This probability determines an essential factor in the calculation of the QoS for such an application. To explain the behaviour of this probability one takes the example with s_f=8, f = 0.5, L = 124 bits, t = 15, from where the Figure 3 that determines the probability that a packet is received correctly by the base station for different simultaneous code cases (Abdel Hafez and Alagöz, 2004; Pogacnik *et al.*, 2004).

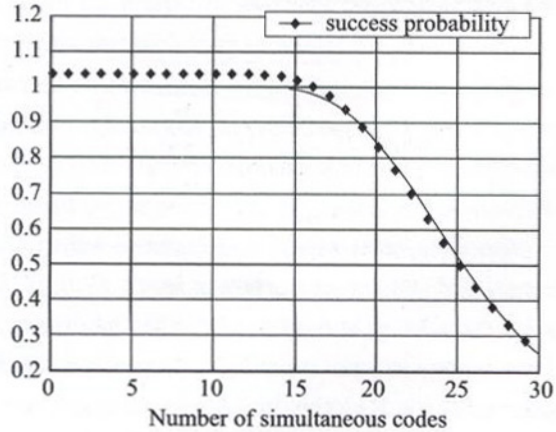

Fig.3. Packet Success Probability.

The graph in the Figure 3, show that the error increases considerably after a limit. For an acceptable service quality, an error lowers than 1% is necessary for voice users and 0.1% for data users. With a small calculation one finds the thresholds of 15 and 13 for voice and data users, successively.

4. Simulation results

The simulation program under MATLAB was tested under several conditions in order to validate it. The parameters used are as follows: voice traffic and data traffic are the same as those defined in section II. While taking the choice of the permission function that permits the acceptance of a maximum number of users with a quality of service (QoS) represented by a probability of loss lower than 1% in the case of voice users and 0.1% in the case of data users. The length of a frame is 16ms, parameters for ON - OFF sources are:

The mean time of speech is ton=1 s.

The mean time of silence is toff= 1.35 s.

The limit of QoS is $S_v = \max(k \mid P_{error}(k) \leq 1\%) = 15$

Parameters taken in the case of ABR traffic (data users) are:

Mean length of a gust is Ls = 100 packets.

Arrival rate per second is λ = 0.5.

As in (Chen *et al.*, 2005), the two functions to compare, in the case of voice users, are a function without limit (classical CDMA) and a second that have the indication of the MAC layer as limit.

$$p_v(x) = f_1(x) = 1 \quad \forall x \qquad \text{(Classical CDMA)}$$

$$p_v(x) = f_2(x) = \begin{cases} 1; & x < K_v \\ 0; & x \geq K_v \end{cases} \qquad \text{(CDMA with limit)}$$

For the classical CDMA there is not a limit on the access to the channel and a user that is needed to send packets use a code immediately. It has the effect to increase the number of simultaneous users and therefore the number of active codes. The CDMA interference increases and as the error probability, but the probability of drop is absolutely zero. The Figure 4 shows the distribution of users, while calculating the active codes on the channel, and the loss probability. When the number of users passes 20 or 30, probabilities that there is a more large number of active codes increase.

In the case of the second permission function the number of active codes is limited to the indication of the MAC layer (S_v). When the simultaneous codes pass this limit, no permission to the channel is allowed.

In Figure 5, one notes that when the number of users increases, the probability that the active codes are in the proximity of this limit increases. The approach of active codes number toward the limit is regular of 20 and 25 users. When this number becomes 30, the graph becomes abnormal. It is due to the congestion. Indeed, most times the active users pass the limit and the probability of permission becomes zero, all users leave the channel and the permission becomes again 1. The system behaviour is then unsteady. The demonstration of this remark is the fact that when the number of active codes is superior to Kv the probability of permission becomes 0 and all new users must leave the channel. In this case the number of active codes becomes lower to this limit and the permission takes the value 1. Note that in the steady zone, probabilities that the simultaneous codes pass the limit of QoS are small and so the error probability. But the considerable drop probability has led to the loss increase (Siwko and Rubin,