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Traffic Analyzer Program

Introduction

The Forecasting process estimates the expected call load for a Call Center based on the observed Historical data. The Scheduling process estimates and allocates the resources based on the expected call load within the service level targets set, and the business objectives of the Call Center. For this reason, part of the Scheduling process is to calculate the number of Agents and Trunks required.

The number of Trunks or Agents required to handle the expected call load depends on the level of service that the Call Center wishes to provide. For Trunk calculations, performance is measured by the level of Blocking, or the Grade Of Service (GOS) that the Trunks provide. For Agent calculations, performance is measured against the delay characteristics that are deemed to be acceptable. These GOS and delay characteristics are typically expressed as the Telephone Service Factor (TSF), which in turn identifies the probability of the delay exceeding a pre-determined threshold.

The TASKE Forecasting tool provides a means of analyzing the call data received from the Telephone System, and a means of performing a what-if analysis on hypothetical data and parameters. The Forecasting tool enables estimating the call duration, number of calls, and number of Agents for a given set of conditions. However, there may be other calculations desired, such as estimating the number of Trunks required, or calculating the average delay in Queue, for a stated set of conditions.

Overview of the Traffic Analyzer

The TASKE Traffic Analyzer performs various traffic calculations relevant to the Call Center. It allows the use of any of the three most commonly applied traffic equations: Erlang B, Erlang C, and Poisson. Among the probabilities that can be calculated are the chance that an incoming call will be blocked, the probability that an Agent will be busy, and the number of Agents required to achieve a specified level of service.

The Traffic Analyzer permits viewing the format and graph the results of various calculations performed by the Traffic Analyzer.

The Traffic Analyzer also has a Cost Justification Guide. This guide is an in-depth profile of the cost components of a Call Center and provides various tables with information on how Call Center statistics are imputed, and how costs are calculated. The guide also describes how a Call Center can decrease costs and increase revenue.

Overview of the Traffic Analyzer Interface

To open the Traffic Analyzer program, double click on the Traffic Analyzer icon in the TASKE ToolBox.

The Traffic Analyzer window is presented.
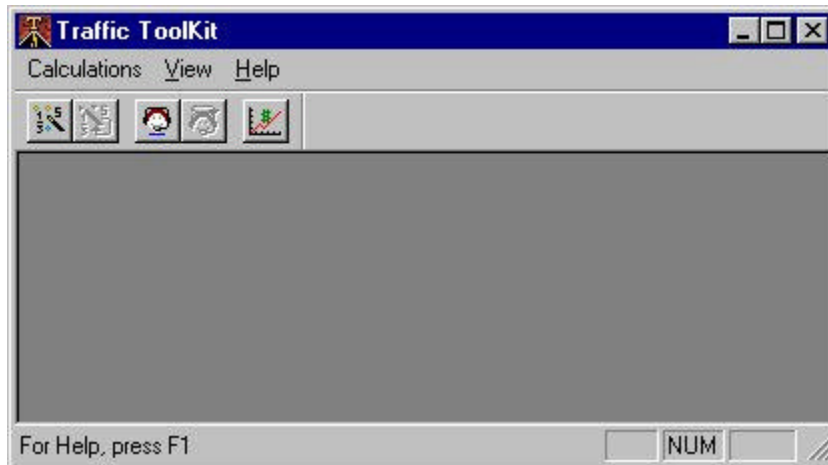
The features available in the Traffic Analyzer program window are described below.

Menu Bar

In the Menu Bar (top of the window) of the Traffic Analyzer, a set of drop-down menus is displayed.

The three menus include Calculations, View and Help and are for creating analyses of the traffic on the phone system, changing the display of toolbars and menus, and accessing the Traffic Analyzer online help.

Tool Bar

In the Tool Bar (top of window, below menu bar) of the Traffic Analyzer program, a set of tool buttons is displayed. The buttons include 2D

Horizontal Bar Graph, Recalculate Current Statistics, Calculate Required Staffing, Recalculate Staffing, and Activate Cost Justification Wizard.

These tools are used to create and recalculate new and existing analyses of traffic, and perform cost justification for a call center.

Main Window
In the Traffic Analyzer Main Window, any analyses of traffic are displayed. The main window appears blank upon entering the traffic analyzer, but different graphs and statistics are displayed once created.

Status Bar

| For Help, press F1 | | NUM | |

The Status Bar (bottom of window) of the Traffic Analyzer displays statistics about the status of the analysis being displayed in the Main Window. The Status bar also displays button names when the mouse pointer is held over a button in the button bar, as well as displaying a brief description of menu options as they are highlighted in the drop-down menus.

Traffic Concepts

The average number of calls and the average call duration are estimated in order to determine the degree of Server utilization over a given period of time.

Note In Teletraffic Engineering terms, a *Server* is a device that accepts telephone traffic. A Server may be a Trunk which accepts calls that originate from an Extension, as is the case for Outbound calls, or an Extension or Agent in the case of Incoming calls. In both instances, the Server is the acceptor of the call.

If a call is not accepted by a Server then it may be Blocked, and the Caller given a busy signal. If the Server is not immediately available but the call is allowed to wait to be accepted, then it will be delayed. The two key service parameters affecting the call and the Servers are Blocking and delay. The traffic load on a group of Servers is determined by multiplying the average call duration by the average number of calls over a given period of time, and is expressed in either Erlangs (number of hours of server time) or CCS (100 call seconds, or centum call seconds of time).

There can be wide variations in the number of calls received over different intervals of time. However, in an ACD Call Center, call arrivals do tend to form hourly, daily, and seasonal patterns; these patterns can be used to analyze traffic and perform estimates on expected traffic loads. Therefore, although telephone call behavior is essentially random over a short period of time, patterns can be detected over longer periods of time.

A rough pattern is established for call duration over a very large number of calls. The pattern is a 'bell curve' with very few calls of very short duration and very few calls of great duration when compared with the average call duration. However, most calls approximate the average. The pattern of call arrivals and call durations has a great affect on how many calls can be handled successfully.

To determine how many Servers should be provided on a telephone or ACD system, the concept of a *Busy Hour* is used.   The Busy Hour is the period of the day when the traffic is the highest.

There are also seasonal variations in traffic over periods such as the Christmas season, where an increase or decrease in the number of incoming calls can be predicted. The term *Busy Season* is used to designate these periods. The Busy Hour is usually measured in the busy season so that an average Busy Hour is found for the Busy Season—or Average Busy Season Busy Hour (ABSBH).

Telephone Systems are typically engineered based on the ABSBH traffic model. This ensures good service at all times, with the exception of peak periods without being excessively expensive.

Blocking

Blocking is the term used to indicate a call, which is unsuccessful, because it cannot be connected, as opposed to a call that connects but finds the called party busy. The probability of Blocking lies between 0 and 100%, and typically falls in the range between 1% and 10%. The probability of a call being Blocked (expressed as P.01 to P.10) is between 1 in 100, and 1 in 10.

In formal traffic engineering terms this probability is termed the Grade of Service (GOS). The higher the GOS, the lower the service provided, the lower the GOS, the higher the service provided.

Queue Delay/Call Abandons

In an ACD situation, successful Callers are placed in Queue and may face a delay. This introduces another measurement of service performance—the *probability of delay*. The less the chance of being delayed and the less the delay, the better the service and vice versa.

In the following example, a threshold delay of 30 seconds is chosen. Service might be considered acceptable if 90% of Callers experience this, or a lesser delay. This is expressed as a service performance target of a '90% probability of delay of less than 30 seconds'. If a Caller is not delayed longer than 30 seconds, then service is considered to be acceptable. If a Caller is delayed longer than 30 seconds, then service is considered to be unacceptable.

Call Duration

The duration of an ACD call typically consists of the following three components.

- The average Queue Time is the time spent in the ACD Queue waiting for an Agent to become free and is often termed the Average Speed of Answer (ASA).

- The average Talk Time is the time the Caller actually spends connected to an Agent, regardless of whether conversation is taking place or not.

- The average Work Time is the time the Agent spends performing paper work in connection with a call, but after the Caller has disconnected.

To a Trunk, the call duration consists only of the Queue Time and the Talk Time; the Trunk (and the Caller) are not involved while the Agent is performing paperwork on Work Time.

To the Extension and Agent, the call duration consists only of the Talk Time and the Work Time; the Extension and Agent are not involved while the call is waiting in Queue on Queue Time.

Thus, the duration of a call usually differs from the perspective of the Trunk carrying the call into the CO or Telephone System PBX from the Extension or Agent who is handling the call.

Service Criteria

To provide good service requires that a call be responded to within or approximately within the Caller's expectations. What does a Caller expect? Good service might be defined by the three components illustrated below.

TELEPHONE SERVICE CRITERIA
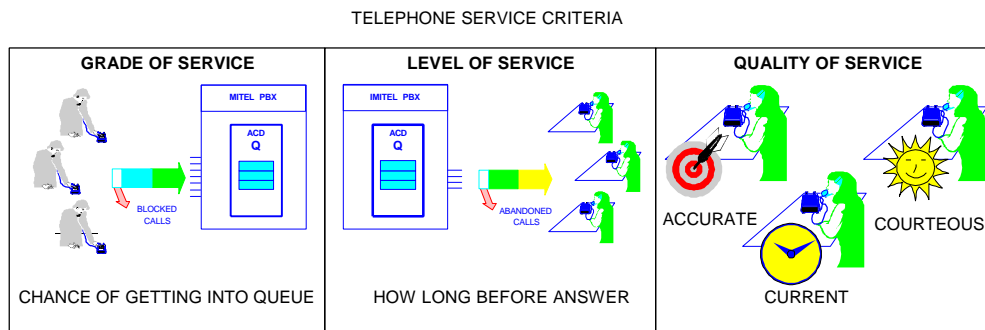
- The Caller expects to have a reasonable chance of obtaining a free Trunk into the system.

- The Caller expects a response within a reasonable amount of time.

- The Caller expects to be treated with reasonable courtesy and to be given reasonably accurate and current information.

Traffic Equations

The Grade Of Service (GOS) is primarily related to the number of Trunks compared to the level of traffic. The delay characteristic is primarily related to the number of Extensions/Agents compared to the level of traffic allowed through by the Trunks.

Traffic engineering revolves around several basic questions concerning the relationship between the following parameters.

- What is the GOS for a given number of Trunks and level of traffic?

- How many Trunks are required to handle a given level of traffic at a particular GOS?

- What is the probability of delay and the amount of delay experienced for a given level of traffic and number of Extensions/Agents?

- What are the delay characteristics?

- How many Extensions/Agents are required to handle a given level of traffic with particular delay characteristics?

Mathematical models that approximate these relationships have been developed but they are complex. The TASKE ToolBox enables the most common of these equations for you to perform the calculations required for traffic engineering.

Two of the equations: Erlang B and Poisson relate the GOS to the traffic and the number of Trunks. The Erlang C equation relates the level of traffic allowed through by the Trunks, to the number of Extensions/Agents and the delay characteristics.

"Erlang B" is the equation most commonly used for Trunk and Blocking calculations. It assumes that there is no queuing and that Callers who get blocked simply give up and do not try the call again.

"Erlang C" is the equation most commonly used for Agent and delay calculations where ACD queuing is employed. It assumes that all Callers who reach the Queue wait until the call is answered, no matter how long it takes.

"Poisson" is another equation sometimes used for Trunk and Blocking calculations. It assumes that there is no queuing, and that all Callers who get a busy signal retry the call.

The following figure summarizes the different traffic equations and the assumptions behind them. The three equations (Poisson, Erlang B and Erlang C) correspond to idealized situations at the corners of the triangle, where the assumptions behind the equations are fully applied. Points "A", "B", "C", "D" represent practical situations.

TRAFFIC EQUATIONS

100% retries　　　　zero queuing

Poisson

A

B

D

zero retries　　Erlang B　　Erlang C　　zero retries
C
zero queuing　　　infinite queuing

TRAFEQNS.DRG
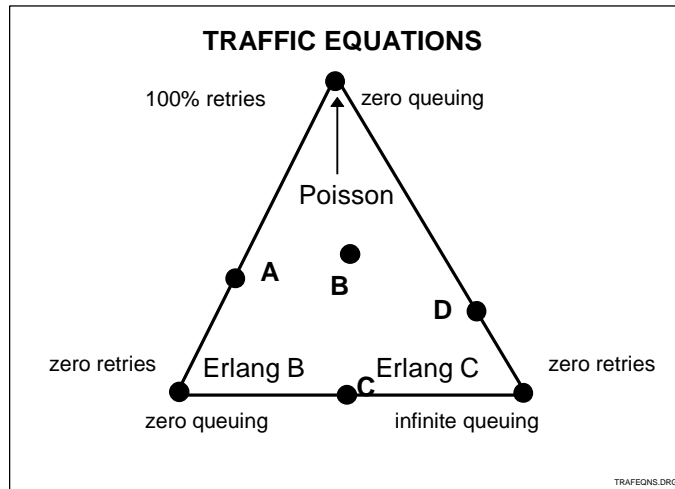
Service Percentage - Level of Abandons

The *Service Percentage* is a term used to represent service performance. This is the percentage of calls which obtain a Trunk and are answered compared to the total number of calls which obtain a Trunk, and is the inverse of the rate of abandons. For example, if 6% of Callers abandon while waiting in the Queue, then the *Abandon Rate* is 6%, and the Service Percentage is 94%.

Telephone Service Factor - Speed of Answer

As mentioned previously, the TSF is the ratio of calls that obtain a Trunk and are either answered or abandoned before a threshold time, to the total number of calls which obtain a Trunk. The Telephone Service Factor is illustrated below.

Service Parameters

Service Percentage = (B+D)/(A+B+C+D)　　　　Telephone Service Factor =

Num. of Calls

16
14
12
10
8
6
4
2
0

A　**C**

B　**D**

Abandoned Calls

Answered Calls

10　20　30　40　50　60　70　80　90　100　110　120　130　140　150　160

Time (seconds)
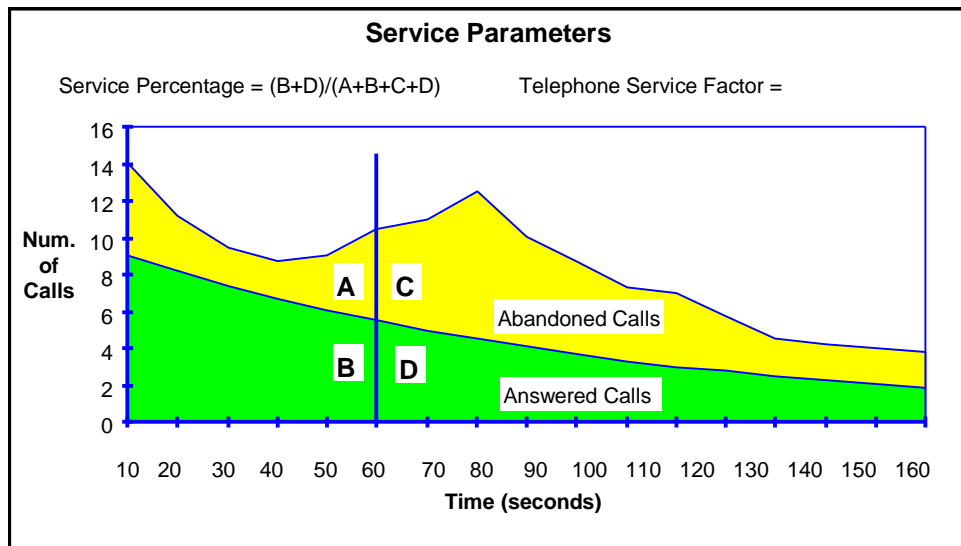
Using the Traffic Analyzer program

Creating a Traffic Analysis

The Calculation Wizard prompts for all of the information needed to create a graph of the traffic analysis calculation.

1. Click the Calculation Wizard button.

2. The Statistic Selection dialog box appears. Choose the class of algorithm for the traffic calculation. The choices are:

Erlang C Model

Erlang C modeling assumes calls placed by a source that are blocked will never hang up, but will queue forever waiting for a server to come free. This model follows the characteristics of an incoming ACD caller to an ACD group or a caller into a Pilot Group.

Erlang B Model

Erlang B modeling assumes that calls placed by a source that are initially blocked will not reattempt the call and that the call will not queue up waiting for a server to come free. When the call is initially blocked, the caller hangs up and NEVER re-attempts to originate again. This distribution typically models outgoing trunk groups.

Poisson Model

Poisson modeling assumes that calls placed by a source that are initially blocked will hang up and reattempt the call at random intervals until the call successfully connects OR until it has waited the length of time the call would have lasted if not blocked. The model assumes that calls will never queue. This distribution is not widely used in North America, but is provided for completeness.

The Erlang C formula is used to model ACD Queues and Agent Groups. Erlang B and Poisson are formulae used to model Trunking and Blocking.

Choose the class of algorithm (Erlang B, Erlang C, or Poisson) to use for the traffic calculation, and click Next.

3. Depending on which traffic model was selected, one of three dialog boxes open. The dialog boxes are illustrated below. Each dialog box contains a list of formulae, which corresponds to the traffic model selected.
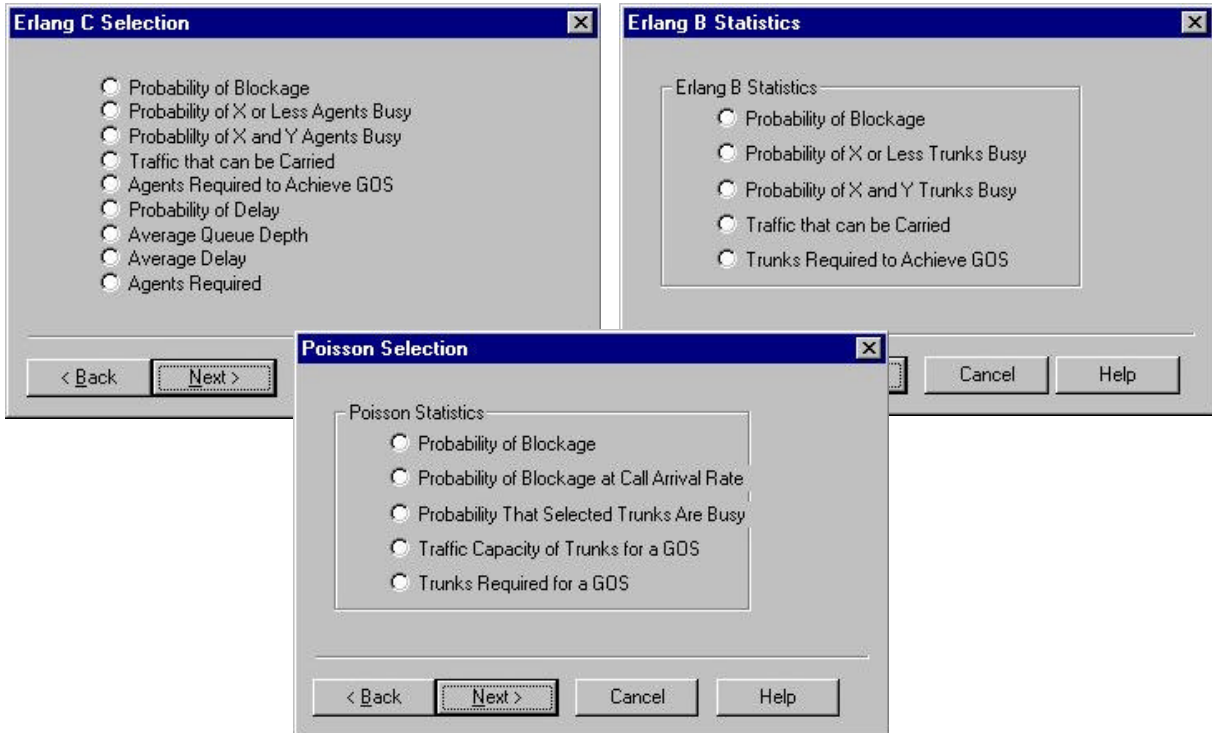
Tip To get detailed information on any dialog box in the Wizard, click its Help button.

For Erlang C, follow the directions below. For Erlang B, skip to the next section of this manual "Erlang B", on page 18. For Poisson, skip to the section of this manual titled "Poisson" found on page 21.
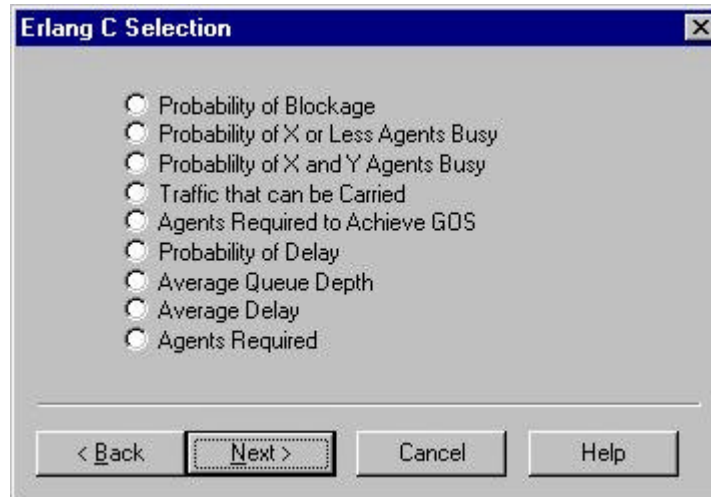
Erlang C

Selecting Erlang C opens the dialog box illustrated below.

The Erlang C Selection allows the following calculations to be performed. The explanation of each of the parameters shown above together with an example indicates how these calculations are used to manage Call Center traffic.

Probability of Blockage (ERLC_GOS formula)

This calculation relates the GOS to the number of Agents and the call load (or the number of calls per hour and the average duration of these). The calculator accepts the number of calls per hour, the average call duration, and the number of available Agents as parameters. The GOS that results from the call load being presented to a given number of Agents, may be determined.

For example, the Probability of Blockage calculation can be applied to estimate the expected call load and to know how many Agents are scheduled to work. Then, you can calculate the GOS that Callers are expected to receive. Although the GOS is generally stated as the probability of Blockage, the GOS in an Erlang C model actually represents the probability that a Caller will experience a delay. Thus, a GOS of P.10, or 10%, means that a Caller has a 10% chance of being delayed.

Probability of X or Less Agents Busy (ERLC_X_CHAN formula)
This calculation determines the probability that X Agents are simultaneously busy when a given call load is presented to a limited number of available Agents. The calculator accepts the number of calls per hour, the average call duration, and the number of available Agents as parameters. It then calculates the probability of a specified number of Agents being busy at any point in time.

This calculation is used to determine the probability of having no Agents that are busy (i.e. All Agents idle). Agent utilization, or the proportion of time that an Agent is busy compared to the total work time of the Agent, depends on the call load and the number of Agents available.

For a certain call load and a limited number of Agents, the calculation reveals that an Agent(s) would be idle for a significant proportion of the time. Then, you might consider reducing the number of Agents for the shift. However, there is a close relationship between Agent utilization and the TSF experienced by Callers. Particularly for a small Agent group, you may find that a relatively low Agent utilization is the price that must be paid to ensure a high level of service to Callers.

This calculation determines the probability that between X and Y Agents are simultaneously busy when a given call load is presented to a given number of available Agents. The calculator accepts as parameters, the number of calls per hour, the average call duration, and the number of available Agents, and calculates the probability that greater than X and fewer than Y Agents are busy at any point in time.

This calculation determines the probability that between X and Y Agents are simultaneously busy when a given call load is presented to a given number of available Agents. The calculator accepts as parameters, the number of calls per hour, the average call duration, and the number of available Agents, and calculates the probability that greater than X and fewer than Y Agents are busy at any point in time.

This calculation determines the probability that four or more Agents in a group of eight are busy at any known point in time. If you supervise a Queue with eight Agents in the morning work shift and four Agents in the afternoon work shift, you can calculate the affect of reducing the number of Agents to four for the morning work shift.

Probability of X and Y Agents Busy (ERLC_INTEG formula)
This calculation determines the probability that between X and Y Agents will be simultaneously busy when a current call load is presented to a limited number of available Agents. The calculator accepts the number of calls per hour, the average call duration, and the number of available Agents as parameters. Then, it calculates the probability that no fewer than X, and no more than Y Agents are busy at any point in time.

You can use this calculation to determine the traffic on the least occupied Agents in an Agent Group. For example, you can calculate the probability of Agents 8 to 10 (for a group of 10 Agents) being busy when presented with 250 calls per hour, and having an average duration of 70 seconds. This calculator calculates the probability of Agents 8 to 10 being busy and determines whether the individual Agent traffic justifies the cost.

Traffic that can be Carried (ERLC_TRAF formula)
This calculation determines the traffic or call load that can be handled by a limited number of Agents within a given GOS. The calculator accepts the number of available Agents, the required GOS, and the average call duration as parameters. Then, it calculates the number of calls per hour that can be handled.

For example, you can determine the call load, with an average call duration of 70 seconds, that can be handled by four Agents, while maintaining the GOS within the company's target of P.05. This calculation can demonstrate that the number of calls per hour that can be handled is less than expected. To remedy this, you can either increase the number of Agents to maintain the GOS within target, or the GOS must be allowed to decline to enable the call load to be handled by the available Agents.

Agents Required to Achieve a GOS (ERLC_TKS formula)
 This calculation determines the number of servers (or Agents in this case) required to handle a certain call load within an acceptable GOS. The calculator accepts the number of calls per hour, the average call duration of those calls, and the required GOS as parameters. Then, it calculates the number of Agents required to handle the calls.

For example, you can determine how many Agents are required to handle 300 calls per hour at an average call duration of 80 seconds, while maintaining the GOS rating at P.20. If this calculation shows that the number of Agents required is more than

the number you expect to have available, then the GOS will be worse than the target GOS of P.20.

Probability of Delay (ERLC_DELAYT formula)
This calculation determines the probability of a Caller having to wait a minimum of XX seconds to be answered, when a limited number of Agents are presented with a certain call load. The calculator accepts the number of seconds for the threshold time, the number of calls per hour, the average call duration of those calls, and the number of available Agents, as parameters. Then, it calculates the probability of Callers having to wait for at least the threshold time.

For example, you can determine the probability of Callers that will have to wait more than 20 seconds for an Agent to respond, when 30 calls per hour with an average single call duration of 70 seconds, are presented to 3 Agents. If the Call Center's level of service target is that 80% of calls be answered within 15 seconds, then 20 seconds might be considered a very poor response. The Supervisor can use this probability to know the number of Callers that receive this poor level of service.

Average Queue Depth (ERLC_AVQ formula)
This calculation determines the average number of Callers waiting in the Queue at any point in time, when there are a limited number of Agents being presented with a certain call load. The calculator accepts the number of calls per hour, the average call duration of those calls, and the number of available Agents as parameters. Then, it calculates the average number of Callers who are delayed and waiting in the ACD Queue at any point in time.

Note Because this calculation produces a value for the average number of Callers, the result may not be a whole number. For example, in the first second there may be one Caller waiting in Queue. For the next three seconds there may be no Callers waiting; the average probability is then 1+3/4 = 1.25 Callers in Queue.

This calculation determines the average number of Callers waiting in Queue, when 70 calls per hour with an average call duration of 70 seconds, are presented to 4 Agents.

Use this calculation to determine the amount of Recorded Announcement Devices (RAD) that are required to provide Queue delay announcements to Callers. For example, if the calculation indicates that the average number of Callers in Queue is 0.03, then enough RAD equipment to deliver an announcement to one Caller

at a time is required. If the calculation for a larger Queue were to indicate that the average number of Callers in Queue is 3.8, then it would probably be wise to provide enough RAD equipment to deliver announcements to 5 Callers at a time; sometimes there are more Callers in Queue than the <u>average</u>.

Average Delay (ERLC_AVGDLY formula)

This calculation determines the average time that a Caller waits in the ACD Queue before being answered by an Agent, when a limited number of Agents is presented with a certain call load. The calculator accepts the number of calls per hour, the average call duration of those calls, and the number of available Agents as parameters. Then, it calculates the average delay experienced by the Callers.

For example, you can determine the average waiting time for Callers when 7 Agents are presented with 70 calls per hour with an average call duration of 70 seconds. In this case, the average wait is insignificant. If different parameters are applied and the wait time is considered to be too long, then additional Agents should be made available, or the average call duration should be decreased.

Agents Required (ERLC_AGENTS formula)

This calculation determines the number of Agents required to handle a given call load within a stated TSF. The calculator accepts the number of calls per hour, the average call duration of the calls, and the required TSF percentage and time as parameters. Then, it calculates the number of Agents required to handle the call load within the TSF requirements.

For example, you can determine the number of Agents required to handle 150 calls per hour, with an average duration of 80 seconds, and within a TSF of 80% of calls answered or abandoned within 20 seconds. This is a key calculation in the Forecasting and Scheduling process.

Choose the type of statistic from the choices above for the calculation to represent, and click <u>N</u>ext >.

4. Enter the calculation parameters in the Wizard dialogs as they appear. After each dialog, click Next >.

5. In the final dialog in the path, click Finish > to create the analysis graph.

For Erlang C, follow the directions above. For Erlang B, follow the directions below. For Poisson, skip to the section of this manual titled "Poisson" found on page 21.

Erlang B

Selecting Erlang B opens the dialog box illustrated below.
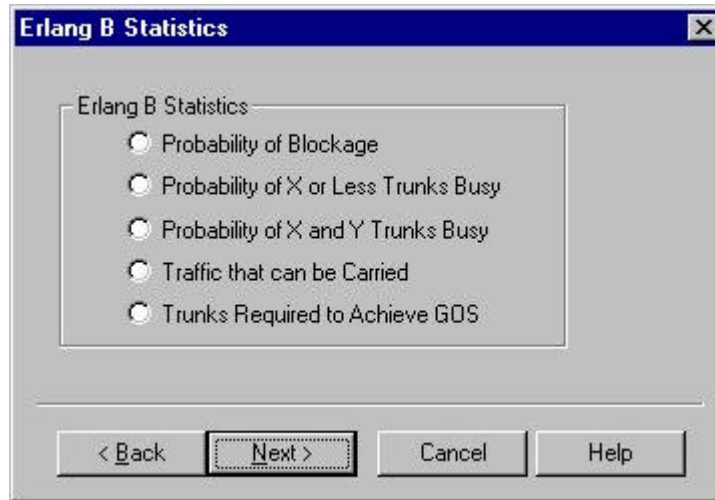
Probability of Blockage (ERLB_GOS formula)
This calculation relates the Grade Of Service (GOS) to the number of Trunks and to the call load (or the number of calls per hour and the average duration of these). The calculator accepts the number of calls per hour, the average call duration, and the number of available Trunks as parameters Then, it calculates the GOS that results from the designated call load being presented to the designated number of Trunks.

For example, you can determine the probability of a Caller receiving a busy signal when trying to access an outgoing Trunk under the following conditions: it is expected that the number of outgoing calls is 150 per hour; the average call duration is 70 seconds; and the number of Trunks is 3. In an Erlang B model, the GOS directly represents the level of Blocking. This calculation results in a P.34 chance of receiving a busy signal. This means that a Caller trying to access an outgoing Trunk has a 34%, or approximately a 1 in 3 chance of receiving a busy signal. This is a very poor level of service. The GOS would typically be in the range of P.01 to P.10.

Probability of X or Less Trunks Busy (ERLB_X_CHAN formula)
This calculation determines the probability that exactly X number of Trunks will be simultaneously busy when a stated call load is presented to a given number of available Trunks. The calculator

accepts the number of calls per hour, the average call duration, and the number of available Trunks as parameters. Then, it calculates the probability that exactly the specified number of Trunks are busy at any point in time.

For example, you can determine the probability of getting an all Trunks busy condition in a group of 4 Trunks under the following conditions: there are 250 calls per hour, with an average duration of 70 seconds. The calculation results in a probability of about 0.39, meaning that there is a 39% chance of all 4 Trunks in the group being busy at the same time. This can also be expressed as precisely 4 Trunks being busy for 39% of the time.

Probability of X and Y Trunks Busy (ERLB_INTEG formula)
This calculation determines the probability that between X and Y Trunks will be simultaneously busy when a current call load is presented to a limited number of available Trunks. The calculator accepts the number of calls per hour, the average call duration, and the number of available Trunks as parameters. Then, it calculates the probability that no fewer than X, and no more than Y Trunks are busy at any point in time.

You can use this calculation to determine the traffic on the least occupied Trunks in a Trunk Group. For example, you can calculate the probability of Trunks 8 to 10 (for a group of 10 Trunks) being busy when presented with 250 calls per hour, and having an average duration of 70 seconds. This calculator calculates the probability of Trunks 8 to 10 being busy and determines if the individual Trunk traffic justifies the cost.

Traffic that can be Carried (ERLB_TRAF formula)
This calculation determines the traffic (call load) that can be handled by a limited number of Trunks within a certain GOS. The calculator accepts the number of Trunks, the GOS required to be met, and the average call duration as parameters. Then, it calculates the number of calls per hour that can be handled. Alternatively, the number of calls can be used. In this case, the calculator determines the average call duration needed in order to meet the GOS.

For example, you can determine the call load, with an average call duration of 70 seconds, that can be handled by three Trunks while maintaining the GOS within the company's target of P.03. If this calculation shows that the number of calls per hour that can be handled is less than expected, then the number of Trunks must be increased to maintain the target GOS. Otherwise, the level of

Blocking must be allowed to worsen to enable the call load to be handled by the Trunks that are available.

Alternatively, the same calculation might be performed with a known number of calls per hour. The calculator then determines the average call duration that can be accepted while still remaining within the target GOS.

Trunks Required to Achieve a GOS (ERLB_TKS formula)
This calculation determines the number of Trunks required to handle a certain call load within a stated GOS. The calculator accepts the number of calls per hour, the average call duration of those calls, and the required GOS as parameters. Then, it calculates the number of Trunks required to handle the call load within the required GOS.

For example, you can determine the number of Trunks required to handle 150 calls per hour, with an average duration of 70 seconds, within a GOS of P.02. This is a key calculation in the Forecasting and Scheduling process.

Choose the type of statistic from the choices above for the calculation to represent, and click Next >.

4. Enter the calculation parameters in the Wizard dialogs as they appear. After each dialog, click Next >.

5. In the final dialog in the path, click Finish > to create the analysis graph.

For Erlang C, follow the directions on page 13. For Erlang B, follow the directions above. For Poisson, follow the directions below.

Poisson

Selecting Poisson opens the dialog box illustrated in below.
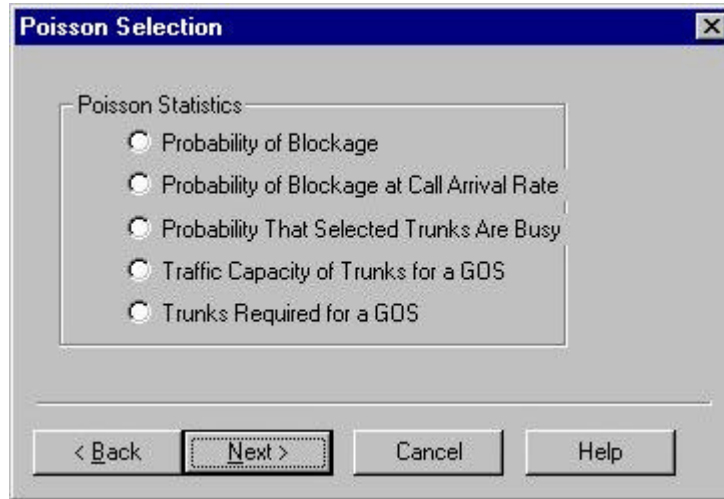
This calculation relates the GOS to the number of Trunks and the call load (the number of calls per hour and the average duration of these). The calculator accepts the number of calls per hour, the average call duration, and the number of available Trunks as parameters. Then, it calculates the GOS that results from the call load being presented to the designated number of Trunks.

Although the GOS generally means the probability of Blockage, the GOS in the Poisson model represents the probability that a Caller will receive a busy signal on the first call attempt. The Poisson model assumes that Callers who meet a busy condition will re-try the call. The GOS in the Poisson model does not necessarily represent the probability of a call being unsuccessful, only that it is unsuccessful on the first attempt.

For example, you can determine the probability of getting an all Trunks busy condition in a group of 4 Trunks, where there are 150 calls per hour with an average duration of 70 seconds. The calculation results in a probability of approximately 0.33, meaning that there is a 33% chance of all 4 Trunks being busy at the same time. Because the Poisson model assumes that Callers who meet a busy condition on the first call attempt re-try the call, this is not the same as saying that the Callers have a 33% probability of being unsuccessful in obtaining a Trunk.

Probability of Blockage at Call Arrival Rate (POIS_GOS formula)

This calculation relates the probability of call Blocking to the number of Trunks and to the call load (the number of calls per hour and the average duration of these). The calculator accepts the number of calls per hour, the average call duration, and the number of available Trunks as parameters. Then, it calculates the probability of call Blocking that results from a certain call load being presented to a given number of Trunks.

The term 'probability of Blocking' is used here to distinguish this calculation from that of the Poisson GOS. The probability of Blocking is the chance that a Caller will meet a busy signal on repeated call attempts, whereas, the Poisson GOS relates only to the chance of receiving a busy signal on the first attempt.

For example, you can determine the probability of a Caller being unsuccessful in getting a free Trunk (even after re-trying the call), when four Trunks are presented, with 150 calls per hour, and an average call duration of 70 seconds. The calculation results in a probability of about 0.16, meaning that there is a 16% chance of a Caller meeting a busy condition on the first and subsequent call attempts.

Notice that the result here is 16%, as opposed to the 33% result obtained when the Poisson GOS was calculated. Together these results mean that the Caller has a 33% chance of meeting a busy condition on the first call attempt and a 16% overall chance of meeting a busy condition on all call attempts.

Probability That Selected Trunks Are Busy (POIS_INTEG formula)

This calculation determines the probability that X Trunks or fewer are busy at any point in time when a certain call load is presented to a limited number of Trunks. The calculator accepts the number of calls per hour, the average call duration, and the number of Trunks as parameters. Then, it calculates the probability that X or fewer number of the Trunks will be busy at any point in time.

This calculation might be applied where you suspect that you have too many Trunks in a Trunk Group and you wish to determine the peak number of Trunks required. In this situation you may wish to know the probability that eight or fewer Trunks are busy in a group of 10, when presented with 150 calls per hour, with an average call duration of 70 seconds.

This calculation might be applied where you suspect that you have too many Trunks in a Trunk Group and you wish to determine the peak number of Trunks required. In this situation you may wish to know the probability that eight or fewer Trunks are busy in a group of 10, when presented with 150 calls per hour, with an average call duration of 70 seconds.

This calculator allows you to calculate the probability that 8 or fewer Trunks are busy. Then, you can calculate the probability that 9 or fewer Trunks are busy. If the difference between the probability of 9 or fewer Trunks, and 8 or fewer Trunks being busy is small, then it may be that no more than 8 Trunks are required (statistical comparison).

Traffic capacity of Trunks for a GOS (POIS_TRAF formula)
This calculation determines the traffic or call load that can be handled by a limited number of Trunks within a stated GOS. The calculator accepts the number of Trunks with the required GOS, and the average call duration as parameters. Then, it calculates the number of calls per hour that can be handled.

For example, you can determine the required call load, with an average call duration of 70 seconds, that can be handled by three Trunks, while maintaining a GOS within the value of P.03. If this calculation shows that the number of calls per hour that can be handled is less than expected, then the following is true. The number of Trunks must be increased to maintain the GOS within target, or the level of Blocking must be allowed to worsen to enable the call load to be handled by the Trunks that are available.

Note The Blocking formula used in this function is that described in the 'Probability of Blockage at a call arrival rate', not that described in the 'Probability of Blockage for a GOS'.

Trunks Required for a GOS (POIS_TKS formula)
This calculation determines the number of Trunks required to handle a given call load within a given GOS. The calculator accepts the number of calls per hour, the average call duration of these calls and the required GOS as parameters. Then, it calculates the number of Trunks required to handle the call load within the GOS requirement.

For example, you can determine the number of Trunks required to handle 150 calls per hour, with an average duration of 70 seconds, within a GOS of P.02. This is a key calculation in the Forecasting and Scheduling process.

> **Note** The Blocking formula used in this function is that described in the 'Probability of Blockage at a call arrival rate', not that described in the 'Probability of Blockage for a GOS'.

Choose the type of statistic from the list above for the calculation to represent, and click <u>N</u>ext >.

4. Enter the calculation parameters in the Wizard dialogs as they appear. After each dialog, click Next >.

5. In the final dialog in the path, click Finish > to create the analysis graph.

Traffic Report Components

When a traffic model is selected and one of its formulae is used to perform calculations, a report is presented that resembles the sample Traffic Analyzer report below.
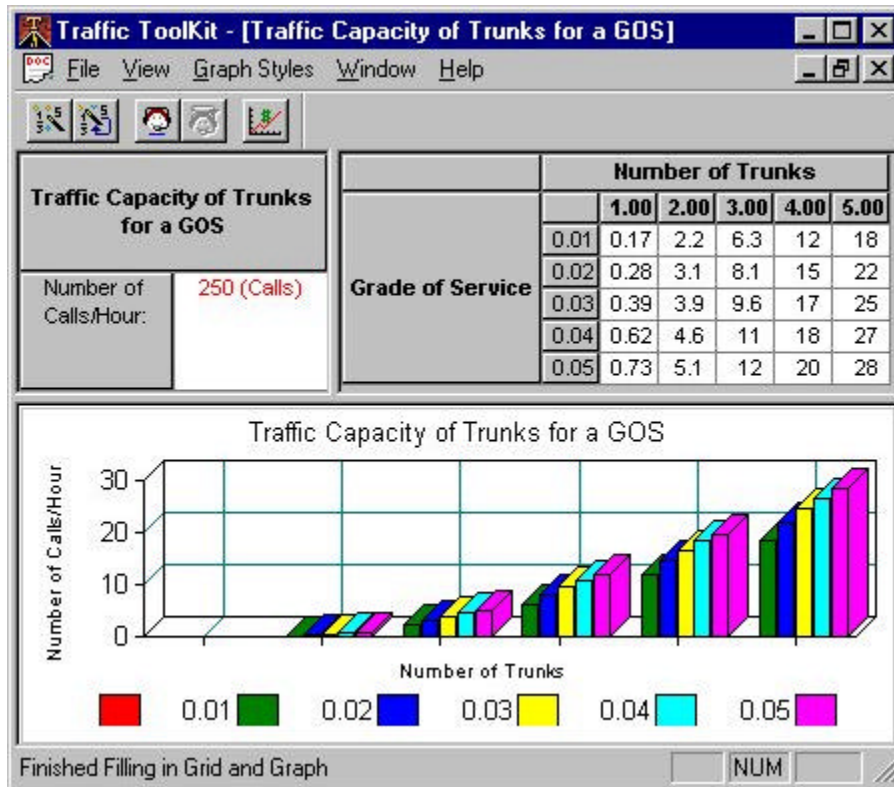
Each report provides an example of the calculation that corresponds to the calculator. All reports contains the following three sections.

- The top left hand side of the report provides a brief explanation of the calculation performed, and any relevant criteria. For example in the above analysis, the report displays that the calculation performed is "Traffic Capacity of Trunks for a GOS" and the calculation is based on the criteria of 250 calls per hour.

- The top right hand side of the report contains the results of the calculation in the form of a table. The example above displays the Grade Of Service required by the Number Of Trunks available. The data in this table corresponds to the graph displayed below, in the bottom half of the report.

- The lower section of the report contains a chart or graph produced using the parameters, data, and results from the table in the top-right section.

The report can be customized, and the values used by the formula can be modified. A re-calculation based on modifications to the formula is provided.

Recalculating your Traffic Analysis with new parameters

You can quickly change the parameters of an existing traffic analysis calculation by using the Recalculation Wizard.

To recalculate your traffic analysis
1. Click the Recalculation Wizard button.

2. Enter the new parameters in the dialogs as they are presented.

3. At the final dialog, click Finish to create your analysis graph.

Switching between Line, Bar and Pie Charts

By default, all analysis data is displayed in a Simple Line Chart. If your analysis lends itself to presentation in another chart style, you can easily switch to another of the sixteen available styles.

To present your data in a line chart
1. Use the Calculation Wizard to produce a Simple Line Chart of your data.

2. Click Graph Styles, Line Charts

3. Choose one of the four styles of line charts from the flyout list.

To present your data in a bar chart
1. Use the Calculation Wizard to produce a Simple Line Chart of your data.

2. Click Graph Styles, Bar Charts

3. Choose one of the ten styles of bar charts from the flyout list.

To present your data in a pie chart
1. Use the Calculation Wizard to produce a Simple Line Chart of your data.

2. Click Graph Styles, Pie Charts

3. Choose one of the two styles of pie charts from the flyout list.

To enter your own values select the Calculations menu and click on **Staffing**.

Staffing Requirements

The staffing option performs calculations with custom input parameters, and produces reports. The Staffing window is divided into three sections, the Traffic Model Information panel, the Data Table panel and the Graph panel.

Traffic Model Information panel

The Traffic Model Information panel shown below contains 5 boxes that allow entry of parameters. This dialog box is initially filled with default values for all entries; data can be entered as single values or within a range.

| Traffic Model Information	
Avg. Calls/Hour:	250
Avg. Talk Time (sec):	70
Serv. Goal (%):	80
TSF Time (sec):	20
Agts Required:	7

The Average Calls/Hour, Average TalkTime, Service Goal, TSF Time, and Agents Required can be edited in the Traffic Model Information Block. Once the values are entered, the probability of queuing, probability of delay, average delay time, and average queue depth in the Data Table panel is updated in text format and the Graph panel is updated in graphical format. An example of these variables in the Data Table panel is shown below.

Data Table panel

Agents	Prob. of Queueing (%)	Prob. of Delay (%)	Avg Delay Time (sec)	Avg Queue Depth (calls)
4	100.00	100.00	1000.00	1000.00
5	93.13	89.51	469.37	32.59
6	53.86	38.90	33.10	2.30
7	29.19	15.84	9.55	0.66
8	14.77	6.02	3.29	0.23
9	6.96	2.13	1.18	0.08
10	3.05	0.70	0.42	0.03

Graph panel

An example of the variables displayed in graph format is shown below.
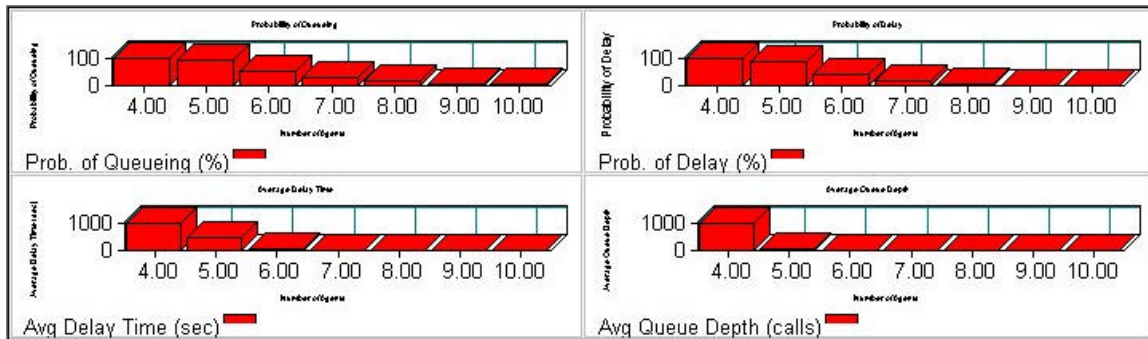
The Cost Justification Guide

It is essential to understand the cost components and structure of the Call Center. The Traffic Analyzer aids in justifying cost requirements to senior management, and assists in the overall management and operation of the Call Center.

The Guide describes how to calculate cost components using hypothetical cost figures. The cells in the tables of the Guide can be edited costs entered that correspond to the Call Center. The Call Center Guide provides various suggestions for reducing Call Center operating costs and for increasing Call Center revenues.

To open the Cost Justification Guide, select Calculations from the file menu and click on Cost Justification and the tutorial is then opened. The Call Cost Justification Guide provides a model for understanding the cost structure of a Call Center. To help illustrate the model, an example of a hypothetical Call Center's cost structure is provided. This is important to understand because the basis for cost justification comes from projecting how features of the equipment will impact the cost structure of the Call Center.

The Cost Justification Wizard includes the following sections:

Call Center Cost Dynamics

Your total call center costs include Loaded Labor Costs, Equipment and Automation Costs, and Transmission Costs. The relative proportion of each cost is illustrated in the Call Center Cost Dynamics chart.

Load Labor Costs

Call center load labor costs are calculated from the following cost components:

- Agent cost per hour

- Facility cost per agent per hour

- Supply cost per agent per hour

- Management and support staff cost per hour

Equipment and Automation Costs

Call Center Equipment and Automation costs may include the ACD system, the computer system, and the furniture used by employees. Equipment and Automation costs are measured in cost per work station units.

Transmission Costs

Transmission Costs include the cost of both voice and data transmission.

Reducing Call Center Costs

Call Center managers must justify the costs of equipment features by identifying the operational savings they provide. Cost justification examples are provided for the following call center features:

- Delayed Answer

- Agent Telephone

- Wrap-Up Data Entry

- Voice Response

Increasing Call Center Revenue

Total annual revenues may significantly increase with the use of an ACD system. Your potential increased revenue can be determined using the Increasing Call Center Revenue Worksheet.