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Erlang B traffic model

Table of contents

The Erlang B distribution

The Erlang B distribution is used for dimensioning trunk routes. It is based on the following assumptions:

- There are an infinite number of sources;
- Calls arrive at random;
- Calls are served in order of arrival;
- Blocked calls are lost; and
- Holding times are exponentially distributed.

The Erlang B formula is used to predict the probability that a call will be blocked. The Erlang B formula is:

$$B = \frac{\dfrac{A^N}{N!}}{\displaystyle\sum_{i=0}^{N} \dfrac{A^i}{i!}}$$

where:
   B=Erlang B loss probability
   N=Number of trunks in full availability group
   A=Traffic offered to group in Erlangs

The model calculator

Tables of Erlang B values have been commonly published, but are inconvenient to use. This convenient calculator will find the number of trunks needed to deliver a specified service level given the traffic intensity.

Traffic model using Erlang B

Traffic intensity (Erlangs) [   ]

Fill in one only of the following:

Grade of Service [   ]

Number of channels [   ]

[Calculate] [Reset]

The following buttons will pre-load and calculate example scenarios:

[Example 1] Dimension a tie line route for Grade of Service.

[Example 2] Find the % busy signals on a call centre inbound route.

Interpreting the results

The calculator will calculate either the unknown Grade Of Service or number of trunks required. If the calculation is of the number of trunks required, then it will also calculate the resulting Grade of Service for that number of trunks (which may be a little better than the objective).

Examples description

Example 1

I am planning a remote PABX connected by a tieline that will be used for all inbound calls to that PABX which will have 780 active ends.

I estimate 30mE of inbound traffic per active end, and GOS should be better than 0.002.

How many trunks do I need in the tie line route?

Answer: to carry 23.4E (780*0.03), I need 38 trunks, and the actual grade of service should be 0.0014.

Example 2

My Service Level Objective says that less than 5% of customer calls will get a busy signal.

I have an inbound 2 x E1 trunk route (60 channels) on my call centre is carrying 51.806E. (This is the traffic level in Example 2 scenario on the Erlang C model page.)

Should the incoming route be sufficient to meet my Service Level Objective.

Answer: Yes, busy rate should be about 3.1%.

Return to Telephony Traffic Modelling