

"STORE-AND-FORWARD" FACILITY IN TELEGRAPHIC NETWORK
 WITH OVERLOADED SUBSCRIBERS' LINES

Zbigniew DEC, Ryszard SOBCZAK, and Marian ZIENTALSKI

Institute of Telecommunication, Technical University
 Gdańsk, Poland

ABSTRACT

There is influence of S&F facility on uneffective network traffic presented. Slightly decrement of this traffic and insignificant improvement of subscriber line's is showed. New S&F facility, connected with called subscriber, is proposed and is demonstrated possibility of significant improvement of overloaded subscriber accessibility.

1. INTRODUCTION

There are two reasons, which induced to evaluate "Store-and-Forward"/S&F/ facility on telegraphic network with overloaded subscribers' lines. The first is to know if S&F facility decreases uneffective network traffic /traffic of repeated attempts to call/. The second is to find a proper criterion of facility allotment, when most of subscriber's needed new facility and could pay for them.

2. UNEFFECTIVE TRAFFIC

2.1. Network without S&F

Uneffective traffic model is build up founded following assumptions:

- a/ subscriber will not resign of message sending,
- b/ uneffective traffic arised from limited access to interexchange lines is to omit [1],
- c/ duration of unsuccessful attempt to call is $\epsilon = 0.2$ of successful call duration,
- d/ probability β_0 of subscriber's occupation is undepended on attempt number [2].

Ratio of uneffective traffic intensity to effective traffic intensity is called efficiency factor [1]. Figure 1 shows this factor according to occupation probability β_0 . The range of β_0 come from fact, that called subscriber is overloaded.

2.2. Network with S&F

Traffic model for such a network is based on following additional assumptions:

- a/ message delivery acknowledgement duration is $\alpha = 2$ times longer then attempt to call duration,
- b/ elongation of call with S&F device is to omit,

Assumptions follow from call protocol [3]. Interesting efficiency factor is:

$$f_f = \beta_0 \alpha \epsilon \frac{\beta_1}{1 - \beta_1} \quad 2.1$$

where β_1 is calling subscriber's occupation probability. Relative efficiency of

put in S&F facility is equal:

$$\eta = \frac{f_f - f}{1 + f} \quad 2.2$$

Figure 2 presents this dependence for several β_0 .

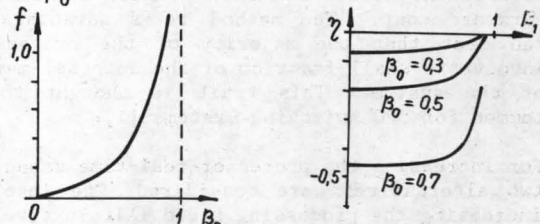


Fig.1 Efficiency factor Fig.2 Relative efficiency factor.

2.3. Subscriber's line

For subscriber's line it is interesting to know relative measure of line's load changes:

$$\eta_l = \frac{\beta_0 \alpha \epsilon - f}{1 + f} \quad 2.3$$

Figure 3 illustrates above dependency.

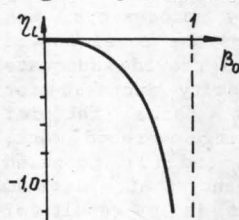


Fig.3 Relative measure

Table 1 Occupation probability

A Erl	β_f	
	1 kb	2 kb
0.3	0.006	0.010
0.4	0.027	0.010
0.5	0.066	0.010
0.6	0.078	0.022
0.7	0.130	0.065

3. CONCLUSIONS

S&F facility reduce uneffective traffic in insignificant degree and doesn't improve subscriber accessibility. For these reasons it is offered new way to use S&F device resources. In new S&F facility buffer is connected with called subscriber and the occupation probability is much smaller. Simulation results for several incoming traffic intensity A /when outgoing traffic is also A/ contain table 1.

REFERENCES

- [1] Z.Dec, R.Sobczak, M.Zientalski, "Służba "Zapamiętaj i Przekaż" w krajowej sieci telegraficznej", Prz.Telekom. R. 55 no 11 pp. 327-330, 1983
- [2] P. Le Gall, "On a Theory of the Repetition of Telephone Calls", Ann. des Telecomm. vol. 24, no. 7-8, 1969
- [3] "Store-and-Forward facilities in use in the swedish telex network", CCITT Study Group X, COM.X-86, 1979.