By requiring SBC Missouri to signal its moves by filing 30 days' notice in advance of price changes, SBC Missouri is discouraged from decreasing prices and is handicapped from competing for specific customer business. In particular, if competitors have advance warning of SBC Missouri's price changes, they can use the 30-day period to counteract the change with their own price changes or marketing efforts in advance of SBC Missouri's pricing change becoming effective. Knowing that a price decrease could be preempted will discourage SBC Missouri from making the decrease to begin with. Such an outcome dampens competition and harms customers. I understand that for a competitively-classified service, SBC Missouri must provide only seven days advance notice of a tariffed price decrease,[140] which is still more than a firm must provide in an unregulated market, but which is much less onerous than the 30-day requirement. Relieving a carrier of this 30-days' notice obligation advances and strengthens competition and, therefore, benefits customers by removing a constraint that discourages price reductions.

[140] RSMo § 392.500.1.

Q.68 WILL PRICES ALWAYS FALL IN A COMPETITIVE MARKET?

A.68 Certainly not; not necessarily as a result of deregulation, nor necessarily over time in a competitive market. Prices will adjust, but that adjustment may be up or down in any given market, may vary across products, and may vary across geographic markets, depending on the relationship of prices to costs, the competitive conditions, changes in input costs, changes in demand, and changes in overall economic conditions. As any consumer knows, prices in competitive markets rise and fall. The Commission correctly noted this when it said "there is no economic, or logical reason why prices must always fall in a competitive market."[141]

Q.69 ARE THERE OTHER BENEFITS TO CONSUMERS THAT ARISE UNDER COMPETITION THAT MAY NOT ARISE UNDER PRICE CAP REGULATION?

A.69 Yes. Permitting an incumbent carrier flexibility to price its services encourages investment in new facilities, and competitive markets provide the incentive to accelerate the deployment and development of advanced technologies.

Maintaining the level of investment and innovation in the telecommunications infrastructure in Missouri is critical to maintaining the vibrancy of many industries in the state and preserving the status of the state as a place where businesses want to locate and talented workers want to live. I believe that maintaining incentives to innovate and

[141] *2003 Sprint Missouri Competitive Reclassification Order*, p. 31.

invest in the telecommunications infrastructure is the most important factor for achieving the RSMo's goal of promoting "economic ... enhancements" in the state.[142]

Q.70 PLEASE PROVIDE AN EXAMPLE OF HOW PRICING FLEXIBILITY ENCOURAGES EFFICIENT INVESTMENT IN NEW FACILITIES.

A.70 Regulated pricing structures wherein business services are priced higher than residential services without corresponding disparities in cost can result in disproportionate competitive attention to business customers rather than residential customers. However, a firm will not choose to enter a market and deploy facilities unless it believes that it will have a reasonable chance to recoup its investment. Lifting price cap regulation provides a signal to potential competitors that the incumbent's prices will not be forced below those that would prevail in a competitive market. If this commitment by the regulator is credible, in that it is not expected to be reversed during the time in which the competitor hopes to recoup its investment, the deployment of new facilities will be encouraged. Of course, the prospect of having sufficient flexibility to maintain prices at a remunerative level, to the extent permitted by competition, and the prospect of competitive investment by CLECs and other competitiors, encourage efficient investment by ILECs as well.

Q.71 IN LIGHT OF THE CRITERIA FOR ASSESSING EFFECTIVE COMPETITION THAT YOU HAVE EXPLAINED, AND THE GOALS OF THE RSMO THAT

142 RSMo § 392.185(8).

YOU HAVE DISCUSSED, HOW SHOULD THE COMMISSION ASSESS THE EVIDENCE IT IS PRESENTED IN THIS CASE?

A.71 I believe that the structure of the Missouri statute – the fact that it requires in Section 392.245.5 the Commission to remove price caps where competition has been present for five years unless it makes an affirmative finding that effective competition does not exist, and the goals articulated in the act that call for competition to serve as a substitute for regulation where possible – establish a pro-competitive, deregulatory orientation. Moreover, the same section of the statute also provides that if, after a competitive reclassification, the Commission later reviews the state of competition and finds that effective competition no longer exists in an exchange, it can rescind the competitive classification and reimpose price caps in that exchange. This ability to reimpose price caps means that the Commission should not refuse to grant competitive classification when it is otherwise convinced that effective competition exist because of concerns that its decision is irreversible. I view the fact that the legislature gave the Commission a safety valve if the competitive landscape significantly deteriorates to be further confirmation that the legislature intended to encourage the Commission to make competitive reclassifications to allow the market to work and competition to develop unfettered by asymmetric price regulations. Indeed, as the Commission noted in its Sprint decision, the statute creates a "*presumption* that effective competition exists in an

exchange when at least one alternative local exchange telecommunications company has been providing service in that exchange for at least five years."[143]

I recognize that the Commission has already found in its previous SBC reclassification order that effective competition did not exist at the time of the earlier review for the services at issue in this proceeding, and that the presumption of competition therefore does not apply to this proceeding; but the fact remains that the statute itself expresses a philosophy that favors removal of regulatory constraints where possible, subject to its criteria. The criteria established for assessing effective competition properly focus on competitive conditions, such as entry conditions, rather than levels of current competition, such as market shares. This is appropriate because, fundamentally, the amount of competitive activity observed today in a given market is a function of the regulatory constraints on that market today. If, for example, prices are held artificially low by regulation in a given market, then this will impede facilities-based competition and discourage interest in serving that market. The lack of competitive activity is not evidence that the market is not competitive, however, but rather is evidence, in the hypothetical case, that the regulatory-constrained prices are impeding competition. Competitive activity would not likely be observed in significant measure in such a market unless and until prices were deregulated.

A policy that required a given level of competitive activity to be observed before deregulating the market would therefore establish a regulatory Catch 22, to the detriment

143 *2003 Sprint Missouri Competitive Reclassification Order*, p. 30 (emphasis added).

of consumers: you cannot deregulate prices until you see competitive activity, and competitors will not want to be in that market as long as prices are held artificially low. As FCC Chairman Michael Powell has stated,

> I do not believe deregulation is like a dessert you serve after people have fed on their vegetables, that it's a reward for the creation of competition...Deregulation is instead a critical ingredient to facilitate competition.[144]

Hence, in evaluating the evidence, both the criteria established in the RSMo and economic principles require, I believe, that the Commission recognize that while there is a certain degree of comfort and certainty that is afforded to regulators in observing actual, extensive competitive activity in a market before deregulating prices in the market, such competition may not, in some cases, be achieved without the removal of price constraints. Chairman Powell recently observed that

> State and Federal regulators can assist in tearing down the market barriers that law, economics or history have erected. However, I believe that we should not delude ourselves that our actions are more important than those of competitors in the marketplace. As we tackle the intellectually- and psychologically-draining task of setting the ground rules for fair and open competition, we need to muster both the courage and humility to yield our regulatory primacy to the market.[145]

In light of these facts, regulators and policy makers face a certain tradeoff: they can withhold price deregulation until they see extensive amounts of actual competitive

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144 Mary Mosquera, "FCC Chief: Deregulation Will Grease Competition," *InternetWeek.Com*, February 7, 2001; <www.internetwk.com/story/INW20010207S0001>, accessed December 8, 2002.

145 Opening Statement of Michael K. Powell Commissioner Federal Communications Commission before the Subcommittee on Telecommunications, Trade and Consumer Protection of The House Committee on Commerce, March 31, 1998.

activity, and risk undue delay and the attendant harm to consumers; or they can grant price deregulation upon a factual determination that the conditions for competition are truly present, and risk the possibility that the market was not as open as they believed. Or they can take an intermediate approach, such as withholding price deregulation until the market is found to be open to competition *and* there is some more moderate evidence of actual competitive activity. All of these approaches contain attendant risks, costs, and benefits to consumers and to regulators. But what I want to emphasize here is that I believe that the Missouri legislature, through the RSMo, has already determined how it wants the Commission to approach these proceedings within this spectrum and has codified it into law.

The law establishes an intermediate approach in which actual evidence of competitive activity and an assessment of barriers to entry are required, but does not require any specific loss of market share or any specific quantitative threshold of competitive activity beyond alternative provision in the relevant market. The legislature's approach is sound, is forward looking, is consistent with economic principles, and recognizes that regulatory oversight and delay are costly to consumers and to the economy when competition can function to replace regulation. A more lethargic, backward-looking, heavy-handed approach to price deregulation not only fails to recognize the social costs of delaying the removal of price controls, and not only fails to acknowledge the Catch-22 characteristic of this approach, but, in my judgment, also is in direct violation of the philosophy clearly established in the RSMo.

XI. CONCLUSIONS

Q.72 DO YOU HAVE ANY CONCLUDING THOUGHTS?

A.72 Yes. The RSMo provides valuable economic guidance on determining the extent of "effective competition" in a competitive declaration proceeding. Some of the main points that I wish to stress are that, first, the relevant product market is determined by what the consumer determines is "reasonable interchangeability" of use. This means that products need not be identical. Products with different attributes can be in the same relevant market if they help provide price discipline.

The second point that I wish to stress is that "alternative providers," as used in Section 386.020(13)(a), reasonably would include carriers using alternative technologies, as well as CLECs that utilize their own wireline networks or UNEs. The tremendous advance and proliferation of alternative technologies since the last SBC Missouri reclassification proceeding adds another dimension to the market now that expands the competitive landscape beyond consideration of traditional wireline providers. The direction of the industry as a whole and the market in Missouri in particular in the next few years may well be determined by competition from wireless, VoIP, and other technologies that provision services by completely bypassing the legacy provider's network. Moreover, carriers who are not now actively providing service may still provide price discipline on the incumbent. When entry barriers are small, it is a matter of

standard economic principle that even *potential* entrants pose a meaningful competitive threat and impose meaningful competitive discipline on incumbents.

My third point is that the experience in the markets that have been reclassified in Missouri should give comfort to the Commission that reclassification has not resulted in consumer harm. As I have explained, once entry barriers are removed from a market there is little to be gained from continued economic regulation, and much to be lost. Where there is incentive and opportunity in a market, competitors will enter and will bring the benefits of competition to consumers. Lack of entry barriers creates the opportunity, and pricing flexibility (and potential profits) creates the incentive. The other witnesses sponsor detailed testimony about the state of competition in Missouri, which I believe is important to evaluate. However, given that (1) consumers benefit most when the market dictates the prices and services brought to them; (2) the growth and development of new technologies has created significant new opportunities for competitors to discipline the incumbent provider and bring new services to the market; (3) TA96 itself imposes extraordinary market-opening obligations; and (4) SWBT has met these obligations, economic principles would dictate that the Commission be strongly predisposed to a determination that the market in Missouri is effectively competitive.

Q.73 DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A.73 Yes, it does.

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Courses taught: Pricing Strategy; Information, Communication, and Competition (strategy and competition in communications industries); Intermediate Microeconomic Theory; Managerial Economics (microeconomic theory as applied to business strategy and decision making) at the M.B.A. level, The Economics of Information at the Ph.D. level.

Also qualified to teach: graduate Microeconomic Theory; Industrial Organization and Labor Economics; the Economics of Personnel; Public Finance; Applied Game Theory.

PUBLICATIONS AND WORKING PAPERS

"State Commissions Systematically Have Set UNE Prices Below Their Actual Costs," with Frank Pampush and E. Gerry Keith, 2004.

"Broadband Adoption in the United States: An Empirical Analysis," with David E. Burnstein, in *Down to the Wire: Studies in the Diffusion and Regulation of Telecommunications Technologies,* Allan Shampine, ed., (Nova Science Publishers, Hauppauge, NY, 2003).

"Developments in the Theory of Vertical Foreclosure as Applied to Regulated Telecommunications Markets" (March, 2002), Prepared for Presentation at The American Bar Association Section of Antitrust Law, 50th Annual Spring Meeting.

"Modifications at HHIs for Vertical Supply Relationships" with Wenqing Li and James Langenfeld, White Paper submitted to European Commission, February 2000.

"Economic Theories of Tying and Foreclosure Applied—And Not Applied—in *Microsoft*," with Steven S. Wildman, *Antitrust*, vol. 14, no. 1, 1999, pp.48-52.

"Effecting a Price Squeeze Through Bundled Pricing," with Steven S. Wildman, in *Competition, Regulation, and Convergence: Current Trends in Telecommunications Policy Research*, Gillett and Vogelsang, eds. (New Jersey: Lawrence Erlbaum Associates, Inc.) 1999, pp. 1-17.

"Worldwide Wait? How the Telecom Act's Unbundling Requirements Slow the Development of the Network Infrastructure," with Ken Dunmore and Frank Pampush, *Industrial and Corporate Change*," vol.7, no. 4, 1998, pp. 615-621.

"The Pricing of Customer Access in Telecommunications," with Steven S. Wildman, *Industrial and Corporate Change*, vol. 5, no. 4, 1996, pp. 1029-1047.

"Bonus and Penalty Schemes as Equilibrium Incentive Devices, With Application to Manufacturing Systems," with Pau Olivella, *Journal of Law, Economics, and Organization*, 10, Spring 1994, pp. 1-34.

"Diversification as a Strategic Preemptive Weapon," *Journal of Economics and Management Strategy*, 2, Spring 1993, pp. 41-70.

"Using the Capital Market as a Monitor: Corporate Spin-offs in an Agency Framework," *RAND Journal of Economics*, 22, Winter 1991, pp. 505-518.

"Firm Organization and the Economic Approach to Personnel Management, *American Economic Review*, vol. 80, no. 2, May 1990, pp. 23-27.

"The Introduction of New Products," with Edward P. Lazear, *American Economic Review*, vol. 80, no. 2, May 1990, pp. 421-426.

"Ability, Moral Hazard, Firm Size, and Diversification," *RAND Journal of Economics*, 19, Spring 1988, pp. 72-87.

"Worker Reputation and Productivity Incentives," *Journal of Labor Economics*, vol. 5, no. 4, October 1987, part 2, pp. S87-S106.

"The Role of Managerial Ability and Moral Hazard in the Determination of Firm Size, Growth and Diversification," Ph.D. Dissertation, University of Chicago, August 1985.

REPRESENTATIVE PRESENTATIONS

"Trends in Telecommunications Demand & Supply," Presentation at the 46th Annual NARUC Regulatory Studies Program, Michigan State University, August 2004.

"The Economic Costs of Proposed Wireless Regulations in California," Presentation to Commissioners Brown and Kennedy, California Public Utilities Commission, San Francisco, California, April 2004.

"The Economics of UNE Pricing: Presentation to Staff," Ex parte presentation to the staff of the FCC, in FCC WC Docket No. 03-173: Review of the Commission's Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers, March 2004.

"The High Cost of Proposed New Wireless Regulations," Presentation to the Pacific Research Institute conference "Regulating Wireless in California: Bill of Rights... or Wrongs?," San Francisco, April 2003.

"The TELRIC Showdown," Panelist, NARUC Staff Subcommittee on Telecommunications, 2002 Annual Convention, Chicago, Illinois, November 2002.

"Economic Principles for Efficient Pricing of Municipal Rights-of-Way," National Association of Telecommunications Officers and Advisors (NATOA), Chicago, Illinois, September 2002.

"Trends in Voice and Broadband Competition in Telecommunications Markets: Markets, Strategies, and Regulation," 82nd Annual Convention of the Indiana Telecommunications Association, Lexington, Kentucky, June 2002.

"Broadband Deployment in the United States," Emerging Opportunities in Broadband Symposium, Northwestern University, Evanston, Illinois, December 2001.

"Local Competition in Illinois," Illinois Telecommunications Symposium, Northwestern University, Evanston, Illinois, December 2000.

"Licensing and Access to Innovations in Telecommunications and Information Services," Telecommunications Policy Research Conference, Alexandria, Virginia, September 2000.

"Effecting a Price Squeeze Through Bundled Pricing," Federal Communications Commission, Washington, D.C., May 1999.

"Competitive and Strategic Use of Optional Calling Plans and Volume Pricing Plans," The Institute for International Research Conference for Competitive Pricing of Telecommunications Services, Chicago, Illinois, July 1998.

"Effecting a Price Squeeze Through Bundled Pricing," Consortium for Research in Telecommunications Policy Conference, University of Michigan, Ann Arbor, Michigan, June 1998.

"The Pricing of Customer Access in Telecommunications," Conference on Public Policy and Corporate Strategy for the Information Economy, Evanston, Illinois, May 1996.

"Diversification as a Strategic Preemptive Weapon," University of Iowa, Iowa City, Iowa, February 1994.

"Diversification as a Strategic Preemptive Weapon, "University of Buffalo, Buffalo, New York, February 1994.

"Diversification as a Strategic Preemptive Weapon," University of Southern California, Los Angeles, California, December 1993.

"Strategic Pricing," Winter Meetings of the Econometric Society, Discussant, Anaheim, California, December 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Michigan State University, Lansing, Michigan, November 1993.

"Diversification as a Strategic Preemptive Weapon," Rutgers University, New Brunswick, New Jersey, November 1993.

"Diversification as a Strategic Preemptive Weapon," University of California at Santa Cruz, Santa Cruz, California, November 1993.

"Diversification as a Strategic Preemptive Weapon," Graduate School of Business, Stanford University, Stanford, California, November 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Purdue University, West Lafayette, Indiana, September 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Summer Meetings of the Econometric Society, Boston University, Boston, Massachusetts, June 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," University of California, Department of Economics, Berkeley, California, May 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Stanford University, Graduate School of Business, Stanford, California, May 1993.

"Diversification as a Strategic Preemptive Weapon," Stanford University, Graduate School of Business, Stanford, California, April 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Hoover Institution, Stanford, California, April 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," University of California, Graduate School of Business, Berkeley, California, February 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Stanford University, Department of Economics, Stanford, California, February 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Hoover Institution, Stanford, California, January 1993.

"Pricing Strategies," Session Discussant, 1992 North American Winter Meeting of The Econometric Society, Anaheim, California, January 1992.

"Diversification as a Strategic Preemptive Weapon," University of Toronto, Toronto, Canada, November 1991.

"Diversification as a Strategic Preemptive Weapon," Queen's University, Kingston, Ontario, Canada, November 1991.

"Bonuses and Penalties as Equilibrium Incentive Devices, with Application to Manufacturing Systems," University of Chicago, Chicago, Illinois, June 1991.

"The Timing of Entry into New Markets," Summer Meetings of the Econometric Society, University of Pennsylvania, Philadelphia, Pennsylvania, June 1991.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," University of Chicago, Chicago, Illinois, April 1991.

"Bonuses and Penalties as Equilibrium Incentive Devices, with Application to Manufacturing Systems," Winter Meetings of the Econometric Society, Washington, D.C., December 1990.

"Corporate Spin-offs in an Agency Framework," University of Washington, Seattle, Washington, October 1990.

"The Timing of Entry Into New Markets," University of British Columbia, Vancouver, British Columbia, October 1990.

"Corporate Spin-offs in an Agency Framework," Texas A&M University, College Station, Texas, April 1990.

"Firm Organization and the Economic Approach to Personnel Management," Winter Meetings of the American Economic Association, New York, New York, December 1989.

"Corporate Spin-offs in an Agency Framework," Western Finance Association Meetings, Seattle, Washington, June 1989.

"Corporate Spin-offs in an Agency Framework," University of Rochester, Rochester, New York, May 1989.

"Corporate Spin-offs in an Agency Framework," North American Summer Meetings of the Econometric Society, Minneapolis, Minnesota, June 1988.

"Competition, Relativism, and Market Choice," North American Summer Meetings of the Econometric Society, Berkeley, California, June 1987.

"Competition, Relativism, and Market Choice," University of Chicago, Chicago, Illinois, April 1987.

"Rate Reform and Competition in Electric Power," Discussant, Conference on Competitive Issues in Electric Power, Northwestern University, Evanston, Illinois, March 1987.

"Worker Reputation and Productivity Incentives," New Economics of Personnel Conference, Arizona State University, Tempe, Arizona, April 1986.

"Ability, Moral Hazard, and Firm Diversification," Various Universities, 1985, 1994, including Yale University, University of Rochester, Stanford University, University of Minnesota, California Institute of Technology, Duke University, Northwestern University, Brown University, Harvard University, University of California - Los Angeles, University of Pennsylvania.

ACADEMIC JOURNAL REFEREEING

Dr. Aron has served as a referee for *The Rand Journal of Economics, the Journal of Political Economy, the Journal of Finance, the American Economic Review, the Quarterly Journal of Economics, the Journal of Industrial Economics, the Journal of Economics and Business, the Journal of Economic Theory, the Journal of Labor Economics, the Review of Industrial Organization, the European Economic Review, the Journal of Economics and Management Strategy, the International Review of Economics and Business, the Quarterly Review of Economics and Business, Management Science, the Journal of Public Economics, the Journal of Institutional and Theoretical Economics*, and the National Science Foundation.

SELECTED TESTIMONY AND OTHER ENGAGEMENTS

Expert testimony before the state regulatory commissions of Ohio and Wisconsin regarding the effects of UNE pricing on the competitive telecommunications markets, July 2004.

Expert testimony before the Florida Public Utilities Commission and the Georgia Public Service Commission, written expert testimony before the public utilities commissions in Mississippi, Alabama, North Carolina, South Carolina, Tennessee, and Kentucky, and deposition testimony, regarding the proper principles for determining which network elements should be provided to competitors on an unbundled basis at regulated rates; including testimony in support of a business case model of the viability of efficient competitive entry in specific geographic markets in each aforementioned state, January-March 2004.

Ex parte presentation "The Economics of UNE Pricing," to the Federal Communications Commission staff, with William Rogerson, March 2004.

White Papers, "The Economics of UNE Pricing," December 2003, and "A Further Analysis of the Economics of UNE Pricing," January 2004, with William Rogerson, submitted to the Federal Communications Commission in FCC WC Docket No. 03-173: Review of the Commission's Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers.

White Paper, "The Effects Of Below-Cost TELRIC-Based UNE Prices On CLEC And ILEC Investment," submitted to the Federal Communications Commission in FCC WC Docket No. 03-173: Review of the Commission's Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers, January 2004.

Expert testimony before the Illinois Public Utilities Commission regarding the proper determination of Total Element Long Run Incremental Cost (TELRIC) for establishing prices for network elements, March 2004.

Expert testimony before the Illinois General Assembly regarding the effects of current regulated UNE pricing of telecommunications elements on competitive telecommunications markets in Illinois, May 2003.

Expert testimony before the Pubic Utilities Commission of Ohio on issues related to rights-of-way fees charged to electric, water, and telecommunications companies in the City of Toledo, Ohio, March 2003.

Reports evaluating the cost impacts and public policy implications of the proposed California Consumer Protection rules on wireless carriers and customers, February 2003 and September 2003.

Expert testimony before the state regulatory commissions in Ohio, Illinois, Indiana, and Kansas on the economic principles for evaluating anticompetitive claims regarding "winback" pricing by incumbent telecommunications carriers, 2002 - 2003.

Report pertaining to the economic and antitrust analysis of price squeezes, and the suitability of imputation rules as a protection against an anticompetitive price squeeze, for a carrier in a foreign market, 2002.

Expert testimony before the Michigan Public Service Commission pertaining to allegations of anticompetitive effects of long term contracts, 2002.

For a small manufacturer of telecommunications equipment, consulting support to evaluate the antitrust implications of a proposed acquisition, 2002.

White Paper submitted to the Texas Public Service Commission pertaining to the competitive effects of "winback" and "retention" pricing, 2002.

In Order Instituting Rulemaking on the Commission's Own Motion to Assess and Revise the new Regulatory Framework for Pacific Bell and Verizon California Incorporated, written declaration submitted to the California Public Utilities Commission pertaining to the economic incentives created by modifications to the State's alternative regulation plan and competitive reclassification of services, 2002.

Statement to the Federal Communications Commission regarding the potential economic causes of sustained price increases for cable television services, 2002.

Expert testimony before the Kansas Corporation Commission regarding the antitrust principles relevant to establishing rules for competitive reclassification of services under governing state law, 2002.

For a national wireless telecommunications carrier, consulting support pertaining to litigation regarding access charges, 2001.

Expert testimony before the Missouri Public Service Commission pertaining to price squeeze allegations in the long-distance market, 2001.

Expert affidavit submitted to the Circuit Court in the state of Wisconsin, pertaining to irreparable harm caused if court declined to grant a stay of disputed performance remedy plan, 2001.

Expert testimony before the public utilities commissions of Illinois, Ohio, California, and Indiana, pertaining to the economic viability of constructing and provisioning ADSL services, including market definition and examination of competitive conditions, 2001.

Expert testimony before the Illinois Commerce Commission pertaining to the proper economic principles governing unbundling obligations, 2001.

In the matter of H & R Mason Contractor's et al. v. Motorola, Inc. et al., before the Circuit Court of Cook County, Illinois, expert affidavit examining the economic impediments to class certification, focusing on the determinants of price in the relevant equipment markets, April 2001.

For a competitive local exchange provider in a foreign market, consulting support regarding the proper determination of avoided costs for resale of incumbent services, April 2001.

For a major Japanese telecommunications equipment manufacturer, evaluated the revenue potential and desirability of entering several advanced services equipment markets worldwide, for the purposes of assisting the client to evaluate a proposed acquisition, February 2001.

Expert testimony in the Illinois Commerce Commission's Investigation Into Certain Payphone Issues, examined the economic and public policy issues pertaining to pricing of access lines for independent pay telephone providers, April 2001.

In the matter of the Illinois Public Utility Commission's Investigation Into Tariff Providing Unbundled Local Switching And Shared Transport, expert testimony regarding economic antitrust perspectives on obligations of firms to affirmatively help their competitors, and related public policy issues, April 2001.

In response to Request for Consultations by the U.S. Trade Representative (USTR) with the Government of Mexico before the World Trade Organization (WTO) regarding barriers to competition in Mexico's telecommunications market, analyzed regulated switched access rates in the U.S. in comparison with those charged by Telmex, November 2000.

Declaration submitted to the Texas Public Utility Commission, analyzed proposed regulation aimed at preventing incumbents from executing a price squeeze; developed a framework for evaluating claims of a price squeeze consistent with antitrust principles of predation, August 2000.

For a taxicab company, analysis of regulatory requirements in the City of Chicago pertaining to valuation of medallions and valuation of capital for purposes of regulatory ratemaking proceeding, 2000.

Written and oral testimony before the public utility commissions of Illinois and Michigan in various arbitration matters pertaining to the proper compensation for the use by competitors of client's facilities for foreign exchange services, 2000.

For a firm in the aluminum fabrication industry, in the matter of a potential merger between vertically integrated competitors, developed a methodology for adjusting the HHI measure of market concentration to account for the vertical control by the merging parties of downstream competitors, 2000.

For a large newspaper publisher, in the possible acquisition of the San Francisco Chronicle, analyzed the potential antitrust impediments to an acquisition by the client of the Chronicle, including issues of geographic and product market definition, the interplay between advertising markets and customer markets, and the relevant implications of the Newspaper Preservation Act, 1999.

Testimony before the Illinois Commerce Commission regarding the proper economic interpretation of the standards for declaring a service competitive under the Illinois Public Utilities Act, and quantification of the extent of competition in relevant Illinois markets, including discussion of market definition; the relevance of entry conditions; the relevance of resale competition and analysis of various resale entry strategies; the interdependence of resale and facilities-based entry strategies; and implementation of a technology-based method of measuring market participation, 1999-2000.

For a firm in the consumer mapmaking business, analyzed market definition, concentration, and efficiencies from a proposed merger, 1999.

Affidavit submitted jointly with Robert G. Harris to the Federal Communications Commission in the matter of "unbundled network elements" and commenting on the proper interpretation of the "Necessary and Impair" standard, including discussion of entry

conditions and the business-case approach to valuation of an entry strategy, April 1999; reply affidavit May 1999.

Affidavit, "An Analysis of Market Power in the Provision of High-Capacity Access in the Chicago LATA," submitted to the Federal Communications Commission, including an analysis of the US DOJ merger guidelines and their applicability to regulatory relief in a regulated market, as well as extensive empirical modeling of the costs and business case for network buildout of high capacity facilities, February 1999.

White Paper, "Proper Recovery of Incremental Signaling System 7 (SS7) Costs for Local Number Portability," submitted to the Federal Communications Commission, April 1999.

PROFESSIONAL ORGANIZATIONS

Member, Telecommunications Policy Research Conference Program Committee

Member, American Economic Association

Member, Econometric Society

Associate Member, American Bar Association

PERSONAL INFORMATION

Born: March 15, 1957
Los Angeles, CA

May 2004