Dave Piira

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking on the Commission's Own Motion Regarding Commission Policy on Area Code Relief	Rulemaking 98-12-014 (Filed December 17, 1998)

CUSTOMER OPINION SURVEY OF THE OFFICE OF RATEPAYER ADVOCATES

Pursuant to the schedule established in the Scoping Memo and Ruling of the Assigned Commissioner dated May 26, 1999, the Office of Ratepayer Advocates hereby submits the attached customer preference survey regarding area code relief options in the 310 and 925 area codes.

Respectfully submitted,

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SURVEY OF CUSTOMER PREFERENCES

ON AREA CODE RELIEF OPTIONS

IN THE 310 AND 925 AREA CODES

Prepared By

The Office of Ratepayer Advocates

California Public Utilities Commission

San Francisco, CA

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Table of Contents

BACKGROUND

The dramatic increase in demand for numbering resources in California over the last five years, combined with the current inefficient central office code (NXX code) allocations, has put the Commission in the unenviable position of recognizing California's pressing need for policies addressing area code relief and number conservation, yet having only limited power to implement change. The result is that California consumers are left to choose between numbering options that most find equally unattractive. This choice is akin to being asked if one prefers to be poked in the right eye or the left.

The Commission first addressed the question of whether California consumers preferred geographic splits or overlays in D.95-08-052. The issue arose in the context of the 310/562 area code relief plan dispute. In that decision, the Commission rejected the overlay option for the 310 area code because it found that the proposed overlay plan was not competitively neutral. The Commission also found insufficient evidence regarding consumers' preferences on area code relief options and directed Pacific Bell (Pacific) and GTEC to conduct customer preference surveys in their respective service territories[1]. In D.96-08-028, other parties were also invited to conduct surveys regarding numbering relief options.[2] Three parties submitted surveys, Pacific, GTEC and a group known as the Area Code Coalition.

Decision 96-08-028 also established preliminary prerequisites before overlays could be considered as a relief option within California. The conditions are: (1) permanent local number portability must be implemented throughout the

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[1] *See*, D. 96-12-086, 70 CPUC2d 464, 1996 Cal. PUC LEXIS 1201 at * 7

[2] Id.

area for which an overlay is proposed, and (2) mandatory 1+10-digit dialing must be in place by the time any proposed overlay would be implemented.[3]

In D.96-12-086, the Commission reviewed the consumer surveys and concluded that at least for the time being, consumers were better served by geographic splits and with the possible exception of the 310 area code splits would be the preferred relief method for all Numbering Plan Areas (NPAs) requiring implementation of relief prior to January, 2001. (Ordering Paragraph 1) Decision 96-12-086 also set conditions that would have to be met in order to implement an overlay. The conditions included mandatory 1+10-digit dialing, a consumer education program and additional consumer education and protection measures on the part of the California-Nevada Code Administrator and telecommunications industry members.

The Commission formally approved the use of an overlay in the 310 area code in D.98-05-021. Mandatory 1+10-digit dialing in the 310 area code was implemented on April 17, 1999. On January 22, 1997, Pacific Bell filed a petition to modify D.96-12-086 in R.95-04-043/I.95-04-044. The petition sought to repeal that portion of the decision requiring geographic splits through the year 2000 for all new area codes except 310. To consider that petition and other policy options governing the implementation of new area codes, the Commission issued Order Instituting Rulemaking (OIR) 98-12-014 on December 17, 1998. The OIR invited parties to comment on a number of issues, including whether consumers should be surveyed regarding their preferences for area code relief options.

A Scoping Memo and Ruling of the Assigned Commissioner was issued on May 26, 1999, allowing parties to submit statistically valid surveys of consumer preferences no later than August 31, 1999. Parties choosing to conduct new

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[3] The Federal Communications Commission (FCC) also imposes certain requirements for implementation of overlays, including mandatory 1+10-digit dialing in overlay areas.

surveys were ordered to use the 1996 surveys "as a starting point", to survey a broad mix of customers in the 310 and 925 NPAs and to use a neutral professional to conduct a statistically valid survey. The Commission chose not to rely on the information gathered by the previous surveys stating that they had "grown stale and may no longer provide an accurate gauge of consumer preference." (Scoping Memo, p.5)

In response to this and because of the significant impact of these changes on the public, ORA developed a survey intended to answer the following questions:

1. Do consumers have a preference between geographic splits and overlays?

2. Are the views of business customers significantly different than the views of residential customers?

3. Were the views of customers in the 310 area code significantly different than the views of customers in the 925 area code?

ORA sought to answer these questions by hiring a neutral outside consultant to conduct a telephone survey; and providing an in-house econometric analysis of the survey results. ORA's econometric analysis of the survey results is attached as Appendix B. ORA offers the results of this survey to assist the Commission in its consideration of current and future area code relief policies.

SURVEY DESCRIPTION

ORA staff developed a 10-part questionnaire (attached as Appendix A) for residential and business customers in 310 and 925 area codes to assess their preferences for future area code changes and their perception of the costs and inconvenience that would be caused by implementation of

new area codes. The questionnaire required less than five minutes of telephone-interviewing time. ORA selected a sample size of 400 responses per area code. Of the 400, 200 would come from the residential sector, with 100 from small businesses and 100 from large businesses.

Between July 28 and August 8, 1999, interviewers dialed a total of 8470 residential and business telephone numbers and administered the survey to 957 participants. A total of 410 residential and 547 business customers in area codes 310 and 925 were surveyed. A complete description of the survey methodology is contained in Appendix B and maps for the 310 and 925 area codes are contained in Appendix C.

SURVEY RESULTS

The survey results indicated that:

- Most consumers (57%) favored geographic splits to overlays with residential customers (62%) favoring splits more than business customers (52%), and 925area code respondents (60%) favoring splits slightly more than 310 area code respondents (52%).
- Most respondents (47%) favored special area codes for wireless technology.
- Both business (83%) and residential (71%) customers were strongly opposed to a different area code for additional lines into the same home or office.
- In the 310 area code, 58% of all customers perceived 1+10-digit dialing as highly or very highly inconvenient with slightly more residential customers (59%) perceiving it as such.
- In the 310 area code, 12% of respondents stated that the costs associated with the change to 1+10-digit dialing were high or very high, with a higher percentage (14%) of business customers expressing this than residential customers (9%).
- In the 925 area code, 38 % of all respondents perceived the area code change as highly or very highly inconvenient, with a higher

percentage of business customers (45%) expressing this than residential customers (28%).

- In the 925 area code, 20% of all respondents stated that the cost of the area code change was high or very high, with a higher percentage of business customers (26%) expressing this than residential customers (11%).

Does Location Matter?

Although the survey results indicate that customers in different area codes have different preferences, the econometric analysis (See Appendix B, Tables 4-11) suggests the differences in responses are not statistically significant. Table 1 compares the preferences of respondents in area codes 310 and 925 area codes as well as the statistical significance of these differences.

Table 1: Customer Preferences for Area Code Relief in the 310 and 925 Area Codes

Subject	Area Code 310 (%)	Area Code 925 (%)	Sig.*
Favor a special area code for cell phones and pagers	52	41	no (.11)
Oppose a different area code for additional lines	77	79	no (.39)
Favor a geographic split rather than an overlay.	52	60	yes (.00)

* The significance level of the estimated coefficient. Throughout this report, a standard significance level of 0.05 (95% confidence level) is used to determine whether or not the coefficient is statistically significant. If the significance level of a coefficient is greater than 0.05, it is assumed that the estimated value of the coefficient is not significantly different than 0.

Do Business And Residential Customers Have Different Preferences?

The survey shows that business customers are more likely to favor a special area code for cell phones and pagers, more likely to oppose a different area code for additional lines and more likely to be inconvenienced by undergoing an area code change. Business customers are slightly less likely to be inconvenienced by 1+10-

digit dialing, and favor geographic splits to overlays by a smaller margin than residential customers. Business customers are more likely to have experienced an unacceptable level of expense when they experienced mandatory 1+10-digit dialing, or when their area code was changed.

The survey shows clear differences in how strongly business and residential customers prefer one numbering relief option to another and their perception of cost and inconvenience. Business and residential customers both preferred splits to overlays, but business customers to a lesser degree. The econometric results demonstrate that most of these differences were statistically significant (See Appendix B, Tables 4-11). Table 2 compares the preferences of business and residential users as well as the statistical significance of these differences.

Table 2: Comparison of Business and Residential Customer Preferences and Perceptions

Subject	Business Users (%)	Residential Users (%)	Sig.*
Favor special area code for cell phones and pagers	48	42	yes (.049)
Oppose a different area code for additional lines	83	71	no (.147)
Find 11-digit dialing to be highly inconvenient	56	59	yes (.012)
Find change to 11-digit dialing to be unacceptably expensive	14	9	no (.053)
Find area code changes to be highly inconvenient	45	28	yes (.004)
Find area code changes to be unacceptably expensive	26	11	yes(.022)
Favor a geographic split rather than an overlay.	52	62	yes(.004)

* The significance level of the estimated coefficient.

CONCLUSIONS

Customers Prefer Geographic Splits to Overlays

The survey results show a clear customer preference for area code splits rather than the overlay method for area code relief. These results mirror the results of the 1996 surveys where all three of the surveys showed that consumers prefer splits.[4]

The ORA survey showed the preference for splits was higher in the 925 area code for both business and residential customers. Business customers in the 310 area code were equally divided between splits and overlays. Because the 310 area code has experienced both a split and the 1+10-digit dialing associated with an overlay, business customers in that area code may view both options with equal displeasure. There has been much speculation regarding the impact of area code changes on businesses. There is some evidence that area code changes create a disproportionate financial impact on businesses due to the costs of reprinting letterhead, business cards and forms and updating advertising[5]. There is also a perception that businesses may suffer financial losses due to customers' preferences for dealing with businesses in certain area codes[6]. Although the reasons cannot be stated with certainty, overall, as with the earlier survey[7], the preference for splits was weaker among business customers than residential customers.

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[4] D.96-12-086, FoF 15

[5] Id. FoF 30

[6] Id. FoF 28(3)

[7] Id. FoF 20

The results indicate that consumers, regardless of past experience with geographic splits or the 1+10-digit dialing associated with overlays, still prefer the perceived "lesser evil" of a split to that of an overlay. This finding also correlates with that of Pacific's earlier survey where respondents were asked to rate the split and the overlay both before and after reading an information booklet describing the features of each plan. Both plans gained favorable ratings, but the split option gained more favorable ratings.[8] Information about the options or experience with the geographic splits and/or 1+10-digit dialing associated with overlays does not significantly change consumer preferences.

Customers Strongly Oppose Different Area Codes For Additional Lines in Their Homes or Businesses

Coinciding with the preference for a split, customers in both area codes also strongly objected to having different area codes for additional lines in the same residence or business. This question elicited the clearest message from respondents. As much as consumers may dislike area code splits, it is clear that they feel a split is preferable to the prospect of different area codes for lines in the same business or residence. While 1+10-digit dialing was perceived as highly inconvenient, the strong reaction to more than one area code in the same house or business is a strong suggestion that the inconvenience of 1+10-digit dialing was not the primary reason for geographic split preference. This is slightly different than the results of the three earlier surveys from 1996, where consumers repeatedly cited retention of 7-digit dialing as a reason for valuing splits.[9].

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[8] Id. FoF 18 & 19

[9] Id. FoF 28, 29, 33 & 43

Customers Prefer a Separate Area Code for Wireless Technology

The survey results indicate that customers support (47%) the concept of assigning separate area codes to cell phones and pagers as a means of mitigating the impact on numbering resources. The preference in favor of doing so was stronger in the 310 area code (52%) and among business customers (48%).

Impacts of Other Proceedings

Customers' awareness of potential changes in the cost of directory assistance may also impact their preferences. A proposed decision is pending in Pacific Bell's Application (A) 98-05-058. This Application seeks to reduce the number of non-charged directory assistance calls per month and increase the cost of calls in excess of the threshold amount. A draft decision has been issued lowering the number of non-charged directory assistance calls per month for residential customers from five to three and raising the cost of calls in excess of the threshold from $0.25 to $0.50. Business customers' non-charged directory assistance calls would be reduced from two per month to zero. In the earlier surveys, customers cited avoiding the need for directory assistance or printed directories as one of the most highly valued reasons for preferring splits.[10] Although ORA's survey did not explore all the ramifications of the various area code options, it is reasonable to assume that given customers' earlier concerns, the overlay option may well be less desirable in light of the pending proposed decision in Pacific's Directory Assistance Application.

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[10] Id. FoF 29(3)

Consumer Comments

ORA's survey allowed respondents to comment on the various area code relief options. Although the number of respondents who took the opportunity to comment is too small to provide a statistically valid sample, the comments ORA did receive were remarkably similar and do provide some valuable anecdotal evidence. Overall, the respondents liked neither of the proffered options and felt there should be more to choose. The respondents who chose to give open-ended comments were fairly well informed regarding the issues surrounding area code exhaust. Several respondents expressed displeasure with the current system of central office code allocations and the resulting number exhaustion.

The results of the 1996 surveys are still valid. Although the Scoping Memo and some Commission decisions have expressed skepticism that the 1996 survey results were still reliable in 1999, the results of this survey, conducted in August 1999, are consistent with the 1996 findings. Customers still clearly prefer geographic splits to overlays for area code relief.

APPENDIX A

TELEPHONE SURVEY QUESTIONS

Q1. Is this number your home or business number?

1	Home
2	Business
99	Refuse to answer

Q2. If **residential**, what is your zip code?

#	
88	Refused
99	Don't Know

Q2A. If **business**, how many telephone lines do you have?

#	
88	Refused
99	Don't Know

Q3. Do you think there should be a separate area code for cellular telephones and pagers?

1	Yes
0	No

Q4. Would you object to having a different area codes for additional telephone lines in the same home or business?

1	YES
0	NO
99	Don't Know

Q5. Would you object to having your cellular telephone or pager in a different area code than your home or business?

1	YES
0	NO
99	Don't Know

If the respondent lives is area code 310, go to question 6. If respondent lives in area code 925, go to question 8.

Q6. Rate the level of inconvenience from having to dial 1 plus the area code plus the telephone number for all calls.

1	Not inconvenient at all
2	Slightly inconvenient
3	Moderately inconvenient
4	Highly inconvenient
5	Very Highly inconvenient

Q7. Rate level of cost you incurred as a result of having to dial 1 plus the area code plus the telephone number within your area code. (Costs may arise from reprogramming telephone equipment such as door buzzers or from updating stationary and advertisements.)

1	Not cost at all
2	Slight cost
3	Moderate cost
4	High cost
5	Very High cost

Q8. How inconvenient did you find it when your area code was changed from 510 to 925?

1	Not inconvenient at all
2	Slightly inconvenient
3	Moderately inconvenient
4	Highly inconvenient
5	Very Highly inconvenient

Q9. Rate the level of cost you incurred as a result of having your area code changed from 510 to 925? (Costs may arise from reprogramming telephone equipment such as door buzzers or from updating stationary and advertisements.)

1	Not cost at all
2	Slight cost
3	Moderate cost
4	High cost
5	Very High cost

Q10. When a new area code is needed, there are currently two options for creating a new area code: an overlay or a geographic split.
An overlay allows you to keep your existing area code but requires you to use 1 plus the area code plus the telephone number for <u>all</u> calls, including calls within your area code. A geographic split allows you to continue to dial a seven digit telephone number within your area code but which creates a 50% chance that your area code will change.

Would you prefer to have an overlay or a geographic split?

1	Overlay
2	Split
99	Don't Know

APPENDIX B

SURVEY METHODOLOGY AND ECONOMETRIC ANALYSIS

I. SURVEY METHODOLOGY

ORA contracted with Quantum Consulting Inc.[1] (QC) to perform the customer preference survey. QC's Consulting Unit specializes in utility and energy services and has 15 years of experience in conducting surveys. The Data Collection Unit has extensive experience surveying all types of utility stakeholders, including residential, commercial, industrial and agricultural customers as well as trade allies, employees and shareholders. QC's senior staff and Data Collection Unit also have extensive research experience in branding, customer tradeoffs/decision making, customer satisfaction and loyalty, and other issues relevant to utility regulation and competition.

QC used the survey methodology procedure described below to develop and provide a statistically significant representation of the two area codes.

For the residential segment of the study, QC purchased a Random Digit Dial (RDD) sample in the 310 and 925 area codes. The RDD sample is generated using blocks of numbers based on area code and the first five digits of a potential telephone number. Telephone blocks or area code designations assigned exclusively for business use, car phones, military or governmental purposes and marine telecommunication are excluded. Additionally, RDD sample numbers were checked against a list of approximately 15 million listed business telephones. If

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[1] Quantum Consulting is located at 2030 Addison Street, Suite 410, Berkeley, CA 94704

the RDD number proved to be a business listing, a new number was generated from that working block and the procedure repeated an unlimited number of times. This reduced the number of business telephone numbers in the residential RDD sample by about one-sixth.

For the business segment, QC purchased a sample list in the 925 and 310 area codes with business names including all SIC codes available (this allowed the sample house to determine that the numbers were truly businesses before giving them to QC). The business sample was also broken down into small versus medium sized businesses (small is defined as less than 5 employees; medium is 5 to 99 employees). This produces a sample that is representative of varying business sizes within the two area codes.

Both the residential and business samples were purchased in 12-to-1 ratios. This ratio ensures the total number of surveys needed is completed prior to sample exhaustion. Reasons for noncompleted surveys include disconnected numbers, no answers, fax lines and refusals to participate.

QC operates its own 35-station Computer-Aided Telephone Interview (CATI) facility that completes 50,000 to 60,000 interviews per year. QC coded ORA's questionnaire into a CATI script. By using this system, numbers were automatically dialed, skip patterns were automatically followed and data was available much more quickly. This method also ensures higher quality control since responses are entered directly in the database.

Using the CATI system, QC began surveying on July 28, 1999, and achieved the requested number of completed surveys on August 8, 1999. Interviews were conducted between 5:00pm and 9:00pm Monday through Friday, 9:00am and 5:00pm Saturdays, and 12:30pm to 8:30pm Sundays. When there was no answer, the number was tried 5 more times at various times of day. A total of 410 residential and 547 business customers in the 310 and 925 area codes were

asked a series of questions about their preferences and experiences with area code splits and area code overlays.

The supervisor to interviewer ratio was 1 to 8. Supervisors interacted with interviewers while they were conducting surveys. QC extensively monitored and evaluated interviewer performance to ensure the highest possible quality and strict adherence to project guidelines and procedures. Interviewers are instructed never to take initial "don't know" responses, but to reread the question in order to diplomatically elicit a response.

Quality control supervisors listened to and watched all interviewing stations using the silent monitoring system; interviewers did not know that the call was being monitored until the supervisor provided feedback. A minimum of 15% of all completed surveys were validated using this silent monitoring system. A quality control supervisor formally evaluated interviewers at least once each day. The evaluation provided the interviewer with constructive feedback. The daily evaluation covered topics such as questionnaire delivery, neutrality, verbatim reading, getting appropriate answers to questions, controlling the interview, using the sample correctly, following project instructions, and using the CATI system correctly.

II. FINDINGS

- 56.53% of respondents favored a split when a new area code is needed, 34.38% favored an overlay, and 9.09% either refused to answer or had no opinion. 61.95% of residential customers favored a split, 28.78% favored an overlay, and 9.27% either refused to answer or had no opinion. 52.47% of business customers favored a split, 38.57% favored an overlay, and 8.96%% either refused to answer or had no opinion.

- 52.28% of respondents in the 310 area code favored a split, 38.37% favored an overlay, and 9.35% either refused to answer or had no opinion. 59.81% of respondents in the 925 area code favored a split, 31.30% favored an overlay, and 8.99% either refused to answer or had no opinion.

- 59.90% of residential customers in the 310 area code favored a split, 31.19% favored an overlay, and 8.91% either refused to answer or had no opinion. 63.94% of residential customers in the 925 area code favored a split, 26.44% favored an overlay, and 9.62% either refused to answer or had no opinion.

- 45.12% of business customers in the 310 area code favored an split, 45.12% favored a overlay, and 9.76% either refused to answer or had no opinion. 57.23% of business customers in the 925 area code favored a split, 34.24% favored an overlay, and 8.53% either refused to answer or had no opinion.

- 46.56% of all respondents were in favor of a separate area code for cellular telephones and pagers, 38.29% were opposed, and 15.05% either had no opinion or refused to answer. A separate area code for cell phones and pagers was also favored by 42.44% of residential customers, and 47.90% of business customers.

- 37.51% of all respondents, 34.39% of residential customers, and 39.85% of business customers were opposed to a single, separate area code for their own cellular telephones and/or pagers.

- 78.16% of all respondents, 71.12% of residential customers, and 83.36% of business customers were opposed to having a different area code for additional telephone lines in the same home or business. The difference between residential and business preferences may reflect the fact that businesses tend to be more severely impacted by area code changes. These changes may result in a loss of business as well as significant printing charges.

- In the 310 area code: 57.55% of all respondents, 58.91% of residential customers, and 56.28% of business customers felt that 11-digit dialing (an overlay) is either highly inconvenient or very highly inconvenient.[2]

- In the 310 area code: 11.51% of all respondents, 8.91% of residential customers, and 13.95% of business customers anticipated a high or very high cost associated with the change to 11-digit dialing.

- In the 925 area code: 38.33% of all respondents, 28.37% of residential customers, and 44.58% of business customers stated that having their area code changed (from 510 to 925) was either highly inconvenient or very highly inconvenient.

- In the 925 area code: 20.19% of all respondents, 10.58% of residential customers, and 26.20% of business customers experienced a high or very high cost associated with having their area code changed.

The Number Of Lines Affects Business Customer

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[2] Customers in the 310 area code are now required to dial 1+ area code + 7-digit number for all calls.

Preferences

Since both overlays and geographic splits involve cause additional cost and inconvenience to some users, the degree of unhappiness about area code relief might correlate with the number of lines at a respondent's business. This expectation was at least partially confirmed by both the survey results and the econometric analysis (see Tables 7-9). Table 3 compares the preferences of business customers by number of lines, as well as the statistical significance of these differences.

Table 3: Business Customer Preferences by Number of Lines

Subject	1 Line (%)	2 Lines (%)	3 Lines (%)	4-5 Lines (%)	Over 5 Lines (%)	Sig.*
Favor a special area code for cell phones and pagers	41.77	48.76	52.68	53.70	44.07	.937
Oppose a different area code for additional lines	72.49	71.90	88.39	87.04	90.68	.003
Found 11-digit dialing to be highly inconvenient (310 area code)**	57.39	66.67	64.10	52.00	50.94	.807
Found change to 11-digit dialing to be unacceptably expensive (310 area code)**	10.87	17.78	7.69	14.00	9.43	.058
Found area code changes to be highly inconvenient (925 area code)	31.72	39.47	42.47	48.28	49.23	.049
Found area code changes to be unacceptably expensive (925 area code)	12.69	21.05	26.03	31.03	33.85	.006
Favored a geographic split rather than an overlay.	60.64	57.02	56.25	43.52	50.85	.376

* The significance level of the estimated coefficient.

** The survey results are at least partially impacted by the low number of respondents in some of the categories. Of the 417 respondents who have 310 telephone numbers: 45 had two lines, 39 had 3 lines, 50 had 4-5 lines, and 53 had over 5 lines.

III. ECONOMETRIC ANALYSIS

The following variables were used in the regressions:

ϕ is the cumulative distribution function of the standard normal distribution.

$\mathbf{Pr(Dac = 1| X_i,\beta)}$ is the probability that a respondent would be opposed to having a different area code for additional telephone lines in the same

home or business given the values of the estimated coefficients (β) and the matrix of independent variables (X_i).

Pr(OC = 1| X_i,β) is the probability that a respondent expects to experience either a high or very high cost as a result of a change to 11-digit dialing given the values of the estimated coefficients (β) and the matrix of independent variables (X_i).

Pr(OI = 1| X_i,β) is the probability that a respondent anticipates that they will be either highly inconvenienced or very highly inconvenience by a change to 11-digit dialing given the values of the estimated coefficients (β) and the matrix of independent variables (X_i).

Pr(Sac = 1| X_i,β) is the probability that a respondent will be in favor of a separate area code for cellular telephones and pagers given the values of the estimated coefficients (β) and the matrix of independent variables (X_i).

Pr(SC = 1| X_i,β) is the probability that a respondent experienced either a high or very high cost as a result of having their area code changed given the values of the estimated coefficients (β) and the matrix of independent variables (X_i).

Pr(SI = 1| X_i,β) is the probability that a respondent was either highly inconvenienced or very highly inconvenienced as a result of having their area code changed given the values of the estimated coefficients (β) and the matrix of independent variables (X_i).

Pr(Split = 1| X_i,β) is the probability that a respondent favored a geographic split rather than an overlay given the values of the estimated coefficients (β) and the matrix of independent variables (X_i).

AC310 is a dummy variable which takes a value of 1 if the respondent's telephone is located in area code, otherwise 0.

Bus is a dummy variable which takes a value of 1 if the respondent is a business user and 0 if the respondent is a residential user.

Dac is a dummy variable which takes a value of 1 if the respondent is opposed to a different area code for additional telephone lines in the same home or business, otherwise 0.

LINES indicates the number of telephone lines at the respondent's place of business.

OC (overlay cost) is a dummy variable which takes a value of 1 if the respondent anticipates a high or very high cost as a result of a switch to 11-digit dialing, otherwise 0.

OI (overlay inconvenience) is a dummy variable which takes a value of 1 if the respondent anticipates that they will either be highly inconvenienced or very highly inconvenienced by a switch to 11-digit dialing, otherwise 0.

Sac is a dummy variable which takes a value of 1 if the respondent is in favor of a separate area code for cellular telephones, otherwise 0.

SC (split cost) is a dummy variable which takes a value of 1 if the respondent experienced either a high or very high cost as a result of having their area code changed, otherwise 0.

SI (split inconvenience) is a dummy variable which takes a value of 1 if the respondent was either highly inconvenienced or very highly inconvenienced as a result of having their area code changed, otherwise 0.

Split is a dummy variable which takes a value of 1 if the respondent favors a geographic split rather than an overlay, otherwise 0.

The Regression Equations

The regression equation related to a different area code for additional telephone lines in the same home or business is:

$$\Pr(Dac = 1|\, X_i,\beta) = \phi(\beta_0 + \beta_1 Bus + \beta_2 AC310 + \beta_3 Lines + \beta_4 OC + \beta_5 OI + \beta_6 SC + \beta_7 SI)$$

The regression equation related to the relative additional cost of 11-digit dialing is:

$$\Pr(OC = 1|\, X_i,\beta) = \phi(\beta_0 + \beta_1 Bus + \beta_2 Lines + \beta_3 OI)$$

The regression equation related to the relative inconvenience of 11-digit dialing is:

$$\Pr(OI = 1|\, X_i,\beta) = \phi(\beta_0 + \beta_1 Bus + \beta_2 Lines + \beta_3 OC)$$

The regression equation related to a separate area code for cellular telephones and pagers is:

$$\Pr(Sac = 1|\, X_i,\beta) = \phi(\beta_0 + \beta_1 Bus + \beta_2 AC310 + \beta_3 Lines + \beta_4 OC + \beta_5 OI + \beta_6 SC + \beta_7 SI)$$

The regression equation related to the relative additional cost of the change in area code from 510 to 925 is:

$$Pr(SC = 1| X_i,\beta) = \phi(\beta_0 + \beta_1 Bus + \beta_2 Lines + \beta_3 SI)$$

The regression equation related to the relative inconvenience of the change in area code from 510 to 925 is:

$$Pr(SI = 1| X_i,\beta) = \phi(\beta_0 + \beta_1 Bus + \beta_2 Lines + \beta_3 SC)$$

The regression equation related to the choice of a geographic split rather than an overlay is:

$$Pr(Split = 1| X_i,\beta) = \phi(\beta_0 + \beta_1 Bus + \beta_2 AC310 + \beta_3 Lines + \beta_4 OC + \beta_5 OI + {}_6 SC + \beta_7 SI)$$

Regression Results

Table 4: The Different Area Code for Additional Lines Regression (McFadden R^2 = 0.04)

Variable	Coefficient	Std. Error	z-statistic	Sig.*
Constant	0.41	0.09	4.38	0.00
AC310	–0.11	0.13	–0.86	0.39
Bus	0.16	0.11	1.45	0.15
Lines	0.08	0.03	2.93	0.00
OC	0.09	0.23	0.41	0.68
OI	0.31	0.14	2.23	0.03
SC	0.23	0.18	1.24	0.21
SI	0.21	0.14	1.46	0.14

- The significance level of the estimated coefficient.

Table 5: The Cell Phone and Pager Regression
(McFadden $R^2 = 0.02$)

Variable	Coefficient	Std. Error	z-statistic	Sig.*
Constant	–0.40	0.08	–4.79	0.00
AC310	0.19	0.12	1.61	0.11
Bus	0.18	0.09	1.97	0.05
Lines	0.00	0.01	0.08	0.94
OC	–0.13	0.19	–0.65	0.52
OI	0.30	0.13	2.41	0.02
SC	–0.33	0.16	–2.13	0.03
SI	0.31	0.13	2.47	0.01

* The significance level of the estimated coefficient.

Table 6: The Overlay Inconvenience Regression
(McFadden $R^2 = 0.05$)

Variable	Coefficient	Std. Error	z-statistic	Sig.*
Constant	–0.618	0.07	–9.10	0.00
Bus	–0.239	0.10	–2.51	0.01
Lines	–0.002	0.01	–0.24	0.81
OC	1.381	0.20	6.83	0.00

* The significance level of the estimated coefficient.

Table 7: The Overlay Cost Regression
(McFadden R^2 = 0.15)

Variable	Coefficient	Std. Error	z-statistic	Sig.*
Constant	–2.16	0.17	–12.76	0.00
Bus	0.35	0.18	1.93	0.05
Lines	–0.06	0.03	–1.90	0.06
OI	1.07	0.16	6.87	0.00

* The significance level of the estimated coefficient.

Table 8: The Split Inconvenience Regression
(McFadden R^2 = 0.20)

Variable	Coefficient	Std. Error	z-statistic	Sig.*
Constant	–1.21	0.08	–14.57	0.000
Bus	0.31	0.11	2.89	0.004
Lines	–0.02	0.01	–1.97	0.049
SC	1.86	0.15	12.39	0.000

* The significance level of the estimated coefficient.

Table 9: The Split Cost Regression
(McFadden R^2 = 0.31)

Variable	Coefficient	Std. Error	z-statistic	Sig.*
Constant	–2.20	0.14	–16.08	0.00
Bus	0.34	0.15	2.29	0.02
Lines	0.03	0.11	2.75	0.01
SI	1.64	0.13	12.63	0.00

* The significance level of the estimated coefficient.

Table 10: The Split or Overlay Regression
(McFadden $R^2 = 0.04$)

Variable	Coefficient	Std. Error	z-statistic	Sig.*
Constant	0.50	0.09	5.85	0.000
AC310	–0.71	0.12	–5.87	0.000
Bus	–0.26	0.09	–2.89	0.003
Lines	0.01	0.01	0.89	0.376
OC	0.10	0.20	0.52	0.606
OI	0.63	0.13	4.99	0.000
SC	–0.14	0.15	–0.97	0.331
SI	–0.22	0.12	–1.78	0.075

* The significance level of the estimated coefficient

Marginal Coefficients

A Probit modeling technique was used to measure the contribution of geographic location, number of telephone lines, the respondent's previous experiences with implementation of area code relief, and service type (i.e., business or residential) to their preferences. Probit regressions are different from OLS (ordinary least squares) regressions in one important respect. An OLS regression yields the marginal effect of each independent variable on the dependent variable. In a Probit regression, the left-hand side of the equation is $Pr(Y = 1| X_I,\beta)$ and the coefficients are the coefficients of a function. Thus, an additional step is necessary to calculate the marginal effect of X on Y.

The marginal coefficients of the significant dependent variables (see Table 11) were calculated by:

1. Forecasting the fitted index and saving the results in series *xb*.
2. Calculating the probability function[3] for series *xb* and multiply the probability function by the estimated regression coefficient(s).
3. Saving the results of step 2 in series *fxb*.
4. Using the mean of the series *fxb* as the marginal coefficient.

Table 11: The Marginal Coefficients

Variable	Regression	Marginal Coefficient*
AC310	Different Area Code for additional lines	–0.03
BUS	Different Area Code for additional lines	0.05
LINES	Different Area Code for additional lines	0.02
OC	Different Area Code for additional lines	0.03
OI	Different Area Code for additional lines	0.09
SC	Different Area Code for additional lines	0.06
SI	Different Area Code for additional lines	0.06
BUS	Overlay cost	0.03

[3] This is also known as the density function.

LINES	Overlay cost	–0.01
OI	Overlay cost	0.10
BUS	Overlay inconvenience	–0.07
LINES	Overlay inconvenience	0.00
OC	Overlay inconvenience	0.41
AC310	Separate area code for cell phones and pagers	0.13
BUS	Separate area code for cell phones and pagers	–0.07
LINES	Separate area code for cell phones and pagers	–0.09

Table 11: The Marginal Coefficients (continued)

Variable	Regression	Marginal Coefficient*
OC	Separate area code for cell phones and pagers	–0.05
OI	Separate area code for cell phones and pagers	0.12
SC	Separate area code for cell phones and pagers	–0.13
SI	Separate area code for cell phones and pagers	0.12
BUS	Split cost	0.05
LINES	Split cost	0.00
SI	Split cost	0.22
BUS	Split inconvenience	0.07
LINES	Split inconvenience	0.00
SC	Split inconvenience	0.43
AC310	Split or overlay	–0.27
BUS	Split or overlay	–0.01
LINES	Split or overlay	0.00
OC	Split or overlay	0.04
OI	Split or overlay	0.24
SC	Split or overlay	–0.06
SI	Split or overlay	-0.08

- Rounded to two decimal places.

APPENDIX C

310 AND 925 AREA CODE BACKGROUND INFORMATION

The 310 Area Code

The 310 Numbering Plan Area (NPA) was created as a geographic split from the 213 NPA and implemented in May 1992. As depicted in the maps, the 310 NPA covers the west side of Los Angeles and currently includes the coastal cities of Malibu, Santa Monica, El Segundo, Redondo, and San Pedro, as well as the inland cities of west Los Angeles, West Hollywood, Beverly Hills, Culver City, Inglewood (including LAX), Hawthorne, Compton, Torrance, and Lomita. The 310 itself was split in 1997 to create the 562 NPA. The 310 was scheduled to implement California's first overlay area code in July 1999, but the Commission has temporarily suspended implementation of the overlay while it considers a Petition to Modify the overlay decision which was filed by Assemblyman Wally Knox, et al.1

The Local Jurisdiction meeting to discuss options for a new area code for the relief of the 310 NPA was held on August 27, 1997 at the City Hall in the City of Inglewood. 66 representatives of Local Jurisdictions attended

[1] *See* Petition To Modify Decision 98-05-021 Establishing A New Area Code in West Los Angeles In Order To Halt The Start-Up Of The 424 Overlay Area Code Plan, To End 10-Digit Dialing In The 310 NPA And

that meeting. There were 17 votes for a split line that would allow the southern portion of the NPA to keep the 310, although all 17 votes for this option came from the south bay cities. In addition, of the 13 that supported an overlay as their first choice of relief, 6 stated that the overlay should be a technology-specific one for only Wireless/Pager/Cellular numbers. Four Public meetings were held in the 310 NPA from November 17-20, 1998 in Torrance, Inglewood, Culver City, and West Hollywood. In Torrance, the common preference was to keep the 310 area code in the south so as to keep the "South Bay" communities of interest whole. At the Inglewood meeting speakers stated that changing the area code would be harmful to small businesses, and that a three-way split was the worst alternative. Speakers at the Culver City and West Hollywood meetings also stated that a split would be disruptive and cause undue hardship to businesses in these areas. The Commission subsequently issued Decision (D.) 98-05-021 which approved an overlay for relief of the 310 NPA. The Decision took into account the customer preferences expressed at the Local Jurisdiction and Public meetings.

To Shorten The Time For Response, filed June 9, 1999. *See also* D.99-06-091.

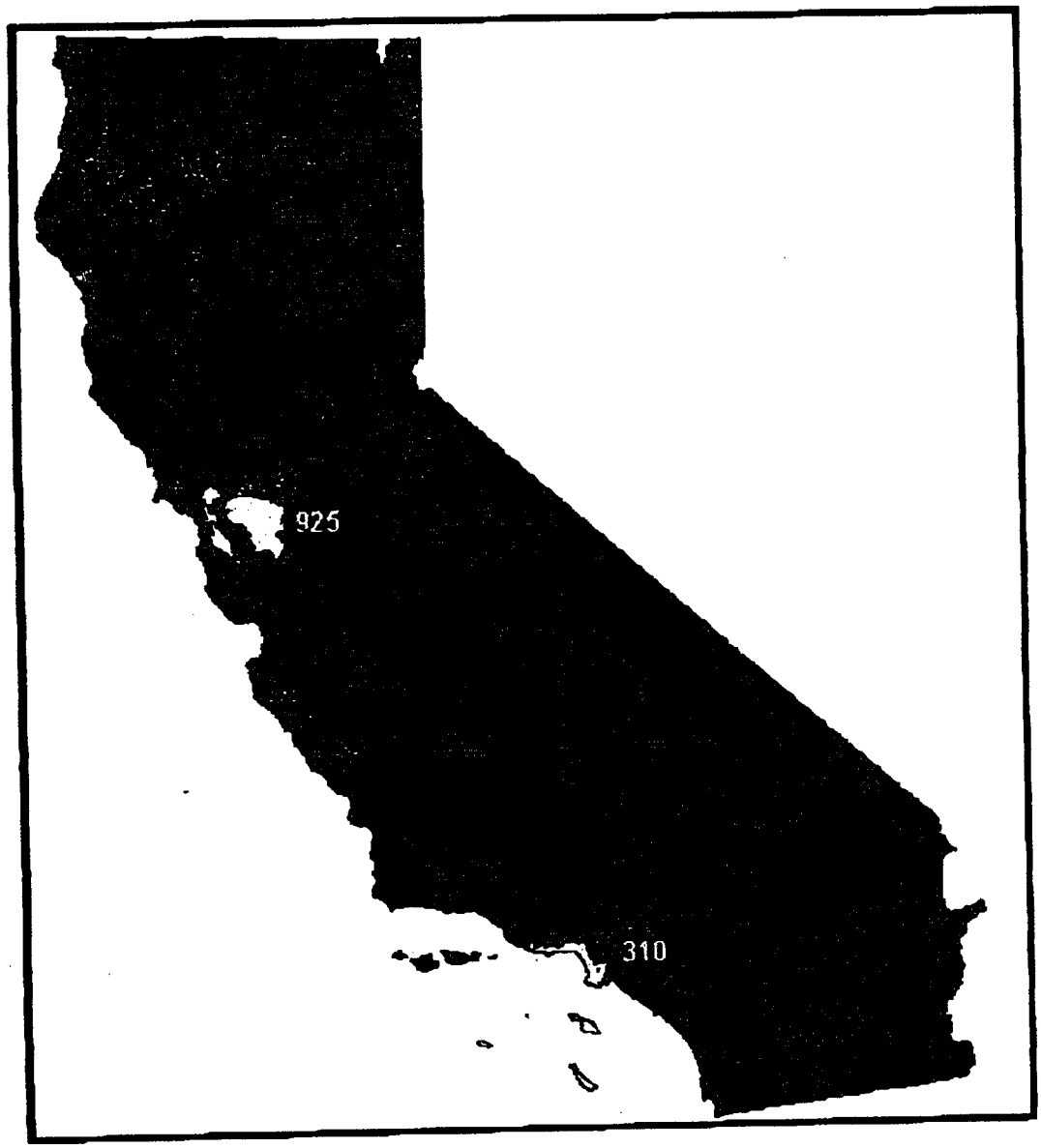
The 925 Area Code

The 925 NPA was created as a geographic split from the 510 NPA and implemented in September 1998. Extremely high demand by service providers for NXX codes in this area has triggered the relief planning process, which began in February 1999. The Local Jurisdiction meeting was held in San Ramon on April 22, 1999. The industry presented 3 options: an all-services overlay, and a two-way north/south split. Seven show of interest forms were submitted. Two preferred the overlay and 5 favored one of the two split options. Public meetings were held June 2-3, 1999, in Pittsburg, Walnut Creek and Pleasanton. A total of 13 members of the public attended these 3 meetings. Ten preferred the overlay and 3 preferred one of the splits.

The industry was unable to reach consensus on recommending a single relief option for this NPA, though it did reach consensus to submit the same three plans presented to the local jurisdictions and the public to the Commission for consideration. The NANPA declared jeopardy in the 925 NPA on June 11, 1999 and the 925 NPA is currently in the monthly NXX code lottery. The NANPA submitted the 925 NPA relief plan to the Commission on July 30, 1999. The Commission has not yet issued a

decision approving a relief plan. Exhaust of the 925 NPA is projected to occur in the first quarter of 2002.

MAP OF CALIFORNIA



DETAILED VIEW OF 310 AND 925 NPAs