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August 23, 2001

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
445 12th St., SW, Room TWB-204
Washington, DC 20554

Re: Notice of oral Ex Parte Presentation:
In the Matter of Implementation of the Local Competition Provisions in the
Local Telecommunications Act of 1996, Fourth Further Notice of Proposed
Rulemaking, CC Docket No. 96-98

Dear Ms. Salas:

Earlier today, I submitted the following letter and attachment to Dorothy Attwood, Chief of the Common Carrier Bureau. The attachment addresses evidence submitted by various parties in the aforementioned proceedings. Please include a copy of that correspondence in the record in those proceedings.

Two copies of this Notice are being submitted in accordance with Section 1.1206 of the Commission's rules.

Sincerely,

cc: Dorothy Attwood

No. of Copies rec'd
DATE

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Ms. Dorothy Attwood,
Chief, Common Carrier Bureau
Federal Communications Commission
445 Twelfth Street, SW
Washington, DC 20554

RE: In the Matter of Implementation of the Local Competition Provisions in the Local Telecommunications Act of 1996, Fourth Further Notice of Proposed Rulemaking and Joint Petition of BellSouth, SBC and Verizon, CC Docket No. 96-98

Dear Ms Attwood:

Attached, please find a further analysis prepared by AT&T for your consideration, which further addresses the study prepared by Dr. Robert Crandall on behalf of the United States Telecommunications Association and responses to AT&T's earlier analysis of that study.

Please contact me at the above telephone number if you have any questions.

Sincerely,

CC: Kyle Dixon, Legal Adviser to Chairman Powell
Deena Shetler, Legal Adviser to Commissioner Tristani
Matthew Brill, Legal Adviser to Commissioner Abernathy
Jordan Goldstein, Legal Adviser to Commissioner Copps
Sam Feder, Legal Adviser to Commissioner Martin
Jeff Carlisle, Senior Deputy Chief, Common Carrier Bureau
Christopher Libertelli, Attorney, Common Carrier Bureau
Jeremy Miller, Attorney, Policy Division, Common Carrier Bureau
Julie Veatch, Attorney, Policy Division, Common Carrier Bureau

**AT&T'S RESPONSE TO DR. CRANDALL'S
ATTEMPTS TO DEFEND HIS
THEORETICAL "IMPAIRMENT" MODELS**

August 23, 2001

TABLE OF CONTENTS

INTRODUCTION AND SUMMARY	1
I. DR. CRANDALL HAS NOT EVEN ATTEMPTED TO MODEL THE REAL WORLD BARRIERS FACED BY COMPETITIVE PROVIDER OF FACILITIES- BASED HIGH-CAPACITY SERVICES.	6
A. Dr. Crandall’s Reliance On An Unjustified And Excessive Terminal Value Demonstrates The Impracticality Of Self-Provisioning High-Capacity Facilities. ...	6
B. Dr. Crandall’s Flawed Assumptions Overstate Competitive LECs’ Potential Profitability.	10
<i>The “Instantaneous Build” Assumption.</i>	11
<i>The “100 percent success rate” assumption.</i>	14
<i>The “perpetual service” assumption.</i>	17
C. Dr. Crandall’s Flawed Cost Assumptions Further Overstate Competitive LECs’ Potential Profitability.	18
<i>The “no-fixed cost” assumption.</i>	19
<i>The “incremental” assumption.</i>	20
<i>The “shortest route” assumption.</i>	22
<i>Biased inputs.</i>	22
<i>The plentiful local fiber assumption.</i>	31
<i>Dr. Crandall’s “Straw Man Defense.”</i>	35
D. Dr. Crandall’s Purported “Sensitivity” Studies.	36
II. DR. CRANDALL’S STATISTICAL METHODS ARE FLAWED.	40
III. DR. CRANDALL’S SIX CITES ARE NOT REPRESENTATIVE.	50
CONCLUSION.....	53

**AT&T'S RESPONSE TO DR. CRANDALL'S
ATTEMPTS TO DEFEND HIS
THEORETICAL "IMPAIRMENT" MODELS**

INTRODUCTION AND SUMMARY

Earlier in this proceeding, the United States Telecom Association ("USTA") offered a declaration from Dr. Robert Crandall in support of the claims of the incumbent local exchange carriers ("LECs") that competitive high-capacity loop and transport facilities are generally available outside of incumbent networks.¹ AT&T's June 11, 2001 White Paper demonstrated that the Crandall Declaration should be given no weight.² In a series of subsequent filings, Dr. Crandall and the incumbent LECs attempted to respond to some, but not all, of the arguments raised in AT&T's White Paper. These filings, whether considered individually or in combination, do little to explain away or rectify the many serious shortcomings AT&T demonstrated in Dr. Crandall's analytical approach and conclusions.

At the most fundamental level, neither Dr. Crandall nor the incumbent LECs reconcile Dr. Crandall's reliance on theoretical models with the Commission's express holding in Paragraph 66 of the *UNE Remand Order* that such "evidence" is irrelevant for "impairment" purposes and that the Commission would instead consider only "*marketplace . . . evidence of actual availability of alternatives as a practical, economic and operational matter.*"³ Nor could they do so. No matter how extensively they may attempt to rationalize, justify or correct errors

¹ Reply Declaration of Robert W. Crandall (attached to Reply Comments of USTA (April 30, 2001)) ("Crandall Dec.").

² An Economic and Engineering Analysis of Dr. Robert Crandall's Theoretical 'Impairment' Study (hereinafter "AT&T White Paper").

³ Third Report and Order and Fourth Further Notice of Proposed Rulemaking, *Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*, 15 FCC Rcd. 3696, ¶ 66 (1999) (emphasis added).

in Dr. Crandall's models, his conclusions are indisputably based on a series of theoretical models that attempt to predict events that may occur ten years – and more – in the future. Further consideration of this flawed theoretical analysis here would simply enable the incumbent LECs to extend the already long-delayed termination of the Commission's "temporary" use restrictions on incumbent LEC loop and access facilities and to further sap the resources of competitive LECs that are attempting to compete with the resource rich incumbents.

In all events, the evidence in this proceeding shows that the procedural flaws and unrealistic assumptions in Dr. Crandall's theoretical constructs fail to emulate the operation of the real-world marketplace. As AT&T and all other non-incumbent LEC commenters in this proceeding have shown, actual marketplace evidence flatly contradicts the conclusions from Dr. Crandall's models. These commenters clearly demonstrated that competitive LECs cannot in fact deploy alternative high-capacity facilities easily, quickly or profitably. In particular, AT&T's reply comments included expert testimony from network planners that showed the very limited extent to which AT&T has been able to self-provide or obtain access to alternative high-capacity loops and transport facilities, despite AT&T's significant incentives and efforts to use such facilities. *See* Declaration of Anthony Fea and William Taggart ("Fea-Taggart Dec.") ¶¶ 3-31 (attached as Exhibit C to the Reply Comments of AT&T (April 30, 2001)). Moreover, to the extent such alternatives exist, they are insufficient to discipline the monopoly power of the incumbent LECs, and the situation is not likely to change materially in the near future.

AT&T's sworn expert testimony demonstrated the many factors that impair its ability to deploy its own facilities, even to the minority of local serving offices ("LSOs") and buildings that might simultaneously have enough traffic and the right operational conditions to support the significant cost of deploying dedicated transport or loops. *Id.* ¶¶ 9-20. Further, in today's

market, for the limited situations where a facilities build might otherwise be practical, it is proving difficult even for AT&T to secure sufficient capital to fund construction of local networks at rates that conform to prudent business practices. *Id.* ¶¶ 22-23. The other commenters provide similar marketplace evidence that confirms AT&T's experience. *See* Reply Comments of AT&T at 5-10 (June 25, 2001) (summarizing comments). The incumbent LECs have not provided one shred of sworn testimony that rebuts these facts. Instead, they revert to ill-disclosed mathematical models that are insufficiently robust, potentially flawed in methodology and employ unrealistic and self-serving input assumptions.

Indeed, the disconnection between Dr. Crandall's theoretical predictions and market reality grows starker every day. For example, the same day that USTA filed the Crandall Rebuttal Declaration, the *Wall Street Journal* reported that "[o]ceans of cheap capital and competitive one-upmanship drove telecommunications and Internet service providers to build far more capacity than realistic forecasts of demand could justify. Now, many of those companies are bankrupt, or close to it." R. Blumenstein, S. Thurm & G. Ip, *Telecom Sector's Bust Reverberates Loudly Across the Economy*, A1 (July 25, 2001). As a result, it has become obvious that even the evidence regarding the relatively modest deployment of high-capacity local facilities by competitive LECs *overstates* the competitive LECs' actual ability to construct their own facilities.

The Commission clearly should not reverse its prior policy regarding the relevancy of theoretical models to the impairment evaluation. However, even if it did do so, it should not accord any weight to the models Dr. Crandall submitted on behalf of the incumbent LECs. First, those models are still black boxes. Despite the fact that Dr. Crandall's initial declaration was filed over three months ago, the incumbent LECs still have refused to provide electronic copies

of Dr. Crandall's "probit" and "OLS" models, which are critical to his analysis. Moreover, the "electronic" copy of the "CSMG cost study" provided by the incumbent LECs is "read-only," does not permit other parties to run sensitivity studies, and contains financial results for only one of the six cities Dr. Crandall studied and only for the single case of a 500 foot lateral fiber extension for Cleveland. *See* AT&T White Paper at 47. But even if the incumbents suddenly chose to reveal the internal operations of the models at this late date, they should not be rewarded by further extension of the already-delayed decision on this important issue. Given that the incumbents have acknowledged that \$2 - \$3 billion of monopoly profits reside in their special access rates,⁴ each additional day of delay takes about \$7 million from competitors and their customers and delivers it to the incumbent monopolists' coffers.

Further, the incumbent LECs' most recent salvage attempts rely heavily on "sensitivity" studies that were supposedly conducted using the Crandall models, but there is no means by which any of the parties to this proceeding – or the Commission itself – can verify those results. Nevertheless, based on the descriptions that have been provided, the so-called sensitivity analyses are not in fact sensitivity analyses at all. Rather, they are inadequate attempts to show (individually rather than in combination) that serious shortcomings of the model might not change Dr. Crandall's conclusions.⁵ This failure to expose the models to the adversary process should preclude the Commission from according any weight to Dr. Crandall's conclusions here.

⁴ *See* Reply Comments of AT&T at 15 (Apr. 30, 2001) (citing incumbent LEC comments acknowledging that access charges are twice the economic costs of providing these services).

⁵ The notion that a sensitivity analysis is a substitute for correcting fundamental flaws of the model is without precedent. Dr. Crandall's so-called sensitivity analyses individually treat numerous identified defects of the model(s) but never identify the combined impact of all those defects (assuming that the approach could in fact do so). Clearly, all identified defects should first be corrected. Only at that point would it be appropriate to run sensitivity analyses varying
(continued . . .)

In sum, the reams of paper the incumbent LECs submitted in their effort to rehabilitate the Crandall Declaration are irrelevant under the standard the Commission adopted in the *UNE Remand Order*, and their only real effect is that they required competitors to divert resources away from market entry in order to respond to the incumbent's faulty and insufficiently documented theoretical analysis. The incumbents' subsequent filings relate only to debates about the insufficiencies of the very type of theoretical models that the Commission has already determined it would not use. And in all events, the incumbents' recent submissions do not provide a meaningful response to the many methodological and computational flaws in Dr. Crandall's models AT&T identified in its White Paper – *i.e.*, (i) that Dr. Crandall's simplifying assumptions ignore or understate many real world costs and entry barriers that preclude new entrants from providing alternative high-capacity facilities; (ii) that his models use improper statistical methods; and (iii) that no national conclusions can be drawn from data on the six, non-representative cities reflected in his study. In fact, as shown below the Crandall Rebuttal Declaration and the incumbents' recent *ex parte* letters provide further evidence that Dr. Crandall's conclusions are flawed and unreliable.

(. . . continued)

the values of input parameters. However, if the Commission required these adjustments at this late date, it would simply be rewarding the incumbent LECs for their failure to come forward timely with critical data.

I. DR. CRANDALL HAS NOT EVEN ATTEMPTED TO MODEL THE REAL WORLD BARRIERS FACED BY COMPETITIVE PROVIDER OF FACILITIES-BASED HIGH-CAPACITY SERVICES.

A. Dr. Crandall's Reliance On An Unjustified And Excessive Terminal Value Demonstrates The Impracticality Of Self-Provisioning High-Capacity Facilities.

As AT&T has already explained, the model's calculation of the revenues associated with a potential "network extension" does *not* estimate competitive LEC revenues or cash flows after 10 years. Instead, it assumes a *terminal value* for such revenues by multiplying the Year 10 EBITDA (earnings before income taxes, depreciation and amortization) of each case (city, by length of lateral fiber extension) by a factor of 10. According to the spreadsheet provided, only about *half* of the initial capital outlay for a "typical" extension is offset by the cash flow from providing service *in the first 10 years* a building is connected to the competitor's network.⁶ The critical factor here is that the new entrant's initial investment is not recovered in the first ten years, so that the assumed terminal value – the assumed positive cash flow earned *after* the first 10 years – is essential to demonstrate that the investment is cost effective.

Of course, in order for the debate over the correct terminal value treatment to be relevant, one must accept the underlying premise that investors will routinely be willing to wait at least 10 years for their investments to bear fruit. Given the current state of the telecommunications industry, this premise is so far fetched that it, by itself, completely invalidates Dr. Crandall's analyses. Nevertheless, in reply, Dr. Crandall claims that a multiple of ten is "conservative" because it his understanding that "common industry practice would be to use a multiple between twelve and eighteen." Rebuttal Declaration of Robert W. Crandall ¶ 40 & n.73 (Attachment 1 to

⁶ This is in addition to the fact that many of the model's assumptions substantially inflate the cash inflows that might occur in those first 10 years.

Reply Comments of USTA (June 25, 2001) (“Crandall Rebuttal Declaration”). Dr. Crandall entirely misses the point.

In today’s market, no rational investor would give money to a company to fund a project for which the investment would not be recovered for more than ten years. In the real world, when an investor provides funding for a project, it is made with the expectation that the investment will be returned to the investor, with a reasonable return and within a reasonable time period. The longer it takes for the discounted cumulative cash receipts (net revenues and expense savings) to offset the cash outflows (expenses and investment), the higher the investor’s risk. Dr. Crandall’s attempt to defend his terminal value multiplier (whether 10, 12 or 18) thus misses this crucial point. The fundamental issue is that Dr. Crandall’s own analysis posits that, in the vast majority of instances, *more than ten years are required to generate sufficient revenues/cost savings to justify the initial investment* – even with his liberal (and highly self-serving) assumptions regarding costs and cost/revenue timing. Investments that require such a long payback period are a huge drain for a new entrant seeking to generate cash for investment in network expansion. And the real world fact that many competitive LECs have already entered *and exited* the market in less than five years makes it exceedingly unrealistic to believe that investors would be willing to wait 10 *or more* years for their investment to yield net positive cash flow. Indeed, it is just such real world facts that validate the Commission’s initial decision to rely on market evidence, not theoretical models, in making critical competition-affecting decisions.

And in all events, Dr. Crandall fails to justify the particular terminal value that he assumed. He concedes that neither he nor CSMG performed any analysis to develop the terminal value methodology for the specific case being studied. Nor does he provide any support for this

claimed “industry practice.” At bottom, Dr. Crandall would ask the Commission to accept his bloated multiple – which virtually guarantees he can show that competitive LECs can profitably serve many potential high-capacity customers – based merely on an *ipsi dixit* statement that this factor is a “standard industry assumption.”

In fact, Dr. Crandall provides no evidence of this “standard” because none exists. In the real world, no *competitive* carrier could ever hope to obtain financing to build a local telecommunications project in which it would recover only half of its investment in the first 10 years.⁷ Furthermore, the terminal value he employs is internally inconsistent. On the one hand, if the Year 10 EBITDA recurred every year thereafter for *infinity* at Dr. Crandall’s assumed 15 percent cost of capital, the self-consistent treatment would be to multiply the Year 10 EBITA by (1/discount rate) which would produce a multiplier of only 6.67 (1/0.15).⁸ On the other hand, assuming that Dr. Crandall used the same discount rate for the post-Year 10 period, the result he produces could only occur if the EBITA stream suddenly had an *increasing* trend in years 10 and after. But given the cost inflation and price declines in the long distance business, such a trend must be rejected out-of-hand without a thorough explanation and justification that is totally absent from the study’s documentation.

⁷ The current market evidence is that when a competitive LEC fails, it is difficult for the investment itself to be liquidated at a level approximating the net book value, much less at a terminal value indicative of a going concern.

⁸ Accordingly, contrary to Dr. Crandall’s assertion, his treatment is not conservative. Using a multiplier of 10 rather than 6.67 inflates the positive impact of the terminal value by 50%, causing the NPV to be significantly more positive than it otherwise would be. In fact, for the terminal value multiplier of 10 to be consistent, the perceived risk of the investment (and as a result the discount rate) would need to plummet from 15% to 10%. There is no credible reason why this should occur.

Apparently recognizing that the terminal value justification provided in his Rebuttal Declaration was inadequate, Dr. Crandall has abruptly switched course and now argues in a July 9 *ex parte* that the terminal value used in the CSMG cost model is conservative in comparison to various EBITDA multiples at which competitive LECs were purchased and competitive LECs' capital valuations expressed as EBITDA multiples for the few competitive LECs that have positive EBITDA. USTA *Ex Parte* Letter at 1 (July 9, 2001) ("July 9 *ex parte*"). This argument, however, is completely irrelevant, because the referenced multiples are for strategic acquisitions of *entire companies* rather than a specific facility that connects a specific building to one and only one carrier's network, which is the subject of Dr. Crandall's analysis. Accordingly, terminal values implicit in recent competitive LEC acquisitions do not address or justify the appropriateness of the assumed terminal value within the context of the model that Dr. Crandall constructed for the specific cases he studied.⁹ Furthermore, the EBITDA multiples Dr. Crandall relies upon are also misleading because those EBITDA multiples cover the *total* value of the competitive LECs cited, which obviously includes any value derived from the first ten years after the competitive LEC is purchased *plus* the value beyond the first ten years. In contrast, the

⁹ Indeed, in this instance one could question where there should be any terminal value at all. For a particular facility to have any value to a successor company, that company would need to buy the entire network, or at least the entire local network, of the carrier previously providing service. Generally, a company will have less risk and greater relative value based on an EBITDA multiple (or any other measure) because its risk is spread over *many* customers that purchase a variety of service offerings, as compared to the single building/customer case studied by Dr. Crandall. Furthermore, the EBITDA multiples cited are based on characteristics that the purchasing company may find valuable in the company being purchased, *e.g.*, expected revenue or customer growth or assets, such as in-place facilities, collocation arrangements or customer base. In sum, the multiple in such cases not derived from the opportunity to serve a single building; rather, it is derived from the strategic value (and lower associated risk) of serving a broad market/market segment.

terminal value in the CSMG model is specifically applied to derive the value generated after the tenth year that high capacity service is initiated. Obviously, the value of a competitive LEC and the EBITDA multiplier have to be greater for the former case, because they derive a competitive LEC's total value, not merely estimates of the value derived after 10 years.

Finally, Dr. Crandall's reliance upon the EBITDA of only profitable competitive LECs to rationalize the terminal value used to calculate the breakeven revenue for extending "existing" competitive LEC fiber is unjustified. The fiber available in the study by Dr. Crandall apparently would be owned by competitive LECs that generally are not profitable – indeed, as even Dr. Crandall concedes, in many cases the carrier owning the fiber may be bankrupt. July 9 *ex parte* at 1. Bankruptcy, as a general proposition, means the EBITDA is (or will soon be) negative. A company cannot be directly valued based on a multiple of a negative EBITDA value. Thus, if Dr. Crandall were to base his terminal value primarily upon the EBITDA of the carriers likely to own the local fiber, his terminal value would be much smaller – indeed, zero in many cases.

B. Dr. Crandall's Flawed Assumptions Overstate Competitive LECs' Potential Profitability.

AT&T's White Paper also showed that Dr. Crandall understated the revenues required for a competitive LEC to "break even" when it extends its network by improperly assuming that:

- (i) competitive carriers can build facilities and generate revenues instantaneously from these facilities, which ignores, among other things, construction intervals and significant delays typically incurred in obtaining rights-of-way;
- (ii) competitive carriers incur no pre-operating expenses prior to generating revenues;
- (iii) competitive carriers routinely penetrate entire buildings and provide all telecommunications services for all customers in those buildings;
- (iv) competitive carriers initially provide no services to any customers in buildings that they may potentially serve; and

(v) a customer won by a competitive LEC is retained in perpetuity, without incurring sales and related marketing expenses that are typically required to retain a customer in a competitive environment.

See AT&T White Paper at 22-28.

Dr. Crandall has now responded to some, but not all, of these arguments. In particular, he offers *no* defense of his assumption that a competitive carrier initially has no customers in any potential high-capacity building or his assumption that customers are retained in perpetuity, both of which overstate incremental revenues available in the building. At this late stage of the proceeding, these points must be considered conceded. Moreover, despite his overheated rhetoric on the other points,¹⁰ Dr. Crandall is unable to justify any of these simplistic but critical assumptions, which overstate a competitive carrier's potential revenues and profitability and/or understate its costs and thereby serve to understate "breakeven revenues" necessary for competitive LECs to extend their fiber networks.

The "Instantaneous Build" Assumption. Dr. Crandall does not contest AT&T's argument that it is improper to assume that competitive LECs are able to build networks instantly. Instead, he claims he did not make such assumption. But rather than provide any detail from his models to back up this assertion, he argues that AT&T acknowledged that he did not make such an

¹⁰ Most notably, Dr. Crandall accuses AT&T of "egregious mischaracterization" for taking the April 26, 2001, CLEC Network Extension Cost Model report ("CSMG Report") *provided by USTA* at face value. Crandall Rebuttal Dec. ¶ 26 & n.48. AT&T's White Paper cited page 11 of that report, which clearly shows results for the same representative cities studied by Dr. Crandall, but lists a far lower percentage of "buildings addressable" than in the Crandall Declaration. Dr. Crandall asserts – without support or citation – that the chart on page 11 is "illustrative" and not representative of his analysis. But there is no such indication on the chart. In fact, at the bottom of the chart it is labeled "Final." Likewise, other charts (but not the chart on page 11) are labeled as "illustrative." If it is true that the chart did not purport to show any substantive results, USTA (or CSMG) should have either clearly labeled the chart as such or should not have submitted the misleadingly irrelevant material in the first place.

assumption when its White Paper stated that the CSMG model “has a negative cash flow in Year 1 of [minus] 102,151.” Crandall Rebuttal Dec. ¶ 25 & n.46. According to Dr. Crandall, this is an admission that the CSMG model assumes capital expenditures occur well in advance of when revenues are earned. He is wrong.

In the CSMG model, the negative \$102,151 referred to in the AT&T White Paper is the *net* of revenues, capital and expenses in the first study year. Not surprisingly, this simply means only that more cash flowed out than was received in year one. It does not demonstrate that Dr. Crandall assumed no cash inflow (or revenues received) in the first year, as can commonly occur when a carrier is engaged in facility construction. And although the CSMG model may show that capital and expenses were greater than revenues in the first year, it apparently did *not* take account of the lengthy period between the time when a competitive LEC begins to spend money to serve a customer and the time when it starts to earn revenues from that customer.

A company building a lateral connection must incur all the costs of borrowing funds, paying rights of way/franchise fees, trenching and laying fiber facilities, installing necessary electronics, building penetration and related costs before the first dollar of revenues is received. Based on the record evidence, the lag between a carrier’s first cash outflows and its first inflows can easily exceed a year or more. Fea-Taggart Dec. ¶ 18. Therefore, if revenues had been properly delayed in the model to reflect the actual timing of facilities construction and pre-operating expenses compared to the receipt of revenues, the first year cash flow would have been considerably *more* negative.¹¹

¹¹ From the first day that expenditures occur, whether for equipment or operating expenses, the competitive LEC incurs financing costs that will continue to accumulate and not be offset in any manner until revenues are generated.

Indeed, the CSMG cost model CD provided by USTA (which contain Excel spreadsheets that contain the breakeven analysis for Cleveland with a 500 foot fiber extension) clearly shows that *all* of the capital expenditures, pre-operating and operating expenses and revenues assumed in the first study year are *assumed to be incurred in that first year* and are all discounted *for the same period of time*. The fact that annual revenues are discounted for the same time period as capital and pre-operating expenses is indisputable proof that the CSMG model overstates net present value (“NPV”) by modeling the cash flows in such a manner that the competitive LEC does not have to expend any capital or pre-operating expenses before it is able to generate revenues from its new facilities. For such an approach to be valid (and of course it is not) the competitive LEC must not only have won all the business in a building but it must also have convinced all those customers to pay for service before any service is delivered. This is obviously impossible. A realistic model, on the other hand, would assume that investments and operating costs occur in advance – sometimes as much as a year in advance (*see* Fea-Taggart Dec. ¶¶ 3-31) – of the competitive LEC’s receipt of the first dollar of revenues.¹²

From a more practical standpoint, a competitive LEC simply cannot spend hundreds of thousands of dollars to extend its network on the hope that it will eventually win customers away from the incumbent. Instead, it must first obtain an agreement with a customer to provide services. Customers, however, do not usually approach competitive LECs unless they have a

¹² Ultimately, in the June 15, 2001 *ex parte* filed by BellSouth (hereinafter “June 15 *ex parte*”) Dr. Crandall concedes – as he must – that the CSMG study assumes an instantaneous build, but he argues, on the basis of an undisclosed sensitivity study, that this assumption has a small effect on the breakeven revenue requirement. *See id.* at 9. This contention is refuted below in the Part I.D. below, which deals globally with Dr. Crandall’s reliance on sensitivity studies. Furthermore, as discussed above, “sensitivity” analysis directed at individual model flaws is not an appropriate alternative to the correction of fundamental modeling errors.

short-term need for additional capacity. As a result, they are generally unwilling to wait for a competitive LEC to complete the arduous process of building facilities, especially when the incumbent is usually able to meet their needs immediately with its existing, ubiquitous network. *Id.* ¶¶ 16, 20. Thus, the need for immediate service often trumps the customer’s desire to use an alternative provider, and in those situations the competitive carrier does not even get the *opportunity* to construct its own facilities to serve the customer. *Id.* ¶ 20.¹³

The “100 percent success rate” assumption. Dr. Crandall resorts to more semantic gymnastics to defend his assumption that a competitive LEC wins *all* services for *all* customers in a building (both high-capacity and low-capacity customers) for purposes of determining the incremental revenues available to a competitive LEC that is considering whether to extend its network to that building. Although he expressly stated he was making this assumption in his original declaration,¹⁴ in his Rebuttal Declaration, he categorically denies having done so. Crandall Rebuttal Dec. ¶ 37. Dr. Crandall tries to reconcile these contradictory positions by pointing to a footnote in his original declaration, which purports to describe a sensitivity study

¹³ The only way to prevent this from happening is for the competitive LEC to resell incumbent LEC special access services. But even if this were profitable despite the monopoly rents embedded in existing incumbent LEC dedicated access rates, the competitive LEC still faces another practical roadblock. Customers, fearing service disruption, often resist subsequent rearrangement of their services to connect them with the competitive LEC’s facilities. Fea-Taggart Dec. ¶ 28. This, in turn, reinforces the fact that the 100% building share assumption (discussed immediately below) is clearly unreasonable and invalid.

¹⁴ In paragraph 39 of his initial declaration, Dr. Crandall stated that he estimated the expected telecommunications revenues for those “*buildings*” that contain at least one potential high-capacity customer and, in paragraph 56, he stated that in determining the revenues for each building he assumed that the competitive LEC would provide all “local non-switched; local switched hi-cap; regional toll; long distance; and international long distance” for all customers in the building. *See* Crandall Reply Dec. ¶¶ 36, 39.

that he ran for a single city, Cleveland. *Id.* See also June 15 *ex parte* at 9 (stating that his “results” do not “hinge” on the assumption). But the fact that Dr. Crandall may have summarily discussed (in a footnote) a sensitivity study¹⁵ for one city does nothing to alter the fact that the *actual* results he reported and the conclusions he draws in his original declaration relate to all six cities, see Crandall Reply Dec., Appendix, Parts E & G, and were based on the absurd assumption that competitive LECs win *all* services for *all* customers.¹⁶ And it is those results that he relied upon in concluding that competitive LECs would not be impaired without access to incumbent LEC high-capacity facilities.¹⁷

Recognizing that this assumption cannot be squared with marketplace reality, Dr. Crandall subsequently argues in the June 15 *ex parte* that any revenue overstatement caused by this assumption is offset by a different “conservative” assumption. June 15 *ex parte* at 8-9. In particular, Dr. Crandall states that he assumed “constant revenues” despite the assumed “fact” that “a typical CLEC could expect per-building revenues to increase over time.”¹⁸ *Id.* His explanation is unavailing.

¹⁵ This is another example of a fundamental modeling error that Dr. Crandall attempts to paper over with another so called “sensitivity” analysis.

¹⁶ Furthermore, the sensitivity study Dr. Crandall referred to was described in his initial declaration as a sensitivity study of decreased revenues caused by discounted rates. He now apparently asserts, however, that the sensitivity study is applicable to the 100% building revenue assumption as well. At a minimum, Dr. Crandall should have performed a sensitivity study that simultaneously took into account *both* the impact of discounted rates *and* less than 100% building penetration.

¹⁷ To the extent Dr. Crandall is trying to support his conclusions on the basis of the sensitivity studies he purports to have run after his initial declaration, the methodology that he used to run the sensitivity studies is methodologically infirm. See *infra* Part I.D.

¹⁸ Dr. Crandall asserts his treatment is conservative because he did not assume both that the carrier instantaneously wins 100% of the building demand *and* assume the total revenue for the
(continued . . .)

That competitive LECs' per-building revenues could be expected to increase over time may be historically true, but that is only because competitive LECs typically *do not* win all of the revenues from all of the customers in a building (or, for that matter, all of the revenues from a single customer) the day that they begin serving the building. Thus, after commencing service to a building, a competitive LEC may increase its revenues over time by increasing the number of customers served, by serving the growing demand of the customers in that building, or (less likely) by increasing the unit price for service. However, Dr. Crandall's model *already* assumes that a competitive LEC wins all of the revenues from all of the customers in a building *the day that it commences service to the building*. Under this assumption, the only ways that a competitive LEC can increase revenues are through price increases or an increased demand for services by the customers in the building. Dr. Crandall's own hypothesized level of competition, however, argues against any notion that these methods for revenue increases are likely. Given that the incumbent still has facilities serving the building, even if no other competitive LEC finds it practical or economic to build its own facilities, Dr. Crandall's analysis can only be correct if the incumbent simply abandons the building forever, a clearly unreasonable assumption. Moreover, given the competition among at least two facilities-based providers to the building, price *decreases* caused by competition are far more likely over time than price increases.

The "perpetual service" assumption. Dr. Crandall offers only a token defense of his simplistic assumption that a competitive LEC retains a customer forever. Most critically, he does not deny that the CSMG model expressly makes this assumption and that it directly collides

(. . . continued)

building was growing. *Id.* The fact that he did not compound his error with a second unreasonable assumption does not make the treatment conservative.

with the real world, in which the incumbent will not simply disappear when a competitor builds new facilities and his hypothesized world, in which a competitive LEC can quickly, easily and economically build facilities to serve individual buildings. In either case, the only reasonable assumption is that churn is perpetual due to a number of factors, not the least of which are customers selecting competitive alternatives, businesses failing and businesses moving locations.

Because of the obvious weakness of the perpetual service assumption, Dr. Crandall responds only to AT&T's related argument that he failed to include all of the significant costs necessary to serve *and retain* that customer. AT&T White Paper at 27-28. In particular, Dr. Crandall observes that the "CSMG model assumes a customer care cost, which includes ongoing costs expended to retain customers, equal to 4% of revenues." Crandall Rebuttal Dec. ¶ 26. That is beside the point. Even if a marketing expense of 4% of revenues could be considered sufficient for ongoing account maintenance, *it is clearly not sufficient to retain business customers when contracts expire in the highly competitive environment hypothesized by Dr. Crandall.*¹⁹ Instead, a competitive LEC would need to incur significant sales and marketing costs at the expiration of the contract in order to retain that customer – an undertaking that would occur several times during the extended period considered in Dr. Crandall's approach. In the real world, typical contracts with large business customers are in the range of 3 to 5 years. Thus,

¹⁹ In all events, the marketing expenses assumed by Dr. Crandall appear too low even for maintaining existing customers who are not near the end of their contracts. Marketing expenses, including account maintenance, are included in the CSMG cost model's SG&A expenses. As shown below, Dr. Crandall's assumed SG&A expenses are substantially lower than those actually incurred by RBOCs and competitive LECs. Because most of an RBOCs SG&A costs are incurred in the provision of non-competitive services, Dr. Crandall has assumed SG&A and ongoing account maintenance expenses that are too low even for an RBOC, not to mention a competitive LEC that needs to expend significant resources to woo customers away from incumbent providers.

at a minimum, Dr. Crandall would have to include periodic sales expenses in each year in which the contract with the business customer is expected to expire and those cost would be comparable, in absolute terms, to the costs incurred to win the customer in the first place. And because Dr. Crandall assumes a customer is kept in perpetuity, these costs would also have to be reflected in the assumed terminal value.²⁰ By failing to include these significant real-world costs, Dr. Crandall grossly underestimates the “break-even” revenues necessary to economically extend existing fiber networks.

C. Dr. Crandall’s Flawed Cost Assumptions Further Overstate Competitive LECs’ Potential Profitability.

AT&T’s White Paper also demonstrated that Dr. Crandall has understated costs by improperly assuming: (i) an “incremental” methodology that ignores huge categories of costs competitive LECs must incur to provide high-capacity services; (ii) a simplistic network architecture that ignores basic engineering principles; (iii) patently unrealistic values for key cost inputs and (iv) long haul fiber is usable for local high-capacity services. AT&T White Paper at 14-22. Rather than refuting these criticisms, the more recent materials submitted by Dr. Crandall reveal yet another flaw in his methodology – *i.e.*, that he incorrectly assumed most costs and expenses are 100% variable with revenue. All of these flawed assumptions improperly inflate the calculation of a competitive LEC’s potential profitability.

²⁰ Given the average contract length, this means that a competitive LEC would have to expect two to three renewals in the first 10 years. In addition, the year 10 EBITDA would need to be adjusted to reflect the added expenses as well. Finally, given that total revenues would likely erode over time (due to unit price declines outpacing demand growth) expressing marketing and sales (as well as other costs) as a percentage of revenues would imply that fewer resources would be required to retain the customer in the face of ever increasing competitive pressures.

The “no-fixed cost” assumption. Dr. Crandall incorrectly assumes many “costs” incurred by competitive LECs are a percentage of revenues. This slight-of-hand enables him to assume (incorrectly) that no competitive LEC will have a negative incremental cash flow following initial facility deployment.²¹ Dr. Crandall’s naive assumption that most competitive LEC network expansion capital costs are simply a function of revenues is made clear by the June 15 *ex parte*. In explaining the methodology used by the CSMG model to calculate capital expenditures, Dr. Crandall states that the model used an iterative process to calculate the revenues required to break even, and then, based on DS-3 rates, derived the number of DS-3s needed to achieve this revenue. *See* June 15 *ex parte* 8. The quantity of equipment and the associated capital expenditures were then calculated based on the derived quantity of DS-3s. That means Dr. Crandall’s estimated capital expenditures are a *direct function of revenue*. A more realistic model would recognize that a significant portion of these capital expenditures is incurred independent of a carrier’s revenue.

Much of a carrier’s infrastructure cost is incurred to serve relatively large units of capacity. For example, a frame and common power infrastructure may be installed initially to serve a building’s total projected demand, and common units of electronics may be installed in anticipation of the first one or two year’s expected demand, with individual plug-ins placed as single circuits are turned up. Such an investment pattern is not a direct function of revenues.

Similarly, many expenses cited by Dr. Crandall are calculated as a fixed percentage of revenues. For example, Dr. Crandall inappropriately modeled *all* SG&A expenses as a variable expense that is calculated as a percentage of revenue, *see* CSMG Report at 32. relies on the

²¹ As discussed in Part I.D. below, this flaw also renders his “sensitivity” studies irrelevant.

highly suspect assumption that unit costs move in lock step with the combined net change in unit rice and volume. In the real world, however, SG&A expenses clearly have components that are incurred independent of the level of a company's output, whether that output is measured by revenue or any other parameter. Some sales expenses will be incurred in the process of trying to win customers, whether or not a particular customer is won and independent of the level of revenue that may be earned. Customer care and service operations must also be established prior to winning customers, and have fixed costs that do not vary with revenue – *e.g.*, the costs associated with land, buildings, power and supervisory personnel. General and administrative costs, which include functions such as accounting and finance, human resources, information systems, legal, procurement and R&D, also clearly have many components that are fixed expenses that are not a function of revenue. Likewise, Dr. Crandall decrees by fiat that all long distance “expenses” are 80% of long distance revenues, regardless of the level of long distance revenues earned. *Id.* All of these assumptions serve to understate a competitive carrier's true costs and thus will overstate the likelihood that a carrier could profitably deploy additional facilities.

The “incremental” assumption. Dr. Crandall also does not (and cannot) provide a justification for his failure to include many real world costs that new entrants must incur in deploying competitive high-capacity facilities in addition to the costs of establishing access to the carriers network. *See* AT&T White Paper at 15-16. For example, Dr. Crandall defends his “incremental” approach – *i.e.*, the assumption that competitive carriers already have in place an existing fiber network and the associated electronics and that such facilities have sufficient capacity to handle all traffic generated by extending the network to individual buildings – on the grounds that the “CSMG model includes the costs associated with the network electronics that

are directly attributable to the additional building” and that, while he assumed excess capacity, those costs can be ignored because there is a glut of local fiber. Crandall Rebuttal Dec. ¶ 28.

This logic is incorrect for several reasons. First and foremost, the record evidence regarding competitive LECs’ inability to find third-party suppliers of alternative facilities demonstrates that there is no glut of *local* fiber. The glut Dr. Crandall refers to is for intercity fiber, which, as shown below, is not and cannot be used to provide local telecommunications services. Second, Dr. Crandall cannot, as he misleadingly suggests, confine a carrier’s necessary costs to those attributable to adding just one “additional building.” Crandall Rebuttal Dec. ¶ 28. Dr. Crandall is in fact using a case-by-case analysis to attempt to show that it is profitable to serve an existing building from an existing network. But his ultimate conclusions make claims regarding the ability of existing fiber networks to serve *entire cities*. See Crandall Reply Dec. ¶¶ 45-51, & App. Part F. That requires existing network capacity and associated electronics that are not merely able to serve just one building, but *all* of the buildings Dr. Crandall says are “addressable” by a particular fiber ring. Third, Dr. Crandall also incorrectly assumes that the existing fiber networks can be used “as is” without incurring any equipment or operating expenditures, *e.g.*, without any need to light dark fiber or to add any multiplexing or other equipment, and without any additional provisioning, maintenance, testing, billing, accounting or administrative costs. Fourth, by ignoring the opportunity cost of the existing fiber facilities and equipment that are used to provide the high capacity services necessary to serve a particular building, Dr. Crandall is making the highly unreasonable assumption that this plant will not be used in the provision of any other services during his more than ten year study period. These are not trivial costs, and ignoring them grossly understates the costs new entrants must incur to deploy high-capacity networks to compete with incumbent LECs.

The “shortest route” assumption. Likewise, Dr. Crandall fails to offer a meaningful defense for his assumption that competitive LECs can always extend fiber over the shortest distance possible between an existing fiber ring and a building. Despite the fact that his sponsors are on the record as arguing that straight-line routing of fiber is infeasible,²² Dr. Crandall argues “straight-line distances can be used as a simplifying assumption” because of “the grid layout of the streets in the urban environment where customers are found.” Crandall Rebuttal Dec. ¶ 34. One need only consult a map of the cities that Dr. Crandall has purported to model to see this is often not the case. Further, even in cases where the roads may approximate a “perfect grid,” the competitive LEC often will not be able to extend fiber in a straight line because of factors such as city ordinances, rights-of-way and obstacles such as rivers and parks. That is why Dr. Crandall ultimately concedes that “lateral extensions are not always built as-the-crow flies.” Crandall Rebuttal Dec. ¶ 33.²³

Biased inputs. Despite considerable effort, Dr. Crandall and the incumbent LECs also fail to justify the numerous flawed input values used in Dr. Crandall’s models. For example, in the July 9 *ex parte*, USTA and CSMG attempt to respond to AT&T’s showing (White Paper at 21-22) that Dr. Crandall understated the costs for trenching associated with lateral fiber

²² See Tenth Report and Order, *Federal-State Joint Board on Universal Service*, 14 FCC Rcd. 20156, ¶ 80 & n.200 (1999) (“*Inputs Order*”).

²³ Dr. Crandall argues that, based on an undisclosed sensitivity analysis, his “as-the-crow-flies” assumption makes no difference to his results. This argument is rebutted in Part I.D. below. Here as elsewhere, Dr. Crandall seeks to incorrectly apply so-called sensitivity analyses to compensate for one of many individual modeling flaws. As noted above, however, sensitivity analysis is not intended to adjust for fundamentally incorrect modeling. Instead, it is intended to evaluate impacts due to uncertainty regarding non-controllable factors such as market demand, supplier prices for inputs and similar items.

extensions from existing fiber rings to buildings in which customers are located. In particular, AT&T showed that CSMG model's trenching costs were significantly less than those developed by the Commission in the universal service proceeding. In response, the July 9 *ex parte* alleges that the CSMG's estimated trenching cost per foot is in fact greater than what it calls "FCC Estimated Costs per foot," which it claims compares the trenching costs used in the Commission's Synthesis model and those assumed in the CSMG model on an apples-to-apples basis.²⁴ In making its comparison, however, the July 9 *ex parte* does not follow accepted engineering practices for underground placement and the manner in which underground fiber cables are engineered and costs are calculated in the Commission's Synthesis model. As a result, USTA and CSMG understate the level of trenching costs used in the Commission's Synthesis model by improperly failing to include manhole installation costs and by basing costs on line densities that are too low. The proper comparison conclusively demonstrates that the CSMG model relies on unrealistically low trenching costs.

More specifically, the Commission's model and standard engineering practices require manholes to be installed on fiber routes to allow easy placement and access to the fiber cables. Most, if not all, of the fiber lateral extensions to potential high-capacity subscribers modeled by Dr. Crandall require the installation of manholes. In the Commission's Synthesis model, manhole spacing varies from 725 feet to 400 feet as the density of lines varies from 0 to 10,000+

²⁴ The FCC costs per foot estimated by CSMG appear to be based on the underground fiber feeder cable placement costs used in the Commission's Synthesis Cost Model. These placement costs are tabulated by the Commission as a function of the density of lines per square mile and terrain type. Manhole costs are tabulated as a function of duct capacity, terrain type, density per square mile and manhole spacing. See the Commission's HCPM documentation, *Computer Modeling of the Local Telephone Network*, October 1999, pp. 26-27 (available at <http://www.fcc.gov/ccb/apd/hcpm/>).

lines per square mile. The “Breakeven Frontier” charts in Dr. Crandall’s Rebuttal Declaration show “Building’s Distance from Closest CLEC Fiber” varying from 0 to 5000 feet. Because Dr. Crandall has not provided the data required to determine where his likely high capacity subscribers are located, the associated density of lines cannot be determined for these customers. However, it is likely (and the July 9 *ex parte* assumes) that most of the potential high capacity customers are located in dense central business districts (“CBDs”) where the manhole spacing is 400 and 575 feet. See July 9 *ex parte* at 2. In any case, Dr. Crandall’s charts show a large number of buildings with lateral extensions longer than 400 feet, which would require the installation of one or more manholes.²⁵ The July 9 *ex parte* also underestimated the Synthesis model’s cost of trenching by apparently basing these costs on the *average* density of lines per square mile over the entirety of each city, rather than density of lines in the CBD in those cities.²⁶

²⁵ As shown above and in the White Paper (at 16-17), the lengths of lateral extensions are incorrectly based on the straight-line distance between a fiber route and a building. Therefore, the CSMG cost model and the charts shown in Dr. Crandall’s Reply Declaration underestimate the length of the fiber extensions and the number of required manhole installations. Thus, assuming *arguendo* that Dr. Crandall has located the buildings properly, his distance measurements would have to be raised by about 27% on average (and by as much a 40% in specific instances) to reflect the cable distances that (based on rectilinear routing) would need to be installed to reach these buildings.

²⁶ CSMG’s decision to select trenching costs that appear to be associated with the city’s *average* line density, rather than selecting the trenching cost associated with the particular cluster or wire center density associated with the identified customer locations, is flawed from an engineering perspective and also does not comport with the way that the Synthesis model determines cable placement costs. Because the cost of a foot of trenching is much higher in dense areas (due to concrete and asphalt coverage, heavy traffic and limited access opportunities), the Synthesis model’s input tables assume that such costs rise severely with increased density. Furthermore, the Synthesis model bases its selected per-foot cost of trenching on the line density exhibited by the particular cluster or wire center where the cable is located – not on the density of the collection of wire centers that serve the entire city.

Correcting these two errors shows, on an apples-to-apples basis, that the CSMG trenching costs are well below those used in the Synthesis model. The table below shows the effect of properly accounting for both the manhole costs and the trenching costs based on the density of lines per square mile in the CBD of each city studied by Dr. Crandall.

City	CSMG-Claimed Lines Density per square mile	CSMG-Claimed Trench Cost per foot	Actual Lines Density of CBD Wire Center from FCC Model	Trench Cost Plus Manhole Cost per foot per FCC Model and CBD Lines Density	Correct Estimate of Total FCC Cost per foot Relative to CSMG Estimate
Greenville	531	\$18.36	1875	\$19.84	108.06%
Akron	1455	\$22.66	3958	\$24.54	108.30%
Cleveland	3423	\$30.94	12,143	\$63.99	206.82%
Dayton	1803	\$19.21	4505	\$24.54	127.75%
St. Paul	3848	\$25.64	7933	\$45.17	176.17%
Seattle	4637	\$31.57	22,523	\$63.99	202.69%
Tucson	405	\$21.90	3944	\$24.54	112.05%

Thus, as shown in the table, the FCC's trenching costs are 8% to 107% *higher* than CSMG model's based on the conservative use of the trenching costs for the line densities that are characteristic of the entire CBD wire center for each city.²⁷

The July 9 *ex parte* closes its section on trenching with the incredible claim that the "Average Weighted Cost for All US Cities" is \$6.03 per foot. But as its source table indicates, CSMG derives this figure by computing an average of per foot costs that is *unweighted* by the size of the city. Thus a small, low-density city counts as much as New York or Chicago in CSMG's calculation. And because there are thousands of small, low-density cities in the U.S., but only a few very dense ones, the low per-foot cost in these low-density cities completely

²⁷ Because the wire center that serves a city's CBD likely also serves some surrounding non-CBD areas, the overall line density of this wire center will be *less* than the density that exists in the clusters that comprise the high volume business locations within the wire center's service area. Thus, even calculating trenching costs based on the density of the entire CBD wire center is likely to *underestimate* the trenching costs associated with laying cable in its most dense clusters.