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June 15, 2001

WRITTEN EX PARTE

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
The Portals
445 12th Street, S.W., Room TWB-204
Washington, D.C. 20554

Re: CC Docket No. 96-98

Dear Ms. Salas:

Attached is a letter to Jeremy Miller, Esq. of the Common Carrier Bureau's Policy Division. The letter addresses issues raised concerning a declaration submitted by Robert Crandall in CC Docket No. 96-98.

In accordance with Section 1.1206(b)(1), I am filing two copies of this notice with you and ask that you include them in the record of CC Docket No. 96-98. If you have any questions concerning this, please call me at 202.463.4182.

Sincerely,

Jonathan Banks

Attachment

cc: Jeremy Miller
Michelle Carey
Julie Veach

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List A B C D E

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June 15, 2001

Mr. Jeremy Miller, Esq.
Policy Division
Common Carrier Bureau
Federal Communications Commission
Washington DC 20554

Re: CC Docket 96-98

Dear Mr. Miller:

Attached, please find responses to questions of the Commission's staff concerning Dr. Robert W. Crandall's Reply Declaration that was attached to reply comments filed by the United States Telecommunications Association on April 30, 2001 in CC Docket 96-98.

We look forward to discussing this matter with the Commission staff at greater length.

Sincerely yours,

Robert T Blau

cc: Michelle Carey
Julie Veach

RESPONSE TO STAFF QUESTIONS REGARDING CRANDALL REPLY DECLARATION

Questions about the TNS Telecoms survey

1. *Explain the sampling methodology?* According to TNS Telecoms (TNS), the sampling methodology consisted of 500 telephone interviews in each of the seven original RBOC regions. Within each region the sample was segmented based on number of employees at the location as follows:

TABLE 1: RANGE OF EMPLOYEES FOR TNS SAMPLE

Range of Employees	Number of Firms Sampled in Range
1-5	125
6-25	125
26-100	125
101-250	75
250+	50

Source: TNS Telecoms

Within these segments candidates were selected randomly. This design was intended to assure adequate geographical as well as business size representation in the TNS studies.

2. *What was the sampling frame? Is this the same as the population?* The sampling frame was the Dun & Bradstreet (D&B) universe and the results were weighted back to that universe. TNS has selected D&B as the basis for the development of its syndicated business product offerings. D&B is a widely accepted sampling frame for U.S. businesses.

3. *What were the response rates? Were there follow-ups of non-respondents? Were there differences between respondents and non-respondents?* For the third quarter 2000 study, approximately 154,000 calls were made to complete 3,500 interviews. TNS tried to schedule follow-up appointments. TNS did not interview people who refused to be interviewed. However, through its incentive programs and aggressive call back strategies, TNS attempted to minimize non-response bias.

4. *Were any responses rejected? Was this rejection criteria rigorously applied?* Respondents who met basic qualification criteria were not rejected. For example, if the contact was the person most familiar with the telephone services used and the telephone-related expenditures for this location, then that observation was preserved. In general, the interview was included as long as it was complete. In the downstream processing of the data, TNS excluded some observations that contained extreme values.

5. *D&B data is well known for underreporting new and small firms. Why is it appropriate to construct weights based upon firm and location size using these data?* There is no perfect source of information on businesses by type and size. TNS considers D&B to be appropriate for the products it develops. The biases in D&B are not necessarily all associated with new or small firms as many larger firms opt out of participation. TNS has examined the distribution of responses within a sample segment by size to test whether

there was a bias within each sample segment. In general, TNS found that this chi-square statistic was not significant. Finally, D&B is the data source that most CLECs rely on for their own business analyses.

Questions about estimation of purchase of high-capacity service

6. *What economic behavior is the index function intended to represent? Conditional factor demand?* The index function used here is the net benefits to a firm of getting a T1 connection.[1] When the net benefits are positive, the firm obtains a T1 connection, and the T1 dummy variable takes on the value of one; otherwise it is zero. Because I cannot observe the actual value of the net benefit, but only the dichotomous response variable, I made an assumption on the random process that generates net benefits across firms for using a T1 connection. I then applied a probit model to estimate the probability that a business uses a T1 connection.

7. *The model assumes that the coefficient on sales and employees are constant across industries. What restrictions does that assumption place on the production processes across industries? Why are these reasonable restrictions?* To account for differences in industry type, I included several industry dummies in the probit model. Inclusion of dummies in a probit model has the effect of shifting (up or down) the probability distribution functions of using a T1. For example, an engineering firm (SIC 87) has a probability distribution function that lies above those of firms in other industries. Hence, for a given value of onsite employees, the incremental change in probability (of using a T1 connection) from an additional onsite employee will be different for an engineering firm (relative to firms in other industries) due to the curvature of the distribution function. Stated differently, in contrast to an OLS model, where dummies preserve the relationship between other continuous variables and the dependent variable, industry dummies in a probit model allow for different marginal relationships. Applied here, inclusion of industry dummies allowed for different marginal relationships between onsite employees and the propensity to use a T1 connection.[2]

8. *How well does the model predict outcomes within the industries? What about within firm size and geographic strata?* The model correctly predicted subscribership for in-sample observations 80.4 percent of the time. Table 2A shows how well the model performs by SIC code.

TABLE 2A: PREDICTIONS BY SIC CODE

SIC Range	Frequency	Percent Correct
SIC_0-10	70	95.7
SIC_10-19	221	93.7
SIC_20-29	188	69.7
SIC_30-39	247	72.9
SIC_40-49	193	73.6
SIC_50-59	739	87.3
SIC_60-69	219	80.4

1. For a complete discussion of index functions, see WILLIAM H. GREENE, ECONOMETRIC ANALYSIS 642 (MacMillan Publishing Co. 2nd ed. 1990)
2. *Id.* at 641-42.

SIC_70-79	538	82.3
SIC_80-89	860	78.1
SIC_90-99	224	64.7
Total	3,499	80.4

As Table 2A shows, the probit model's in-sample accuracy is generally consistent across SIC codes. The model does not perform as well for SIC codes 90-99, but as I demonstrate below, a very small percentage of the businesses in the sample cities fall within that range. Table 2B shows how well the model performs by number of onsite employees.

TABLE 2B: PREDICTIONS BY NUMBER OF ONSITE EMPLOYEES

Onsite Employee Range	Frequency	Percent Correct
0-1	353	99.4
2	262	98.1
3-4	326	97.2
5-7	333	96.1
8-13	363	91.5
14-29	361	82.0
30-49	324	80.0
50-100	371	62.0
101-240	335	50.7
241 +	382	53.1
Total	3,410*	80.4

Note: * There are a handful of observations with missing values of "onsite employee"

As Table 2B shows, the model's in-sample accuracy is above 80 percent for firms with less than 49 employees, and declines steadily as the number of onsite employees increases above that figure. As I demonstrate below, however, a very small percentage of the businesses in the six sample cities fall within the high end of the distribution.

9. *How well does the estimation predict outcomes for the firm types (industry, employees, sales) commonly found in the 6 sample cities?* Table 3A shows the frequency distribution of SIC codes by city for the six sample cities.

TABLE 3A: FREQUENCY DISTRIBUTION BY CITY, WITHIN TNS SAMPLE

SIC Range	Cleveland	Seattle	Tucson	St. Paul	Dayton	Greenville	TNS Sample	TNS Sample Weighted
SIC_0-10	0%	0%	0%	0%	0%	0%	2.0%	5.7%
SIC_10-19	1%	1%	2%	1%	1%	1%	6.3%	9.4%
SIC_20-29	1%	2%	2%	3%	3%	4%	5.4%	2.6%
SIC_30-39	1%	1%	2%	1%	2%	1%	7.1%	3.0%
SIC_40-49	2%	3%	5%	2%	4%	4%	5.5%	3.9%
SIC_50-59	6%	10%	21%	13%	9%	16%	21.0%	25.4%
SIC_60-69	6%	9%	11%	9%	7%	12%	6.3%	8.7%
SIC_70-79	5%	8%	12%	9%	7%	9%	15.3%	19.4%
SIC_80-89	68%	55%	34%	49%	65%	51%	24.8%	20.8%
SIC_90-99	10%	12%	11%	13%	2%	1%	6.4%	1.2%
Totals	100%	100%	100%	100%	100%	100%	100.0%	100.0%

Source: InfoUSA, TNS Telecoms.

As Table 3A shows, the distribution of SIC codes for the six sample cities follows a similar pattern as the distribution of SIC codes for the TNS sample. The bulk of the distribution for the six sample cities falls between SIC codes 80 and 89—the probit model predicted T1 usage correctly 78.1 percent of the time for that range of SIC codes. Table 3B shows the frequency distribution of onsite employees by city for the six sample cities.

TABLE 3B: FREQUENCY DISTRIBUTION OF ONSITE EMPLOYEES BY CITY

Onsite Employees	Cleveland	Seattle	Tucson	St. Paul	Dayton	Greenville	TNS Sample	TNS Sample Weighted
0-1	11%	23%	26%	22%	10%	13%	10.4%	23.0%
2	46%	31%	17%	25%	35%	31%	7.7%	17.9%
3-4	19%	19%	17%	18%	17%	20%	9. 6%	21.8%
5-7	7%	7%	10%	7%	6%	8%	9.8%	13.5%
8-13	4%	6%	10%	7%	8%	10%	10.7%	8.7%
14-29	4%	5%	8%	6%	8%	8%	10.6%	8.0%
30-49	2%	3%	4%	4%	4%	4%	9.5%	2.5%
50-100	4%	3%	5%	5%	6%	5%	10.9%	3.0%
101-240	2%	2%	3%	3%	3%	3%	9.8%	1.0%
241 +	2%	1%	2%	3%	3%	1%	11.2%	0.5%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Source: InfoUSA, TNS Telecoms.

As Table 3B shows, the distribution of onsite employees for the six sample cities follows a similar pattern as the distribution of onsite employees for the TNS sample. The bulk of the distribution for the six sample cities falls between two and four employees—the probit model predicted T1 usage correctly 97.7 percent of the time for that range of onsite employees.

Questions about estimation of building revenues

10. *Explain the exact source of the "high-cap dummy variable" and how the estimation is performed. Is this variable endogenous or exogenous?* In the OLS (revenue forecasting) model, I regressed the firm's revenues on several of the firm's characteristics, including an exogenous dummy variable ("high-cap dummy") that was assigned the value of one if the firm subscribed to a T1 connection (according to TNS) and zero otherwise. I included a "high-cap dummy" because there is good reason to believe that firms with a T1 connection spend more on telecommunications services for *all* levels of onsite employees. Moreover, I interacted the high-cap dummy with different SIC codes to allow for a change in the slope of the line that relates onsite employees to telecommunications expenditures—that is, I allowed for a different average *and* marginal effect of onsite employees on telecommunications expenditures. Finally, I am not concerned about whether T1 use is exogenous or endogenous as long as the equation gives me the relationship between revenues and the firm's characteristics. In the OLS model, I am not trying to get insights on the firm's behavior.

11. *Why do you believe the coefficient estimates are consistent (in a statistical sense)?* To take advantage of most central limit theorems, some statisticians believe that a sample size as low as 30 is sufficient.[3] In the case of the revenue-forecasting model, the sample size was 3,500. It is possible that some relevant explanatory variable was not included. However, I included every explanatory variable to which I had access and, in my opinion, was relevant to the structural estimation of the model. Any statistical inconsistencies of the parameter estimates simply cannot be controlled for with the available data.

Questions about the 6-city sample

12. *What population are the results intended to represent? Were all of these units in the sampling frame?* The results were intended to represent the population of all cities in the United States, exclusive of the very largest and the very smallest cities. As Tables 2A, 2B, 3A, and 3B demonstrate, the distribution of SIC codes and onsite employees for the six sample cities were well within the sampling frame of the TNS Telecoms survey data.

13. *What is the variance of the estimated population parameters when the sample size is only 6?* The units of observation for my model were businesses, not cities. My *firm*-based sample size for the regression model was 2,363 (I was not provided with telecommunications revenues for the entire sample). It would only make sense to ask for an "analysis of variance" of the revenue-forecasting regression specification. The R-squared of the revenue-forecasting regression was 0.44. Had CLEC fiber data and expansion costs been available in other cities, I would have applied the identical OLS and probit models to the *businesses* in those cities.

14. *For which cities does iMapData have data on CLEC fiber routes?* At the beginning of the project, I was informed that iMapdata could complete the fiber grids for a host of cities, but that each city would take a considerable amount of time and expense. Moreover, I was informed that iMapData had recently brought several cities in Ohio up-to-date during a separate consulting engagement. I attempted to choose six cities that represented a broad range of the U.S. population, and that were sufficiently up-to-date so that iMapdata could complete the analysis by the date on which reply comments were due.

15. *What is the average number of CLECs in these cities compared to all cities in the population?* It is possible to compare the number of CLEC fiber networks for the MSAs that contain the six sample cities with the number of CLEC fiber networks for MSAs of the same size cohort. Table 4 shows the number of CLEC fiber networks in the MSAs that contain the six sample cities.

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3. *See, e.g.*, RAMU RAMANATHAN, INTRODUCTORY ECONOMETRICS WITH APPLICATIONS 35 (Dryden Press 2nd ed. 1992).

TABLE 4: NUMBER OF CLEC FIBER NETWORKS BY MSA

MSA Rank	MSA	CLEC Fiber Networks	Cohort	Range of CLEC Fiber Networks for Cohort
13	Minneapolis-St. Paul, MN-WI	8	MSAs 11-20	2 to 10
21	Seattle-Bellevue-Everett, WA	10	MSAs 21-30	4 to 11
23	Cleveland-Lorain-Elyria, OH	8	MSAs 21-30	4 to 11
63	Dayton-Springfield, OH	3	MSAs 61-70	1 to 6
64	Greenville-Spartanburg-Anderson, SC	6	MSAs 61-70	1 to 6
69	Tucson, AZ	4	MSAs 61-70	1 to 6

Source: NEW PARADIGM RESOURCE GROUP, INC., CLEC REPORT 2001 (13 ed. 2001).

As Table 4 shows, the number of CLEC fiber networks for the six MSAs (that contain the six sample cities) generally lies within the range of CLEC fiber networks for MSAs of the same size cohort. The one exception is Greenville-Spartanburg-Anderson MSA, which has six fiber networks (equal to the upper bound of the range of CLEC fiber networks for MSAs of the same size cohort). It is important to note, however, that two other MSAs in that cohort have six CLEC fiber networks (Birmingham and Albany), and that the mean number of CLEC networks for the cohort is four.

16. *Describe the distribution of industry and firm size in the sample cities. How does this compare to the population of the United States?* Table 5A describes the frequency distribution of SIC codes for the six sample cities and for the nation as a whole.

TABLE 5A: FREQUENCY DISTRIBUTION OF SIC CODES BY CITY

SIC Range	Cleveland	Seattle	Tucson	St. Paul	Dayton	Greenville	United States
SIC_0-10	0%	0%	0%	0%	0%	0%	2%
SIC_10-19	1%	1%	2%	1%	1%	1%	7%
SIC_20-29	1%	2%	2%	3%	3%	4%	2%
SIC_30-39	1%	1%	2%	1%	2%	1%	2%
SIC_40-49	2%	3%	5%	2%	4%	4%	3%
SIC_50-59	6%	10%	21%	13%	9%	16%	25%
SIC_60-69	6%	9%	11%	9%	7%	12%	8%
SIC_70-79	5%	8%	12%	9%	7%	9%	17%
SIC_80-89	68%	55%	34%	49%	65%	51%	26%
SIC_90-99	10%	12%	11%	13%	2%	1%	7%
Totals	100%	100%	100%	100%	100%	100%	100%

Source: InfoUSA.

As Table 5A shows, with the exception of SIC codes 80-89 (services), the pattern of the SIC code frequency distribution for the six sample cities generally conforms to the pattern for the nation as a whole. The same can be said for the pattern of onsite employees. Finally, it is important to note that the distribution of *any* city should not perfectly match the distribution for the United States as a whole because the national distribution would include rural areas.

TABLE 5B: FREQUENCY DISTRIBUTION OF ONSITE EMPLOYEES BY CITY

Onsite Employees	Cleveland	Seattle	Tucson	St. Paul	Dayton	Greenville	United States
0-1	11%	23%	26%	22%	10%	13%	20%
2	46%	31%	17%	25%	35%	31%	26%
3-4	19%	19%	17%	18%	17%	20%	19%
5-7	7%	7%	10%	7%	6%	8%	14%
8-13	4%	6%	10%	7%	8%	10%	8%
14-29	4%	5%	8%	6%	8%	8%	7%
30-49	2%	3%	4%	4%	4%	4%	3%
50-100	4%	3%	5%	5%	6%	5%	2%
101-240	2%	2%	3%	3%	3%	3%	1%
241 +	2%	1%	2%	3%	3%	1%	0%
Total	100%	100%	100%	100%	100%	100%	100%

Source: InfoUSA.

Questions about cost model

17. *CSMG suggests that Akron was also studied. Why are the results not discussed in Crandall's declaration?* From the onset, I had the "luxury" of choosing between two small cities in Ohio (Akron and Dayton) due to a recent iMapData consulting engagement for a different client. Because the objective of my study was to select a sample of cities that were representative of the United States, however, the value of the option of using a *second* small Ohio city was close to zero. Indeed, I had originally ruled out Akron because it is very close to Cleveland, and I wanted to get a little more geographical diversity. Because Akron and Dayton are identical in many respects, and because iMapData had up-to-date maps for each city, CSMG offered to prepare the breakeven estimates for both cities at no additional charge. The fact that CSMG supplied cost data for Akron does not imply that I chose the six sample cities *ex post* among a host of candidate cities across the nation to obtain the most favorable results. Rather, the six cities were chosen *ex ante* and the client was stuck with the results.

18. *Why are pole attachment fees not city-specific?* Pole attachment fees do vary by city. Although the CSMG presentation shows the cost as general and not city-specific, the model uses pole attachment fees, which vary from $0.0251 to $0.0549 per foot across the markets studied and are included as such in the CSMG model. These values are shown, rounded to the nearest cent, in the Assumptions and Sources section of the CSMG cost study.

19. *Distance between fiber ring and building appears to be straight-line distance. Are networks built like this? What about bodies of water (such as in Seattle and St. Paul)? Why wouldn't CLECs just follow the existing road network? How much would using road distance raise costs?* The CSMG model uses fiber distance only and makes no assumption about the actual path chosen for the lateral extension between the building and the existing fiber network. For example, when reading the revenue breakeven frontier charts, the distance depicted on the x-axis refers to the actual length of the fiber lateral installed, not to the straight-line distance between existing network and the building. Generally, lateral extensions off of fiber rings are not built as-the-crow-flies. Instead, a

CLEC, working with a contractor, will determine the optimal path to build out the lateral extension at the least cost, which may not be in a straight line and may circumvent obstacles such as water bodies and historical sites. However, given the difficulty in determining the actual build distance for a specific lateral extension without conducting an in-depth study on a case-by-case basis with contractors of the optical lateral route, straight-line distance can be used as a simplifying assumption. Assuming a CLEC were to strictly use only existing roads to build a fiber lateral extension, and that the road network was arranged as a perfect grid, the average distance would be increased by the mathematically-derived value of the average of 1 and square root 2 or 1.207 or 20.7 percent. For example, if the straight-line distance were 1,000 feet, the distance on average to the fiber ring using a grid road network would be 1,207 feet. This sensitivity is low because the cost function is relatively flat with respect to distance. Applying this incremental distance to the building plots would effectively shift each building slightly to the right.

20. *"Network Core" and "Customer Premise Electronics" capital expenditures are functions of the number of DS-3s supplied. How is this number arrived at? Crandall's econometric models do not estimate this.* The CSMG model only examines costs and therefore does not make any assumptions about any particular building or its revenues and bandwidth requirements. Many cost variables, however, scale with revenue or bandwidth. CSMG therefore uses an iterative process in its model to calculate the revenue breakeven frontier, from which revenue-dependent costs are derived and incorporated into the next model iteration. Some cost variables of the network core and customer premise electronics scale according to bandwidth required. Here, CSMG uses the revenues from the iterative process to derive the bandwidth (number of DS-3s) required for a building based on DS-3 prices for each market. In fact, one DS-3 supplies sufficient bandwidth to serve a building with more than $200,000 in revenues, which is more than twice the revenue breakeven frontier at 5,000 feet for any market studied. The model does not incorporate any additional costs as a function of DS-3s until lateral distances exceed 20,000 feet (4 times the greatest distance used in the CSMG study).

21. *"Long Distance Costs" portion of Operating Expenses is simply a percent of premises revenue, not long distance revenue. Why is this assumption valid? Do all customers spend the same fraction of their telecommunications expenditures on long distance?* Long distance costs are modeled only as a percent of long distance revenue. CSMG has modeled long distance costs as 80 percent of long distance revenues, which are assumed to be 30 percent of total building revenues. All customers do not spend the same fraction of the telecommunications expenditures on long distance. The 30 percent of total building revenue is a simplifying assumption based on typical long distance revenues as a percent of total revenues for a CLEC.

22. *"Cash Inflow (Revenue Generation)" is positive in the first year. How quickly can a CLEC build a lateral extension? Why wouldn't the first year revenue be lower since the network would be under construction for some period of time before being able to provide service and generate revenue?* CSMG has used the conservative and simplifying assumption in its model of constant revenues, although CLEC per-building revenues

would certainly fluctuate over time. In fact, a typical CLEC could expect per-building revenues to increase over time. Furthermore, in CSMG's experience, CLECs often will not build out a lateral extension from their existing network to an off-net building until they have signed up customers in the building. Taking CSMG's already conservative assumption and adding another layer of conservatism by assuming the CLEC can only realize six months of revenue in the first year increases the revenue breakeven threshold only slightly by approximately 4.2 percent, across all distances for each market.

23. *Are the quotes on percentage of fiber installed in conduit (as opposed to aerial) based upon exactly the same geographic boundaries as the analysis?* The information that CSMG obtained from city governments should correspond closely to the geographic unit of analysis (census place). In particular, the geographic areas of analysis (for example, Seattle) are likely to be the most dense areas in the broader market (for example, the Seattle-Tacoma-Bremerton metropolitan area), and therefore more likely to require trenching. CSMG has used the conservative and simplifying assumption in its model of using terrestrial versus aerial fiber percentages for the central business district and applying this percentage to the market as a whole. In fact, the percentage of terrestrially-installed fiber is much lower outside the central business district and consequently the costs would be lower as well.

24. *Does the term "building revenues" include revenues generated by all building tenants or just the tenant that was predicted to purchase a high-capacity service? Historically, what percentage of tenants in an "on-net" building purchase service from the CLEC? What percentage of building revenues would a CLEC typically capture from an "on-net" building? What percentage of businesses typically engage in dual-sourcing of telecommunications services?* My results in no way hinge on the assumption of the CLEC gaining all of the building revenues. To the contrary, I performed a sensitivity analysis of the percentage of buildings and building revenues that remained above the breakeven frontier as the fraction of captured revenues ranged from 50 to 100 percent. Even when the CLEC only captures half of the building revenues, I demonstrated that a significant number of buildings still remained above the breakeven frontier. Moreover, it is important to note that the breakeven model assumes *no* growth in revenues over the life of the customer relationship, and assumes that the CLEC makes the decision to serve each building on a stand-alone basis. In particular, CSMG has assumed building revenue to remain constant in perpetuity for the net present value calculation—despite the fact that building telecommunications revenues have historically seen strong growth and are forecasted to continue to grow substantially over the next decade. Similarly, a CLEC would evaluate potential revenue from a cluster of buildings that might be served from a single extension. Hence, similar results could have been obtained with a less aggressive assumption on captured revenues but a more aggressive assumption on revenue growth or clustering.