DISCUSSION RECORD

Session No. 13 – SUBSCRIBER BEHAVIOUR

PAPER No. 131
Authors: D H BARNES and W O REUTELHUBER

Question by H Y KRAEPELIEN

In San Fransisco - as in most Bell System measured service cases - three components make up the tariff, i.e.:

1. The basic montly rate
2. The rate per message unit
3. The message unit allotment included in the monthly rate.

Tables 1 and 5 specify allotments.
Why are the other two important tariff components left out?
What were the rates in the exchanges during the study period?

Answer
The monthly rate for basic service has been included in my presentation. As was pointed out, other detail is necessary for revenue estimates. The message unit charge in California is, I believe, five cents but this is not positive. All three tariff components and perhaps others are of course significant and should be included in a complete analysis. The data being reported is in an initial stage, because we are still occupied with data collection and organization of the data base. The rates during data collection to date have not changed, but we hope to see a change before termination of the study.

Question by G WIKELL
An essential point in planning is forecasting future traffic demand. Prognostication by the aid of a linear regression model is the method ordinarily used. The variables that are used or may be suggested for such a model cannot all have the same importance. What comment would you give to this?

Answer
A multiple regression model is contemplated to determine coefficients and to select those demographic factors most useful in a traffic forecast model. We hope through such multi-variate analysis to not only trend traffic growth or change, but to also estimate the effect of planned line transfers or the traffic to expect in a new office. We also hope through statistical inference to estimate factors not otherwise measurable. For example the future effect of rate changes by perhaps sorting out a related cost variable from a multivariate regression over many offices and develop a coefficient in the traffic forecast for cost.

Question by M MIZUKI
The distribution of originating Message Holding Time of Figure 8 suggests a possibility that the distribution may be a mixture of distributions with a certain set of mixing probabilities. Individual distributions may be of exponential or even chi-square types.
I would like to see a further analysis of data along this line.

Answer
I think it very likely that this distribution is a mixture of distributions. One cause, for example, of very short holding times could be wrong number disconnects. An in depth analysis of this data is still pending. As mentioned in my presentation a cursary analysis of the calls shorter than 30 seconds shows significant differences among offices and among classes of service. There is also a significant mode at 10 seconds for the FR class of service. Our data base organization allows ready access to line and office details. Individual account analysis will be made in an attempt to answer questions such as yours. This and many other results should be available as our analysis proceeds.

PAPER No. 132
Authors: A MYSKJA and O O WALMANN

Question by G WIKELL
Of major importance among the variables you have studied is the interval between call arrivals. Your samples have one hour length. What would you think of choosing the sample period length from a call rate fluctuation point of view?

Answer
The interarrival curve shown in our paper is from 6 quite uniform days. We do intend to study the traffic level influence ranging from zero blocking in steps to heavy saturation.

Parameter variations are difficult to distinguish from stochastic fluctuations. What can be done is to assume a regular transition (e.g. linear) between two different stationary levels and then compare with a weighted sum of exponential functions.

PAPER No. 133
Authors: F TOLEDANO and J R DE LOS MOZOS

Question by G WIKELL
In considering the problem of repeated attempts for a fully available group the authors pay special attention to the fact that an overall state-dependent birth coefficient can be defined. Knowing the variation of that coefficient what use do the authors contemplate for it?

Answer
The intention of the model has been to give a better description of the state probabilities of a full-availability group so that a better knowledge of the congestion probability can be obtained. Another outcome of this study may be the differentiation between congestion probabilities for initial attempts and reattempts allowing a better definition of the grade of service.

The knowledge of the state probabilities will also allow the use of existing theories for calculation of probabilities of internal blocking in limited availability system.

PAPER No. 134
Author: P LE GALL

Question by J W COHEN
Le Gall's approach to the influence of repeated calls is mainly from the network point of view. It is a macro-approach contrary to the micro-approach which investigates the simple model starting from a hypothetical subscriber behaviour. The experimental results with the macro-approach and the difficulties with

a good description of the subscriber behaviour strongly indicates that the macro-approach is more promising. From a theoretical as well as designer's point of view this is highly unsatisfactory. What is needed is a number of simple micro-models which guarantee a good approximation of the real traffic situation and by which the traffic process on the network level can be understood and predicted. Is such an approach possible or does the subscriber behaviour show such a large variety that we have to be content with the macro-approach?

Answer
It must be noticed that using a micro model for the study of a single exchange may depend strongly on the exchanges around. The types of refusal, originating thus repeated attempts, are not, of course, the same in the case of step-by-step systems as in the case of exchanges with common control equipment. The types of refusals may also depend strongly on the constraints offered by the signalling system between exchanges. In this way an overload located in one point of a large network may be, for example, the source of call refusals in the register of the originating exchange, because of the effect of the time-out relays. Above all, one has to keep in mind these types of refusals in the definition of a sufficiently realistic loss-system, this system being therefore necessarily global. These remarks concern especially switching networks with common control equipment. Overall measurements of the efficiency rates allow us to avoid the error of not taking into account an important amount of refusals. Of course, it would be more useful to make more localized measurement Only after such measurement would it be possible to define a realistic micro-model for the type of network considered, if we want to consider the fluctuations of the traffic.

Question by G WIKELL

You take up as a final point in your paper a very important problem for traffic operation namely that of service quality observation. You formulate your result so, that it is necessary to measure a total traffic flow in order to get good figures for traffic loss estimates. This seems a bit discouraging to me. Might it not be possible to envisage some special procedure for a random sampling of calls for observation?

Answer
I have only wanted to point out the precautions that must be taken with regard to the interpretation of results of call refusal measurements, because of the sampling method used.

It may be useful to have these precautions in mind during the design of equipments to be used for the measurements of call refusals of any nature, by using, if possible, the information given by the signalling system between exchanges, for all the call refusals, and not only for calls lost in the speech network.

PAPER No. 136
Author: G PELLIEUX

Question by G WIKELL
You give in your paper a lot of most interesting measurement data on multiple lines subscriber behaviour in repeating unsuccessful attempts. In your table 11 you have distinguished between subscribers that repeat their attempts rapidly and such as repeat slowly, but you give no estimate of the relative sizes of these two classes. Have you any idea of their proportions?

Answer
An answer to your question can be given on the basis of results in my paper. If we use Table VII concerning the distribution of the first two intervals between the three first attempts and Table IV and V concerning the perserverance function respectively the failure rate at each attempt we can calculate approximately the size of each class of Table XI, with respect to the fresh calls (the number of which is given in Table III).

From these data we find that the two classes are approximately equal to 20 % of the fresh calls, that is to say, each class contains approximately 15.000 calls.

PAPER No. 138
Authors: O GAUSTAD, A FLO and R L DADSWELL

Question by G WIKELL
The authors describe equipment and data processing system for a big traffic study project. What would authors comment to the question of man power demand for various parts of a big measurement project such as this one?

Answer
The project was started in spring 1971 and we got the first data in April 1973, which means two years of system planning, development and testing. 4 research engineers and technical assistants have participated in the project, and altogether some 6 manyears were put into the project during the two years. The exact amount of manpower needed for the different parts is difficult to give, but a rough estimate is: 3/4 manyear for a preliminary study, 2 1/2 manyear for the hardware development, 1 1/2 manyear for the software development and 3/4 manyear for system test. Finally, some 1/2 manyear is until now put into the data analysis.