Pinpoint Communications, Inc.

ANALYSIS OF THE ECONOMICS OF CHANNEL EXCLUSIVITY FOR WIDE-AREA LOCATION MONITORING SYSTEMS

by

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1.0 Introduction

As part of its comments in FCC Rulemaking 93-61, PacTel Teletrac (PacTel) -- a subsidiary of the monopoly local telephone company in several western states -- proffers an assertedly objective and academic economic analysis supporting grant of exclusive franchises in the proposed Location and Monitoring Service (LMS). The appendix, by Richard Schmalensee and William E. Taylor, argues that exclusivity, which in turn implies the creation of an LMS duopoly, would best serve the public, consumer's interest.

PacTel and its consultants no doubt are used to arguing for the prevention of competition, possibly in the context of preserving their dominance in local exchange markets. Economic theory, however, teaches otherwise. As described below, even using the classical microeconomics relied upon by Schmalensee and Taylor, their conclusions are diametrically opposed to the economics on which they appear to rely. Moreover, more contemporary microeconomic analysis that more closely describes modern business environments confirm that the PacTel study is fundamentally erroneous and should not be relied upon by the Commission. Below, this paper analyzes the individual conclusions of the PacTel study under both classical and newer microeconomics and provides a point-by-point refutation.

2.0 Benefits Of Competition

2.1 Spectrum sharing will encourage the number and variety of competitors to increase.

In their attached appendix to the PacTel Comments, Mr. Schmalensee and Mr. Taylor argue in Section II-A that spectrum sharing will not necessarily cause the number of competitors to increase because new entrants into a geographic market will increase the proportion of fixed costs that each firm (including new

entrants) must bear, and that this will therefore discourage new entrants. The commenters further argue that spectrum sharing necessarily implies uncertainty about the ability of new entrants to earn an adequate return on their investments in capacity and in research and development, and that this uncertainty will further discourage investment by potential new entrants.

2.1.1 Mr. Schmalensee and Mr. Taylor are essentially arguing that the market for LMS services support the conditions of a natural monopoly (or duopoly), but their rationale for this conclusion is unconvincing. Since all markets require some fixed costs to serve and some sunk costs to enter, and since all new business ventures involve uncertainty of economic return because the reactions of customers and competitors can not be predicted precisely, the arguments advanced by Schmalensee and Taylor can be used to justify and predict monopolies or duopolies in any market. Because almost all markets involve fixed costs, sunk costs and uncertainty, and almost all markets are clearly not anything close to natural monopolies, the arguments advanced for suggesting that additional competitors will not enter the LMS market do not support the assertion. Clearly other factors determine the number of competitors which optimally serve a market at any time, and these other considerations are detailed below.

In particular, Schmalensee and Taylor present no evidence that the market for LMS services inherently would support only a monopoly or at best a duopoly of suppliers. They provide no data on the magnitude of fixed costs, and do not attempt to show rigorously that economics of scale preclude competition. Nor could they. Pinpoint's experience is that technological developments have made LMS a relatively easy to enter marketplace, albeit one with some startup costs. The record, however, suggests that the market is no more difficult to enter than, for example, PCS. Yet no one argues that PCS is a natural monopoly.

The ultimate refutation of the conceptual assertion that additional competitors

Braxton & Associates, and Strategic Planning Associates. Traditional consulting firms such as McKinsey & Co. and Booz, Allen & Hamilton also adopted these principles of modern economic analysis in serving the needs of their clients. With its principles verified by competitor after competitor acting successfully in the marketplace, modern economic analysis has been subsumed into the thinking of managers and planners for major corporations everywhere, and has been woven into the teaching curriculum of almost every business school. Some members of the academic community who have close associations with corporations and consultants, such as Michael Porter of the Harvard Business School, have published and promulgated the principles of modern economic analysis, but these academics tend to come from the business schools rather than from the mainstream academic community for economics. Many of the arguments advanced by Schmalensee and Taylor contradict the principles of modern economic analysis and the considerable weight of empirical evidence upon which they are based.

2.1.3 Under these new techniques, the classical microeconomics argument advanced by Schmalensee and Taylor that there is an equilibrium number of competitors in an industry which is dictated by market size and scale effects is fallacious. This argument is based upon a number of abstract assumptions which do not apply in real world situations. One of the assumptions of such an argument is that demand in the market is homogenous and that the needs of all buyers are the same. In fact, modern economic analysis has shown that customers in a market purchase not a single, well-defined product, but rather a range of associated products, services and intangible associations. Customers are not uniform in the breadth and importance of these needs which they are seeking to fulfill, but rather significant differences in needs and desires exist among potential customers. Customers in a market with relatively similar needs are grouped together into segments. Segments can be addressed by focused competitors, providing a superior response to the needs of that segment and a superior economic return for those competitors. Because market needs are not uniform, a multitude of competitors focused on different customer segments can prosper and better serve the market overall.

Furthermore, modern economic analysis has shown that markets evolve through life cycles over time, with customer familiarity with the purpose, use and selection of products growing as the market matures. In other words, customer needs change significantly over time. The additional diversity that this creates in the market provides further segmentation opportunities, which in turn support multiple competitors to better serve the entire breadth of customer needs.

2.1.4 The Schmalensee and Taylor argument is further based upon the fallacious assumption that production functions are the same across suppliers and cost variations are purely a function of scale of operations. Modern economic analysis has shown through countless empirical examples that in fact cost structures differ significantly among competitors, and the causal effects behind those cost

structures are at no time the same. Competitor costs are always different, and usually for reasons that have little to do with scale.

One of the major breakthroughs of modern economic analysis was the development of the concept of the experience curve. This principle holds that in a competitive environment unit costs decline directly with cumulative production (regardless of the scale of operations). This effect has been shown to exist across a wide range of industries, across product and service industries, and across consumer and industrial markets. As explained below, experience effects are important in allowing prices to decline continuously, providing continuous improvement in prices offered to customers and continuous incremental growth in market demand. Experience effects accumulated in serving different market segments have also been shown to be a stronger determinant of the viable number of competitors than the influence of scale noted by the Commenters.

Even when scale effects have a significant impact on unit costs, the appropriate

in the same industry and nominally addressing the same markets. Of course, if there are only two firms in the market -- as PacTel proposes -- the public will be denied the benefits of this diversity.

The assumption by Schmalensee and Taylor that LMS technology is static and that there will be no further significant technological innovation among competitors is particularly invalid in an embryonic industry such as Location and Monitoring Services. In an embryonic industry competitors are by definition still developing the first levels of cumulative experience. That there is only one commercially deployed LMS service suggests that further innovation is to be expected since it is extremely unlikely (and in fact, unprecedented) that the first

investment is best left to the self-interested judgment of professional investors, and economic analysis assures us that, in the aggregate, they will get it right. If investors are willing to fund new LMS entrants, as they are, then the assertions by Schmalensee and Taylor are patently wrong.

The fundamentally incorrect assumption behind the Commenters' position on investment is that all of the potential technologies to implement LMS are already known and available to all competitors. As stated earlier, modern business economics recognizes, however, that technologies differ among competitors, and over time. In an industry which is still embryonic, such as in this case, not all technological alternatives have been developed and presented to the market, and the industry has not yet gone through the natural process of evaluating and segregating superior and inferior technologies for offering Location and Monitoring Services. Investors in current and potential LMS competitors will continue to seek out new and innovative LMS technologies which can significantly improve the price/performance of LMS services. Investors will invest when they are presented with new technologies which can significantly improve over current and anticipated LMS technologies and which can allow them to earn a return large enough to compensate for the uncertainties described by Schmalensee and Taylor. Investment in all embryonic technology-driven industries occurs this way.

The arguments presented by the authors in this instance serve only to prop-up the current investors in existing LMS competitors which have not kept pace with the rate of technological innovation being set by other potential LMS service providers. These are the primary investors who would be protected by unnatural restrictions on competitive entry, to the extent that their investment is in a technology which does not maintain the rate of improvement in price/performance set by other potential competitors. Such protection obviously comes at the expense of consumers.

2.2 Unrestrained competition causes prices to decline.

Mr. Schmalensee and Mr. Taylor argue in Section II-B of their Comments that expanding the number of competitors does not necessarily reduce prices in the market. While the Commenters do concede that more competitors do tend to produce lower prices in most industries, this common phenomenon, they claim, will not occur in LMS services because of special conditions. They argue that the special conditions are that highly elastic demand will not result in significant price decreases from the entrance of new suppliers, that the mechanism for spectrum sharing will automatically create some degree of price collusion among competitors, and a repeat of their argument that duplicative fixed costs and uncertainty (as well as coordination costs) will burden the market with unnecessarily high unit capacity costs.

2.2.1 Schmalensee and Taylor have not adequately demonstrated that the special conditions claimed for LMS services which will allegedly exempt this industry from well-recognized economic principles are in fact conditions which are unique to LMS services or which will prevent an increased level of competition from producing lower prices. There are a wide range of markets with highly elastic demand, and many of these markets are well-served by a large number of suppliers and prevailing prices are driven down to levels approaching costs. The Commenters provide no empirical evidence to support their implication that markets with highly elastic demand are somehow associated with prices higher than would be expected under pure competition, and in fact most practical experience tends to indicate that just the opposite is true. Schmalensee and Taylor do, in fact, concede even with their assumptions that additional competitors will produce lower market prices, just not much lower. Lower prices, even just a little lower, are a desirable economic outcome and a benefit for all consumers. The Commenters' supporting argument itself disproves the initial assertion.

Similarly, the argument that the mechanism for spectrum sharing (and implied by the Commenters, all mechanisms for spectrum sharing) must necessarily increase price collusion among the competitors involved in sharing is unsupported and unexplained. Unanswered is the question how competitors using a common mechanism for sharing spectrum necessarily will engage in more price collusion than competitors using a common telecommunications infrastructure or a common banking system. Such a blanket assertion for all potential sharing mechanisms can not be taken seriously.

2.2.2 The arguments suggested by Schmalensee and Taylor that prices will not be reduced under spectrum sharing because industry costs will be increased by the entry of more competitors (e.g., duplicative fixed costs, uncertainty) have been addressed and refuted earlier. What the Commenters have not acknowledged is the well-recognized economic principle that monopoly control of a market by a competitor results in higher prices. This effect also applies to duopolies and

costs, that those costs will improve on a continuous and predictable basis from a variety of mechanisms, that cost improvements will be reflected in continuous reductions in prices to customers, that price reductions will increase aggregate demand in the marketplace, and that the growth in demand will provide additional operating experience and scale to competitors, which will in turn lead to additional incremental cost improvements.

The convoluted microeconomics argument advanced by the authors that elastic demand will not lead to meaningful price improvements by suppliers is directly at odds with this principle of modern economic analysis, and at odds with historical business experience. In fact, modern economic analysis points out that the rate of price reduction is greatest in industries which exhibit highly elastic demand (all other factors being equal), which is the exact opposite of the prediction by Schmalensee and Taylor. The specific example of the evolution of the personal computer industry, and of the entire computer industry in general, is a stunning refutation of their conceptual error. The original forecasts by IBM for the size of the personal computer market were roughly two orders of magnitude less than the actual results, and this severe underestimation came directly from their failure to correctly anticipate the cyclical causal relationship between highly elastic demand, lower prices, and the experience curve's cumulative impact on industry costs.

2.3 Increased competition will result in more efficient spectrum use.

Mr. Schmalensee and Mr. Taylor argue in Section II-C of their attachment to the PacTel filing that expanding the number of competitors will not result in more efficient spectrum use because more competitors will not increase aggregate demand, but will rather reduce aggregate capacity; and because more competitors will not create any additional incentives for competitors to improve efficiency or the rate of technological innovation.

2.3.1 The fallacious argument advanced to support the authors' incorrect conclusion is based on approaches to allocating spectrum use assuming that all competitors use the same, and current, technology. The most marked improvement in efficient use of spectrum (correctly defined by the authors as the greatest number of subscribers which can be served for a given allocation of bandwidth) will in fact come from improvements in the fundamental technologies used for providing LMS services. Competitors with superior technologies (those that make more efficient use of spectrum) will force competitors with inferior technologies to improve or be driven from the market. Indeed, elsewhere in this filing, Pinpoint shows how sharing can be implemented with a minimum of overhead and, therefore, with substantial efficiency.

2.3.2 The classical microeconomics argument used by Schmalensee and Taylor is that competitors will invest in technology to reduce costs and maximize profits, up to

return from cost reduction. Modern economic analysis recognizes that the imperative to invest in research and development in a fully competitive environment is more compelling than indicated by classic microeconomics. Competitors who do not continuously invest in technology and business improvement are not just foregoing potential incremental profits, but rather they are putting the entire business and its cumulative investment at risk. Competitors who continuously invest in technology will make continuous, unending improvements in their price/performance ratio, to the point that competitors who have foregone similar investment will not be viable in the marketplace because their costs will approach or exceed the continuously declining prices set by other competitors. In this case, customers and investors will force the laggard competitor to exit from the industry. These competitors face not just potential incremental profits foregone, but rather a much more severe penalty as laggards in innovation -- complete obsolescence of their total investment.

This encouragement to innovation and efficient spectrum use will not occur in a monopoly or duopoly, which probably explains PacTel's resistance to spectrum sharing. Only competition among multiple competitors can credibility provide the threat which forces all competitors to invest in innovation as if their economic lives depended on it. Only such competition, therefore, can serve the public's needs.

2.4 More competitors will increase technological diversity.

Mr. Schmalensee and Mr. Taylor argue in Section II-D of their paper that expanding the number of competitors for LMS services will not expand the

since the existing two competitors appear to have adopted virtually identical technologies.

That more competitors will bring more technical diversity is supported by economic theory as well as, more importantly, by historical evidence. Additional competitors entering a market will by necessity bring new technological approaches into play in order to gain some differentiation from and advantage over existing competitors; duplicating the exact technology of entrenched competitors will not earn an adequate return on the investment required for entry. The argument that additional competitors will not increase technical diversity was also part of the argument for continuing monopoly regulation in long distance telephone services. The results of deregulation in that market indicate that just the opposite has occurred -- that open competition has stimulated both the rate and diversity of technical innovation (as well as stimulating lower prices and increasing the diversity of other elements of customer service). Additional competitors clearly stimulate greater technical diversity, and increase the multiple benefits to consumers which result therefrom.

Schmalensee and Taylor also claim that spectrum sharing will limit technological diversity. But, it is axiomatic that PacTel's duopoly will have far fewer providers, and thus fewer avenues for technologies to reach the marketplace, than the

in which a number of distinct components must work together in a concerted fashion according to a system architecture. This system architecture will be dictated by the LMS service provider which has strong incentives to take responsibility for the overall technology because it has such significant implications for the company's competitive position and economic return, as

explained earlier, the conclusion reached by the Commenters is false according to either classical or modern microeconomic theory, and more importantly, is disproved by the existence of multiple competitors in almost every identifiable market, given that every market requires some level of fixed costs to enter and serve. Obviously many more significant factors are at work which determine competitors' costs and market prices, and those considerations have been explained in detail earlier.

In particular, the assertion by Schmalensee and Taylor here and throughout their analysis that the market must cover the aggregate costs of the industry is fallacious. Customers do not purchase services from the industry as a whole, but rather purchase services from individual suppliers. Customers do not need to purchase from suppliers which have inefficient operations, which employ inferior technology, and which offer inadequate service, and in fact customers will, at the margin, not purchase from such suppliers. Such suppliers, and their investors, will discover that the market prices set by stronger and superior competitors will not cover costs, and these inferior competitors will be eliminated from the market by the rational purchase decisions of customers. In a competitive market, customers are not required to help recover the investments or fixed costs of inferior competitors, but rather the economic value of the investments in inferior competitors is wasted. Economic history is full of examples of companies on whom competitive markets have imposed their severe but objective discipline, and many of those companies no longer exist as independent economic entities. Rather than being burdened by the inefficiencies of inferior competitors through the regulatory protection sought by PacTel, the market -- and the consuming public -- is better served with their elimination through superior service and lower prices.

3.1.2 The argument by Schmalensee and Taylor is further based on the fallacious

analysis fails to consider more up-to-date economic theory, which confirms that a competitive LMS environment will support a large and diverse group of suppliers, will reduce prices to end users, and will boost spectrum efficiency, all without increasing underlying costs. For these reasons, competition, not duopoly, is the best approach for LMS.

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