win and serve a customer and the time it begins to collect revenues is considerable – typically at least a year. In sharp contrast, the models wish away this period and assume that a competitive LEC will be earning earn maximum revenues as soon as it incurs any expenditures.[12]

The "100 percent success rate" assumption. And the unreality of the Crandall models does not stop there. Not only do they assume instantaneous construction and revenue generation, they also assume that the competitive LEC *immediately* wins *all* services for *all* customers in the building (both high-capacity and low-capacity customers). Crandall Dec. at 29-30, 39. This rises to the level of the absurd. AT&T's reply comments provided substantial evidence showing that in many cases it is *impossible* to serve all customers in a building due to impediments created by landlords. *See* Fea-Taggart Dec. ¶¶ 16-20, 30-31. Further, even where AT&T can gain access to an entire building, many customers have refused to permit AT&T to "roll" their existing service to AT&T facilities, even when AT&T offered them financial incentive to do so, because they did not want to risk the possibility of any service disruptions. *Id.* ¶ 28. Competitive LECs face the reality that no one has ever been fired for buying access from the incumbent LEC, and many customers are unwilling to take the (perceived) risk of using competitive LEC facilities, even if they offer generally superior performance and lower price. *Id.* This customer perception has been exacerbated by the recent spate of public announcements of competitive LEC bankruptcies, creating the impression that

[12] *See* CSMG Cost Model CD, Worksheet "Financial," "Total Revenue" and "Operating Expenses" lines on the Income Statement, "Fiber Capex" lines on the Balance Sheet.

new entrants may not be reliable suppliers. *Id.* ¶ 37. This perception is yet another major factor that dissuades individual customers – much less all of the customers in a multi-tenant building – from giving all of their business to a new supplier. *Id.*; Declaration of Alice Carroll and Cynthia Rhodes ¶ 15 (attached as Exhibit A to the Comments of AT&T Corp.).

And in all events, even if it were correct to assume away the significant barriers competitive LECs face in penetrating buildings (and it clearly is not), the assumption that a single competitive LEC could win all of the customers in a building is flatly inconsistent with that assumption. If one could ignore all the significant barriers to providing local telecommunications services, then one could not reasonably expect, as the models explicitly do, that a single competitive carrier would win all the customers in a building. Rather, in such an intensely competitive environment, there would be multiple competitive LECs serving the same building.

The "no prior service" assumption. At the same time Dr. Crandall assumes that competitive carriers will win all the customers in a building prior to extending fiber to the building, he assumes for modeling purposes that the competitive LEC provides *no* services, either local or long distance, to any customer located in a building with a high-capacity customer. *See* Crandall Dec. at 30. In this way, Dr. Crandall claims all of the customers' revenues as "incremental" revenues that are obtained for the "incremental" cost of adding a fiber extension to the building.

This assumption is obviously not true, particularly for carriers such as AT&T, WorldCom and Sprint, which are also the largest interexchange carriers.[13] Further, in the few instances where landlords permit competitive LECs to gain access to an entire building on the same terms as incumbents, there are often multiple competitive LECs providing service. Declaration of C. Michael Pfau ("Pfau Dec.") ¶ 44 (attached as Exhibit B to the Reply Comments of AT&T Corp.). The result of this assumption is to overstate the amount of revenues potentially available to a competitive LEC for its "incremental" build, again overstating the number of "addressable" buildings.

The "perpetual service" assumption. Finally, the models not only assume that a competitive LEC wins all the customers in a building, they also make the fantastic assumption that it keeps the customers it wins in perpetuity,[14] without any need to invest in additional marketing expenses,[15] and that the competitive LECs incur no incremental, on-going costs to serve the customers they have already won, except for some billing costs, long distance costs, minor Sales, General & Administrative costs, and costs for

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[13] This is so because the largest long distance carriers would often already be serving customers in the largest buildings and because the customers most likely to be heavy users of high-capacity facilities would be most likely to use multiple carriers to better assure continued communications capability should one carrier experience a network failure.

[14] Dr. Crandall's assumption that a customer remains with a competitive LEC forever is apparent from the fact that Dr. Crandall multiplies the year 10 EBITDA (earnings before income taxes, depreciation and amortization) by 10 to determine the net present value of revenues that a competitive LEC will earn by serving a building. *See* Crandall Dec. at 44.

[15] The documentation provided on the CSMG study makes no mention of any marketing expenditures by a competitive LEC after it wins the initial contract.

premise equipment and maintenance of the fiber extension. These assumptions are not only unrealistic, but the only way they could even possibly occur is if the competitive LECs establish long-term exclusionary contracts – a practice that is expressly prohibited by the Commission's *Building Access Order,* except in very limited circumstances.[16] In fact, competitive LECs are typically able to sign customers to contracts lasting only a few years. Thus, they cannot expect to avoid ongoing sales and marketing costs, and quite possibly declining unit revenues over time, in order to keep the business.

* * *

In sum, the Crandall models and the conclusions they generate are remarkable chiefly for how unambitious they really are. The models merely identify situations where, in a world without practical operational procedures and problems, it would be theoretically economic for a competitive LEC that already has fiber transport facilities in place to extend those facilities to buildings where special access customers are located. Although such simplified models may be reasonable for instructional purposes, they have no application to the serious decisions that businesses must make about how to spend their investors' funds. In those real-world situations, they cannot ignore competitive carriers' critical marketplace imperative – the need to derive a reasonable return on their investment. That means taking reasonable account of all the "friction" that exists in the

[16] *See generally* First Report and Order and Further Notice of Proposed Rulemaking, *Promotion of Competitive Networks in Local Telecommunications Market, Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, Review of Sections 68.104, and 68.213 of the Commission's Rules Concerning Connection of Simple Inside Wiring to the Telephone Network*, 15 FCC Rcd 22983 (2000).

real world – *i.e.*, the significant transaction costs and impediments described above and in the comments that demonstrate the *real* problems competitive LECs face in deploying local fiber in order to compete with incumbent LECs.

Given the unrealities of the models, it is not surprising that there is an extraordinary disconnect between Dr. Crandall's conclusions and recent market developments. If he were correct and there were literally hundreds of thousands of buildings that could profitably be served by competitive LECs, then the capital markets should be pouring in billions of dollars to fund construction of competitive networks, and the prices of special access services would be plummeting. But exactly the opposite is occurring. As AT&T explained – and as an even more recent spate of news stories attests[17] – the capital markets are effectively closed to competitive LECs. Indeed "[t]he reality is that almost no CLECs are profitable and most are saddled with massive debt."[18] In short, the Baby Bells, "with their seemingly impenetrable local-service fortresses, are emerging as the hands down winners."[19] If this is true – and the above news reports

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[17] *See, e.g.*, Y. Noguchi, *Teligent to Cut 900 Jobs*, The Washington Post (May 11, 2001); G. Zuckerman, *Wrong Numbers: Telecom Debt Debacle Could Lead to Losses Of Historic Proportions*, Wall St. J., at A1 (May 11, 2001); D. Solomon, *Everyone's Got A Solution For Industry's Woes*, Wall St. J., at B1 (May 3, 2001); L. Lazaroff, *Jonas Launches CLEC Rollup*, The Daily Deal (May 3, 2001); J. Boyd, *Service Discontinued - As Carriers Go Bust, Customers Need Recovery Options*, InternetWeek, at 104 (Apr. 30, 2001).

[18] M. Martin, *Besieged CLECs Continue to Flounder*, Network World, at 22 (May 7, 2001) (2001 WL 10797656) (quoting Jeff Moore, an analyst with research firm Current Analysis).

[19] R. Farzad, *Has the Telecom War Been Won?* Dow Jones News Service (May 15, 2001).

speak for themselves – this is hardly the time for the Commission to put competitors at an even greater competitive disadvantage by denying them access to high-capacity facilities in general and to high-capacity loop-transport combinations in particular.

Moreover, if Dr. Crandall was correct about how easy it is to win large business customers, there would be every reason to expect significant incumbent-against-incumbent competition for high-capacity services. After all, the incumbents not only have in place all the back office systems necessary to provide local services, particularly high-capacity services, in neighboring territories, but also the funds and the expertise to provide such services. That is why the Commission has repeatedly found that incumbent LECs are among the most likely and significant potential entrants into an adjacent incumbent LEC's territory.[20] But rather than enter neighboring territories and win customers with the ease suggested by these theoretical models, the incumbents have shown virtually no interest in competing outside their territories – even SBC, which is under an affirmative obligation to enter out-of-region territories.[21] The incumbents' own actions speak much louder about the real world than any models.

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[20] Memorandum Op. and Order, *Application of GTE Corporation and Bell Atlantic Corporation For Consent to Transfer Control of Domestic and International Sections 214 and 310 Authorizations and Application to Transfer Control of a Submarine Cable Landing License*, 15 FCC Rcd 14,032, ¶¶ 100, 107-08 (2000); Memorandum Op. and Order, *Applications of Ameritech Corp. and SBC Communications, Inc. For Consent to Transfer Control of Corporations Holding Commission Licenses and Lines Pursuant to Sections 214 and 31(d) of the Communications Act and Parts 5, 22, 24, 25, 63, 90, 95, and 101 of the Commission's Rules*, 14 FCC Rcd 14,712, ¶¶ 66, 77-91 (1999).

[21] *See* P. Davidson, *SBC Scales Back Plans For Local Telephone Service*, USA Today, at 1B (March 19, 2001) ("SBC Communications is sharply scaling back its much-ballyhooed plan to offer local phone service outside its 13-state region," which "deals another blow to the prospect of new choices for consumers"); M. Wigfield, *SBC Curtails*

(continued . . .)

III. THE MODELS DO NOT EVEN PROPERLY REFLECT THE IDEALIZED WORLD THEY ASSUME.

Even assuming *arguendo* that these theoretical constructs are relevant to this proceeding, the limited information available from the Crandall declaration shows that the modeling techniques used are faulty and that the models fail to calculate even the incremental costs of expanding existing competitive LEC networks in a frictionless world. Buried in the Crandall declaration is evidence regarding overall error rates in the Probit model, which is used to identify potential high-capacity customers. As described above, the Probit model based the identification of potential high-capacity customers on the number of on-site employees and the industry (*i.e.*, the standard industrial code ("SIC"))[22] of the customer. Crandall Dec. at 19. Dr. Crandall himself admits, however, that the Probit model, which provides the first and most fundamental input (*i.e.*, buildings that might have sufficient revenues to justify a build) is wrong one out of five times. *Id.* Moreover, as also discussed above, Dr. Crandall's approach applies three models in sequence – the Probit Model, the OLS Model and the CSMG study. If each model were likewise 80 percent accurate (and there is no evidence that they are even this reliable), the

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(. . . continued)
Effort To Launch Local Service in New Mkts, Dow Jones News Service (March 6, 2001) ("SBC Communications Inc. is curtailing its push into 30 new markets, a push which was a condition of SBC's merger with Ameritech Corp. in 1999"); M. Wigfield, *FCC Criticizes SBC's Work on Merger Conditions*, Wall St. J., at A4 (Oct. 9, 2000) (2000 WL-WSJ 26612388) (reporting on letter from FCC and industry opinions that SBC is violating merger conditions by allowing service levels to decline, and by refusing to open its own markets while simultaneously declining to offer out of region services to the extent it should).

[22] The SIC identifies an industry group such as Agricultural and Government. Dr. Crandall stratifies buildings by SIC to perform his Probit and OLS regressions.

overall conclusion would not be any more than about 50 percent accurate (0.8 x 0.8 x 0.8 = 0.512).[23]

The limited documentation provided for review in connection with these comments also indicates that Dr. Crandall ignored rigorous analytical methods in order to achieve a pre-designed outcome. In particular, even though the inputs used in running the models are highly variable in nature, the key results are presented as point estimates, rather than a range of probabilistic outcomes. Given that the estimates themselves contain significant error, there is no reason to expect that these point estimates accurately reflect the true values of the variables that are modeled.

For example, the principal result discussed in the text of the Crandall declaration is that 90.4 percent of Cleveland buildings with a high-capacity "anchor tenant" could be profitably served by a competitive LEC. Crandall Dec. at 31. In reporting this point estimate, however, Dr. Crandall ignores random variation around the predicted values of "Distribution of Expected Revenues From Buildings" shown in Figure 3. Critically, a large number of revenue points lie just above the predicted "breakeven" frontier line. *Id.* at 30. Nevertheless, the OLS regression model has low values for the "t statistics" associated with the industry groups that are drawn into the revenue estimates by the Probit model. *Id.* at 38-41. The low values of the t statistics imply that the true revenue,

[23] Neither Dr. Crandall nor USTA has provided information regarding the variability of the OLS model used to estimate building revenues or information relating to the extent of variation in cost inputs derived by CSMG through informal and limited interviews. Without full disclosure of the model details, the variability of the inputs to the models, the variance of model predictions and a full understanding of the interplay of the models the reliability of the modeling process cannot be independently established.

could it actually be determined, would have equal probability of having any value in the range defined by the point value estimated by Dr. Crandall plus and minus a large "confidence interval." Therefore, many of the points that are shown as lying just above the "breakeven" line (and thus profitable for a competitor) may actually fall *below* the line and thus not be addressable by competitive LECs, even in the wildly hypothetical world that the models assume.[24] The same is also true for the graphs reporting results for the other five cities discussed in the declaration. *See* Crandall Dec. at 46-50.

Most critically, Dr. Crandall's reported results are at war with the CSMG Report submitted by USTA, in which the developers of the CSMG model Dr. Crandall used discuss the methodology they used in their model. In his declaration, Dr. Crandall asserts that 90.4 percent of high-capacity buildings in Cleveland, Ohio are "addressable" by existing competitive LEC networks; 92 percent for Seattle, Washington; 82.1 percent for Tucson, Arizona; 88.6 percent for St. Paul, Minnesota; 91.6 percent for Dayton, Ohio; and 90.9 percent for Greenville, North Carolina. Crandall Dec. at 30, 46-50. The CSMG Report contains a similar analysis for these same cities. The results provided by CSMG, however, are *radically different* from those Crandall generated. *See* CSMG Report at 11. According to CSMG, only a small fraction of "off net" buildings in the six markets Dr. Crandall reviewed are addressable by existing competitive LEC fiber. *Id.*[25] In addition,

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[24] Tellingly, Dr. Crandall has not quantified the impact on his results of this effect or provided the data necessary to allow someone else to perform that analysis.

[25] Only the 0 percent and 100 percent points on the graph on Chart 11 of the CSMG Report are shown. The precise percentages associated with the bar that represents each city on the graph are not shown. Nonetheless, the bars are drawn such that it is clear that significantly less than 50 percent of the buildings in each city are reported as addressable.

the CSMG study reports results for Akron, Ohio, which is not included in Crandall's report. According to CSMG, less than 25 percent of "off net" buildings in Akron are addressable by existing competitive LEC fiber. *Id.* This is powerful evidence that Dr. Crandall's methodology grossly inflated the potential building revenues achievable by competitive LECs and that selective filtering of results has occurred.

Further, even the cursory description of Dr. Crandall's approach and the limited documentation provided by USTA in time for this filing demonstrate that that there are several errors in the analyses that attempt to identify potential high-capacity customers and calculate the costs of extending competitive LEC networks to them. And there is no meaningful justification for an argument that the six city sample presented is representative of competitive conditions throughout the country.

The models used to identify high-capacity locations. The method used to identify buildings with high-capacity customers is flawed. Because it is assumed that a "high-capacity" customer is one that requires a single DS-1 of usage, Crandall Dec. at 18, the Probit model draws buildings with fewer than eight DS-1s of usage into the "potential" high capacity customers and then includes such buildings in the remainder of his analysis.[26] Moreover, the model attributes revenues from all customers in a building for all services to determine the overall revenue potential of the building. In AT&T's

[26] Part of the reason that Dr. Crandall must assume that a carrier not only wins 100 percent of a customer's demand, but also 100 percent of the demand for all customers in a building, is because without this patently absurd assumption individual customers in many buildings would probably not have sufficient demand to even qualify for consideration of a build, much less actually have a facility built.

experience, however, it is rarely economic to deploy facilities to a building unless it has at least eight DS-1s of usage.[27] The results showing the number of buildings that are "above" the break-even revenue threshold, *see id.* at 30, 46-50, therefore include buildings for which it would never make economic sense to incur the significant fixed costs necessary to deploy high-capacity facilities.[28] And it is for this reason that the conclusions of Dr. Crandall directly conflict with the judgment of investment professionals who see no more than 30,000 to 60,000 buildings addressable nationally by competitive LEC fiber extensions in the near term.[29]

Another error in the estimation of the revenue potential for business telecommunications users is the manner in which the OLS regression model is used to estimate expected telecommunications revenues, *i.e.*, based upon the number of employees and the SIC for the company. *See* Crandall Dec. at 40-41. In particular, there is no support provided for the use of a simplistic linear regression model in this context.

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[27] Indeed, a straightforward review of incumbent LEC pricing in their interstate special access tariffs relating to channel terminations (the functionality replaced by fiber laterals) shows almost uniformly that a DS-3 channel termination would replace a DS-1 channel termination only when it replaces at least eight to 10 DS-1 channel terminations. This reflects the fundamental economic reality that no one builds a bare DS-1 facility and that at least eight times the level of demand assumed by Dr. Crandall is required to justify a high-capacity facility build.

[28] The supporting materials that AT&T has reviewed to date are not sufficient to allow AT&T to estimate what percentage of the buildings that Dr. Crandall considers to have a high-capacity customer contain customers with less than eight DS-1s of usage and, therefore, are not in fact "targetable" customers.

[29] *City Light: An Investor Guide to Metropolitan Optical Services*, at 11, (March 22, 2001).

Use of such a linear model is highly suspect in this case, because the distribution of telecommunications revenues from business customers is typically skewed, with relatively few customers in the higher revenue strata. The statistically correct approach for dealing with highly skewed data is to transform the data so that the transformed distribution is more approximately linear before performing a linear regression.[30] There is no explanation offered to justify the use of simple linear regression model, or the failure to do a data transformation. For this reason alone, the modeling results are invalid.

Furthermore, because the six separate cities examined would likely have different calling patterns, prices and mix of industries, one would expect that the regressions would be *separately* applied for each city and the individual models applied to each city's analysis. As noted, Dr. Crandall improperly uses *national* survey data to determine the likelihood a customer would buy special access services in a particular city. *See* Crandall Dec. at 12-13.

These and other flaws manifest themselves in the tables that report Dr. Crandall's computations. Table A1 of the declaration identifies seven SICs as the buildings most

[30] Revenue data are almost always highly skewed. As a result, analysis of untransformed data would probably violate all the main assumptions of linear regression: linearity, additivity, constancy of error variance, and normality for the distribution of errors. Consequently, the resulting model would not be correct (even after accounting for sampling error). For highly skewed data, predicted values could exceed the actual value of the dependent variable for the vast majority of observations. Because Dr. Crandall bases his conclusions on these predicted values, this problem would seriously distort his conclusions. In addition, his results would be highly at risk to outliers; that is, a few of the observations could violently change the predicted values for all other observations.

likely ($t > 4.0$) to have a high-capacity customer. However, in Table A2, five of these same seven SICs have $t < 1.0$ for the regression that estimates the telecommunications revenues associated with these buildings. In addition, the interaction terms for all seven SICs have t of 1.4 or less, which again strongly indicates that the reliability of the estimates is dubious. In particular, the low values of the t statistics indicate that the revenue estimates from the OLS model have large confidence intervals around them and all revenues within a confidence interval have equal statistical validity. That means that when Dr. Crandall used the point estimate in the middle of the confidence interval, the revenues at the bottom and top of the interval have equal statistical validity.

To take this into account, Dr. Crandall should have performed a sensitivity study, especially for revenues at the lower bounds of the intervals. However, no such sensitivity study was provided in the Crandall declaration, which also does not provide the underlying data that would allow others to do so. The reasons for failing to perform such a sensitivity study here are obvious. Revenues within the confidence interval that are below the mid-point revenue figure that Dr. Crandall used are likely to have a significant effect in decreasing the number of buildings that competitive LECs' could profitability serve.

The model used to determine the location of fiber and how far it must be extended to reach customers. With regard to determining the distance that fiber must be extended – an important driver of the costs of extending a network – Dr. Crandall does not identify or address the possible different uses for fiber listed in his iMap data set. *See* Crandall Dec. at 23-26. Rather, it appears that he simply assumed that all the fiber identified can

be used for special access. *See id.* That is wrong. Interexchange backbone fiber cannot be a substitute for the incumbent LEC *local* facilities that competing carriers must use to provide local and special access services. Pfau Dec. ¶ 23. Likewise, it is also assumed, without justification, that none of the fiber is at capacity or reserved for a particular use and, therefore, not available for additional special access use. *See* Crandall Dec. at 23-26.

These simplistic assumptions are demonstrably wrong. For example, as shown in fiber "map" for Cleveland, Ohio and Seattle, Washington, Dr. Crandall relies on Level 3's fiber in performing his calculations. *See* Crandall Affidavit, Appendix, Part F. However, as AT&T previously explained, *none* of Level 3's fiber is local; it is all long-haul fiber. Pfau Dec. ¶ 26. Similarly, in concluding that competitive LECs are not impaired in Tucson, Arizona, Dr. Crandall relies critically on the ability of e.spire to extend its network. *See* Crandall Affidavit, Appendix, Part F. That company, however, is now bankrupt.[31] Rather than being plentiful, metropolitan fiber capacity is scarce and, as a result, the entire premise of Dr. Crandall's analysis and his conclusions come crashing down.[32]

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[31] Similar problems may exist for Greenville, South Carolina, but Dr. Crandall does not identify the companies that have purportedly deployed fiber in that city. *Id.*

[32] In contrast to long-haul bandwidth connecting most major population centers, metro bandwidth is scarce. "[W]e believe there is a clear distinction between metro-area scarcity and the relative over-capacity that exists between cities, with multiple fiber providers often traversing redundant intercity stretches. In essence, long haul networks operate today at multi-Gigabit speeds while metro-are networks are burdened by legacy infrastructures (or entire lack of infrastructure) that were designed for outmoded circuit-switched applications, are bandwidth-constrained, and generally take a long time to (continued . . .)

The model used to calculate "break-even" revenues. The CSMG model uses a gimmick to calculate the "breakeven" revenues required by a competitive LEC to achieve an NPV of zero for extending its network to "potential" customers. In particular, the model does not estimate competitive LEC revenues or cash flows after 10 years of service. Instead, it assumes a "terminal value" for such revenues by multiplying the Year 10 EBITDA (earnings before income taxes, depreciation and amortization) of each competitive LEC by a factor of 10.

According to the spreadsheet provided, only about *half* of initial capital outlay for a "typical" extension is offset by the cash flow from providing service for 10 years. The other half is offset by the assumed terminal value – those earned after the first 10 years.[33] In the real world, no competitive carrier could ever hope to obtain financing to build a local telecommunications project in which it would only recover half of its investment in the first 10 years. Thus, by assuming a post-10 year terminal value, Dr. Crandall grossly

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(. . . continued)
provision." *City Light: An Investor Guide to Metropolitan Optical Services*, at 4 (March 22, 2001).

[33] The spreadsheet USTA provided that shows the application of the CSMG study to Cleveland, Ohio for a 500 foot extension. According to the spreadsheet, the CSMG model has a negative cash flow in Year 1 of -$102,151. In other words, the model assumes that in the first year of operation a competitive LEC in Cleveland would have to spend $102,151 to extend fiber 500 feet and provide service. The assumed terminal value in Year 10 is calculated as 10 times the Year 10 EBITDA (10*($21,013) = $210,130). The effect of this on the NPV calculation (discounted at the assumed cost of capital of 15 percent) to a year 0 reference point is $210,130/$(1.15)^{10}$ = $51,941. Thus, about half the costs incurred to extend the network are recovered through the terminal value assumption.

understates the minimum revenues that a building would need to generate to make a network extension economic.

To the extent that competitive LEC business models can be predicated on retaining a customer for more than 10 years, the terminal value assumed in the CSMG study is still excessive. If the Year 10 EBITDA recurred every year thereafter for *infinity* at the assumed 15 percent cost of capital, the NPV in Year 10 would be as follows: (Year 10 EBITDA /.15) = 6.67*(Year 10 EBITDA). Therefore, by multiplying the Year 10 EBITDA by 10 (instead of 6.67), the model assumes that a competitive LEC's EBITDA somehow grows *larger* after year 10.[34] By contrast, if a more realistic terminal value of 6.67 * Year 10 EBITDA was used, the annual "breakeven" revenue requirements calculated by Dr. Crandall would increase significantly.[35]

Furthermore, Dr. Crandall's analysis appears to ignore much of the costs of delivering services other than for long distance services. The CSMG study indicates that the minimum revenues required for a building were deduced by first determining the incremental costs (negative cash flows) then adding incremental revenues and the cost associated with the incremental revenues (generally a positive cash flow) until a point is

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[34] Not only is that contrary to common sense, it is at odds with the fact that spreadsheet shows that EBITDAs steadily *decline* from Year 2 ($24,435) through Year 10 ($21,013). Similarly, the annual free cash flows steadily decrease from Year 2 ($20,309) through Year 10 ($841).

[35] As discussed below in Part IV, it is impossible to determine precisely the impact of changing the terminal value to a more realistic figure because USTA provided a "read only" version of the CSMG model and reviewers cannot changed the input assumptions that are embedded in the spreadsheet.

reached where the NPV of these cash flows is zero. Said another way, profitable service revenues are added until the where the investment breaks even, at which point the minimum revenue requirement from a building is determined. Because only the profits from these revenues can offset the investment to reach the building, it is critical that the "service revenues" gained reflect a reasonable profitability assumption. The underlying information from the CSMG study, however, indicates that for every dollar of revenue that is generated by a building, 30 percent is long distance revenue (and accordingly 70 percent is other service revenues). *See* CSMG Report at 32. The long distance revenue is also assumed to generate costs at the rate of 80 cents per long distance dollar. What is notably absent is any discussion of service costs that are added with every additional dollar of non-long distance service revenues. If significant cost for providing the non-long distance services are omitted, the only conclusion that can be drawn from disclosures to date, then the minimum revenues necessary to economically deploy fiber to a building are grossly understated.

The "national" conclusions. The interplay of the preceding weaknesses makes Dr. Crandall's results unreliable not only for the six markets individually modeled but also for any general conclusion – particularly with respect to any assessment of impairment at the national level. Dr. Crandall does not statistically (or in any other way) justify the assumption that the six cities discussed are representative of the nation as a whole. Nevertheless, he boldly asserts that nationwide special access competition can be inferred from these six cities, based on the simple fact that these cities represent a range of population – and nothing more. *See* Crandall Dec. at 20-21. In fact, he concedes that

his choice of cities was not the result of any valid sampling technique; rather, it was really driven by "the availability of up-to-date fiber data from iMapData." Crandall Dec. at 21 n.35. Thus, it is clear any attempt to justify the selection of cities is an after-the-fact contrivance and that the only thing "representative" about these cities is that they are places for which a vendor had some data available on fiber ring deployment (and are therefore more likely to be the cities with the most mature competitive markets).

Moreover, the six cities cannot be a statistically reliable basis for extrapolating to national conclusions, especially given the wide variation in the results shown in Tables A3 and A4 of the Crandall declaration. For each pair of cities (*i.e.*, large, medium and small), the percent of addressable "potential" customers by distance at 500 and 1000 feet is very different for the two cities within each pair. The 500 and 1000 foot distances are important, because competitive LECs have the greatest chance for profitability when they only need to construct facilities over shorter distances. However, the great variability within each city pair studied creates significant doubt that the city pairs studied adequately represents all cities of that size and makes clear that an important national policy cannot be set on the basis of this limited sample.

IV. USTA HAS FAILED TO ADEQUATELY DOCUMENT DR. CRANDALL'S MODELS; THEREFORE, HIS REPORT MUST BE REJECTED.

It is clear from the information provided above that Dr. Crandall's models are deeply flawed, both technically and because they simply ignore critical facts about how the real-world marketplace operates. However, as noted, the information filed with the Crandall declaration did not describe the key methodological assumptions that he

employed and did not include critical underlying data used to develop his studies. *See Ex Parte* Letter from James P. Young to Magalie Roman Salas (May 21, 2001). Despite repeated requests for this material beginning shortly after the Crandall declaration was filed, *id.*, USTA has attempted to slow roll the Commission and interested parties. To date, USTA has only turned over limited backup information for one of the models used by Dr. Crandall (the CSMG study) – and that only 10 days before opening comments were due. As a consequence, this *ex parte* cannot provide a full analysis of these materials.

With regard to the data Dr. Crandall used in his models, USTA has told parties that, if they want it, they can pay for it. That would mean that each and every party to this proceeding that wanted to assess fully the accuracy of Dr. Crandall's approach would need to spend on the order of $100,000 for this privilege.[36]

More critically, USTA continues to maintain an iron curtain around the OLS and Probit models that Dr. Crandall developed. *See Ex Parte* Letter from Keith Townsend to Magalie Roman Salas (June 1, 2001). Without full access to Dr. Crandall's studies and inputs it is impossible to verify fully whether he accurately estimated (i) the location of high-capacity customers; (ii) the potential telecommunications revenues for buildings containing such high-capacity customers; (iii) the costs of extending networks to these buildings; or (iv) the revenues that would be generated from such network extensions. *See Ex Parte* Letter from James P. Young to Magalie Roman Salas (May 21, 2001).

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[36] *See supra* note 2.

Because Dr. Crandall's conclusions are a result of the application of three models in succession, each is a critical link in assessing the validity of his conclusions regarding these matters. *Id.*

As described above, Dr. Crandall's assertion that carriers can efficiently serve customers is based upon the purported revenue potential for various buildings in particular locations (as calculated by the Probit and OLS models). Thus, the entire basis for Dr. Crandall's assertions evaporates if his revenue estimates are faulty or unreliable. But no party – including the Commission – can assess the validity of those revenue assumptions without full access to the Probit and OLS models, identification of the inputs to the models that were based upon sampling, and an explanation of the steps that were taken to assure that the conclusions drawn from the sample may be extended more generally.

Commenters also need access to the TNS Telecom survey that served as the basis for the "regressions" performed by the Probit and OLS models that purport to identify "likely" high-capacity customers and the potential telecommunications revenues from the buildings in which those high-capacity customers are located. This information is essential because, even if the Probit/OLS models were computationally correct and theoretically sound – neither of which has been demonstrated – selective use of information, inappropriate weighting of results or biased interpretation of respondent

information can cause the inputs to be invalid and thus invalidate all conclusions drawn from the analysis.[37]

Further, to assess Dr. Crandall's assumptions, analytical methodology and conclusions regarding the costs of extending competitive LEC fiber, reviewing parties need access to the iMap data Dr. Crandall relied upon, as well as access to the models he used to calculate the distance between competitive LEC fiber and alleged high capacity business locations, together with any inputs used in developing or running those models. Without access to this information, there is no way to know whether Dr. Crandall correctly calculated the distance between competitive LEC local fiber and a high capacity customer; whether the calculated distances accurately reflect terrain and rights-of-way considerations; or whether the underlying data accurately locate competitive LEC local fiber. Access to this information is also necessary because failure to properly quantify the costs of reaching such buildings would generate erroneous conclusions as to whether competitive LECs can economically serve those buildings.

A few examples aptly illustrate why Dr. Crandall's analysis cannot be relied upon without full access to his models and underlying data. For instance, Dr. Crandall uses the following equation for calculating the probability that a customer will purchase a high capacity service:

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[37] In particular, reviewing parties need a full explanation of the TNS survey methodology, including (i) whether the data were gathered through in-depth meetings or telephone interviews; (ii) who gathered the data; (iii) how potential respondents were qualified; (iv) the completion rate for those interviews; and (v) how individual results were weighted in the aggregation process.

$$\text{Prob(Purchase high-cap)} = \text{Prob}(Y_i = 1) = \text{Prob}(\varepsilon > -X_i\,\beta) =$$
$$1\text{-Standard Normal Distribution}(-X_i\,\beta)$$

Crandall Dec. at 37. In his formula, Dr. Crandall used Y = 1 to indicate a customer that will purchase a high-capacity service. Then he used the Probit model to calculate the probability that Y = 1. The probability that Y = 1 for a customer is, by definition, between 0 and 1.0. For a customer to be considered a "potential" high-cap customer, Dr. Crandall must specify a threshold probability. If the Probit model calculates a probability above the threshold for a customer, then Y = 1 for that customer and it is included in his set of "potential" customers. Therefore, the selected threshold probability is an important factor in determining the number of "potential" customers. However, Dr. Crandall did not specify the value of the threshold probability that he used, let alone explain or justify that value.

Although not clear, other statements in Dr. Crandall's declaration indicate that the threshold was far too low. In footnote 38 of his declaration, Dr. Crandall states that for the weighted survey sample, he estimated that 5.8 percent of businesses have a high capacity connection, and that in the Probit model "a probability cutoff of .1886 is necessary to infer the 5.8%" result. As a matter of basic statistics, the probability of cutoff (threshold probability) should be specified first, and then the model used determine the percentage of businesses that are high-capacity customers. Instead, he states that he used the process backwards – *i.e.*, he used the percentage of customers to determine the probability of cutoff. On the other hand, if Dr. Crandall in fact used a cutoff probability of 0.1886 to draw telecommunications customers into the set of high-capacity customers, this is an arbitrarily low probability that would treat numerous customers with a low

probability of purchasing high-capacity service as potential high-capacity customers. Without access to Dr. Crandall's models and underlying assumptions, however, it is ultimately impossible to determine whether his methodology is sound or whether he has simply reverse-engineered key inputs to obtain a pre-ordained result.

Another critical failure of documentation concerns the error term, ε, in the Probit regression. Dr. Crandall assumes that ε is normally distributed. Crandall Dec. at 37. A sound statistical analysis, however, would examine the distribution of ε (*e.g.*, a graph of ε based on sample data) to justify the distribution assumption. Dr. Crandall provides no such support for his distribution assumption, and without access to the TNS Survey data, there is no way for anyone to test this assumption.

And even in the single instance where USTA has provided some support for one of Dr. Crandall's models in time for incorporation for this filing, the information it has provided has not permitted meaningful review. For example, the "electronic" version of the CSMG study supplied by USTA on a CD contains a *read-only* Excel spreadsheet that cannot be used to perform independent sensitivity studies of the model. Further, the spreadsheet only contains data for a *single* case: extending fiber 500 feet in Cleveland, Ohio.

Likewise, in the "detail" USTA provided for the CSMG network extension model, in a number of instances the "source" provided for several types of recurring expenses is "CSMG analysis," without any explanation of what "analysis" entailed. *See* CSMG Report at 31-32. In this same vein, the backup material reports the cost of trenching – a critical component of the costs of deploying fiber – to be $17 - $30/foot. *Id.*

at 31. Although this is a highly variable cost (and, as shown above considerably below the costs the Commission itself developed), nothing in the supporting documentation discusses how the costs applicable to any individual city is established other than to say it was based on "[i]nterviews with city officials." *Id.* In other instances, critical inputs are purportedly drawn from "interviews" without disclosure of the number of interviews performed, the qualifications of the interviewee or the variability for the results obtained through the interview process. *Id.* at 31-32.

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USTA's end game here is obvious. Every day that illegal use restrictions remain in place is yet another day in which the incumbent LECs, by their own admissions, collect supracompetitive access charges. The Commission should make clear it will not countenance USTA's attempts to achieve its desired result through delay and obfuscation. It should promptly strike the Crandall declaration as unverified and unverifiable, and act promptly to end the interim use restrictions on combinations of the loop and transport network elements.