Recommendation E.427

COLLECTION AND STATISTICAL ANALYSIS OF SPECIAL QUALITY OF SERVICE OBSERVATION DATA FOR MEASUREMENTS OF CUSTOMER DIFFICULTIES IN THE INTERNATIONAL AUTOMATIC SERVICE

This Recommendation is provided to permit the orderly collection of data required for special studies to identify sources of difficulty in customer use of the international automatic telephone service.

When calls are made to points outside a customer's home country, many different sets of ringing and busy tones are encountered. In order to measure the effect of unusual sounding ringing tones and busy tones on customer behaviour, it has been decided to collect data on how long customers listen to such foreign tones as well as to their national tones in order to compare them.

The data are to be collected in the same manner as those required for the completion of Table 1/E.422. These data are an extension of those collected for Table 1/E.422, and, as an aid to subsequent analysis, a copy of the current version of that table should be used with the table of this Recommendation.

Table 1/E.427 contains questions numbered 1—9. Their relationship to the questions of Table 1/E.422 is shown in parentheses.

A preferred set of analyses for identifying the statistical significance of differences between data collected from subscribers when setting up national calls and the corresponding data collected from subscribers when setting up international calls is given below.

1 Determine the percentage change in any measure by use of the formula:

$$\text{Change } (C_i) = \left[\frac{f_{ij}}{N_j} - \frac{f_{iH}}{N_H}\right] \times 100 \qquad j = \text{A, B, C}$$

$$i = 0\text{—}2,\ 2\text{—}5\ \ldots,\ > 30$$

where

f_{ij} is the observed frequency of calls of category i in the country j,

N_j is the total number of observations in the country j sample,

f_{iH} is the observed frequency of calls of category i in the home country H, and

N_H is the total number of observations in the home country sample.

2 Compare the central location of the distributions by use of the Kruskal—Wallis One—Way Analysis of Variance [1].

3 Compare the “forms” or “shapes” of the distribution by means of the chi—square test [2].

4 Compare changes in single valued variables, e.g. percentage incomplete—trunk—code, by use the chi—square test.

TABLEAU 1/E.427

(Supplement to Table 1/E.427)

Observations of international outgoing telephone calls for quality of service
Additionaldetails regarding subscriber dialled calls

Outgoing international exchange .....

Group of circuit .....

Period from..... to .....

Category			Number		Percentage	
			Subtotal	Total	Subtotal	Total
Details of dialled calls [a)b)c)]						
1. Calls with errors in the dialled number [d)]						
1.1 (6.1)		Wrong number dialled.....		. . .		100
1.1.1		Wrong country code.....	. . .		. . .	
1.1.2		National trunk prefix (e.g. "0") wrongly included.....	. . .		. . .	
1.1.3		Wrong trunk code.....	. . .		. . .	
1.1.4		Wrong subscriber number	. . .		. . .	
1.2 (6.2)		Incomplete number dialled.....		. . .		100
1.2.1		National (significant) number not dialled or incomplete.....	. . .		. . .	
1.2.2		Trunk code not dialled or incomplete	. . .		. . .	
1.2.3		Subscriber number not dialled or incomplete.....	. . .		. . .	
2. (5.3) (6.3)		Calls abandonned prematurely before receipt of a tone or announcement		. . .		100
		Interval from end of dialling to disconnect[e)]:				
		0-5 s.....	. . .		. . .	
		5-10 s.....	. . .		. . .	
		10-20 s.....	. . .		. . .	
		20-30 s.....	. . .		. . .	
		30-50 s.....	. . .		. . .	
		> 50 s.....	. . .		. . .	
3. Post dialling delay on all calls that are maintened beyond the start of a tone or announcement				. . .		100
		Interval from end of dialling to tone or announcement:				
		0-5 s.....	. . .		. . .	
		5-10 s.....	. . .		. . .	
		10-20 s.....	. . .		. . .	
		20-30 s.....	. . .		. . .	
		30-60 s.....	. . .		. . .	
		60-90 s.....	. . .		. . .	
		> 90 s.....	. . .		. .	
		Average excluded portion[f)] ...				
4. Calls that encounter ringing tones[g)]						
4.1 (1)		Completed calls.....		. .		100
		Interval from beginning of tone to answer:				
		0-10 s.....	. . .		. . .	
		10-20 s.....	. . .		. . .	
		20-30 s.....	. . .		. . .	
		30-50 s.....	. . .		. . .	
		> 50 s.....	. . .		. . .	
4.2 (2.6.4)		Incompleted calls		. .		100
		Interval from beginning of tone to disconnect:				
		0-10 s.....	. . .		. . .	
		10-20 s.....	. . .		. . .	
		20-30 s.....	. . .		. . .	
		30-50 s.....	. . .		. . .	
		> 50 s.....	. . .		. . .	

Category		Number		Percentage	
		Subtotal	Total	Subtotal	Total
5. (3-2)	Calls that encounter busy/congestion tones[g]		. . .		100
	Interval from beginning of tone to disconnect:				
	0-2 s	. . .		. . .	
	2-5 s	. . .		. . .	
	5-20 s	. . .		. . .	
	20-30 s	. . .		. . .	
	> 30 s	. . .		. .	
6. (4.2)	Calls that encounter tones that the observer cannot identify		. . .		100
	Interval from beginning of tone to disconnect:				
	0-2 s	. . .		. . .	
	2-5 s	. . .		. . .	
	5-10 s	. . .		. . .	
	10-30 s	. . .		. . .	
	> 30 s	. . .		. .	
7. (3.3, 4.3)	Calls encountering recorded announcements		. . .		100
	Interval from beginning of announcement to disconnect:				
	0-2 s	. . .		. . .	
	2-5 s	. . .		. . .	
	5-10 s	. . .		. . .	
	10-30 s	. . .		. . .	
	> 30 s	. . .		. .	
8. List types of errors in dialling and tone interpretation which could not be categorized					
.....					
9. List restrictions on subscriber sample[h]					
.....					
.....					

a) The term "calls" throughout this table refers to circuit seizures by outgoing traffic.

b) The data for each called country should be collected separately and not combined with other countries.

c) The interpretation of these results cannot be made adequately except by comparing them with similar results on national calls.

d) The practicability of putting the observation in category 1 will depend upon the observation access point and knowledge of national numbering plan of the outgoing country and of the destination country.

e) 0-5 s simplies $0 \leq t \leq 5$.
5-10s simplies $5 < t < 10$.

f) The "post-dialling delay"measurements may not represent the actuel delay from the time the subscriber finishes dialling to receipt of tone. To the extent that this measurement as observed on the trunk excludes the time from completing of dialling seizure of trunk, the average duration of this excluded time should be reported.

g) Identification of tone categories should be made by service observers who are trained to identify the tome categories reliably.

h) If access to the trunks being observed is restricted to some specified population of subscribers, e.g., heavy users, non-coin users residents of large urban centres, such restrictions should be noted and reported with the service observations.

References

[1] MARASCUILO (L. A.), McSWEENEY (M.): Non—Parametric and Distribution—Free Methods for the Social Sciences, *Wadsworth Publishing Co.*, California, 1977.

[2] SIEGEL (S.): Non—Parametric Statistics for the Behavioural Sciences, *McGraw Hill*, New York, 1956.