T-Lib User Guide V7.5

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Contents

1 Introduction

1.1 T-Lib Introduction

T-Lib is a library of call-centre calculation routines that can be used with:-

- Excel spreadsheets. A large repertoire of functions suitable for use with spreadsheets are provided. Each spreadsheet function returns just a single value, making the functions easy to call from a spreadsheet.
- Programming projects. Specific guidance is provided for
  - Delphi/Pascal
  - Visual Basic

  Users of other languages, should see the interface information for details of the subroutine calling conventions used by T-Lib.

1.2 Error Codes

There are a number of error codes that can be returned by the functions, which are listed in table 1.Note that the ”programming routines” return the values listed below, while the ”spreadsheet routines” return the negative of these values.

Error Code		Meaning
Value	Name	
0	OK	Normal, calculated values are valid.
1	Zero_Zero	Both the workload (call rate or call duration), and the number of agents are zero. Valid calculations cannot be performed.
2	Overloaded	The workload exceeds the capacity of the agents, and valid results cannot be calculated.
3	Invalid_Input	One or more of the input parameters has an invalid value.
4	Internal_Error	An internal programming error has occurred. See ”Reporting Internal Errors”.
5	Iterations_Exceeded	An iterative calculation cannot reach the required accuracy. See ”Reporting Internal Errors”.
6	Infeasible_Agent_Limits	Limits of the number of agents are either contradictory or infeasible. The associated ”Result Code for Agent Limits” provides additional information.
9	No_Licence	You are attempting to use a function that requires a licence, but there is no licence installed. All calculated values will be set to zero.

Table 1: Error codes

Reporting Internal Errors

If you get any of the error codes Internal_Error, SubError, or Iterations_Exceeded then you should first check that the parameters you are supplying to the routine make sense. For example, there is no point in using the Limited Queue Size model with a queue-size limit of several thousand, since that is effectively an unlimited queue size. If you do encounter any of the above errors because you are using extreme or invalid input values, then please report the error, because it means the checking of input values is incomplete and needs to be improved. When reporting errors we obviously need a clear statement of the routine you are trying to use, the input values you are using that gave rise to the error, and the error code that was actually returned (or other error condition that resulted).

1.3 Interface Information

This information is intended for people with detailed knowledge of programming environments. You do not need to understand this section for using T-Lib in spreadsheets.

Parameter Types

Table 2 shows the two types of variable used as parameters by T-Lib routines, and how those variable types are designated in different programming languages.

Variable type	Delphi/Lazarus	VB	C/C++
64-bit floating point	double	double	double
32-bit signed integer	longint	longint	long int

Table 2: Parameter types

Subroutine Calling Conventions

The T-Lib functions are written in Lazarus/Free Pascal, and are declared with the ”stdcall” attribute, which means

- Parameters are put on the stack ”right to left”, which means the rightmost parameter is evaluated and pushed onto the stack first.
- The called routine cleans up the stack on termination.
- Parameters are not passed in registers.

1.4 Spreadsheet Functions

Spreadsheet functions return just a single value, which means the functions are straightforward to use to provide a single value for a spreadsheet cell. There is a separate function for each of the performance values that can be calculated for a queueing model. Error codes, such as an indication that the input parameters are invalid, are returned in the following way. All of the performance statistics, for example service level, are non-negative. Error codes are returned as negative values, and can be recognised as error codes because a valid result would be either zero or positive. Spreadsheet functions can also be used for programming, except that the ”programming functions” are likely to be more convenient and more efficient.

1.5 Programming Functions

Programming functions may return more than one value, and return an error code as a separate variable. This makes the routines difficult to use in a spreadsheet, but is more convenient in a programming environment.

2 Using Tlib with Delphi

2.1 T-Lib support for Delphi

A Delphi unit (in source code form) containing declarations of all the T-Lib functions is provided. The module is called

```
TLibIntf.pas
```

and is in the folder

```
c:\Program Files\Mitan\TCalc suite\TLib and Delphi
```

A sample Delphi application is provided, with all the source code, showing how you can use T-Lib with Delphi. the sample Delphi project is in the folder given above.

2.2 Additional functions

Extra functions are provided for use with programming projects, in addition to the functions normally used with Excel. Excel functions need to return a single value, while from a Delphi program you can call functions that return several values at once.

3 Using Tlib with Excel

3.1 Excel and T-Lib

Incorporating Tlib in an Excel workbook is straightforward. You must include a Visual Basic (VB) module (provided with T-Lib), in each Excel workbook using T-Lib. This is simple to do (see instructions below) and no knowledge of VB is needed. The included VB module just contains the definitions of the T-Lib functions so that Excel knows about them and how to call them.

3.2 Including the VB module

1. Open or create the Excel workbook in which you wish to use T-Lib functions.
2. Press ALT + F11 This displays the Visual Basic editor thst is built-in to Excel.
3. With the VB editor showing, click the menu item File / Import File. The usual open-file dialog will be displayed.
4. Navigate to the file

   ```
   c:\Program Files\Mitan\TCalc Suite\TLib and Excel\basTLib.vba
   ```

   Note this file will be in the folder in which T-Lib was installed, which may be different from the default folder above.
5. Open this file, which will import the file into your workbook. You do not have to do anything else with this file, and you don't need to know anything about Visual Basic. The file just has to be present so Excel can find the TLib functions.
6. Press ALT + F11 again to get back to the normal spreadsheet display.

3.3 T-Lib function call format

The format of a T-Lib function call is:

```
=ElgCAgts(CALLDUR,CALLRATE,ITVLTIME,TGTAPCT,TGTATME)
```

which is the same as calling any other Excel function.

3.4 Notes

Using VB in this way to access T-Lib is regarded as using Excel "macros", and when you open the workbook you will be asked by Excel whether macros are to be enabled. You must answer yes to this question to allow T-Lib to operate

4 Using Tlib with C/C++ and other languages

4.1 C/C++ and others

As TLib is implemented as a DLL, it can easily be used with other programming languages and packages. The user will need to translate the function definitions into the required language.

4.2 Parameter Descriptions

Tables 3 and 4 give an alphabetical list of the parameters used by the routines in the library. Whether a parameter is an input value or a result depends on the particular routine.

Parameter	Type	Description
ABST	double	% chance an agent is absent.
AFAB	double	Fractional agents for abandon rate.
AFABLMTS	double	Fractional agents for abandon rate, limits.
AFLS	double	Fractional agents for loss rate.
AFSL	double	Fractional agents for service level.
AFSLLMTS	double	Fractional agents for service level, limits.
AFTF	double	Fractional agents for traffic.
AGAB	longint	Agents needed for abandon rate.
AGABLMTS	longint	Agents for abandon rate, limits.
AGFR	double	Agents assigned, fractional agents.
AGLS	longint	Agents needed for loss rate.
AGSL	longint	Agents needed for service level.
AGSL	longint	Agents needed for service level.
AGSLLMTS	longint	Agents for service level, limits.
AGTF	longint	Agents needed for traffic.
AGTS	longint	Agents assigned, whole agents.
AHAB	longint	Shrinkage agents needed for abandon rate.
AHABLMTS	longint	Shrinkage agents for abandon rate, limits.
AHLS	longint	Shrinkage agents needed for loss rate.
AHSL	longint	Shrinkage agents needed for service level.
AHSLLMTS	longint	Shrinkage agents for service level, limits.
AHTF	longint	Shrinkage agents needed for traffic.
ATME	double	Average answer-time (ASA) in seconds.
ATMP	double	Average call attempts per call.
CABN	double	% calls abandoned.
CABW	double	% calls abandoned within target.
CADH	double	% agent unaccounted time.
CBLK	double	% call attempts that are blocked.
CBSY	double	% calls getting busy signal.
CDFX	double	Cdf of distribution
CDSC	double	% calls disconnected before answer.
CDUR	double	Average call duration, in seconds.
CIMD	double	% calls answered immediately.
CLST	double	% calls lost.
CLTE	double	% calls answered later than target.
COFU	double	% offered agent utilisation.
COVL	double	% probability of overload.
CRTE	double	Calls expected during the interval.
CRTY	double	% call attempts that are retries.
CSLV	double	% calls answered within target.
CUTL	double	% actual agent utilisation.
CV2A	double	Coeff of variation inter-arrival time

Table 3: Parameter descriptions part 1

Parameter	Type	Description
CV2S	double	Coeff of variation service time
DLAY	double	Average delay in seconds.
ECDE	longint	Error code.
ELGS	double	”Traffic” or workload in erlangs.
FCTR	double	Truncation factor
ITVL	double	Interval length, in seconds.
MEAD	double	Mean value of distribution
MNAF	double	Minimum number of agents, fractional.
MNAG	longint	Minimum number of agents.
MNAU	double	Minimum % agent utilisation.
MXAF	double	Maximum number of agents, fractional.
MXAG	longint	Maximum number of agents.
MXAU	double	Maximum % agent utilisation.
MXQZ	longint	Maximum queue size.
MXWT	double	Maximum waiting time, in seconds.
NMND	double	Nominal mean of distribution
OVLDSW	boolean	”True” if overloaded.
PDFX	double	Pdf of distribution
PERF	double	performance
PRCT	double	Percentage
PTLE	longint	Percentile value, integer
QSZE	double	Average queue size.
RABA	double	Average attempts before abandoning.
RCDE	longint	Result code.
RDLY	double	Average retry delay.
RTRT	double	Retry ratio, (retries/offered calls).
SDRT	double	Standard deviation of call rate.
STDV	double	Standard deviation of distribution
TABD	double	Average time to abandon in seconds.
TGAB	double	Target abandon rate, % of calls.
TGAT	longint	Target call attempts required.
TGLS	double	Target loss rate, % of offered calls.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
TLCE	double	Average caller tolerance.
UMPH	double	Unaccounted minutes per hour.
VLDSW	boolean	”True” if results are valid.
WPTL	double	Percentile of waiting time.
XINT	longint	Integer argument ¿=0
XMNI	longint	Lower integer bound
XMXI	longint	Upper integer bound
ZEROSW	boolean	”True” if zero traffic, zero agents.

Table 4: Parameter descriptions part 2

5 Basic Queued Calls (Erlang-C)

5.1 Erlang-C model description

Erlang-C is the formula conventionally used in call-centres to work out how many agents are needed to achieve the target service level. Arriving calls are answered immediately if an agent is available, otherwise the calls join the queue. Calls are answered first-come first-served. Callers never abandon or get removed from the system except by being answered by an agent. There is no limit on the length of the queue or on how long calls wait for an answer. Erlang-C doesn't work if the call load exceeds the capacity of the agents. There is no "safety-valve" of any kind to deal with overload situations. An important limitation of Erlang-C is that it can tell you nothing about abandoned calls. It is extremely misleading to believe that Erlang-C can tell you anything at all about abandon rates. Erlang-C is widely used because it is quite easy to program and provides a rough guide to the number of agents needed, but Erlang-C is an unnecessary over-simplification, and for general call-centre use Mitan-C is better. See figure (1).

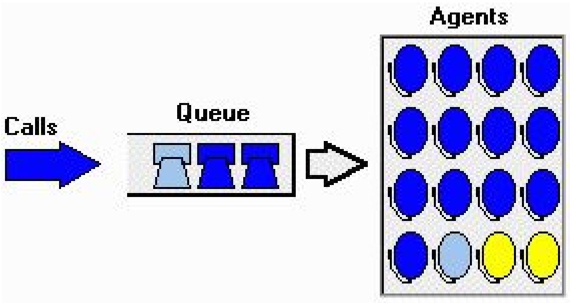

Figure 1: Erlang-C

5.2 Whole agents

5.2.1 ElgcAgsl : agents needed for service level (S/P)

ElgcAgsl calculates the number of agents needed to achieve the target service level according to Erlang-C. The Excel spreadsheet call format is:

```
=ElgcAgsl(CDUR,CRTE,ITVL,TGPC,TGTM)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcAgsl(CDUR,CRTE,ITVL,TGPC,TGTM:double):longint;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcAgsl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double) As long
```

The function ElgcAgsl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 5

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.

Table 5: Parameters for ElgcAgsl

5.2.2 ElgcAgts : agents needed for service level (S/P)

ElgcAgts calculates the number of agents needed to achieve the target service level according to Erlang-C.
The Excel spreadsheet call format is:

```
=ElgcAgts(CDUR,CRTE,ITVL,TGPC,TGTM)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcAgts(CDUR,CRTE,ITVL,TGPC,TGTM:double):longint;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcAgts Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double) As long
```

The function ElgcAgts is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 6

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.

Table 6: Parameters for ElgcAgts

5.2.3 ElgcImed : % calls answered immediately (S/P)

ElgcImed calculates the percentage of calls that are answered immediately for Erlang-C.
The Excel spreadsheet call format is:

```
=ElgcImed(CDUR,CRTE,ITVL,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcImed(CDUR,CRTE,ITVL:double;AGTS:longint):double;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcImed Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long) As double
```

The function ElgcImed is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 7

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.

Table 7: Parameters for ElgcImed

5.2.4 ElgcSlvl : % service level (S/P)

ElgcSlvl calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Erlang-C.
The Excel spreadsheet call format is:

```
=ElgcSlvl(CDUR,CRTE,ITVL,TGTM,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcSlvl(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint):double;
                    stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long) As double
```

The function ElgcSlvl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 8

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.

Table 8: Parameters for ElgcSlvl

5.2.5 ElgcLate : % calls answered later than target (S/P)

ElgcLate calculates the percentage of calls that are answered late (after a longer wait than the target answer time) for Erlang-C.
The Excel spreadsheet call format is:

```
=ElgcLate(CDUR,CRTE,ITVL,TGTM,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcLate(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint):double;
                    stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcLate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long) As double
```

The function ElgcLate is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 9

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.

Table 9: Parameters for ElgcLate

5.2.6 ElgcQsze : average calls waiting (S/P)

ElgcQsze calculates the average queue size, or number of calls waiting, for Erlang-C.
The Excel spreadsheet call format is:

```
=ElgcQsze(CDUR,CRTE,ITVL,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcQsze(CDUR,CRTE,ITVL:double;AGTS:longint):double;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcQsze Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long) As double
```

The function ElgcQsze is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 10

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.

Table 10: Parameters for ElgcQsze

5.2.7 ElgcAtme : average answer time (wait or ASA) (S/P)

ElgcAtme calculates the average time a call waits for an answer for Erlang-C. This is also known as ”average speed of answer” or ASA.
The Excel spreadsheet call format is:

```
=ElgcAtme(CDUR,CRTE,ITVL,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcAtme(CDUR,CRTE,ITVL:double;AGTS:longint):double;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcAtme Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long) As double
```

The function ElgcAtme is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 11

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.

Table 11: Parameters for ElgcAtme

5.2.8 ElgcWait : average answer time (wait or ASA) (S/P)

ElgcWait calculates the average time a call waits for an answer for Erlang-C. This is also known as ”average speed of answer” or ASA.
The Excel spreadsheet call format is:

```
=ElgcWait(CDUR,CRTE,ITVL,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcWait(CDUR,CRTE,ITVL:double;AGTS:longint):double;
                  stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function ElgcWait Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long) As double
```

The function ElgcWait is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 12

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.

Table 12: Parameters for ElgcWait

5.2.9 ElgcDlay : average answer time if not immediate (S/P)

ElgcDlay calculates the average delay for Erlang-C. Delay means the average wait time for calls that do not get answered immediately.
The Excel spreadsheet call format is:

```
=ElgcDlay(CDUR,CRTE,ITVL,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcDlay(CDUR,CRTE,ITVL:double;AGTS:longint):double;
                  stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function ElgcDlay Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long) As double
```

The function ElgcDlay is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 13

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.

Table 13: Parameters for ElgcDlay

5.2.10 ElgcUtil : % agent utilisation for calls (S/P)

ElgcUtil calculates the average agent utilisation for Erlang-C. Utilisation, also referred to as ”occupancy”, means the percentage of an agents time spent handling calls.
The Excel spreadsheet call format is:

```
=ElgcUtil(CDUR,CRTE,ITVL,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcUtil(CDUR,CRTE,ITVL:double;AGTS:longint):double;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcUtil Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long) As double
```

The function ElgcUtil is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 14

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.

Table 14: Parameters for ElgcUtil

5.2.11 ElgcAgtsSlvl : agents needed for service level (S/P)

ElgcAgtsSlvl calculates the number of agents needed to achieve the target service level according to Erlang-C.
The Excel spreadsheet call format is:

```
=ElgcAgtsSlvl(CDUR,CRTE,ITVL,TGPC,TGTM,ECDE)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcAgtsSlvl(CDUR,CRTE,ITVL,TGPC,TGTM:double;var ECDE:longint):longint;
                      stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcAgtsSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double,ByRef ECDE As Long) As long
```

The function ElgcAgtsSlvl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 15

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
ECDE	longint	Error code.

Table 15: Parameters for ElgcAgtsSlvl

5.2.12 ElgcSvcLevel : % service level (P)

ElgcSvcLevel calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Erlang-C.
The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcSvcLevel(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;var ECDE:longint)
                           :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcSvcLevel Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByRef ECDE As Long) As double
```

The function ElgcSvcLevel is suitable for programming use only. The meaning of each of the parameters is shown in table 16

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
ECDE	longint	Error code.

Table 16: Parameters for ElgcSvcLevel

5.2.13 ElgcAgtsSlvlLmts : agents needed for service level (P)

ElgcAgtsSlvlLmts calculates the number of agents needed to achieve the target service level according to Erlang-C.
The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcAgtsSlvlLmts(MNAG,MXAG:integer;
                                MNAU,MXAU,CDUR,CRTE,ITVL,TGPC,TGTM:double;
                                var RCDE,ECDE:longint):longint;
                                stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcAgtsSlvlLmts Lib "tlib01.dll" _
  (ByVal MNAG As Integer,ByVal MXAG As Integer, _
   ByVal MNAU As Double,ByVal MXAU As Double, _
   ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double,ByRef RCDE As Long, _
   ByRef ECDE As Long) As long
```

The function ElgcAgtsSlvlLmts is suitable for programming use only. The meaning of each of the parameters is shown in table 17

Parameter	Type	Description
MNAG	integer	Minimum number of agents.
MXAG	integer	Maximum number of agents.
MNAU	double	Minimum % agent utilisation.
MXAU	double	Maximum % agent utilisation.
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
RCDE	longint	Result code.
ECDE	longint	Error code.

Table 17: Parameters for ElgcAgtsSlvlLmts

5.2.14 ElgcPerf : performance statistics (P)

ElgcPerf calculates most of the performance statistics of interest for Erlang-C. ElgcPerf is intended for programming use, and is not suitable for use in a spreadsheet.
The Delphi or Lazarus (Pascal) definition is:

```
Procedure ElgcPerf(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;
                   var ELGS,COFU,CUTL,CIMD,CSLV,CLTE,ATME,DLAY,QSZE:double;
                   var ECDE:longint);stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Sub ElgcPerf Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByRef ELGS As Double, _
   ByRef COFU As Double,ByRef CUTL As Double, _
   ByRef CIMD As Double,ByRef CSLV As Double, _
   ByRef CLTE As Double,ByRef ATME As Double, _
   ByRef DLAY As Double,ByRef QSZE As Double, _
   ByRef ECDE As Long)
```

The function ElgcPerf is suitable for programming use only. The meaning of each of the parameters is shown in table 18

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
ELGS	double	”Traffic” or workload in erlangs.
COFU	double	% offered agent utilisation.
CUTL	double	% actual agent utilisation.
CIMD	double	% calls answered immediately.
CSLV	double	% calls answered within target.
CLTE	double	% calls answered later than target.
ATME	double	Average answer-time (ASA) in seconds.
DLAY	double	Average delay in seconds.
QSZE	double	Average queue size.
ECDE	longint	Error code.

Table 18: Parameters for ElgcPerf

5.3 Fractional agents

5.3.1 ElgcFracAgsl : fractional agents needed for service level (S/P)

ElgcFracAgsl calculates the fractional number of agents needed to achieve the target service level. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=ElgcFracAgsl(CDUR,CRTE,ITVL,TGPC,TGTM)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcFracAgsl(CDUR,CRTE,ITVL,TGPC,TGTM:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcFracAgsl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double) As double
```

The function ElgcFracAgsl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 19

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.

Table 19: Parameters for ElgcFracAgsl

5.3.2 ElgcFracImed : % calls answered immediately (S/P)

ElgcFracImed calculates the percentage of calls that are answered immediately for Erlang-C. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=ElgcFracImed(CDUR,CRTE,ITVL,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcFracImed(CDUR,CRTE,ITVL,AGFR:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcFracImed Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGFR As Double) As double
```

The function ElgcFracImed is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 20

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGFR	double	Agents assigned, fractional agents.

Table 20: Parameters for ElgcFracImed

5.3.3 ElgcFracSlvl : % service level (S/P)

ElgcFracSlvl calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Erlang-C. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=ElgcFracSlvl(CDUR,CRTE,ITVL,TGTM,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcFracSlvl(CDUR,CRTE,ITVL,TGTM,AGFR:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcFracSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double) As double
```

The function ElgcFracSlvl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 21

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.

Table 21: Parameters for ElgcFracSlvl

5.3.4 ElgcFracLate : % calls answered later than target (S/P)

ElgcFracLate calculates the percentage of calls that are answered late (after a longer wait than the target answer time) for Erlang-C. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=ElgcFracLate(CDUR,CRTE,ITVL,TGTM,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcFracLate(CDUR,CRTE,ITVL,TGTM,AGFR:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcFracLate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double) As double
```

The function ElgcFracLate is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 22

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.

Table 22: Parameters for ElgcFracLate

5.3.5 ElgcFracQsze : average calls waiting (S/P)

ElgcFracQsze calculates the average queue size, or number of calls waiting, for Erlang-C. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=ElgcFracQsze(CDUR,CRTE,ITVL,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcFracQsze(CDUR,CRTE,ITVL,AGFR:double):double;
                     stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcFracQsze Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGFR As Double) As double
```

The function ElgcFracQsze is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 23

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGFR	double	Agents assigned, fractional agents.

Table 23: Parameters for ElgcFracQsze

5.3.6 ElgcFracAtme : average answer time (wait or ASA) (S/P)

ElgcFracAtme calculates the average time a call waits for an answer for Erlang-C. This is also known as "average speed of answer" or ASA. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=ElgcFracAtme(CDUR,CRTE,ITVL,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcFracAtme(CDUR,CRTE,ITVL,AGFR:double):double;
                     stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcFracAtme Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGFR As Double) As double
```

The function ElgcFracAtme is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 24

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGFR	double	Agents assigned, fractional agents.

Table 24: Parameters for ElgcFracAtme

5.3.7 ElgcFracDlay : average answer time if not immediate (S/P)

ElgcFracDlay calculates the average delay for Erlang-C. Delay means the average wait time for calls that do not get answered immediately. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=ElgcFracDlay(CDUR,CRTE,ITVL,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcFracDlay(CDUR,CRTE,ITVL,AGFR:double):double;
                      stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcFracDlay Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGFR As Double) As double
```

The function ElgcFracDlay is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 25

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGFR	double	Agents assigned, fractional agents.

Table 25: Parameters for ElgcFracDlay

5.3.8 ElgcFracUtil : % agent utilisation for calls (S/P)

ElgcFracUtil calculates the average agent utilisation for Erlang-C. Utilisation, also referred to as ”occupancy”, means the percentage of an agents time spent handling calls. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=ElgcFracUtil(CDUR,CRTE,ITVL,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcFracUtil(CDUR,CRTE,ITVL,AGFR:double):double;
                      stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcFracUtil Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGFR As Double) As double
```

The function ElgcFracUtil is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 26

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGFR	double	Agents assigned, fractional agents.

Table 26: Parameters for ElgcFracUtil

5.3.9 ElgcFracAgtsSlvl : fractional agents needed for service level (P)

ElgcFracAgtsSlvl calculates the fractional number of agents needed to achieve the target service level.
See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcFracAgtsSlvl(CDUR,CRTE,ITVL,TGPC,TGTM:double;var ECDE:longint):double;
                          stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcFracAgtsSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double,ByRef ECDE As Long) As double
```

The function ElgcFracAgtsSlvl is suitable for programming use only. The meaning of each of the parameters is shown in table 27

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
ECDE	longint	Error code.

Table 27: Parameters for ElgcFracAgtsSlvl

5.3.10 ElgcFracAgtsSlvlLmts : fractional agents for service level, limits (P)

ElgcFracAgtsSlvlLmts calculates the fractional number of agents needed to achieve the target service level, with limits on the number of agents. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcFracAgtsSlvlLmts(MNAF,MXAF,MNAU,MXAU,CDUR,CRTE,ITVL,TGPC,TGTM:double;
                              var RCDE,ECDE:longint):double;
                              stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcFracAgtsSlvlLmts Lib "tlib01.dll" _
  (ByVal MNAF As Double,ByVal MXAF As Double, _
   ByVal MNAU As Double,ByVal MXAU As Double, _
   ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double,ByRef RCDE As Long, _
   ByRef ECDE As Long) As double
```

The function ElgcFracAgtsSlvlLmts is suitable for programming use only. The meaning of each of the parameters is shown in table 28

Parameter	Type	Description
MNAF	double	Minimum number of agents, fractional.
MXAF	double	Maximum number of agents, fractional.
MNAU	double	Minimum % agent utilisation.
MXAU	double	Maximum % agent utilisation.
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
RCDE	longint	Result code.
ECDE	longint	Error code.

Table 28: Parameters for ElgcFracAgtsSlvlLmts

5.3.11 ElgcFracSvcLevel : % service level (P)

ElgcFracSvcLevel calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Erlang-C. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcFracSvcLevel(CDUR,CRTE,ITVL,TGTM,AGFR:double;var ECDE:longint):double;
                          stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcFracSvcLevel Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByRef ECDE As Long) As double
```

The function ElgcFracSvcLevel is suitable for programming use only. The meaning of each of the parameters is shown in table 29

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
ECDE	longint	Error code.

Table 29: Parameters for ElgcFracSvcLevel

5.3.12 ElgcFracPerf : performance statistics (P)

ElgcFracPerf calculates most of the performance statistics of interest for Erlang-C. ElgcFracPerf is intended for programming use, and is not suitable for use in a spreadsheet. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Procedure ElgcFracPerf(CDUR,CRTE,ITVL,TGTM,AGFR:double;
                       var ELGS,COFU,CUTL,CIMD,CSLV,CLTE,ATME,DLAY,QSZE:double;
                       var ECDE:longint);stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Sub ElgcFracPerf Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByRef ELGS As Double, _
```

```
        ByRef COFU As Double,ByRef CUTL As Double, _
        ByRef CIMD As Double,ByRef CSLV As Double, _
        ByRef CLTE As Double,ByRef ATME As Double, _
        ByRef DLAY As Double,ByRef QSZE As Double, _
        ByRef ECDE As Long)
```

The function ElgcFracPerf is suitable for programming use only. The meaning of each of the parameters is shown in table 30

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
ELGS	double	”Traffic” or workload in erlangs.
COFU	double	% offered agent utilisation.
CUTL	double	% actual agent utilisation.
CIMD	double	% calls answered immediately.
CSLV	double	% calls answered within target.
CLTE	double	% calls answered later than target.
ATME	double	Average answer-time (ASA) in seconds.
DLAY	double	Average delay in seconds.
QSZE	double	Average queue size.
ECDE	longint	Error code.

Table 30: Parameters for ElgcFracPerf

5.4 Shrinkage

5.4.1 ElgcShrkAgsl : agents with shrinkage needed for service level (S/P)

ElgcShrkAgsl calculates the number of agents with shrinkage needed to achieve the target service level according to Erlang-C.
The Excel spreadsheet call format is:

```
=ElgcShrkAgsl(CDUR,CRTE,ITVL,TGPC,TGTM,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcShrkAgsl(CDUR,CRTE,ITVL,TGPC,TGTM,UMPH:double):longint;
                     stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcShrkAgsl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double,ByVal UMPH As Double) As long
```

The function ElgcShrkAgsl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 31

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
UMPH	double	Unaccounted minutes per hour.

Table 31: Parameters for ElgcShrkAgsl

5.4.2 ElgcShrkImed : % calls answered immediately (S/P)

ElgcShrkImed calculates the percentage of calls that are answered immediately for Erlang-C.
The Excel spreadsheet call format is:

```
=ElgcShrkImed(CDUR,CRTE,ITVL,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcShrkImed(CDUR,CRTE,ITVL:double;AGTS:longint;UMPH:double):double;
                      stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcShrkImed Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long, _
   ByVal UMPH As Double) As double
```

The function ElgcShrkImed is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 32

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 32: Parameters for ElgcShrkImed

5.4.3 ElgcShrkSlvl : % service level (S/P)

ElgcShrkSlvl calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Erlang-C.
The Excel spreadsheet call format is:

```
=ElgcShrkSlvl(CDUR,CRTE,ITVL,TGTM,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcShrkSlvl(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH:double)
                      :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcShrkSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double) As double
```

The function ElgcShrkSlvl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 33

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 33: Parameters for ElgcShrkSlvl

5.4.4 ElgcShrkLate : % calls answered later than target (S/P)

ElgcShrkLate calculates the percentage of calls that are answered late (after a longer wait than the target answer time) for Erlang-C.
The Excel spreadsheet call format is:

```
=ElgcShrkLate(CDUR,CRTE,ITVL,TGTM,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcShrkLate(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH:double)
                        :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcShrkLate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double) As double
```

The function ElgcShrkLate is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 34

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 34: Parameters for ElgcShrkLate

5.4.5 ElgcShrkQsze : average calls waiting (S/P)

ElgcShrkQsze calculates the average queue size, or number of calls waiting, for Erlang-C.
The Excel spreadsheet call format is:

```
=ElgcShrkQsze(CDUR,CRTE,ITVL,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcShrkQsze(CDUR,CRTE,ITVL:double;AGTS:longint;UMPH:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcShrkQsze Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long, _
   ByVal UMPH As Double) As double
```

The function ElgcShrkQsze is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 35

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 35: Parameters for ElgcShrkQsze

5.4.6 ElgcShrkAtme : average answer time (wait or ASA) (S/P)

ElgcShrkAtme calculates the average time a call waits for an answer for Erlang-C. This is also known as ”average speed of answer” or ASA.
The Excel spreadsheet call format is:

```
=ElgcShrkAtme(CDUR,CRTE,ITVL,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcShrkAtme(CDUR,CRTE,ITVL:double;AGTS:longint;UMPH:double):double;
                        stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function ElgcShrkAtme Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long, _
   ByVal UMPH As Double) As double
```

The function ElgcShrkAtme is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 36

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 36: Parameters for ElgcShrkAtme

5.4.7 ElgcShrkDlay : average answer time if not immediate (S/P)

ElgcShrkDlay calculates the average delay for Erlang-C. Delay means the average wait time for calls that do not get answered immediately.
The Excel spreadsheet call format is:

```
=ElgcShrkDlay(CDUR,CRTE,ITVL,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcShrkDlay(CDUR,CRTE,ITVL:double;AGTS:longint;UMPH:double):double;
                        stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function ElgcShrkDlay Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long, _
   ByVal UMPH As Double) As double
```

The function ElgcShrkDlay is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 37

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 37: Parameters for ElgcShrkDlay

5.4.8 ElgcShrkUtil : % agent utilisation for calls (S/P)

ElgcShrkUtil calculates the average agent utilisation for Erlang-C. Utilisation, also referred to as "occupancy", means the percentage of an agents time spent handling calls.
The Excel spreadsheet call format is:

```
=ElgcShrkUtil(CDUR,CRTE,ITVL,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcShrkUtil(CDUR,CRTE,ITVL:double;AGTS:longint;UMPH:double):double;
                    stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcShrkUtil Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long, _
   ByVal UMPH As Double) As double
```

The function ElgcShrkUtil is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 38

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 38: Parameters for ElgcShrkUtil

5.4.9 ElgcShrkAgtsSlvl : agents with shrinkage needed for service level (P)

ElgcShrkAgtsSlvl calculates the number of agents with shrinkage needed to achieve the target service level according to Erlang-C.
The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcShrkAgtsSlvl(CDUR,CRTE,ITVL,TGPC,TGTM,UMPH:double;var ECDE:longint)
                        :longint;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcShrkAgtsSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double,ByVal UMPH As Double, _
   ByRef ECDE As Long) As long
```

The function ElgcShrkAgtsSlvl is suitable for programming use only. The meaning of each of the parameters is shown in table 39

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
UMPH	double	Unaccounted minutes per hour.
ECDE	longint	Error code.

Table 39: Parameters for ElgcShrkAgtsSlvl

5.4.10 ElgcShrkSvcLevel : % service level (P)

ElgcShrkSvcLevel calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Erlang-C.
The Delphi or Lazarus (Pascal) definition is:

```
Function ElgcShrkSvcLevel(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH:double;
                          var ECDE:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgcShrkSvcLevel Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByRef ECDE As Long) As double
```

The function ElgcShrkSvcLevel is suitable for programming use only. The meaning of each of the parameters is shown in table 40

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
ECDE	longint	Error code.

Table 40: Parameters for ElgcShrkSvcLevel

5.4.11 ElgcShrkPerf : performance statistics (P)

ElgcShrkPerf calculates most of the performance statistics of interest for Erlang-C. ElgcShrkPerf is intended for programming use, and is not suitable for use in a spreadsheet.
The Delphi or Lazarus (Pascal) definition is:

```
Procedure ElgcShrkPerf(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH:double;
                       var ELGS,COFU,CUTL,CADH,CIMD,CSLV,CLTE,ATME,DLAY,QSZE:double;
                       var ECDE:longint);stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Sub ElgcShrkPerf Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByRef ELGS As Double,ByRef COFU As Double, _
   ByRef CUTL As Double,ByRef CADH As Double, _
   ByRef CIMD As Double,ByRef CSLV As Double, _
   ByRef CLTE As Double,ByRef ATME As Double, _
   ByRef DLAY As Double,ByRef QSZE As Double, _
   ByRef ECDE As Long)
```

The function ElgcShrkPerf is suitable for programming use only. The meaning of each of the parameters is shown in table 41

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
ELGS	double	”Traffic” or workload in erlangs.
COFU	double	% offered agent utilisation.
CUTL	double	% actual agent utilisation.
CADH	double	% agent unaccounted time.
CIMD	double	% calls answered immediately.
CSLV	double	% calls answered within target.
CLTE	double	% calls answered later than target.
ATME	double	Average answer-time (ASA) in seconds.
DLAY	double	Average delay in seconds.
QSZE	double	Average queue size.
ECDE	longint	Error code.

Table 41: Parameters for ElgcShrkPerf

6 Basic Lost Calls (Erlang-B)

6.1 Erlang-B model description

With the Basic Lost Calls model, calls are not allowed to queue if there is no agent available when the call arrives. Calls arriving when all the agents are busy are "lost", which means they get a busy tone. Lost calls are not re-tried. The Basic Lost Calls model can be used for calculating the number of phone lines needed. For this application an "agent" is really a phone line. You could use a maximum loss rate of 1%, and this would give you some idea of how many phone lines are needed. Unless phone lines or their associated equipment are expensive, you would probably install more than enough lines, since you would not want to have expensive agents unable to make or take calls through lack of inexpensive phone lines. See figure (2).

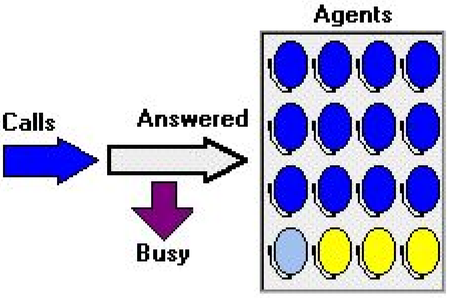

Figure 2: Erlang-B

6.2 Whole agents

6.2.1 ElgbAgls : agents needed for service level (S/P)

ElgbAgls calculates the number of agents needed to achieve the target service level according to Erlang-B. The Excel spreadsheet call format is:

```
=ElgbAgls(CDUR,CRTE,ITVL,TGLS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgbAgls(CDUR,CRTE,ITVL,TGLS:double):longint;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgbAgls Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGLS As Double) As long
```

The function ElgbAgls is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 42

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGLS	double	Target loss rate, % of offered calls.

Table 42: Parameters for ElgbAgls

6.2.2 ElgbOfut : % offered utilisation (S/P)

ElgbOfut calculates the "offered utilisation", which is the agent utilisation that would occur if all calls were answered.
The Excel spreadsheet call format is:

```
=ElgbOfut(CDUR,CRTE,ITVL,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgbOfut(CDUR,CRTE,ITVL:double;AGTS:longint):double;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgbOfut Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long) As double
```

The function ElgbOfut is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 43

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.

Table 43: Parameters for ElgbOfut

6.2.3 ElgbUtil : % agent utilisation for calls (S/P)

ElgbUtil calculates the average agent utilisation for Erlang-B. Utilisation, also referred to as ”occupancy”, means the percentage of an agents time spent handling calls.
The Excel spreadsheet call format is:

```
=ElgbUtil(CDUR,CRTE,ITVL,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgbUtil(CDUR,CRTE,ITVL:double;AGTS:longint):double;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgbUtil Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long) As double
```

The function ElgbUtil is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 44

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.

Table 44: Parameters for ElgbUtil

6.2.4 ElgbLoss : % of calls lost (S/P)

ElgbLoss calculates the percentage of calls that will be lost.
The Excel spreadsheet call format is:

```
=ElgbLoss(CDUR,CRTE,ITVL,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
    Function ElgbLoss(CDUR,CRTE,ITVL:double;AGTS:longint):double;
                      stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgbLoss Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long) As double
```

The function ElgbLoss is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 45

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.

Table 45: Parameters for ElgbLoss

6.2.5 ElgbAgtsLoss : agents needed for loss rate (P)

ElgbAgtsLoss calculates the number of agents needed to prevent the lost-call rate exceeding the target set.
The Delphi or Lazarus (Pascal) definition is:

```
    Function ElgbAgtsLoss(CDUR,CRTE,ITVL,TGLS:double;var ECDE:longint):longint;
                          stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgbAgtsLoss Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGLS As Double, _
   ByRef ECDE As Long) As long
```

The function ElgbAgtsLoss is suitable for programming use only. The meaning of each of the parameters is shown in table 46

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGLS	double	Target loss rate, % of offered calls.
ECDE	longint	Error code.

Table 46: Parameters for ElgbAgtsLoss

6.2.6 ElgbLossRate : % of calls lost (P)

ElgbLossRate calculates the percentage of calls that will be lost.
The Delphi or Lazarus (Pascal) definition is:

```
    Function ElgbLossRate(CDUR,CRTE,ITVL:double;AGTS:longint;var ECDE:longint)
                          :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgbLossRate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long, _
   ByRef ECDE As Long) As double
```

The function ElgbLossRate is suitable for programming use only. The meaning of each of the parameters is shown in table 47

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.
ECDE	longint	Error code.

Table 47: Parameters for ElgbLossRate

6.2.7 ElgbPerform : performance statistics (P)

ElgbPerform calculates most of the performance statistics of interest for Erlang-B. ElgbPerform is intended for programming use, and is not suitable for use in a spreadsheet.
The Delphi or Lazarus (Pascal) definition is:

```
Procedure ElgbPerform(CDUR,CRTE,ITVL:double;AGTS:longint;
                      var ELGS,COFU,CUTL,CBSY:double;var ECDE:longint);
                      stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Sub ElgbPerform Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long, _
   ByRef ELGS As Double,ByRef COFU As Double, _
   ByRef CUTL As Double,ByRef CBSY As Double, _
   ByRef ECDE As Long)
```

The function ElgbPerform is suitable for programming use only. The meaning of each of the parameters is shown in table 48

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.
ELGS	double	”Traffic” or workload in erlangs.
COFU	double	% offered agent utilisation.
CUTL	double	% actual agent utilisation.
CBSY	double	% calls getting busy signal.
ECDE	longint	Error code.

Table 48: Parameters for ElgbPerform

6.3 Fractional agents

6.3.1 ElgbFracAgls : fractional agents needed for service level (S/P)

ElgbFracAgls calculates the fractional number of agents needed to achieve the target service level. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=ElgbFracAgls(CDUR,CRTE,ITVL,TGLS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgbFracAgls(CDUR,CRTE,ITVL,TGLS:double):double;
                      stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgbFracAgls Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGLS As Double) As double
```

The function ElgbFracAgls is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 49

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGLS	double	Target loss rate, % of offered calls.

Table 49: Parameters for ElgbFracAgls

6.3.2 ElgbFracOfut : % offered utilisation (S/P)

ElgbFracOfut calculates the ”offered utilisation”, which is the agent utilisation that would occur if all calls were answered. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=ElgbFracOfut(CDUR,CRTE,ITVL,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgbFracOfut(CDUR,CRTE,ITVL,AGFR:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgbFracOfut Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGFR As Double) As double
```

The function ElgbFracOfut is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 50

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGFR	double	Agents assigned, fractional agents.

Table 50: Parameters for ElgbFracOfut

6.3.3 ElgbFracUtil : % agent utilisation for calls (S/P)

ElgbFracUtil calculates the average agent utilisation for Erlang-B. Utilisation, also referred to as ”occupancy”, means the percentage of an agents time spent handling calls. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=ElgbFracUtil(CDUR,CRTE,ITVL,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgbFracUtil(CDUR,CRTE,ITVL,AGFR:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgbFracUtil Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGFR As Double) As double
```

The function ElgbFracUtil is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 51

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGFR	double	Agents assigned, fractional agents.

Table 51: Parameters for ElgbFracUtil

6.3.4 ElgbFracLoss : % of calls lost (S/P)

ElgbFracLoss calculates the percentage of calls that will be lost. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=ElgbFracLoss(CDUR,CRTE,ITVL,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgbFracLoss(CDUR,CRTE,ITVL,AGFR:double):double;
                      stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgbFracLoss Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGFR As Double) As double
```

The function ElgbFracLoss is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 52

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGFR	double	Agents assigned, fractional agents.

Table 52: Parameters for ElgbFracLoss

6.3.5 ElgbFracAgtsLoss : fractional agents needed for loss rate (P)

ElgbFracAgtsLoss calculates the fractional number of agents needed to achieve the target loss rate. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function ElgbFracAgtsLoss(CDUR,CRTE,ITVL,TGLS:double;var ECDE:longint):double;
                          stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgbFracAgtsLoss Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGLS As Double, _
   ByRef ECDE As Long) As double
```

The function ElgbFracAgtsLoss is suitable for programming use only. The meaning of each of the parameters is shown in table 53

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGLS	double	Target loss rate, % of offered calls.
ECDE	longint	Error code.

Table 53: Parameters for ElgbFracAgtsLoss

6.3.6 ElgbFracLossRate : % of calls lost (P)

ElgbFracLossRate calculates the percentage of calls that will be lost. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function ElgbFracLossRate(CDUR,CRTE,ITVL,AGFR:double;var ECDE:longint):double;
                          stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgbFracLossRate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGFR As Double, _
   ByRef ECDE As Long) As double
```

The function ElgbFracLossRate is suitable for programming use only. The meaning of each of the parameters is shown in table 54

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGFR	double	Agents assigned, fractional agents.
ECDE	longint	Error code.

Table 54: Parameters for ElgbFracLossRate

6.3.7 ElgbFracPerf : performance statistics (P)

ElgbFracPerf calculates most of the performance statistics of interest for Erlang-B. ElgbFracPerf is intended for programming use, and is not suitable for use in a spreadsheet. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Procedure ElgbFracPerf(CDUR,CRTE,ITVL,AGFR:double;var ELGS,COFU,CUTL,CBSY:double;
                       var ECDE:longint);stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Sub ElgbFracPerf Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGFR As Double, _
   ByRef ELGS As Double,ByRef COFU As Double, _
   ByRef CUTL As Double,ByRef CBSY As Double, _
   ByRef ECDE As Long)
```

The function ElgbFracPerf is suitable for programming use only. The meaning of each of the parameters is shown in table 55

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGFR	double	Agents assigned, fractional agents.
ELGS	double	”Traffic” or workload in erlangs.
COFU	double	% offered agent utilisation.
CUTL	double	% actual agent utilisation.
CBSY	double	% calls getting busy signal.
ECDE	longint	Error code.

Table 55: Parameters for ElgbFracPerf

6.4 Shrinkage

6.4.1 ElgbShrkAgls : agents needed for service level (S/P)

ElgbShrkAgls calculates the number of agents needed to achieve the target service level according to Erlang-B.
The Excel spreadsheet call format is:

```
=ElgbShrkAgls(CDUR,CRTE,ITVL,TGLS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgbShrkAgls(CDUR,CRTE,ITVL,TGLS,UMPH:double):longint;
                        stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function ElgbShrkAgls Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGLS As Double, _
   ByVal UMPH As Double) As long
```

The function ElgbShrkAgls is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 56

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGLS	double	Target loss rate, % of offered calls.
UMPH	double	Unaccounted minutes per hour.

Table 56: Parameters for ElgbShrkAgls

6.4.2 ElgbShrkOfut : % offered utilisation (S/P)

ElgbShrkOfut calculates the ”offered utilisation”, which is the agent utilisation that would occur if all calls were answered.
The Excel spreadsheet call format is:

```
=ElgbShrkOfut(CDUR,CRTE,ITVL,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgbShrkOfut(CDUR,CRTE,ITVL:double;AGTS:longint;UMPH:double):double;
                        stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function ElgbShrkOfut Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long, _
   ByVal UMPH As Double) As double
```

The function ElgbShrkOfut is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 57

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 57: Parameters for ElgbShrkOfut

6.4.3 ElgbShrkUtil : % agent utilisation for calls (S/P)

ElgbShrkUtil calculates the average agent utilisation for Erlang-B. Utilisation, also referred to as ”occupancy”, means the percentage of an agents time spent handling calls.
The Excel spreadsheet call format is:

```
=ElgbShrkUtil(CDUR,CRTE,ITVL,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgbShrkUtil(CDUR,CRTE,ITVL:double;AGTS:longint;UMPH:double):double;
                      stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgbShrkUtil Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long, _
   ByVal UMPH As Double) As double
```

The function ElgbShrkUtil is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 58

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 58: Parameters for ElgbShrkUtil

6.4.4 ElgbShrkLoss : % of calls lost (S/P)

ElgbShrkLoss calculates the percentage of calls that will be lost.
The Excel spreadsheet call format is:

```
=ElgbShrkLoss(CDUR,CRTE,ITVL,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgbShrkLoss(CDUR,CRTE,ITVL:double;AGTS:longint;UMPH:double):double;
                      stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgbShrkLoss Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long, _
   ByVal UMPH As Double) As double
```

The function ElgbShrkLoss is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 59

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 59: Parameters for ElgbShrkLoss

6.4.5 ElgbShrkLossRate : % of calls lost (S/P)

ElgbShrkLossRate calculates the percentage of calls that will be lost.
The Excel spreadsheet call format is:

```
=ElgbShrkLossRate(CDUR,CRTE,ITVL,AGTS,UMPH,ECDE)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function ElgbShrkLossRate(CDUR,CRTE,ITVL:double;AGTS:longint;UMPH:double;
                          var ECDE:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgbShrkLossRate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long, _
   ByVal UMPH As Double,ByRef ECDE As Long) As double
```

The function ElgbShrkLossRate is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 60

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
ECDE	longint	Error code.

Table 60: Parameters for ElgbShrkLossRate

6.4.6 ElgbShrkPerf : performance statistics (S/P)

ElgbShrkPerf calculates most of the performance statistics of interest for Erlang-B. ElgbShrkPerf is intended for programming use, and is not suitable for use in a spreadsheet.
The Excel spreadsheet call format is:

```
=ElgbShrkPerf(CDUR,CRTE,ITVL,AGTS,UMPH,ELGS,COFU,CUTL,CADH,CBSY,ECDE)
```

The Delphi or Lazarus (Pascal) definition is:

```
Procedure ElgbShrkPerf(CDUR,CRTE,ITVL:double;AGTS:longint;UMPH:double;
                        var ELGS,COFU,CUTL,CADH,CBSY:double;var ECDE:longint);
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Sub ElgbShrkPerf Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long, _
   ByVal UMPH As Double,ByRef ELGS As Double, _
   ByRef COFU As Double,ByRef CUTL As Double, _
   ByRef CADH As Double,ByRef CBSY As Double, _
   ByRef ECDE As Long)
```

The function ElgbShrkPerf is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 61

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
ELGS	double	”Traffic” or workload in erlangs.
COFU	double	% offered agent utilisation.
CUTL	double	% actual agent utilisation.
CADH	double	% agent unaccounted time.
CBSY	double	% calls getting busy signal.
ECDE	longint	Error code.

Table 61: Parameters for ElgbShrkPerf

6.4.7 ElgbShrkAgtsLoss : agents needed for service level (P)

ElgbShrkAgtsLoss calculates the number of agents needed to achieve the target service level according to Erlang-B.
The Delphi or Lazarus (Pascal) definition is:

```
Function ElgbShrkAgtsLoss(CDUR,CRTE,ITVL,TGLS,UMPH:double;var ECDE:longint):longint;
                           stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function ElgbShrkAgtsLoss Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGLS As Double, _
   ByVal UMPH As Double,ByRef ECDE As Long) As long
```

The function ElgbShrkAgtsLoss is suitable for programming use only. The meaning of each of the parameters is shown in table 62

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGLS	double	Target loss rate, % of offered calls.
UMPH	double	Unaccounted minutes per hour.
ECDE	longint	Error code.

Table 62: Parameters for ElgbShrkAgtsLoss

7 Basic Retry (Erlang-B Extended)

7.1 Erlang-B Extended model description

The Basic Retry model is a way of taking into account callers attempting a call again when they get a busy tone. A call attempt is said to be ”blocked” if there is no agent avaiable when the call arrives. The caller may then decide to retry the call sometime later, or to abandon the call. One of the parameters of the model is the average number of attempts a caller will make before abandoning. The Basic Retry model adds the retry calls to the new calls to get a better estimate of the loss rate. (The actual calculation is complicated because the number of retries and the loss rate interact in a ”chicken-and-egg” way). The Basic Retry model will still tend to under-estimate the loss or abandon rate, beacuse it does not take into account the fact that another call attempt is often made within a few seconds of a failed call attempt. This means in practice that a new attempt is often made while all the agents are still busy. The Advanced Retry model does take account of the potentially short delay between call attempts. See figure (3).

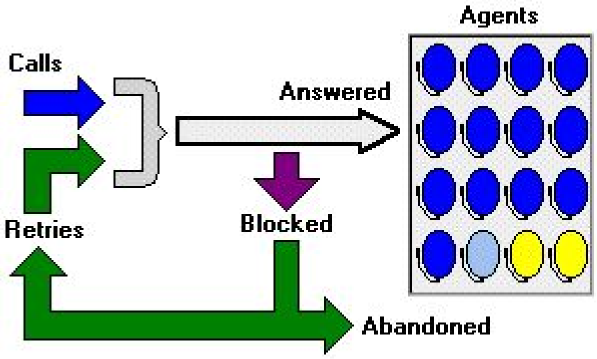

Figure 3: Erlang-B Extended

7.2 Whole agents

7.2.1 EbexAgsl : agents needed for service level (S/P)

EbexAgsl calculates the number of agents needed to achieve the target service level according to Erlang-B Extended.
The Excel spreadsheet call format is:

```
=EbexAgsl(CDUR,CRTE,ITVL,RABA,TGPC,TGAT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexAgsl(CDUR,CRTE,ITVL,RABA,TGPC:double;TGAT:longint):longint;
                    stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexAgsl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGPC As Double,ByVal TGAT As Long) As long
```

The function EbexAgsl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 63

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGPC	double	Target percentage of calls.
TGAT	longint	Target call attempts required.

Table 63: Parameters for EbexAgsl

7.2.2 EbexAgab : agents needed for abandon rate (S/P)

EbexAgab calculates the number of agents needed to achieve the target abandon rate. according to Erlang-B Extended.
The Excel spreadsheet call format is:

```
=EbexAgab(CDUR,CRTE,ITVL,RABA,TGAB)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexAgab(CDUR,CRTE,ITVL,RABA,TGAB:double):longint;
                 stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexAgab Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGAB As Double) As long
```

The function EbexAgab is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 64

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGAB	double	Target abandon rate, % of calls.

Table 64: Parameters for EbexAgab

7.2.3 EbexBlck : % of call attempts blocked (S/P)

EbexBlck calculates the percentage abandon rate for Erlang-B Extended.
The Excel spreadsheet call format is:

```
=EbexBlck(CDUR,CRTE,ITVL,RABA,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexBlck(CDUR,CRTE,ITVL,RABA:double;AGTS:longint):double;
                 stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexBlck Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGTS As Long) As double
```

The function EbexBlck is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 65

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGTS	longint	Agents assigned, whole agents.

Table 65: Parameters for EbexBlck

7.2.4 EbexAbnd : % of calls abandoned (S/P)

EbexAbnd calculates the percentage of calls that will be abandoned.
The Excel spreadsheet call format is:

```
=EbexAbnd(CDUR,CRTE,ITVL,RABA,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexAbnd(CDUR,CRTE,ITVL,RABA:double;AGTS:longint):double;
                 stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexAbnd Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGTS As Long) As double
```

The function EbexAbnd is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 66

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGTS	longint	Agents assigned, whole agents.

Table 66: Parameters for EbexAbnd

7.2.5 EbexOfut : % offered utilisation (S/P)

EbexOfut calculates the "offered utilisation", which is the agent utilisation that would occur if all calls were answered.
The Excel spreadsheet call format is:

```
=EbexOfut(CDUR,CRTE,ITVL,RABA,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexOfut(CDUR,CRTE,ITVL,RABA:double;AGTS:longint):double;
                 stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexOfut Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGTS As Long) As double
```

The function EbexOfut is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 67

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGTS	longint	Agents assigned, whole agents.

Table 67: Parameters for EbexOfut

7.2.6 EbexUtil : % agent utilisation for calls (S/P)

EbexUtil calculates the average agent utilisation for Erlang-B Extended. Utilisation, also referred to as "occupancy", means the percentage of an agents time spent handling calls.
The Excel spreadsheet call format is:

```
=EbexUtil(CDUR,CRTE,ITVL,RABA,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexUtil(CDUR,CRTE,ITVL,RABA:double;AGTS:longint):double;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexUtil Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGTS As Long) As double
```

The function EbexUtil is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 68

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGTS	longint	Agents assigned, whole agents.

Table 68: Parameters for EbexUtil

7.2.7 EbexImed : % calls answered immediately (S/P)

EbexImed calculates the percentage of calls that are answered immediately for Erlang-B Extended.
The Excel spreadsheet call format is:

```
=EbexImed(CDUR,CRTE,ITVL,RABA,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexImed(CDUR,CRTE,ITVL,RABA:double;AGTS:longint):double;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexImed Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGTS As Long) As double
```

The function EbexImed is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 69

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGTS	longint	Agents assigned, whole agents.

Table 69: Parameters for EbexImed

7.2.8 EbexLate : % calls answered later than target (S/P)

EbexLate calculates the percentage of calls that are answered late (after a longer wait than the target answer time) for Erlang-B Extended.
The Excel spreadsheet call format is:

```
=EbexLate(CDUR,CRTE,ITVL,RABA,TGAT,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexLate(CDUR,CRTE,ITVL,RABA:double;TGAT,AGTS:longint):double;
                    stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexLate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGAT As Long,ByVal AGTS As Long) As double
```

The function EbexLate is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 70

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGAT	longint	Target call attempts required.
AGTS	longint	Agents assigned, whole agents.

Table 70: Parameters for EbexLate

7.2.9 EbexSlvl : % service level (S/P)

EbexSlvl calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Erlang-B Extended.
The Excel spreadsheet call format is:

```
=EbexSlvl(CDUR,CRTE,ITVL,RABA,TGAT,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexSlvl(CDUR,CRTE,ITVL,RABA:double;TGAT,AGTS:longint):double;
                    stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGAT As Long,ByVal AGTS As Long) As double
```

The function EbexSlvl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 71

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGAT	longint	Target call attempts required.
AGTS	longint	Agents assigned, whole agents.

Table 71: Parameters for EbexSlvl

7.2.10 EbexAtmp : average attempts per call (S/P)

EbexAtmp calculates the average number of attempts made per call.
The Excel spreadsheet call format is:

```
=EbexAtmp(CDUR,CRTE,ITVL,RABA,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexAtmp(CDUR,CRTE,ITVL,RABA:double;AGTS:longint):double;
                 stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexAtmp Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGTS As Long) As double
```

The function EbexAtmp is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 72

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGTS	longint	Agents assigned, whole agents.

Table 72: Parameters for EbexAtmp

7.2.11 EbexRtrt : % retry ratio (S/P)

EbexRtrt calculates the percentage of call attempts that are retries.
The Excel spreadsheet call format is:

```
=EbexRtrt(CDUR,CRTE,ITVL,RABA,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexRtrt(CDUR,CRTE,ITVL,RABA:double;AGTS:longint):double;
                 stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexRtrt Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGTS As Long) As double
```

The function EbexRtrt is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 73

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGTS	longint	Agents assigned, whole agents.

Table 73: Parameters for EbexRtrt

7.2.12 EbexAgtsSlvl : agents needed for service level (P)

EbexAgtsSlvl calculates the number of agents needed to achieve the target service level according to Erlang-B Extended.
The Delphi or Lazarus (Pascal) definition is:

```
Function EbexAgtsSlvl(CDUR,CRTE,ITVL,RABA,TGPC:double;TGAT:longint;
                      var ECDE:longint):longint;stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function EbexAgtsSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGPC As Double,ByVal TGAT As Long, _
   ByRef ECDE As Long) As long
```

The function EbexAgtsSlvl is suitable for programming use only. The meaning of each of the parameters is shown in table 74

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGPC	double	Target percentage of calls.
TGAT	longint	Target call attempts required.
ECDE	longint	Error code.

Table 74: Parameters for EbexAgtsSlvl

7.2.13 EbexAgstAbnd : agents needed for abandon rate (P)

EbexAgstAbnd calculates the number of agents needed to achieve the target abandon rate. according to Erlang-B Extended.
The Delphi or Lazarus (Pascal) definition is:

```
Function EbexAgstAbnd(CDUR,CRTE,ITVL,RABA,TGAB:double;var ECDE:longint):longint;
                      stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function EbexAgstAbnd Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGAB As Double,ByRef ECDE As Long) As long
```

The function EbexAgstAbnd is suitable for programming use only. The meaning of each of the parameters is shown in table 75

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGAB	double	Target abandon rate, % of calls.
ECDE	longint	Error code.

Table 75: Parameters for EbexAgstAbnd

7.2.14 EbexBlock : % of call attempts blocked (P)

EbexBlock calculates the percentage abandon rate for Erlang-B Extended.
The Delphi or Lazarus (Pascal) definition is:

```
Function EbexBlock(CDUR,CRTE,ITVL,RABA:double;AGTS:longint;var ECDE:longint)
                    :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexBlock Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGTS As Long,ByRef ECDE As Long) As double
```

The function EbexBlock is suitable for programming use only. The meaning of each of the parameters is shown in table 76

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGTS	longint	Agents assigned, whole agents.
ECDE	longint	Error code.

Table 76: Parameters for EbexBlock

7.2.15 EbexAbandon : % of calls abandoned (P)

EbexAbandon calculates the percentage of calls that will be abandoned.
The Delphi or Lazarus (Pascal) definition is:

```
Function EbexAbandon(CDUR,CRTE,ITVL,RABA:double;AGTS:longint;var ECDE:longint)
                      :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexAbandon Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGTS As Long,ByRef ECDE As Long) As double
```

The function EbexAbandon is suitable for programming use only. The meaning of each of the parameters is shown in table 77

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGTS	longint	Agents assigned, whole agents.
ECDE	longint	Error code.

Table 77: Parameters for EbexAbandon

7.2.16 EbexPerf : performance statistics (P)

EbexPerf calculates most of the performance statistics of interest for Erlang-B Extended. EbexPerf is intended for programming use, and is not suitable for use in a spreadsheet.
The Delphi or Lazarus (Pascal) definition is:

```
    Procedure EbexPerf(CDUR,CRTE,ITVL,RABA:double;TGAT,AGTS:longint;
                       var ELGS,COFU,CUTL,CIMD,CSLV,CLTE,CABN,ATMP,CBLK,RTRT:double;
                       var ECDE:longint);stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Sub EbexPerf Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGAT As Long,ByVal AGTS As Long, _
   ByRef ELGS As Double,ByRef COFU As Double, _
   ByRef CUTL As Double,ByRef CIMD As Double, _
   ByRef CSLV As Double,ByRef CLTE As Double, _
   ByRef CABN As Double,ByRef ATMP As Double, _
   ByRef CBLK As Double,ByRef RTRT As Double, _
   ByRef ECDE As Long)
```

The function EbexPerf is suitable for programming use only. The meaning of each of the parameters is shown in table 78

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGAT	longint	Target call attempts required.
AGTS	longint	Agents assigned, whole agents.
ELGS	double	”Traffic” or workload in erlangs.
COFU	double	% offered agent utilisation.
CUTL	double	% actual agent utilisation.
CIMD	double	% calls answered immediately.
CSLV	double	% calls answered within target.
CLTE	double	% calls answered later than target.
CABN	double	% calls abandoned.
ATMP	double	Average call attempts per call.
CBLK	double	% call attempts that are blocked.
RTRT	double	Retry ratio, (retries/offered calls).
ECDE	longint	Error code.

Table 78: Parameters for EbexPerf

7.3 Fractional agents

7.3.1 EbexFracAgsl : fractional agents needed for service level (S/P)

EbexFracAgsl calculates the fractional number of agents needed to achieve the target service level. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=EbexFracAgsl(CDUR,CRTE,ITVL,RABA,TGPC,TGAT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexFracAgsl(CDUR,CRTE,ITVL,RABA,TGPC:double;TGAT:longint):double;
                     stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexFracAgsl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGPC As Double,ByVal TGAT As Long) As double
```

The function EbexFracAgsl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 79

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGPC	double	Target percentage of calls.
TGAT	longint	Target call attempts required.

Table 79: Parameters for EbexFracAgsl

7.3.2 EbexFracAgab : fractional agents needed for abandon rate (S/P)

EbexFracAgab calculates the fractional number of agents needed to prevent the abandon rate exceeding the target abandon rate. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=EbexFracAgab(CDUR,CRTE,ITVL,RABA,TGAB)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexFracAgab(CDUR,CRTE,ITVL,RABA,TGAB:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexFracAgab Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGAB As Double) As double
```

The function EbexFracAgab is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 80

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGAB	double	Target abandon rate, % of calls.

Table 80: Parameters for EbexFracAgab

7.3.3 EbexFracBlck : % of call attempts blocked (S/P)

EbexFracBlck calculates the percentage abandon rate for Erlang-B Extended. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=EbexFracBlck(CDUR,CRTE,ITVL,RABA,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexFracBlck(CDUR,CRTE,ITVL,RABA,AGFR:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexFracBlck Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGFR As Double) As double
```

The function EbexFracBlck is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 81

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGFR	double	Agents assigned, fractional agents.

Table 81: Parameters for EbexFracBlck

7.3.4 EbexFracAbnd : % of calls abandoned (S/P)

EbexFracAbnd calculates the percentage of calls that will be abandoned. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=EbexFracAbnd(CDUR,CRTE,ITVL,RABA,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexFracAbnd(CDUR,CRTE,ITVL,RABA,AGFR:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexFracAbnd Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGFR As Double) As double
```

The function EbexFracAbnd is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 82

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGFR	double	Agents assigned, fractional agents.

Table 82: Parameters for EbexFracAbnd

7.3.5 EbexFracOfut : % offered utilisation (S/P)

EbexFracOfut calculates the "offered utilisation", which is the agent utilisation that would occur if all calls were answered. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=EbexFracOfut(CDUR,CRTE,ITVL,RABA,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexFracOfut(CDUR,CRTE,ITVL,RABA,AGFR:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexFracOfut Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGFR As Double) As double
```

The function EbexFracOfut is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 83

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGFR	double	Agents assigned, fractional agents.

Table 83: Parameters for EbexFracOfut

7.3.6 EbexFracUtil : % agent utilisation for calls (S/P)

EbexFracUtil calculates the average agent utilisation for Erlang-B Extended. Utilisation, also referred to as ”occupancy”, means the percentage of an agents time spent handling calls. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=EbexFracUtil(CDUR,CRTE,ITVL,RABA,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexFracUtil(CDUR,CRTE,ITVL,RABA,AGFR:double):double;
                         stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexFracUtil Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGFR As Double) As double
```

The function EbexFracUtil is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 84

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGFR	double	Agents assigned, fractional agents.

Table 84: Parameters for EbexFracUtil

7.3.7 EbexFracImed : % calls answered immediately (S/P)

EbexFracImed calculates the percentage of calls that are answered immediately for Erlang-B Extended. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=EbexFracImed(CDUR,CRTE,ITVL,RABA,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexFracImed(CDUR,CRTE,ITVL,RABA,AGFR:double):double;
                         stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexFracImed Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGFR As Double) As double
```

The function EbexFracImed is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 85

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGFR	double	Agents assigned, fractional agents.

Table 85: Parameters for EbexFracImed

7.3.8 EbexFracLate : % calls answered later than target (S/P)

EbexFracLate calculates the percentage of calls that are answered late (after a longer wait than the target answer time) for Erlang-B Extended. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=EbexFracLate(CDUR,CRTE,ITVL,RABA,TGAT,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexFracLate(CDUR,CRTE,ITVL,RABA:double;TGAT:longint;AGFR:double)
                        :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexFracLate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGAT As Long,ByVal AGFR As Double) As double
```

The function EbexFracLate is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 86

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGAT	longint	Target call attempts required.
AGFR	double	Agents assigned, fractional agents.

Table 86: Parameters for EbexFracLate

7.3.9 EbexFracSlvl : % service level (S/P)

EbexFracSlvl calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Erlang-B Extended. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=EbexFracSlvl(CDUR,CRTE,ITVL,RABA,TGAT,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexFracSlvl(CDUR,CRTE,ITVL,RABA:double;TGAT:longint;AGFR:double)
                        :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexFracSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGAT As Long,ByVal AGFR As Double) As double
```

The function EbexFracSlvl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 87

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGAT	longint	Target call attempts required.
AGFR	double	Agents assigned, fractional agents.

Table 87: Parameters for EbexFracSlvl

7.3.10 EbexFracAtmp : average attempts per call (S/P)

EbexFracAtmp calculates the average number of attempts made per call. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=EbexFracAtmp(CDUR,CRTE,ITVL,RABA,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexFracAtmp(CDUR,CRTE,ITVL,RABA,AGFR:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexFracAtmp Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGFR As Double) As double
```

The function EbexFracAtmp is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 88

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGFR	double	Agents assigned, fractional agents.

Table 88: Parameters for EbexFracAtmp

7.3.11 EbexFracRtrt : % retry ratio (S/P)

EbexFracRtrt calculates the percentage of call attempts that are retries. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=EbexFracRtrt(CDUR,CRTE,ITVL,RABA,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexFracRtrt(CDUR,CRTE,ITVL,RABA,AGFR:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexFracRtrt Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGFR As Double) As double
```

The function EbexFracRtrt is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 89

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGFR	double	Agents assigned, fractional agents.

Table 89: Parameters for EbexFracRtrt

7.3.12 EbexFracAgtsSlvl : fractional agents needed for service level (P)

EbexFracAgtsSlvl calculates the fractional number of agents needed to achieve the target service level. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function EbexFracAgtsSlvl(CDUR,CRTE,ITVL,RABA,TGPC:double;TGAT:longint;
                          var ECDE:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexFracAgtsSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGPC As Double,ByVal TGAT As Long, _
   ByRef ECDE As Long) As double
```

The function EbexFracAgtsSlvl is suitable for programming use only. The meaning of each of the parameters is shown in table 90

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGPC	double	Target percentage of calls.
TGAT	longint	Target call attempts required.
ECDE	longint	Error code.

Table 90: Parameters for EbexFracAgtsSlvl

7.3.13 EbexFracAgtsAbnd : fractional agents needed for abandon rate (P)

EbexFracAgtsAbnd calculates the fractional number of agents needed to prevent the abandon rate exceeding the target abandon rate. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function EbexFracAgtsAbnd(CDUR,CRTE,ITVL,RABA,TGAB:double;var ECDE:longint):double;
                          stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexFracAgtsAbnd Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGAB As Double,ByRef ECDE As Long) As double
```

The function EbexFracAgtsAbnd is suitable for programming use only. The meaning of each of the parameters is shown in table 91

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGAB	double	Target abandon rate, % of calls.
ECDE	longint	Error code.

Table 91: Parameters for EbexFracAgtsAbnd

7.3.14 EbexFracBlock : % of call attempts blocked (P)

EbexFracBlock calculates the percentage abandon rate for Erlang-B Extended. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function EbexFracBlock(CDUR,CRTE,ITVL,RABA,AGFR:double;var ECDE:longint):double;
                       stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexFracBlock Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGFR As Double,ByRef ECDE As Long) As double
```

The function EbexFracBlock is suitable for programming use only. The meaning of each of the parameters is shown in table 92

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGFR	double	Agents assigned, fractional agents.
ECDE	longint	Error code.

Table 92: Parameters for EbexFracBlock

7.3.15 EbexFracAbandon : % of calls abandoned (P)

EbexFracAbandon calculates the percentage of calls that will be abandoned. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function EbexFracAbandon(CDUR,CRTE,ITVL,RABA,AGFR:double;var ECDE:longint):double;
                         stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexFracAbandon Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGFR As Double,ByRef ECDE As Long) As double
```

The function EbexFracAbandon is suitable for programming use only. The meaning of each of the parameters is shown in table 93

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGFR	double	Agents assigned, fractional agents.
ECDE	longint	Error code.

Table 93: Parameters for EbexFracAbandon

7.3.16 EbexFracPerf : performance statistics (P)

EbexFracPerf calculates most of the performance statistics of interest for Erlang-B Extended. EbexFracPerf is intended for programming use, and is not suitable for use in a spreadsheet. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Procedure EbexFracPerf(CDUR,CRTE,ITVL,RABA:double;TGAT:longint;AGFR:double;
                       var ELGS,COFU,CUTL,CIMD,CSLV,CLTE,CABN,ATMP,CBLK,RTRT:double;
                       var ECDE:longint);stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Sub EbexFracPerf Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGAT As Long,ByVal AGFR As Double, _
   ByRef ELGS As Double,ByRef COFU As Double, _
   ByRef CUTL As Double,ByRef CIMD As Double, _
   ByRef CSLV As Double,ByRef CLTE As Double, _
   ByRef CABN As Double,ByRef ATMP As Double, _
   ByRef CBLK As Double,ByRef RTRT As Double, _
   ByRef ECDE As Long)
```

The function EbexFracPerf is suitable for programming use only. The meaning of each of the parameters is shown in table 94

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGAT	longint	Target call attempts required.
AGFR	double	Agents assigned, fractional agents.
ELGS	double	”Traffic” or workload in erlangs.
COFU	double	% offered agent utilisation.
CUTL	double	% actual agent utilisation.
CIMD	double	% calls answered immediately.
CSLV	double	% calls answered within target.
CLTE	double	% calls answered later than target.
CABN	double	% calls abandoned.
ATMP	double	Average call attempts per call.
CBLK	double	% call attempts that are blocked.
RTRT	double	Retry ratio, (retries/offered calls).
ECDE	longint	Error code.

Table 94: Parameters for EbexFracPerf

7.4 Shrinkage

7.4.1 EbexShrkAgsl : agents with shrinkage needed for service level (S/P)

EbexShrkAgsl calculates the number of agents with shrinkage needed to achieve the target service level according to Erlang-B Extended.
The Excel spreadsheet call format is:

```
=EbexShrkAgsl(CDUR,CRTE,ITVL,RABA,TGPC,TGAT,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexShrkAgsl(CDUR,CRTE,ITVL,RABA,TGPC:double;TGAT:longint;UMPH:double)
                      :longint;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexShrkAgsl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGPC As Double,ByVal TGAT As Long, _
   ByVal UMPH As Double) As long
```

The function EbexShrkAgsl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 95

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGPC	double	Target percentage of calls.
TGAT	longint	Target call attempts required.
UMPH	double	Unaccounted minutes per hour.

Table 95: Parameters for EbexShrkAgsl

7.4.2 EbexShrkAgab : agents with shrinkage needed for abandon rate (S/P)

EbexShrkAgab calculates the number of agents with shrinkage needed to achieve the target abandon rate.
The Excel spreadsheet call format is:

```
=EbexShrkAgab(CDUR,CRTE,ITVL,RABA,TGAB,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexShrkAgab(CDUR,CRTE,ITVL,RABA,TGAB,UMPH:double):longint;
                      stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexShrkAgab Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGAB As Double,ByVal UMPH As Double) As long
```

The function EbexShrkAgab is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 96

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGAB	double	Target abandon rate, % of calls.
UMPH	double	Unaccounted minutes per hour.

Table 96: Parameters for EbexShrkAgab

7.4.3 EbexShrkBlck : % of call attempts blocked (S/P)

EbexShrkBlck calculates the percentage abandon rate for Erlang-B Extended.
The Excel spreadsheet call format is:

```
=EbexShrkBlck(CDUR,CRTE,ITVL,RABA,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexShrkBlck(CDUR,CRTE,ITVL,RABA:double;AGTS:longint;UMPH:double)
                        :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexShrkBlck Lib "tlib01.dll" _
   (ByVal CDUR As Double,ByVal CRTE As Double, _
    ByVal ITVL As Double,ByVal RABA As Double, _
    ByVal AGTS As Long,ByVal UMPH As Double) As double
```

The function EbexShrkBlck is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 97

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 97: Parameters for EbexShrkBlck

7.4.4 EbexShrkAbnd : % of calls abandoned (S/P)

EbexShrkAbnd calculates the percentage of calls that will be abandoned.
The Excel spreadsheet call format is:

```
=EbexShrkAbnd(CDUR,CRTE,ITVL,RABA,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexShrkAbnd(CDUR,CRTE,ITVL,RABA:double;AGTS:longint;UMPH:double)
                        :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexShrkAbnd Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double) As double
```

The function EbexShrkAbnd is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 98

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 98: Parameters for EbexShrkAbnd

7.4.5 EbexShrkOfut : % offered utilisation (S/P)

EbexShrkOfut calculates the ”offered utilisation”, which is the agent utilisation that would occur if all calls were answered.
The Excel spreadsheet call format is:

```
=EbexShrkOfut(CDUR,CRTE,ITVL,RABA,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexShrkOfut(CDUR,CRTE,ITVL,RABA:double;AGTS:longint;UMPH:double)
                           :double;stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function EbexShrkOfut Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double) As double
```

The function EbexShrkOfut is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 99

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 99: Parameters for EbexShrkOfut

7.4.6 EbexShrkUtil : % agent utilisation for calls (S/P)

EbexShrkUtil calculates the average agent utilisation for Erlang-B Extended. Utilisation, also referred to as ”occupancy”, means the percentage of an agents time spent handling calls.
The Excel spreadsheet call format is:

```
=EbexShrkUtil(CDUR,CRTE,ITVL,RABA,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexShrkUtil(CDUR,CRTE,ITVL,RABA:double;AGTS:longint;UMPH:double)
                           :double;stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function EbexShrkUtil Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double) As double
```

The function EbexShrkUtil is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 100

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 100: Parameters for EbexShrkUtil

7.4.7 EbexShrkImed : % calls answered immediately (S/P)

EbexShrkImed calculates the percentage of calls that are answered immediately for Erlang-B Extended. The Excel spreadsheet call format is:

```
=EbexShrkImed(CDUR,CRTE,ITVL,RABA,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexShrkImed(CDUR,CRTE,ITVL,RABA:double;AGTS:longint;UMPH:double)
                        :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexShrkImed Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double) As double
```

The function EbexShrkImed is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 101

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 101: Parameters for EbexShrkImed

7.4.8 EbexShrkLate : % calls answered later than target (S/P)

EbexShrkLate calculates the percentage of calls that are answered late (after a longer wait than the target answer time) for Erlang-B Extended.
The Excel spreadsheet call format is:

```
=EbexShrkLate(CDUR,CRTE,ITVL,RABA,TGAT,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexShrkLate(CDUR,CRTE,ITVL,RABA:double;TGAT,AGTS:longint;UMPH:double)
                        :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexShrkLate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGAT As Long,ByVal AGTS As Long, _
   ByVal UMPH As Double) As double
```

The function EbexShrkLate is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 102

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGAT	longint	Target call attempts required.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 102: Parameters for EbexShrkLate

7.4.9 EbexShrkSlvl : % service level (S/P)

EbexShrkSlvl calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Erlang-B Extended.
The Excel spreadsheet call format is:

```
=EbexShrkSlvl(CDUR,CRTE,ITVL,RABA,TGAT,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexShrkSlvl(CDUR,CRTE,ITVL,RABA:double;TGAT,AGTS:longint;UMPH:double)
                      :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexShrkSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGAT As Long,ByVal AGTS As Long, _
   ByVal UMPH As Double) As double
```

The function EbexShrkSlvl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 103

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGAT	longint	Target call attempts required.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 103: Parameters for EbexShrkSlvl

7.4.10 EbexShrkAtmp : average attempts per call (S/P)

EbexShrkAtmp calculates the average number of attempts made per call.
The Excel spreadsheet call format is:

```
=EbexShrkAtmp(CDUR,CRTE,ITVL,RABA,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexShrkAtmp(CDUR,CRTE,ITVL,RABA:double;AGTS:longint;UMPH:double)
                           :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexShrkAtmp Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double) As double
```

The function EbexShrkAtmp is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 104

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 104: Parameters for EbexShrkAtmp

7.4.11 EbexShrkRtrt : % retry ratio (S/P)

EbexShrkRtrt calculates the percentage of call attempts that are retries.
The Excel spreadsheet call format is:

```
=EbexShrkRtrt(CDUR,CRTE,ITVL,RABA,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function EbexShrkRtrt(CDUR,CRTE,ITVL,RABA:double;AGTS:longint;UMPH:double)
                           :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexShrkRtrt Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double) As double
```

The function EbexShrkRtrt is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 105

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 105: Parameters for EbexShrkRtrt

7.4.12 EbexShrkAgtsSlvl : agents with shrinkage needed for service level (P)

EbexShrkAgtsSlvl calculates the number of agents with shrinkage needed to achieve the target service level according to Erlang-B Extended.
The Delphi or Lazarus (Pascal) definition is:

```
Function EbexShrkAgtsSlvl(CDUR,CRTE,ITVL,RABA,TGPC:double;TGAT:longint;UMPH:double;
                          var ECDE:longint):longint;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexShrkAgtsSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGPC As Double,ByVal TGAT As Long, _
   ByVal UMPH As Double,ByRef ECDE As Long) As long
```

The function EbexShrkAgtsSlvl is suitable for programming use only. The meaning of each of the parameters is shown in table 106

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGPC	double	Target percentage of calls.
TGAT	longint	Target call attempts required.
UMPH	double	Unaccounted minutes per hour.
ECDE	longint	Error code.

Table 106: Parameters for EbexShrkAgtsSlvl

7.4.13 EbexShrkAgtsAbnd : agents with shrinkage needed for abandon rate (P)

EbexShrkAgtsAbnd calculates the number of agents with shrinkage needed to achieve the target abandon rate.
The Delphi or Lazarus (Pascal) definition is:

```
Function EbexShrkAgtsAbnd(CDUR,CRTE,ITVL,RABA,TGAB,UMPH:double;var ECDE:longint)
                          :longint;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexShrkAgtsAbnd Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGAB As Double,ByVal UMPH As Double, _
   ByRef ECDE As Long) As long
```

The function EbexShrkAgtsAbnd is suitable for programming use only. The meaning of each of the parameters is shown in table 107

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGAB	double	Target abandon rate, % of calls.
UMPH	double	Unaccounted minutes per hour.
ECDE	longint	Error code.

Table 107: Parameters for EbexShrkAgtsAbnd

7.4.14 EbexShrkBlock : % of call attempts blocked (P)

EbexShrkBlock calculates the percentage abandon rate for Erlang-B Extended.
The Delphi or Lazarus (Pascal) definition is:

```
Function EbexShrkBlock(CDUR,CRTE,ITVL,RABA:double;AGTS:longint;UMPH:double;
                       var ECDE:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexShrkBlock Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByRef ECDE As Long) As double
```

The function EbexShrkBlock is suitable for programming use only. The meaning of each of the parameters is shown in table 108

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
ECDE	longint	Error code.

Table 108: Parameters for EbexShrkBlock

7.4.15 EbexShrkAbandon : % of calls abandoned (P)

EbexShrkAbandon calculates the percentage of calls that will be abandoned.
The Delphi or Lazarus (Pascal) definition is:

```
Function EbexShrkAbandon(CDUR,CRTE,ITVL,RABA:double;AGTS:longint;UMPH:double;
                         var ECDE:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function EbexShrkAbandon Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByRef ECDE As Long) As double
```

The function EbexShrkAbandon is suitable for programming use only. The meaning of each of the parameters is shown in table 109

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
ECDE	longint	Error code.

Table 109: Parameters for EbexShrkAbandon

7.4.16 EbexShrkPerf : performance statistics (P)

EbexShrkPerf calculates most of the performance statistics of interest for Erlang-B Extended. EbexShrkPerf is intended for programming use, and is not suitable for use in a spreadsheet.
The Delphi or Lazarus (Pascal) definition is:

```
Procedure EbexShrkPerf(CDUR,CRTE,ITVL,RABA:double;TGAT,AGTS:longint;UMPH:double;
                       var ELGS,COFU,CUTL,CADH,CIMD,CSLV,CLTE,CABN,ATMP,CBLK:double;
                       var RTRT:double;var ECDE:longint);
                       stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Sub EbexShrkPerf Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal RABA As Double, _
   ByVal TGAT As Long,ByVal AGTS As Long, _
   ByVal UMPH As Double,ByRef ELGS As Double, _
   ByRef COFU As Double,ByRef CUTL As Double, _
   ByRef CADH As Double,ByRef CIMD As Double, _
   ByRef CSLV As Double,ByRef CLTE As Double, _
   ByRef CABN As Double,ByRef ATMP As Double, _
   ByRef CBLK As Double,ByRef RTRT As Double, _
   ByRef ECDE As Long)
```

The function EbexShrkPerf is suitable for programming use only. The meaning of each of the parameters is shown in table 110

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
RABA	double	Average attempts before abandoning.
TGAT	longint	Target call attempts required.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
ELGS	double	”Traffic” or workload in erlangs.
COFU	double	% offered agent utilisation.
CUTL	double	% actual agent utilisation.
CADH	double	% agent unaccounted time.
CIMD	double	% calls answered immediately.
CSLV	double	% calls answered within target.
CLTE	double	% calls answered later than target.
CABN	double	% calls abandoned.
ATMP	double	Average call attempts per call.
CBLK	double	% call attempts that are blocked.
RTRT	double	Retry ratio, (retries/offered calls).
ECDE	longint	Error code.

Table 110: Parameters for EbexShrkPerf

8 Abandoned Calls (Mitan-C)

8.1 Mitan-C model description

The Abandoned Calls (Mitan-C) model is a ”super” version of Erlang-C. Mitan-C takes account of the tolerance, or impatience, of callers. The interaction between service-level and abandon rate is complex and subtle, and cannot be accounted for just my ”adjustments” to results from Erlang-C. Mitan-C gives a much better explanation than Erlang-C of call-centre performance, and allows you to manage both your service-level and the abandon rate. Overload situations, which cannot always be avoided, can also be effectively analysed with Mitan-C. See figure (**??**).

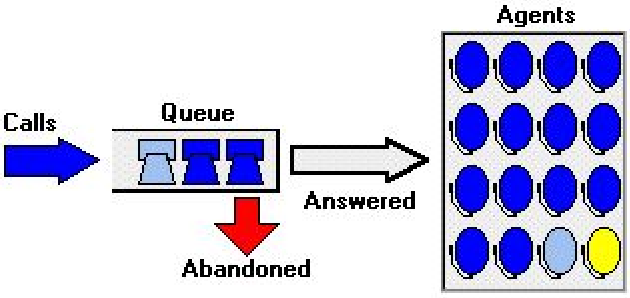

Figure 4: Mitan-C

8.2 Whole agents

8.2.1 MtncAgsl : agents needed for service level (S/P)

MtncAgsl calculates the number of agents needed to achieve the target service level according to Mitan-C. The Excel spreadsheet call format is:

```
=MtncAgsl(CDUR,CRTE,ITVL,TLCE,TGPC,TGTM)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncAgsl(CDUR,CRTE,ITVL,TLCE,TGPC,TGTM:double):longint;
                stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncAgsl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGPC As Double,ByVal TGTM As Double) As long
```

The function MtncAgsl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 111

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.

Table 111: Parameters for MtncAgsl

8.2.2 MtncAgab : agents needed for abandon rate (S/P)

MtncAgab calculates the number of agents needed to achieve the target abandon rate. according to Mitan-C.
The Excel spreadsheet call format is:

```
=MtncAgab(CDUR,CRTE,ITVL,TLCE,TGAB)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncAgab(CDUR,CRTE,ITVL,TLCE,TGAB:double):longint;
                    stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncAgab Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGAB As Double) As long
```

The function MtncAgab is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 112

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGAB	double	Target abandon rate, % of calls.

Table 112: Parameters for MtncAgab

8.2.3 MtncImed : % calls answered immediately (S/P)

MtncImed calculates the percentage of calls that are answered immediately for Mitan-C.
The Excel spreadsheet call format is:

```
=MtncImed(CDUR,CRTE,ITVL,TLCE,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncImed(CDUR,CRTE,ITVL,TLCE:double;AGTS:longint):double;
                    stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncImed Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGTS As Long) As double
```

The function MtncImed is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 113

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGTS	longint	Agents assigned, whole agents.

Table 113: Parameters for MtncImed

8.2.4 MtncSlvl : % service level (S/P)

MtncSlvl calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Mitan-C.
The Excel spreadsheet call format is:

```
=MtncSlvl(CDUR,CRTE,ITVL,TLCE,TGTM,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncSlvl(CDUR,CRTE,ITVL,TLCE,TGTM:double;AGTS:longint):double;
                    stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGTM As Double,ByVal AGTS As Long) As double
```

The function MtncSlvl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 114

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.

Table 114: Parameters for MtncSlvl

8.2.5 MtncLate : % calls answered later than target (S/P)

MtncLate calculates the percentage of calls that are answered late (after a longer wait than the target answer time) for Mitan-C.
The Excel spreadsheet call format is:

```
=MtncLate(CDUR,CRTE,ITVL,TLCE,TGTM,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncLate(CDUR,CRTE,ITVL,TLCE,TGTM:double;AGTS:longint):double;
                    stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncLate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGTM As Double,ByVal AGTS As Long) As double
```

The function MtncLate is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 115

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.

Table 115: Parameters for MtncLate

8.2.6 MtncQsze : average calls waiting (S/P)

MtncQsze calculates the average queue size, or number of calls waiting, for Mitan-C.
The Excel spreadsheet call format is:

```
=MtncQsze(CDUR,CRTE,ITVL,TLCE,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncQsze(CDUR,CRTE,ITVL,TLCE:double;AGTS:longint):double;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncQsze Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGTS As Long) As double
```

The function MtncQsze is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 116

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGTS	longint	Agents assigned, whole agents.

Table 116: Parameters for MtncQsze

8.2.7 MtncAtme : average answer time (wait or ASA) (S/P)

MtncAtme calculates the average time a call waits for an answer for Mitan-C. This is also known as ”average speed of answer” or ASA.
The Excel spreadsheet call format is:

```
=MtncAtme(CDUR,CRTE,ITVL,TLCE,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncAtme(CDUR,CRTE,ITVL,TLCE:double;AGTS:longint):double;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncAtme Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGTS As Long) As double
```

The function MtncAtme is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 117

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGTS	longint	Agents assigned, whole agents.

Table 117: Parameters for MtncAtme

8.2.8 MtncWait : average answer time (wait or ASA) (S/P)

MtncWait calculates the average time a call waits for an answer for Mitan-C. This is also known as ”average speed of answer” or ASA.
The Excel spreadsheet call format is:

```
=MtncWait(CDUR,CRTE,ITVL,TLCE,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncWait(CDUR,CRTE,ITVL,TLCE:double;AGTS:longint):double;
                    stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function MtncWait Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGTS As Long) As double
```

The function MtncWait is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 118

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGTS	longint	Agents assigned, whole agents.

Table 118: Parameters for MtncWait

8.2.9 MtncDlay : average answer time if not immediate (S/P)

MtncDlay calculates the average delay for Mitan-C. Delay means the average wait time for calls that do not get answered immediately.
The Excel spreadsheet call format is:

```
=MtncDlay(CDUR,CRTE,ITVL,TLCE,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncDlay(CDUR,CRTE,ITVL,TLCE:double;AGTS:longint):double;
                    stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function MtncDlay Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGTS As Long) As double
```

The function MtncDlay is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 119

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGTS	longint	Agents assigned, whole agents.

Table 119: Parameters for MtncDlay

8.2.10 MtncUtil : % agent utilisation for calls (S/P)

MtncUtil calculates the average agent utilisation for Mitan-C. Utilisation, also referred to as ”occupancy”, means the percentage of an agents time spent handling calls.
The Excel spreadsheet call format is:

```
=MtncUtil(CDUR,CRTE,ITVL,TLCE,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncUtil(CDUR,CRTE,ITVL,TLCE:double;AGTS:longint):double;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncUtil Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGTS As Long) As double
```

The function MtncUtil is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 120

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGTS	longint	Agents assigned, whole agents.

Table 120: Parameters for MtncUtil

8.2.11 MtncAbnd : % of calls abandoned (S/P)

MtncAbnd calculates the percentage of calls that will be abandoned.
The Excel spreadsheet call format is:

```
=MtncAbnd(CDUR,CRTE,ITVL,TLCE,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncAbnd(CDUR,CRTE,ITVL,TLCE:double;AGTS:longint):double;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncAbnd Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGTS As Long) As double
```

The function MtncAbnd is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 121

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGTS	longint	Agents assigned, whole agents.

Table 121: Parameters for MtncAbnd

8.2.12 MtncAwth : % calls abandoned within target (S/P)

MtncAwth calculates the percentage of calls that will be abandoned within the target answer time.
The Excel spreadsheet call format is:

```
=MtncAwth(CDUR,CRTE,ITVL,TLCE,TGTM,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncAwth(CDUR,CRTE,ITVL,TLCE,TGTM:double;AGTS:longint):double;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncAwth Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGTM As Double,ByVal AGTS As Long) As double
```

The function MtncAwth is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 122

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.

Table 122: Parameters for MtncAwth

8.2.13 MtncTabd : average time to abandon (S/P)

MtncTabd calculates the average time to abandon.
The Excel spreadsheet call format is:

```
=MtncTabd(CDUR,CRTE,ITVL,TLCE,AGTS)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncTabd(CDUR,CRTE,ITVL,TLCE:double;AGTS:longint):double;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncTabd Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGTS As Long) As double
```

The function MtncTabd is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 123

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGTS	longint	Agents assigned, whole agents.

Table 123: Parameters for MtncTabd

8.2.14 MtncAgtsAbnd : agents needed for abandon rate (P)

MtncAgtsAbnd calculates the number of agents needed to achieve the target abandon rate. according to Mitan-C.
The Delphi or Lazarus (Pascal) definition is:

```
Function MtncAgtsAbnd(CDUR,CRTE,ITVL,TLCE,TGAB:double;var ECDE:longint):longint;
                      stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncAgtsAbnd Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGAB As Double,ByRef ECDE As Long) As long
```

The function MtncAgtsAbnd is suitable for programming use only. The meaning of each of the parameters is shown in table 124

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGAB	double	Target abandon rate, % of calls.
ECDE	longint	Error code.

Table 124: Parameters for MtncAgtsAbnd

8.2.15 MtncAgtsAbndLmts : agents for abandon rate, limits (P)

MtncAgtsAbndLmts calculates the number of agents needed to achieve the target abandon rate, with limits on the number of agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function MtncAgtsAbndLmts(MNAG,MXAG:integer;
                          MNAU,MXAU,CDUR,CRTE,ITVL,TLCE,TGAB:double;
                          var RCDE,ECDE:longint):longint;
                          stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncAgtsAbndLmts Lib "tlib01.dll" _
  (ByVal MNAG As Integer,ByVal MXAG As Integer, _
   ByVal MNAU As Double,ByVal MXAU As Double, _
   ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGAB As Double,ByRef RCDE As Long, _
   ByRef ECDE As Long) As long
```

The function MtncAgtsAbndLmts is suitable for programming use only. The meaning of each of the parameters is shown in table 125

Parameter	Type	Description
MNAG	integer	Minimum number of agents.
MXAG	integer	Maximum number of agents.
MNAU	double	Minimum % agent utilisation.
MXAU	double	Maximum % agent utilisation.
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGAB	double	Target abandon rate, % of calls.
RCDE	longint	Result code.
ECDE	longint	Error code.

Table 125: Parameters for MtncAgtsAbndLmts

8.2.16 MtncAgtsSlvl : agents needed for service level (P)

MtncAgtsSlvl calculates the number of agents needed to achieve the target service level according to Mitan-C.
The Delphi or Lazarus (Pascal) definition is:

```
Function MtncAgtsSlvl(CDUR,CRTE,ITVL,TLCE,TGPC,TGTM:double;var ECDE:longint)
                            :longint;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncAgtsSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGPC As Double,ByVal TGTM As Double, _
   ByRef ECDE As Long) As long
```

The function MtncAgtsSlvl is suitable for programming use only. The meaning of each of the parameters is shown in table 126

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
ECDE	longint	Error code.

Table 126: Parameters for MtncAgtsSlvl

8.2.17 MtncAgtsSlvlLmts : agents for service level, limits (P)

MtncAgtsSlvlLmts calculates the number of agents needed to achieve the target service level, with limits on the number of agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function MtncAgtsSlvlLmts(MNAG,MXAG:integer;
                          MNAU,MXAU,CDUR,CRTE,ITVL,TLCE,TGPC,TGTM:double;
                          var RCDE,ECDE:longint):longint;
                          stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncAgtsSlvlLmts Lib "tlib01.dll" _
  (ByVal MNAG As Integer,ByVal MXAG As Integer, _
   ByVal MNAU As Double,ByVal MXAU As Double, _
   ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGPC As Double,ByVal TGTM As Double, _
   ByRef RCDE As Long,ByRef ECDE As Long) As long
```

The function MtncAgtsSlvlLmts is suitable for programming use only. The meaning of each of the parameters is shown in table 127

Parameter	Type	Description
MNAG	integer	Minimum number of agents.
MXAG	integer	Maximum number of agents.
MNAU	double	Minimum % agent utilisation.
MXAU	double	Maximum % agent utilisation.
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
RCDE	longint	Result code.
ECDE	longint	Error code.

Table 127: Parameters for MtncAgtsSlvlLmts

8.2.18 MtncSvcLevel : % service level (P)

MtncSvcLevel calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Mitan-C.
The Delphi or Lazarus (Pascal) definition is:

```
Function MtncSvcLevel(CDUR,CRTE,ITVL,TLCE,TGTM:double;AGTS:longint;
                      var ECDE:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncSvcLevel Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGTM As Double,ByVal AGTS As Long, _
   ByRef ECDE As Long) As double
```

The function MtncSvcLevel is suitable for programming use only. The meaning of each of the parameters is shown in table 128

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
ECDE	longint	Error code.

Table 128: Parameters for MtncSvcLevel

8.2.19 MtncAbndRate : % of calls abandoned (P)

MtncAbndRate calculates the percentage of calls that will be abandoned.
The Delphi or Lazarus (Pascal) definition is:

```
Function MtncAbndRate(CDUR,CRTE,ITVL,TLCE:double;AGTS:longint;var ECDE:longint)
                        :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncAbndRate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGTS As Long,ByRef ECDE As Long) As double
```

The function MtncAbndRate is suitable for programming use only. The meaning of each of the parameters is shown in table 129

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGTS	longint	Agents assigned, whole agents.
ECDE	longint	Error code.

Table 129: Parameters for MtncAbndRate

8.2.20 MtncPerf : performance statistics (P)

MtncPerf calculates most of the performance statistics of interest for Mitan-C. MtncPerf is intended for programming use, and is not suitable for use in a spreadsheet.
The Delphi or Lazarus (Pascal) definition is:

```
Procedure MtncPerf(CDUR,CRTE,ITVL,TLCE,TGTM:double;AGTS:longint;
                   var ELGS,COFU,CUTL,CIMD,CSLV,CLTE,CABN,CABW,ATME,DLAY:double;
                   var TABD,QSZE:double;var ECDE:longint);
                   stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Sub MtncPerf Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGTM As Double,ByVal AGTS As Long, _
   ByRef ELGS As Double,ByRef COFU As Double, _
   ByRef CUTL As Double,ByRef CIMD As Double, _
   ByRef CSLV As Double,ByRef CLTE As Double, _
   ByRef CABN As Double,ByRef CABW As Double, _
   ByRef ATME As Double,ByRef DLAY As Double, _
   ByRef TABD As Double,ByRef QSZE As Double, _
   ByRef ECDE As Long)
```

The function MtncPerf is suitable for programming use only. The meaning of each of the parameters is shown in table 130

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
ELGS	double	”Traffic” or workload in erlangs.
COFU	double	% offered agent utilisation.
CUTL	double	% actual agent utilisation.
CIMD	double	% calls answered immediately.
CSLV	double	% calls answered within target.
CLTE	double	% calls answered later than target.
CABN	double	% calls abandoned.
CABW	double	% calls abandoned within target.
ATME	double	Average answer-time (ASA) in seconds.
DLAY	double	Average delay in seconds.
TABD	double	Average time to abandon in seconds.
QSZE	double	Average queue size.
ECDE	longint	Error code.

Table 130: Parameters for MtncPerf

8.3 Fractional agents

8.3.1 MtncFracAgsl : fractional agents needed for service level (S/P)

MtncFracAgsl calculates the fractional number of agents needed to achieve the target service level. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=MtncFracAgsl(CDUR,CRTE,ITVL,TLCE,TGPC,TGTM)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncFracAgsl(CDUR,CRTE,ITVL,TLCE,TGPC,TGTM:double):double;
                         stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncFracAgsl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGPC As Double,ByVal TGTM As Double) As double
```

The function MtncFracAgsl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 131

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.

Table 131: Parameters for MtncFracAgsl

8.3.2 MtncFracAgab : fractional agents needed for abandon rate (S/P)

MtncFracAgab calculates the fractional number of agents needed to prevent the abandon rate exceeding the target abandon rate. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=MtncFracAgab(CDUR,CRTE,ITVL,TLCE,TGAB)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncFracAgab(CDUR,CRTE,ITVL,TLCE,TGAB:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncFracAgab Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGAB As Double) As double
```

The function MtncFracAgab is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 132

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGAB	double	Target abandon rate, % of calls.

Table 132: Parameters for MtncFracAgab

8.3.3 MtncFracImed : % calls answered immediately (S/P)

MtncFracImed calculates the percentage of calls that are answered immediately for Mitan-C. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=MtncFracImed(CDUR,CRTE,ITVL,TLCE,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncFracImed(CDUR,CRTE,ITVL,TLCE,AGFR:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncFracImed Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGFR As Double) As double
```

The function MtncFracImed is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 133

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGFR	double	Agents assigned, fractional agents.

Table 133: Parameters for MtncFracImed

8.3.4 MtncFracSlvl : % service level (S/P)

MtncFracSlvl calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Mitan-C. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=MtncFracSlvl(CDUR,CRTE,ITVL,TLCE,TGTM,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncFracSlvl(CDUR,CRTE,ITVL,TLCE,TGTM,AGFR:double):double;
                         stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncFracSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGTM As Double,ByVal AGFR As Double) As double
```

The function MtncFracSlvl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 134

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.

Table 134: Parameters for MtncFracSlvl

8.3.5 MtncFracLate : % calls answered later than target (S/P)

MtncFracLate calculates the percentage of calls that are answered late (after a longer wait than the target answer time) for Mitan-C. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=MtncFracLate(CDUR,CRTE,ITVL,TLCE,TGTM,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncFracLate(CDUR,CRTE,ITVL,TLCE,TGTM,AGFR:double):double;
                         stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncFracLate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGTM As Double,ByVal AGFR As Double) As double
```

The function MtncFracLate is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 135

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.

Table 135: Parameters for MtncFracLate

8.3.6 MtncFracQsze : average calls waiting (S/P)

MtncFracQsze calculates the average queue size, or number of calls waiting, for Mitan-C. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=MtncFracQsze(CDUR,CRTE,ITVL,TLCE,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncFracQsze(CDUR,CRTE,ITVL,TLCE,AGFR:double):double;
                          stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncFracQsze Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGFR As Double) As double
```

The function MtncFracQsze is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 136

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGFR	double	Agents assigned, fractional agents.

Table 136: Parameters for MtncFracQsze

8.3.7 MtncFracAtme : average answer time (wait or ASA) (S/P)

MtncFracAtme calculates the average time a call waits for an answer for Mitan-C. This is also known as "average speed of answer" or ASA. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=MtncFracAtme(CDUR,CRTE,ITVL,TLCE,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncFracAtme(CDUR,CRTE,ITVL,TLCE,AGFR:double):double;
                          stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncFracAtme Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGFR As Double) As double
```

The function MtncFracAtme is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 137

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGFR	double	Agents assigned, fractional agents.

Table 137: Parameters for MtncFracAtme

8.3.8 MtncFracDlay : average answer time if not immediate (S/P)

MtncFracDlay calculates the average delay for Mitan-C. Delay means the average wait time for calls that do not get answered immediately. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=MtncFracDlay(CDUR,CRTE,ITVL,TLCE,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncFracDlay(CDUR,CRTE,ITVL,TLCE,AGFR:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncFracDlay Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGFR As Double) As double
```

The function MtncFracDlay is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 138

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGFR	double	Agents assigned, fractional agents.

Table 138: Parameters for MtncFracDlay

8.3.9 MtncFracUtil : % agent utilisation for calls (S/P)

MtncFracUtil calculates the average agent utilisation for Mitan-C. Utilisation, also referred to as ”occupancy”, means the percentage of an agents time spent handling calls. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=MtncFracUtil(CDUR,CRTE,ITVL,TLCE,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncFracUtil(CDUR,CRTE,ITVL,TLCE,AGFR:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncFracUtil Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGFR As Double) As double
```

The function MtncFracUtil is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 139

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGFR	double	Agents assigned, fractional agents.

Table 139: Parameters for MtncFracUtil

8.3.10 MtncFracAbnd : % of calls abandoned (S/P)

MtncFracAbnd calculates the percentage of calls that will be abandoned. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=MtncFracAbnd(CDUR,CRTE,ITVL,TLCE,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncFracAbnd(CDUR,CRTE,ITVL,TLCE,AGFR:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncFracAbnd Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGFR As Double) As double
```

The function MtncFracAbnd is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 140

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGFR	double	Agents assigned, fractional agents.

Table 140: Parameters for MtncFracAbnd

8.3.11 MtncFracAwth : average answer time (wait or ASA) (S/P)

MtncFracAwth calculates the average time a call waits for an answer for Mitan-C. This is also known as ”average speed of answer” or ASA. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=MtncFracAwth(CDUR,CRTE,ITVL,TLCE,TGTM,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncFracAwth(CDUR,CRTE,ITVL,TLCE,TGTM,AGFR:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncFracAwth Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGTM As Double,ByVal AGFR As Double) As double
```

The function MtncFracAwth is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 141

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.

Table 141: Parameters for MtncFracAwth

8.3.12 MtncFracTabd : average time to abandon (S/P)

MtncFracTabd calculates the average time to abandon. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=MtncFracTabd(CDUR,CRTE,ITVL,TLCE,AGFR)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncFracTabd(CDUR,CRTE,ITVL,TLCE,AGFR:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncFracTabd Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGFR As Double) As double
```

The function MtncFracTabd is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 142

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGFR	double	Agents assigned, fractional agents.

Table 142: Parameters for MtncFracTabd

8.3.13 MtncFracAgtsAbnd : fractional agents needed for abandon rate (P)

MtncFracAgtsAbnd calculates the fractional number of agents needed to prevent the abandon rate exceeding the target abandon rate. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function MtncFracAgtsAbnd(CDUR,CRTE,ITVL,TLCE,TGAB:double;var ECDE:longint):double;
                            stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncFracAgtsAbnd Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGAB As Double,ByRef ECDE As Long) As double
```

The function MtncFracAgtsAbnd is suitable for programming use only. The meaning of each of the parameters is shown in table 143

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGAB	double	Target abandon rate, % of calls.
ECDE	longint	Error code.

Table 143: Parameters for MtncFracAgtsAbnd

8.3.14 MtncFracAgtsAbndLmts : fractional agents for abandon rate, limits (P)

MtncFracAgtsAbndLmts calculates the fractional number of agents needed to achieve the target abandon rate, with limits on the number of agents. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function MtncFracAgtsAbndLmts(MNAF,MXAF,MNAU,MXAU,CDUR,CRTE,ITVL,TLCE,TGAB:double;
                              var RCDE,ECDE:longint):double;
                              stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncFracAgtsAbndLmts Lib "tlib01.dll" _
  (ByVal MNAF As Double,ByVal MXAF As Double, _
   ByVal MNAU As Double,ByVal MXAU As Double, _
   ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGAB As Double,ByRef RCDE As Long, _
   ByRef ECDE As Long) As double
```

The function MtncFracAgtsAbndLmts is suitable for programming use only. The meaning of each of the parameters is shown in table 144

Parameter	Type	Description
MNAF	double	Minimum number of agents, fractional.
MXAF	double	Maximum number of agents, fractional.
MNAU	double	Minimum % agent utilisation.
MXAU	double	Maximum % agent utilisation.
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGAB	double	Target abandon rate, % of calls.
RCDE	longint	Result code.
ECDE	longint	Error code.

Table 144: Parameters for MtncFracAgtsAbndLmts

8.3.15 MtncFracAgtsSlvl : fractional agents needed for service level (P)

MtncFracAgtsSlvl calculates the fractional number of agents needed to achieve the target service level. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function MtncFracAgtsSlvl(CDUR,CRTE,ITVL,TLCE,TGPC,TGTM:double;var ECDE:longint)
                         :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncFracAgtsSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGPC As Double,ByVal TGTM As Double, _
   ByRef ECDE As Long) As double
```

The function MtncFracAgtsSlvl is suitable for programming use only. The meaning of each of the parameters is shown in table 145

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
ECDE	longint	Error code.

Table 145: Parameters for MtncFracAgtsSlvl

8.3.16 MtncFracAgtsSlvlLmts : fractional agents for service level, limits (P)

MtncFracAgtsSlvlLmts calculates the fractional number of agents needed to achieve the target service level, with limits on the number of agents. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function MtncFracAgtsSlvlLmts(MNAF,MXAF,MNAU,MXAU,CDUR,CRTE,ITVL,TLCE,TGPC,TGTM:double;
                              var RCDE,ECDE:longint):double;
                              stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncFracAgtsSlvlLmts Lib "tlib01.dll" _
  (ByVal MNAF As Double,ByVal MXAF As Double, _
   ByVal MNAU As Double,ByVal MXAU As Double, _
   ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGPC As Double,ByVal TGTM As Double, _
   ByRef RCDE As Long,ByRef ECDE As Long) As double
```

The function MtncFracAgtsSlvlLmts is suitable for programming use only. The meaning of each of the parameters is shown in table 146

Parameter	Type	Description
MNAF	double	Minimum number of agents, fractional.
MXAF	double	Maximum number of agents, fractional.
MNAU	double	Minimum % agent utilisation.
MXAU	double	Maximum % agent utilisation.
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
RCDE	longint	Result code.
ECDE	longint	Error code.

Table 146: Parameters for MtncFracAgtsSlvlLmts

8.3.17 MtncFracSvcLevel : % service level (P)

MtncFracSvcLevel calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Mitan-C. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function MtncFracSvcLevel(CDUR,CRTE,ITVL,TLCE,TGTM,AGFR:double;var ECDE:longint)
                          :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncFracSvcLevel Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGTM As Double,ByVal AGFR As Double, _
   ByRef ECDE As Long) As double
```

The function MtncFracSvcLevel is suitable for programming use only. The meaning of each of the parameters is shown in table 147

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
ECDE	longint	Error code.

Table 147: Parameters for MtncFracSvcLevel

8.3.18 MtncFracAbndRate : % of calls abandoned (P)

MtncFracAbndRate calculates the percentage of calls that will be abandoned. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function MtncFracAbndRate(CDUR,CRTE,ITVL,TLCE,AGFR:double;var ECDE:longint):double;
                          stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncFracAbndRate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGFR As Double,ByRef ECDE As Long) As double
```

The function MtncFracAbndRate is suitable for programming use only. The meaning of each of the parameters is shown in table 148

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGFR	double	Agents assigned, fractional agents.
ECDE	longint	Error code.

Table 148: Parameters for MtncFracAbndRate

8.3.19 MtncFracPerf : performance statistics (P)

MtncFracPerf calculates most of the performance statistics of interest for Mitan-C. MtncFracPerf is intended for programming use, and is not suitable for use in a spreadsheet. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Procedure MtncFracPerf(CDUR,CRTE,ITVL,TLCE,TGTM,AGFR:double;
                       var ELGS,COFU,CUTL,CIMD,CSLV,CLTE,CABN,CABW,ATME,DLAY:double;
                       var TABD,QSZE:double;var ECDE:longint);
                       stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Sub MtncFracPerf Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGTM As Double,ByVal AGFR As Double, _
   ByRef ELGS As Double,ByRef COFU As Double, _
   ByRef CUTL As Double,ByRef CIMD As Double, _
   ByRef CSLV As Double,ByRef CLTE As Double, _
   ByRef CABN As Double,ByRef CABW As Double, _
   ByRef ATME As Double,ByRef DLAY As Double, _
   ByRef TABD As Double,ByRef QSZE As Double, _
   ByRef ECDE As Long)
```

The function MtncFracPerf is suitable for programming use only. The meaning of each of the parameters is shown in table 149

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
ELGS	double	”Traffic” or workload in erlangs.
COFU	double	% offered agent utilisation.
CUTL	double	% actual agent utilisation.
CIMD	double	% calls answered immediately.
CSLV	double	% calls answered within target.
CLTE	double	% calls answered later than target.
CABN	double	% calls abandoned.
CABW	double	% calls abandoned within target.
ATME	double	Average answer-time (ASA) in seconds.
DLAY	double	Average delay in seconds.
TABD	double	Average time to abandon in seconds.
QSZE	double	Average queue size.
ECDE	longint	Error code.

Table 149: Parameters for MtncFracPerf

8.4 Shrinkage

8.4.1 MtncShrkAgsl : agents needed for service level (S/P)

MtncShrkAgsl calculates the number of agents needed to achieve the target service level according to Mitan-C.
The Excel spreadsheet call format is:

```
=MtncShrkAgsl(CDUR,CRTE,ITVL,TLCE,TGPC,TGTM,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncShrkAgsl(CDUR,CRTE,ITVL,TLCE,TGPC,TGTM,UMPH:double):longint;
                      stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncShrkAgsl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGPC As Double,ByVal TGTM As Double, _
   ByVal UMPH As Double) As long
```

The function MtncShrkAgsl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 150

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
UMPH	double	Unaccounted minutes per hour.

Table 150: Parameters for MtncShrkAgsl

8.4.2 MtncShrkAgab : agents needed for abandon rate (S/P)

MtncShrkAgab calculates the number of agents needed to achieve the target abandon rate. according to Mitan-C.
The Excel spreadsheet call format is:

```
=MtncShrkAgab(CDUR,CRTE,ITVL,TLCE,TGAB,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncShrkAgab(CDUR,CRTE,ITVL,TLCE,TGAB,UMPH:double):longint;
                      stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncShrkAgab Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGAB As Double,ByVal UMPH As Double) As long
```

The function MtncShrkAgab is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 151

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGAB	double	Target abandon rate, % of calls.
UMPH	double	Unaccounted minutes per hour.

Table 151: Parameters for MtncShrkAgab

8.4.3 MtncShrkImed : % calls answered immediately (S/P)

MtncShrkImed calculates the percentage of calls that are answered immediately for Mitan-C.
The Excel spreadsheet call format is:

```
=MtncShrkImed(CDUR,CRTE,ITVL,TLCE,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncShrkImed(CDUR,CRTE,ITVL,TLCE:double;AGTS:longint;UMPH:double)
                      :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncShrkImed Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double) As double
```

The function MtncShrkImed is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 152

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 152: Parameters for MtncShrkImed

8.4.4 MtncShrkSlvl : % service level (S/P)

MtncShrkSlvl calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Mitan-C.
The Excel spreadsheet call format is:

```
=MtncShrkSlvl(CDUR,CRTE,ITVL,TLCE,TGTM,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncShrkSlvl(CDUR,CRTE,ITVL,TLCE,TGTM:double;AGTS:longint;UMPH:double)
                          :double;stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function MtncShrkSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGTM As Double,ByVal AGTS As Long, _
   ByVal UMPH As Double) As double
```

The function MtncShrkSlvl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 153

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 153: Parameters for MtncShrkSlvl

8.4.5 MtncShrkLate : % calls answered later than target (S/P)

MtncShrkLate calculates the percentage of calls that are answered late (after a longer wait than the target answer time) for Mitan-C.
The Excel spreadsheet call format is:

```
=MtncShrkLate(CDUR,CRTE,ITVL,TLCE,TGTM,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncShrkLate(CDUR,CRTE,ITVL,TLCE,TGTM:double;AGTS:longint;UMPH:double)
                        :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncShrkLate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGTM As Double,ByVal AGTS As Long, _
   ByVal UMPH As Double) As double
```

The function MtncShrkLate is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 154

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 154: Parameters for MtncShrkLate

8.4.6 MtncShrkQsze : average calls waiting (S/P)

MtncShrkQsze calculates the average queue size, or number of calls waiting, for Mitan-C.
The Excel spreadsheet call format is:

```
=MtncShrkQsze(CDUR,CRTE,ITVL,TLCE,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncShrkQsze(CDUR,CRTE,ITVL,TLCE:double;AGTS:longint;UMPH:double)
                        :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncShrkQsze Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double) As double
```

The function MtncShrkQsze is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 155

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 155: Parameters for MtncShrkQsze

8.4.7 MtncShrkAtme : average answer time (wait or ASA) (S/P)

MtncShrkAtme calculates the average time a call waits for an answer for Mitan-C. This is also known as ”average speed of answer” or ASA.
The Excel spreadsheet call format is:

```
=MtncShrkAtme(CDUR,CRTE,ITVL,TLCE,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncShrkAtme(CDUR,CRTE,ITVL,TLCE:double;AGTS:longint;UMPH:double)
                           :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncShrkAtme Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double) As double
```

The function MtncShrkAtme is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 156

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 156: Parameters for MtncShrkAtme

8.4.8 MtncShrkDlay : average answer time if not immediate (S/P)

MtncShrkDlay calculates the average delay for Mitan-C. Delay means the average wait time for calls that do not get answered immediately.
The Excel spreadsheet call format is:

```
=MtncShrkDlay(CDUR,CRTE,ITVL,TLCE,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncShrkDlay(CDUR,CRTE,ITVL,TLCE:double;AGTS:longint;UMPH:double)
                           :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncShrkDlay Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double) As double
```

The function MtncShrkDlay is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 157

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 157: Parameters for MtncShrkDlay

8.4.9 MtncShrkUtil : % agent utilisation for calls (S/P)

MtncShrkUtil calculates the average agent utilisation for Mitan-C. Utilisation, also referred to as ”occupancy”, means the percentage of an agents time spent handling calls.
The Excel spreadsheet call format is:

```
=MtncShrkUtil(CDUR,CRTE,ITVL,TLCE,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncShrkUtil(CDUR,CRTE,ITVL,TLCE:double;AGTS:longint;UMPH:double)
                      :double;stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function MtncShrkUtil Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double) As double
```

The function MtncShrkUtil is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 158

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 158: Parameters for MtncShrkUtil

8.4.10 MtncShrkAbnd : % of calls abandoned (S/P)

MtncShrkAbnd calculates the percentage of calls that will be abandoned.
The Excel spreadsheet call format is:

```
=MtncShrkAbnd(CDUR,CRTE,ITVL,TLCE,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncShrkAbnd(CDUR,CRTE,ITVL,TLCE:double;AGTS:longint;UMPH:double)
                      :double;stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function MtncShrkAbnd Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double) As double
```

The function MtncShrkAbnd is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 159

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 159: Parameters for MtncShrkAbnd

8.4.11 MtncShrkAwth : % calls abandoned within target (S/P)

MtncShrkAwth calculates the percentage of calls that will be abandoned within the target answer time.
The Excel spreadsheet call format is:

```
=MtncShrkAwth(CDUR,CRTE,ITVL,TLCE,TGTM,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncShrkAwth(CDUR,CRTE,ITVL,TLCE,TGTM:double;AGTS:longint;UMPH:double)
                   :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncShrkAwth Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGTM As Double,ByVal AGTS As Long, _
   ByVal UMPH As Double) As double
```

The function MtncShrkAwth is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 160

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 160: Parameters for MtncShrkAwth

8.4.12 MtncShrkTabd : average time to abandon (S/P)

MtncShrkTabd calculates the average time to abandon.
The Excel spreadsheet call format is:

```
=MtncShrkTabd(CDUR,CRTE,ITVL,TLCE,AGTS,UMPH)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function MtncShrkTabd(CDUR,CRTE,ITVL,TLCE:double;AGTS:longint;UMPH:double)
                   :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncShrkTabd Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double) As double
```

The function MtncShrkTabd is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 161

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.

Table 161: Parameters for MtncShrkTabd

8.4.13 MtncShrkAgtsAbnd : agents with shrinkage needed for abandon rate (P)

MtncShrkAgtsAbnd calculates the number of agents with shrinkage needed to achieve the target abandon rate.
The Delphi or Lazarus (Pascal) definition is:

```
Function MtncShrkAgtsAbnd(CDUR,CRTE,ITVL,TLCE,TGAB,UMPH:double;var ECDE:longint)
                         :longint;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncShrkAgtsAbnd Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGAB As Double,ByVal UMPH As Double, _
   ByRef ECDE As Long) As long
```

The function MtncShrkAgtsAbnd is suitable for programming use only. The meaning of each of the parameters is shown in table 162

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGAB	double	Target abandon rate, % of calls.
UMPH	double	Unaccounted minutes per hour.
ECDE	longint	Error code.

Table 162: Parameters for MtncShrkAgtsAbnd

8.4.14 MtncShrkAgtsAbndLmts : shrinkage agents for abandon rate, limits (P)

MtncShrkAgtsAbndLmts calculates the number of agents with shrinkage needed to achieve the target abandon rate, with limits on the number of agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function MtncShrkAgtsAbndLmts(MNAG,MXAG:longint;
                              MNAU,MXAU,CDUR,CRTE,ITVL,TLCE,TGAB,UMPH:double;
                              var RCDE,ECDE:longint):longint;
                              stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncShrkAgtsAbndLmts Lib "tlib01.dll" _
  (ByVal MNAG As Long,ByVal MXAG As Long, _
   ByVal MNAU As Double,ByVal MXAU As Double, _
   ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGAB As Double,ByVal UMPH As Double, _
   ByRef RCDE As Long,ByRef ECDE As Long) As long
```

The function MtncShrkAgtsAbndLmts is suitable for programming use only. The meaning of each of the parameters is shown in table 163

Parameter	Type	Description
MNAG	longint	Minimum number of agents.
MXAG	longint	Maximum number of agents.
MNAU	double	Minimum % agent utilisation.
MXAU	double	Maximum % agent utilisation.
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGAB	double	Target abandon rate, % of calls.
UMPH	double	Unaccounted minutes per hour.
RCDE	longint	Result code.
ECDE	longint	Error code.

Table 163: Parameters for MtncShrkAgtsAbndLmts

8.4.15 MtncShrkAgtsSlvl : shrinkage agents for abandon rate, limits (P)

MtncShrkAgtsSlvl calculates the number of agents with shrinkage needed to achieve the target abandon rate, with limits on the number of agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function MtncShrkAgtsSlvl(CDUR,CRTE,ITVL,TLCE,TGPC,TGTM,UMPH:double;var ECDE:longint)
                           :longint;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncShrkAgtsSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGPC As Double,ByVal TGTM As Double, _
   ByVal UMPH As Double,ByRef ECDE As Long) As long
```

The function MtncShrkAgtsSlvl is suitable for programming use only. The meaning of each of the parameters is shown in table 164

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
UMPH	double	Unaccounted minutes per hour.
ECDE	longint	Error code.

Table 164: Parameters for MtncShrkAgtsSlvl

8.4.16 MtncShrkAgtsSlvlLmts : agents with shrinkage needed for service level (P)

MtncShrkAgtsSlvlLmts calculates the number of agents with shrinkage needed to achieve the target service level according to Mitan-C.
The Delphi or Lazarus (Pascal) definition is:

```
Function MtncShrkAgtsSlvlLmts(MNAG,MXAG:longint;
                               MNAU,MXAU,CDUR,CRTE,ITVL,TLCE,TGPC,TGTM,UMPH:double;
                               var RCDE,ECDE:longint):longint;
                               stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncShrkAgtsSlvlLmts Lib "tlib01.dll" _
  (ByVal MNAG As Long,ByVal MXAG As Long, _
   ByVal MNAU As Double,ByVal MXAU As Double, _
   ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGPC As Double,ByVal TGTM As Double, _
   ByVal UMPH As Double,ByRef RCDE As Long, _
   ByRef ECDE As Long) As long
```

The function MtncShrkAgtsSlvlLmts is suitable for programming use only. The meaning of each of the parameters is shown in table 165

Parameter	Type	Description
MNAG	longint	Minimum number of agents.
MXAG	longint	Maximum number of agents.
MNAU	double	Minimum % agent utilisation.
MXAU	double	Maximum % agent utilisation.
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
UMPH	double	Unaccounted minutes per hour.
RCDE	longint	Result code.
ECDE	longint	Error code.

Table 165: Parameters for MtncShrkAgtsSlvlLmts

8.4.17 MtncShrkSvcLevel : shrinkage agents for service level, limits (P)

MtncShrkSvcLevel calculates the number of agents with shrinkage needed to achieve the target service level, with limits on the number of agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function MtncShrkSvcLevel(CDUR,CRTE,ITVL,TLCE,TGTM:double;AGTS:longint;UMPH:double;
                          var ECDE:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncShrkSvcLevel Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGTM As Double,ByVal AGTS As Long, _
   ByVal UMPH As Double,ByRef ECDE As Long) As double
```

The function MtncShrkSvcLevel is suitable for programming use only. The meaning of each of the parameters is shown in table 166

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
ECDE	longint	Error code.

Table 166: Parameters for MtncShrkSvcLevel

8.4.18 MtncShrkAbndRate : % service level (P)

MtncShrkAbndRate calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Mitan-C.
The Delphi or Lazarus (Pascal) definition is:

```
Function MtncShrkAbndRate(CDUR,CRTE,ITVL,TLCE:double;AGTS:longint;UMPH:double;
                          var ECDE:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function MtncShrkAbndRate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByRef ECDE As Long) As double
```

The function MtncShrkAbndRate is suitable for programming use only. The meaning of each of the parameters is shown in table 167

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
ECDE	longint	Error code.

Table 167: Parameters for MtncShrkAbndRate

8.4.19 MtncShrkPerf : performance statistics (P)

MtncShrkPerf calculates most of the performance statistics of interest for Mitan-C. MtncShrkPerf is intended for programming use, and is not suitable for use in a spreadsheet.
The Delphi or Lazarus (Pascal) definition is:

```
Procedure MtncShrkPerf(CDUR,CRTE,ITVL,TLCE,TGTM:double;AGTS:longint;UMPH:double;
                       var ELGS,COFU,CUTL,CIMD,CSLV,CLTE,CABN,CABW,ATME,DLAY:double;
                       var TABD,QSZE:double;var ECDE:longint);
                       stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Sub MtncShrkPerf Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TLCE As Double, _
   ByVal TGTM As Double,ByVal AGTS As Long, _
   ByVal UMPH As Double,ByRef ELGS As Double, _
   ByRef COFU As Double,ByRef CUTL As Double, _
   ByRef CIMD As Double,ByRef CSLV As Double, _
   ByRef CLTE As Double,ByRef CABN As Double, _
   ByRef CABW As Double,ByRef ATME As Double, _
   ByRef DLAY As Double,ByRef TABD As Double, _
   ByRef QSZE As Double,ByRef ECDE As Long)
```

The function MtncShrkPerf is suitable for programming use only. The meaning of each of the parameters is shown in table 168

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TLCE	double	Average caller tolerance.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
ELGS	double	”Traffic” or workload in erlangs.
COFU	double	% offered agent utilisation.
CUTL	double	% actual agent utilisation.
CIMD	double	% calls answered immediately.
CSLV	double	% calls answered within target.
CLTE	double	% calls answered later than target.
CABN	double	% calls abandoned.
CABW	double	% calls abandoned within target.
ATME	double	Average answer-time (ASA) in seconds.
DLAY	double	Average delay in seconds.
TABD	double	Average time to abandon in seconds.
QSZE	double	Average queue size.
ECDE	longint	Error code.

Table 168: Parameters for MtncShrkPerf

9 Limited Queue Size

9.1 Limited Queue Size model description

With the limited queue size model, the number of calls waiting is restricted to a specified maximum size. In general, this improves the service level for those calls that are allowed to enter the queue, at the expense of a small proportion of calls that get a busy tone. Limiting the queue size also allows overload situations to be handled. One of the assumptions for this model is that calls getting busy tone don't retry, and this is not very realistic. Even so, the limited queue size model provides an effective guide to using a queue size limit to improve service level and to deal with overloads. With a queue size limit, calls entering the queue are unlikely to have to wait long for an answer, so abandoned calls are much less likely. See figure (5).

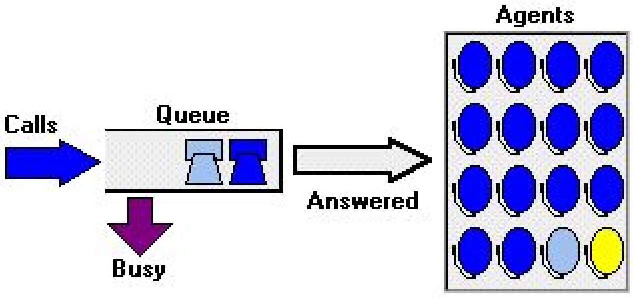

Figure 5: Limited Queue Size

9.2 Whole agents

9.2.1 LqszAgls : agents needed for loss rate (S/P)

LqszAgls calculates the number of agents needed to prevent the lost-call rate exceeding the target set. The Excel spreadsheet call format is:

```
=LqszAgls(CDUR,CRTE,ITVL,TGLS,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszAgls(CDUR,CRTE,ITVL,TGLS:double;MXQZ:longint):longint;
                    stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszAgls Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGLS As Double, _
   ByVal MXQZ As Long) As long
```

The function LqszAgls is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 169

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGLS	double	Target loss rate, % of offered calls.
MXQZ	longint	Maximum queue size.

Table 169: Parameters for LqszAgls

9.2.2 LqszAgsl : agents needed for service level (S/P)

LqszAgsl calculates the number of agents needed to achieve the target service level according to Limited Queue Size.
The Excel spreadsheet call format is:

```
=LqszAgsl(CDUR,CRTE,ITVL,TGPC,TGTM,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszAgsl(CDUR,CRTE,ITVL,TGPC,TGTM:double;MXQZ:longint):longint;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszAgsl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double,ByVal MXQZ As Long) As long
```

The function LqszAgsl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 170

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
MXQZ	longint	Maximum queue size.

Table 170: Parameters for LqszAgsl

9.2.3 LqszOfut : % offered utilisation (S/P)

LqszOfut calculates the "offered utilisation", which is the agent utilisation that would occur if all calls were answered.
The Excel spreadsheet call format is:

```
=LqszOfut(CDUR,CRTE,ITVL,TGTM,AGTS,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszOfut(CDUR,CRTE,ITVL,TGTM:double;AGTS,MXQZ:longint):double;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszOfut Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal MXQZ As Long) As double
```

The function LqszOfut is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 171

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXQZ	longint	Maximum queue size.

Table 171: Parameters for LqszOfut

9.2.4 LqszUtil : % agent utilisation for calls (S/P)

LqszUtil calculates the average agent utilisation for Limited Queue Size. Utilisation, also referred to as ”occupancy”, means the percentage of an agents time spent handling calls.
The Excel spreadsheet call format is:

```
=LqszUtil(CDUR,CRTE,ITVL,TGTM,AGTS,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszUtil(CDUR,CRTE,ITVL,TGTM:double;AGTS,MXQZ:longint):double;
                    stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszUtil Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal MXQZ As Long) As double
```

The function LqszUtil is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 172

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXQZ	longint	Maximum queue size.

Table 172: Parameters for LqszUtil

9.2.5 LqszImed : % calls answered immediately (S/P)

LqszImed calculates the percentage of calls that are answered immediately for Limited Queue Size.
The Excel spreadsheet call format is:

```
=LqszImed(CDUR,CRTE,ITVL,TGTM,AGTS,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszImed(CDUR,CRTE,ITVL,TGTM:double;AGTS,MXQZ:longint):double;
                    stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszImed Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal MXQZ As Long) As double
```

The function LqszImed is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 173

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXQZ	longint	Maximum queue size.

Table 173: Parameters for LqszImed

9.2.6 LqszSlvl : % service level (S/P)

LqszSlvl calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Limited Queue Size.
The Excel spreadsheet call format is:

```
=LqszSlvl(CDUR,CRTE,ITVL,TGTM,AGTS,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszSlvl(CDUR,CRTE,ITVL,TGTM:double;AGTS,MXQZ:longint):double;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal MXQZ As Long) As double
```

The function LqszSlvl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 174

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXQZ	longint	Maximum queue size.

Table 174: Parameters for LqszSlvl

9.2.7 LqszLoss : % of calls lost (S/P)

LqszLoss calculates the percentage of calls that will be lost.
The Excel spreadsheet call format is:

```
=LqszLoss(CDUR,CRTE,ITVL,TGTM,AGTS,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszLoss(CDUR,CRTE,ITVL,TGTM:double;AGTS,MXQZ:longint):double;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszLoss Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal MXQZ As Long) As double
```

The function LqszLoss is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 175

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXQZ	longint	Maximum queue size.

Table 175: Parameters for LqszLoss

9.2.8 LqszAtme : average answer time (wait or ASA) (S/P)

LqszAtme calculates the average time a call waits for an answer for Limited Queue Size. This is also known as ”average speed of answer” or ASA.
The Excel spreadsheet call format is:

```
=LqszAtme(CDUR,CRTE,ITVL,TGTM,AGTS,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszAtme(CDUR,CRTE,ITVL,TGTM:double;AGTS,MXQZ:longint):double;
                    stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszAtme Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal MXQZ As Long) As double
```

The function LqszAtme is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 176

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXQZ	longint	Maximum queue size.

Table 176: Parameters for LqszAtme

9.2.9 LqszDlay : average answer time if not immediate (S/P)

LqszDlay calculates the average delay for Limited Queue Size. Delay means the average wait time for calls that do not get answered immediately.
The Excel spreadsheet call format is:

```
=LqszDlay(CDUR,CRTE,ITVL,TGTM,AGTS,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszDlay(CDUR,CRTE,ITVL,TGTM:double;AGTS,MXQZ:longint):double;
                    stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszDlay Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal MXQZ As Long) As double
```

The function LqszDlay is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 177

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXQZ	longint	Maximum queue size.

Table 177: Parameters for LqszDlay

9.2.10 LqszQsze : average calls waiting (S/P)

LqszQsze calculates the average queue size, or number of calls waiting, for Limited Queue Size.
The Excel spreadsheet call format is:

```
=LqszQsze(CDUR,CRTE,ITVL,TGTM,AGTS,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszQsze(CDUR,CRTE,ITVL,TGTM:double;AGTS,MXQZ:longint):double;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszQsze Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal MXQZ As Long) As double
```

The function LqszQsze is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 178

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXQZ	longint	Maximum queue size.

Table 178: Parameters for LqszQsze

9.2.11 LqszAgtsLoss : agents needed for loss rate (P)

LqszAgtsLoss calculates the number of agents needed to prevent the lost-call rate exceeding the target set.
The Delphi or Lazarus (Pascal) definition is:

```
Function LqszAgtsLoss(CDUR,CRTE,ITVL,TGLS:double;MXQZ:longint;var ECDE:longint)
                  :longint;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszAgtsLoss Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGLS As Double, _
   ByVal MXQZ As Long,ByRef ECDE As Long) As long
```

The function LqszAgtsLoss is suitable for programming use only. The meaning of each of the parameters is shown in table 179

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGLS	double	Target loss rate, % of offered calls.
MXQZ	longint	Maximum queue size.
ECDE	longint	Error code.

Table 179: Parameters for LqszAgtsLoss

9.2.12 LqszAgtsSlvl : agents needed for service level (P)

LqszAgtsSlvl calculates the number of agents needed to achieve the target service level according to Limited Queue Size.
The Delphi or Lazarus (Pascal) definition is:

```
Function LqszAgtsSlvl(CDUR,CRTE,ITVL,TGPC,TGTM:double;MXQZ:longint;
                      var ECDE:longint):longint;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszAgtsSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double,ByVal MXQZ As Long, _
   ByRef ECDE As Long) As long
```

The function LqszAgtsSlvl is suitable for programming use only. The meaning of each of the parameters is shown in table 180

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
MXQZ	longint	Maximum queue size.
ECDE	longint	Error code.

Table 180: Parameters for LqszAgtsSlvl

9.2.13 LqszLossRate : % of calls lost (P)

LqszLossRate calculates the percentage of calls that will be lost.
The Delphi or Lazarus (Pascal) definition is:

```
Function LqszLossRate(CDUR,CRTE,ITVL:double;AGTS,MXQZ:longint;var ECDE:longint)
                      :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszLossRate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long, _
   ByVal MXQZ As Long,ByRef ECDE As Long) As double
```

The function LqszLossRate is suitable for programming use only. The meaning of each of the parameters is shown in table 181

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXQZ	longint	Maximum queue size.
ECDE	longint	Error code.

Table 181: Parameters for LqszLossRate

9.2.14 LqszSvcLevel : % service level (P)

LqszSvcLevel calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Limited Queue Size.
The Delphi or Lazarus (Pascal) definition is:

```
Function LqszSvcLevel(CDUR,CRTE,ITVL,TGTM:double;AGTS,MXQZ:longint;
                      var ECDE:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszSvcLevel Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal MXQZ As Long, _
   ByRef ECDE As Long) As double
```

The function LqszSvcLevel is suitable for programming use only. The meaning of each of the parameters is shown in table 182

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXQZ	longint	Maximum queue size.
ECDE	longint	Error code.

Table 182: Parameters for LqszSvcLevel

9.2.15 LqszPerf : performance statistics (P)

LqszPerf calculates most of the performance statistics of interest for Limited Queue Size. LqszPerf is intended for programming use, and is not suitable for use in a spreadsheet.
The Delphi or Lazarus (Pascal) definition is:

```
Procedure LqszPerf(CDUR,CRTE,ITVL,TGTM:double;AGTS,MXQZ:longint;
                   var ELGS,COFU,CUTL,CIMD,CSLV,CLTE,CBSY,ATME,DLAY,QSZE:double;
                   var ECDE:longint);stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Sub LqszPerf Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal MXQZ As Long, _
   ByRef ELGS As Double,ByRef COFU As Double, _
   ByRef CUTL As Double,ByRef CIMD As Double, _
   ByRef CSLV As Double,ByRef CLTE As Double, _
   ByRef CBSY As Double,ByRef ATME As Double, _
   ByRef DLAY As Double,ByRef QSZE As Double, _
   ByRef ECDE As Long)
```

The function LqszPerf is suitable for programming use only. The meaning of each of the parameters is shown in table 183

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXQZ	longint	Maximum queue size.
ELGS	double	”Traffic” or workload in erlangs.
COFU	double	% offered agent utilisation.
CUTL	double	% actual agent utilisation.
CIMD	double	% calls answered immediately.
CSLV	double	% calls answered within target.
CLTE	double	% calls answered later than target.
CBSY	double	% calls getting busy signal.
ATME	double	Average answer-time (ASA) in seconds.
DLAY	double	Average delay in seconds.
QSZE	double	Average queue size.
ECDE	longint	Error code.

Table 183: Parameters for LqszPerf

9.3 Fractional agents

9.3.1 LqszFracAgls : fractional agents needed for loss rate (S/P)

LqszFracAgls calculates the fractional number of agents needed to achieve the target loss rate. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LqszFracAgls(CDUR,CRTE,ITVL,TGLS,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszFracAgls(CDUR,CRTE,ITVL,TGLS:double;MXQZ:longint):double;
                    stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszFracAgls Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGLS As Double, _
   ByVal MXQZ As Long) As double
```

The function LqszFracAgls is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 184

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGLS	double	Target loss rate, % of offered calls.
MXQZ	longint	Maximum queue size.

Table 184: Parameters for LqszFracAgls

9.3.2 LqszFracAgsl : fractional agents needed for service level (S/P)

LqszFracAgsl calculates the fractional number of agents needed to achieve the target service level. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LqszFracAgsl(CDUR,CRTE,ITVL,TGPC,TGTM,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszFracAgsl(CDUR,CRTE,ITVL,TGPC,TGTM:double;MXQZ:longint):double;
                            stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszFracAgsl Lib "tlib01.dll" _
   (ByVal CDUR As Double,ByVal CRTE As Double, _
    ByVal ITVL As Double,ByVal TGPC As Double, _
    ByVal TGTM As Double,ByVal MXQZ As Long) As double
```

The function LqszFracAgsl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 185

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
MXQZ	longint	Maximum queue size.

Table 185: Parameters for LqszFracAgsl

9.3.3 LqszFracOfut : % offered utilisation (S/P)

LqszFracOfut calculates the ”offered utilisation”, which is the agent utilisation that would occur if all calls were answered. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LqszFracOfut(CDUR,CRTE,ITVL,TGTM,AGFR,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszFracOfut(CDUR,CRTE,ITVL,TGTM,AGFR:double;MXQZ:longint):double;
                            stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszFracOfut Lib "tlib01.dll" _
   (ByVal CDUR As Double,ByVal CRTE As Double, _
    ByVal ITVL As Double,ByVal TGTM As Double, _
    ByVal AGFR As Double,ByVal MXQZ As Long) As double
```

The function LqszFracOfut is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 186

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXQZ	longint	Maximum queue size.

Table 186: Parameters for LqszFracOfut

9.3.4 LqszFracUtil : % agent utilisation for calls (S/P)

LqszFracUtil calculates the average agent utilisation for Limited Queue Size. Utilisation, also referred to as ”occupancy”, means the percentage of an agents time spent handling calls. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LqszFracUtil(CDUR,CRTE,ITVL,TGTM,AGFR,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszFracUtil(CDUR,CRTE,ITVL,TGTM,AGFR:double;MXQZ:longint):double;
                     stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function LqszFracUtil Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByVal MXQZ As Long) As double
```

The function LqszFracUtil is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 187

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXQZ	longint	Maximum queue size.

Table 187: Parameters for LqszFracUtil

9.3.5 LqszFracImed : % calls answered immediately (S/P)

LqszFracImed calculates the percentage of calls that are answered immediately for Limited Queue Size. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LqszFracImed(CDUR,CRTE,ITVL,TGTM,AGFR,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszFracImed(CDUR,CRTE,ITVL,TGTM,AGFR:double;MXQZ:longint):double;
                     stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function LqszFracImed Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByVal MXQZ As Long) As double
```

The function LqszFracImed is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 188

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXQZ	longint	Maximum queue size.

Table 188: Parameters for LqszFracImed

9.3.6 LqszFracSlvl : % service level (S/P)

LqszFracSlvl calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Limited Queue Size. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LqszFracSlvl(CDUR,CRTE,ITVL,TGTM,AGFR,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszFracSlvl(CDUR,CRTE,ITVL,TGTM,AGFR:double;MXQZ:longint):double;
                    stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function LqszFracSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByVal MXQZ As Long) As double
```

The function LqszFracSlvl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 189

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXQZ	longint	Maximum queue size.

Table 189: Parameters for LqszFracSlvl

9.3.7 LqszFracLoss : % of calls lost (S/P)

LqszFracLoss calculates the percentage of calls that will be lost. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LqszFracLoss(CDUR,CRTE,ITVL,TGTM,AGFR,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszFracLoss(CDUR,CRTE,ITVL,TGTM,AGFR:double;MXQZ:longint):double;
                    stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function LqszFracLoss Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByVal MXQZ As Long) As double
```

The function LqszFracLoss is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 190

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXQZ	longint	Maximum queue size.

Table 190: Parameters for LqszFracLoss

9.3.8 LqszFracAtme : average answer time (wait or ASA) (S/P)

LqszFracAtme calculates the average time a call waits for an answer for Limited Queue Size. This is also known as ”average speed of answer” or ASA. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LqszFracAtme(CDUR,CRTE,ITVL,TGTM,AGFR,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszFracAtme(CDUR,CRTE,ITVL,TGTM,AGFR:double;MXQZ:longint):double;
                        stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function LqszFracAtme Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByVal MXQZ As Long) As double
```

The function LqszFracAtme is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 191

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXQZ	longint	Maximum queue size.

Table 191: Parameters for LqszFracAtme

9.3.9 LqszFracDlay : average answer time if not immediate (S/P)

LqszFracDlay calculates the average delay for Limited Queue Size. Delay means the average wait time for calls that do not get answered immediately. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LqszFracDlay(CDUR,CRTE,ITVL,TGTM,AGFR,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszFracDlay(CDUR,CRTE,ITVL,TGTM,AGFR:double;MXQZ:longint):double;
                        stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function LqszFracDlay Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByVal MXQZ As Long) As double
```

The function LqszFracDlay is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 192

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXQZ	longint	Maximum queue size.

Table 192: Parameters for LqszFracDlay

9.3.10 LqszFracQsze : average calls waiting (S/P)

LqszFracQsze calculates the average queue size, or number of calls waiting, for Limited Queue Size. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LqszFracQsze(CDUR,CRTE,ITVL,TGTM,AGFR,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszFracQsze(CDUR,CRTE,ITVL,TGTM,AGFR:double;MXQZ:longint):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszFracQsze Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByVal MXQZ As Long) As double
```

The function LqszFracQsze is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 193

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXQZ	longint	Maximum queue size.

Table 193: Parameters for LqszFracQsze

9.3.11 LqszFracAgtsLoss : fractional agents needed for loss rate (P)

LqszFracAgtsLoss calculates the fractional number of agents needed to achieve the target loss rate. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function LqszFracAgtsLoss(CDUR,CRTE,ITVL,TGLS:double;MXQZ:longint;var ECDE:longint)
                          :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszFracAgtsLoss Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGLS As Double, _
   ByVal MXQZ As Long,ByRef ECDE As Long) As double
```

The function LqszFracAgtsLoss is suitable for programming use only. The meaning of each of the parameters is shown in table 194

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGLS	double	Target loss rate, % of offered calls.
MXQZ	longint	Maximum queue size.
ECDE	longint	Error code.

Table 194: Parameters for LqszFracAgtsLoss

9.3.12 LqszFracAgtsSlvl : fractional agents needed for service level (P)

LqszFracAgtsSlvl calculates the fractional number of agents needed to achieve the target service level. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function LqszFracAgtsSlvl(CDUR,CRTE,ITVL,TGPC,TGTM:double;MXQZ:longint;
                          var ECDE:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszFracAgtsSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double,ByVal MXQZ As Long, _
   ByRef ECDE As Long) As double
```

The function LqszFracAgtsSlvl is suitable for programming use only. The meaning of each of the parameters is shown in table 195

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
MXQZ	longint	Maximum queue size.
ECDE	longint	Error code.

Table 195: Parameters for LqszFracAgtsSlvl

9.3.13 LqszFracLossRate : % of calls lost (P)

LqszFracLossRate calculates the percentage of calls that will be lost. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function LqszFracLossRate(CDUR,CRTE,ITVL,AGFR:double;MXQZ:longint;var ECDE:longint)
                          :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszFracLossRate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGFR As Double, _
   ByVal MXQZ As Long,ByRef ECDE As Long) As double
```

The function LqszFracLossRate is suitable for programming use only. The meaning of each of the parameters is shown in table 196

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXQZ	longint	Maximum queue size.
ECDE	longint	Error code.

Table 196: Parameters for LqszFracLossRate

9.3.14 LqszFracSvcLevel : % service level (P)

LqszFracSvcLevel calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Limited Queue Size. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function LqszFracSvcLevel(CDUR,CRTE,ITVL,TGTM,AGFR:double;MXQZ:longint;
                          var ECDE:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszFracSvcLevel Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByVal MXQZ As Long, _
   ByRef ECDE As Long) As double
```

The function LqszFracSvcLevel is suitable for programming use only. The meaning of each of the parameters is shown in table 197

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXQZ	longint	Maximum queue size.
ECDE	longint	Error code.

Table 197: Parameters for LqszFracSvcLevel

9.3.15 LqszFracPerf : performance statistics (P)

LqszFracPerf calculates most of the performance statistics of interest for Limited Queue Size. LqszFracPerf is intended for programming use, and is not suitable for use in a spreadsheet. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Procedure LqszFracPerf(CDUR,CRTE,ITVL,TGTM,AGFR:double;MXQZ:longint;
                       var ELGS,COFU,CUTL,CIMD,CSLV,CLTE,CBSY,ATME,DLAY,QSZE:double;
                       var ECDE:longint);stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Sub LqszFracPerf Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByVal MXQZ As Long, _
   ByRef ELGS As Double,ByRef COFU As Double, _
   ByRef CUTL As Double,ByRef CIMD As Double, _
   ByRef CSLV As Double,ByRef CLTE As Double, _
   ByRef CBSY As Double,ByRef ATME As Double, _
   ByRef DLAY As Double,ByRef QSZE As Double, _
   ByRef ECDE As Long)
```

The function LqszFracPerf is suitable for programming use only. The meaning of each of the parameters is shown in table 198

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXQZ	longint	Maximum queue size.
ELGS	double	”Traffic” or workload in erlangs.
COFU	double	% offered agent utilisation.
CUTL	double	% actual agent utilisation.
CIMD	double	% calls answered immediately.
CSLV	double	% calls answered within target.
CLTE	double	% calls answered later than target.
CBSY	double	% calls getting busy signal.
ATME	double	Average answer-time (ASA) in seconds.
DLAY	double	Average delay in seconds.
QSZE	double	Average queue size.
ECDE	longint	Error code.

Table 198: Parameters for LqszFracPerf

9.4 Shrinkage

9.4.1 LqszShrkAgls : shrinkage agents needed for loss rate (S/P)

LqszShrkAgls calculates the number of agents with shrinkage needed to achieve the target loss rate.
The Excel spreadsheet call format is:

```
=LqszShrkAgls(CDUR,CRTE,ITVL,TGLS,UMPH,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszShrkAgls(CDUR,CRTE,ITVL,TGLS,UMPH:double;MXQZ:longint):longint;
                  stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function LqszShrkAgls Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGLS As Double, _
   ByVal UMPH As Double,ByVal MXQZ As Long) As long
```

The function LqszShrkAgls is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 199

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGLS	double	Target loss rate, % of offered calls.
UMPH	double	Unaccounted minutes per hour.
MXQZ	longint	Maximum queue size.

Table 199: Parameters for LqszShrkAgls

9.4.2 LqszShrkAgsl : agents with shrinkage needed for service level (S/P)

LqszShrkAgsl calculates the number of agents with shrinkage needed to achieve the target service level according to Limited Queue Size.
The Excel spreadsheet call format is:

```
=LqszShrkAgsl(CDUR,CRTE,ITVL,TGPC,TGTM,UMPH,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszShrkAgsl(CDUR,CRTE,ITVL,TGPC,TGTM,UMPH:double;MXQZ:longint):longint;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszShrkAgsl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double,ByVal UMPH As Double, _
   ByVal MXQZ As Long) As long
```

The function LqszShrkAgsl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 200

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
UMPH	double	Unaccounted minutes per hour.
MXQZ	longint	Maximum queue size.

Table 200: Parameters for LqszShrkAgsl

9.4.3 LqszShrkOfut : % offered utilisation (S/P)

LqszShrkOfut calculates the "offered utilisation", which is the agent utilisation that would occur if all calls were answered.
The Excel spreadsheet call format is:

```
=LqszShrkOfut(CDUR,CRTE,ITVL,TGTM,AGTS,UMPH,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszShrkOfut(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH:double;
                        MXQZ:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszShrkOfut Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByVal MXQZ As Long) As double
```

The function LqszShrkOfut is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 201

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXQZ	longint	Maximum queue size.

Table 201: Parameters for LqszShrkOfut

9.4.4 LqszShrkUtil : % agent utilisation for calls (S/P)

LqszShrkUtil calculates the average agent utilisation for Limited Queue Size. Utilisation, also referred to as "occupancy", means the percentage of an agents time spent handling calls.
The Excel spreadsheet call format is:

```
=LqszShrkUtil(CDUR,CRTE,ITVL,TGTM,AGTS,UMPH,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszShrkUtil(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH:double;
                      MXQZ:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszShrkUtil Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByVal MXQZ As Long) As double
```

The function LqszShrkUtil is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 202

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXQZ	longint	Maximum queue size.

Table 202: Parameters for LqszShrkUtil

9.4.5 LqszShrkImed : % calls answered immediately (S/P)

LqszShrkImed calculates the percentage of calls that are answered immediately for Limited Queue Size.
The Excel spreadsheet call format is:

```
=LqszShrkImed(CDUR,CRTE,ITVL,TGTM,AGTS,UMPH,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszShrkImed(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH:double;
                      MXQZ:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszShrkImed Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByVal MXQZ As Long) As double
```

The function LqszShrkImed is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 203

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXQZ	longint	Maximum queue size.

Table 203: Parameters for LqszShrkImed

9.4.6 LqszShrkSlvl : % service level (S/P)

LqszShrkSlvl calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Limited Queue Size.
The Excel spreadsheet call format is:

```
=LqszShrkSlvl(CDUR,CRTE,ITVL,TGTM,AGTS,UMPH,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszShrkSlvl(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH:double;
                      MXQZ:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszShrkSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByVal MXQZ As Long) As double
```

The function LqszShrkSlvl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 204

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXQZ	longint	Maximum queue size.

Table 204: Parameters for LqszShrkSlvl

9.4.7 LqszShrkLoss : % of calls lost (S/P)

LqszShrkLoss calculates the percentage of calls that will be lost.
The Excel spreadsheet call format is:

```
=LqszShrkLoss(CDUR,CRTE,ITVL,TGTM,AGTS,UMPH,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszShrkLoss(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH:double;
                      MXQZ:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszShrkLoss Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByVal MXQZ As Long) As double
```

The function LqszShrkLoss is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 205

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXQZ	longint	Maximum queue size.

Table 205: Parameters for LqszShrkLoss

9.4.8 LqszShrkAtme : average answer time (wait or ASA) (S/P)

LqszShrkAtme calculates the average time a call waits for an answer for Limited Queue Size. This is also known as ”average speed of answer” or ASA.
The Excel spreadsheet call format is:

```
=LqszShrkAtme(CDUR,CRTE,ITVL,TGTM,AGTS,UMPH,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszShrkAtme(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH:double;
                      MXQZ:longint):double;stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function LqszShrkAtme Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByVal MXQZ As Long) As double
```

The function LqszShrkAtme is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 206

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXQZ	longint	Maximum queue size.

Table 206: Parameters for LqszShrkAtme

9.4.9 LqszShrkDlay : average answer time if not immediate (S/P)

LqszShrkDlay calculates the average delay for Limited Queue Size. Delay means the average wait time for calls that do not get answered immediately.
The Excel spreadsheet call format is:

```
=LqszShrkDlay(CDUR,CRTE,ITVL,TGTM,AGTS,UMPH,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszShrkDlay(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH:double;
                      MXQZ:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszShrkDlay Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByVal MXQZ As Long) As double
```

The function LqszShrkDlay is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 207

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXQZ	longint	Maximum queue size.

Table 207: Parameters for LqszShrkDlay

9.4.10 LqszShrkQsze : average calls waiting (S/P)

LqszShrkQsze calculates the average queue size, or number of calls waiting, for Limited Queue Size. The Excel spreadsheet call format is:

```
=LqszShrkQsze(CDUR,CRTE,ITVL,TGTM,AGTS,UMPH,MXQZ)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LqszShrkQsze(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH:double;
                      MXQZ:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszShrkQsze Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByVal MXQZ As Long) As double
```

The function LqszShrkQsze is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 208

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXQZ	longint	Maximum queue size.

Table 208: Parameters for LqszShrkQsze

9.4.11 LqszShrkAgtsLoss : shrinkage agents needed for loss rate (P)

LqszShrkAgtsLoss calculates the number of agents with shrinkage needed to achieve the target loss rate.
The Delphi or Lazarus (Pascal) definition is:

```
Function LqszShrkAgtsLoss(CDUR,CRTE,ITVL,TGLS,UMPH:double;MXQZ:longint;
                          var ECDE:longint):longint;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszShrkAgtsLoss Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGLS As Double, _
   ByVal UMPH As Double,ByVal MXQZ As Long, _
   ByRef ECDE As Long) As long
```

The function LqszShrkAgtsLoss is suitable for programming use only. The meaning of each of the parameters is shown in table 209

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGLS	double	Target loss rate, % of offered calls.
UMPH	double	Unaccounted minutes per hour.
MXQZ	longint	Maximum queue size.
ECDE	longint	Error code.

Table 209: Parameters for LqszShrkAgtsLoss

9.4.12 LqszShrkAgtsSlvl : agents with shrinkage needed for service level (P)

LqszShrkAgtsSlvl calculates the number of agents with shrinkage needed to achieve the target service level according to Limited Queue Size.
The Delphi or Lazarus (Pascal) definition is:

```
Function LqszShrkAgtsSlvl(CDUR,CRTE,ITVL,TGPC,TGTM,UMPH:double;MXQZ:longint;
                          var ECDE:longint):longint;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszShrkAgtsSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double,ByVal UMPH As Double, _
   ByVal MXQZ As Long,ByRef ECDE As Long) As long
```

The function LqszShrkAgtsSlvl is suitable for programming use only. The meaning of each of the parameters is shown in table 210

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
UMPH	double	Unaccounted minutes per hour.
MXQZ	longint	Maximum queue size.
ECDE	longint	Error code.

Table 210: Parameters for LqszShrkAgtsSlvl

9.4.13 LqszShrkLossRate : % of calls lost (P)

LqszShrkLossRate calculates the percentage of calls that will be lost.
The Delphi or Lazarus (Pascal) definition is:

```
Function LqszShrkLossRate(CDUR,CRTE,ITVL:double;AGTS:longint;UMPH:double;
                          MXQZ:longint;var ECDE:longint):double;
                          stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszShrkLossRate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long, _
   ByVal UMPH As Double,ByVal MXQZ As Long, _
   ByRef ECDE As Long) As double
```

The function LqszShrkLossRate is suitable for programming use only. The meaning of each of the parameters is shown in table 211

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXQZ	longint	Maximum queue size.
ECDE	longint	Error code.

Table 211: Parameters for LqszShrkLossRate

9.4.14 LqszShrkSvcLevel : % service level (P)

LqszShrkSvcLevel calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Limited Queue Size.
The Delphi or Lazarus (Pascal) definition is:

```
Function LqszShrkSvcLevel(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH:double;
                          MXQZ:longint;var ECDE:longint):double;
                          stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LqszShrkSvcLevel Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByVal MXQZ As Long,ByRef ECDE As Long) As double
```

The function LqszShrkSvcLevel is suitable for programming use only. The meaning of each of the parameters is shown in table 212

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXQZ	longint	Maximum queue size.
ECDE	longint	Error code.

Table 212: Parameters for LqszShrkSvcLevel

9.4.15 LqszShrkPerf : performance statistics (P)

LqszShrkPerf calculates most of the performance statistics of interest for Limited Queue Size. LqszShrkPerf is intended for programming use, and is not suitable for use in a spreadsheet.
The Delphi or Lazarus (Pascal) definition is:

```
Procedure LqszShrkPerf(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH:double;
                       MXQZ:longint;
                       var ELGS,COFU,CUTL,CADH,CIMD,CSLV,CLTE,CBSY,ATME,DLAY:double;
                       var QSZE:double;var ECDE:longint);
                       stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Sub LqszShrkPerf Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByVal MXQZ As Long,ByRef ELGS As Double, _
   ByRef COFU As Double,ByRef CUTL As Double, _
   ByRef CADH As Double,ByRef CIMD As Double, _
   ByRef CSLV As Double,ByRef CLTE As Double, _
   ByRef CBSY As Double,ByRef ATME As Double, _
   ByRef DLAY As Double,ByRef QSZE As Double, _
   ByRef ECDE As Long)
```

The function LqszShrkPerf is suitable for programming use only. The meaning of each of the parameters is shown in table 213

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXQZ	longint	Maximum queue size.
ELGS	double	”Traffic” or workload in erlangs.
COFU	double	% offered agent utilisation.
CUTL	double	% actual agent utilisation.
CADH	double	% agent unaccounted time.
CIMD	double	% calls answered immediately.
CSLV	double	% calls answered within target.
CLTE	double	% calls answered later than target.
CBSY	double	% calls getting busy signal.
ATME	double	Average answer-time (ASA) in seconds.
DLAY	double	Average delay in seconds.
QSZE	double	Average queue size.
ECDE	longint	Error code.

Table 213: Parameters for LqszShrkPerf

10 Limited Waiting Time

10.1 Limited Wait Time model description

With the limited waiting time model, the length of time that a call may wait is limited to a specified maximum size. In general, this improves the service level for most calls, at the expense of a small proportion of calls that are disconnected or routed to an alternative facility. Limiting the waiting time also allows overload situations to be handled. One of the assumptions for this model is that removed calls don't retry. This is unlikely to be realistic if calls are simply disconnected, but is reasonable if calls are reouted to a voice-mail service. Even so, the limited waiting time model provides an effective guide to using a waiting time limit to improve service level and to deal with overloads. See figure (6).

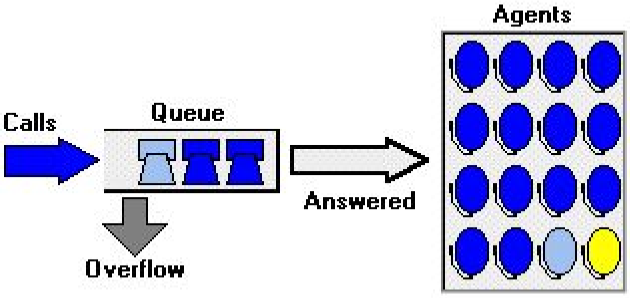

Figure 6: Limited Wait Time

10.2 Whole agents

10.2.1 LwtmAgls : agents needed for loss rate (S/P)

LwtmAgls calculates the number of agents needed to prevent the lost-call rate exceeding the target set. The Excel spreadsheet call format is:

```
=LwtmAgls(CDUR,CRTE,ITVL,TGLS,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmAgls(CDUR,CRTE,ITVL,TGLS,MXWT:double):longint;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmAgls Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGLS As Double, _
   ByVal MXWT As Double) As long
```

The function LwtmAgls is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 214

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGLS	double	Target loss rate, % of offered calls.
MXWT	double	Maximum waiting time, in seconds.

Table 214: Parameters for LwtmAgls

10.2.2 LwtmAgsl : agents needed for service level (S/P)

LwtmAgsl calculates the number of agents needed to achieve the target service level according to Limited Waiting Time.
The Excel spreadsheet call format is:

```
=LwtmAgsl(CDUR,CRTE,ITVL,TGPC,TGTM,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmAgsl(CDUR,CRTE,ITVL,TGPC,TGTM,MXWT:double):longint;
                  stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmAgsl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double,ByVal MXWT As Double) As long
```

The function LwtmAgsl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 215

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
MXWT	double	Maximum waiting time, in seconds.

Table 215: Parameters for LwtmAgsl

10.2.3 LwtmOfut : % offered utilisation (S/P)

LwtmOfut calculates the "offered utilisation", which is the agent utilisation that would occur if all calls were answered.
The Excel spreadsheet call format is:

```
=LwtmOfut(CDUR,CRTE,ITVL,TGTM,AGTS,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmOfut(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;MXWT:double)
                  :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmOfut Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal MXWT As Double) As double
```

The function LwtmOfut is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 216

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXWT	double	Maximum waiting time, in seconds.

Table 216: Parameters for LwtmOfut

10.2.4 LwtmUtil : % agent utilisation for calls (S/P)

LwtmUtil calculates the average agent utilisation for Limited Waiting Time. Utilisation, also referred to as "occupancy", means the percentage of an agents time spent handling calls.
The Excel spreadsheet call format is:

```
=LwtmUtil(CDUR,CRTE,ITVL,TGTM,AGTS,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmUtil(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;MXWT:double)
                    :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmUtil Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal MXWT As Double) As double
```

The function LwtmUtil is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 217

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXWT	double	Maximum waiting time, in seconds.

Table 217: Parameters for LwtmUtil

10.2.5 LwtmImed : % calls answered immediately (S/P)

LwtmImed calculates the percentage of calls that are answered immediately for Limited Waiting Time.
The Excel spreadsheet call format is:

```
=LwtmImed(CDUR,CRTE,ITVL,TGTM,AGTS,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmImed(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;MXWT:double)
                    :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmImed Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal MXWT As Double) As double
```

The function LwtmImed is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 218

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXWT	double	Maximum waiting time, in seconds.

Table 218: Parameters for LwtmImed

10.2.6 LwtmSlvl : % service level (S/P)

LwtmSlvl calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Limited Waiting Time.
The Excel spreadsheet call format is:

```
=LwtmSlvl(CDUR,CRTE,ITVL,TGTM,AGTS,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmSlvl(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;MXWT:double)
                  :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal MXWT As Double) As double
```

The function LwtmSlvl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 219

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXWT	double	Maximum waiting time, in seconds.

Table 219: Parameters for LwtmSlvl

10.2.7 LwtmLoss : % of calls lost (S/P)

LwtmLoss calculates the percentage of calls that will be lost.
The Excel spreadsheet call format is:

```
=LwtmLoss(CDUR,CRTE,ITVL,TGTM,AGTS,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmLoss(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;MXWT:double)
                  :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmLoss Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal MXWT As Double) As double
```

The function LwtmLoss is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 220

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXWT	double	Maximum waiting time, in seconds.

Table 220: Parameters for LwtmLoss

10.2.8 LwtmAtme : average answer time (wait or ASA) (S/P)

LwtmAtme calculates the average time a call waits for an answer for Limited Waiting Time. This is also known as ”average speed of answer” or ASA.
The Excel spreadsheet call format is:

```
=LwtmAtme(CDUR,CRTE,ITVL,TGTM,AGTS,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmAtme(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;MXWT:double)
                       :double;stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function LwtmAtme Lib "tlib01.dll" _
   (ByVal CDUR As Double,ByVal CRTE As Double, _
    ByVal ITVL As Double,ByVal TGTM As Double, _
    ByVal AGTS As Long,ByVal MXWT As Double) As double
```

The function LwtmAtme is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 221

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXWT	double	Maximum waiting time, in seconds.

Table 221: Parameters for LwtmAtme

10.2.9 LwtmDlay : average answer time if not immediate (S/P)

LwtmDlay calculates the average delay for Limited Waiting Time. Delay means the average wait time for calls that do not get answered immediately.
The Excel spreadsheet call format is:

```
=LwtmDlay(CDUR,CRTE,ITVL,TGTM,AGTS,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmDlay(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;MXWT:double)
                       :double;stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function LwtmDlay Lib "tlib01.dll" _
   (ByVal CDUR As Double,ByVal CRTE As Double, _
    ByVal ITVL As Double,ByVal TGTM As Double, _
    ByVal AGTS As Long,ByVal MXWT As Double) As double
```

The function LwtmDlay is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 222

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXWT	double	Maximum waiting time, in seconds.

Table 222: Parameters for LwtmDlay

10.2.10 LwtmQsze : average calls waiting (S/P)

LwtmQsze calculates the average queue size, or number of calls waiting, for Limited Waiting Time.
The Excel spreadsheet call format is:

```
=LwtmQsze(CDUR,CRTE,ITVL,TGTM,AGTS,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmQsze(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;MXWT:double)
                    :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmQsze Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal MXWT As Double) As double
```

The function LwtmQsze is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 223

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXWT	double	Maximum waiting time, in seconds.

Table 223: Parameters for LwtmQsze

10.2.11 LwtmAgtsLoss : agents needed for loss rate (P)

LwtmAgtsLoss calculates the number of agents needed to prevent the lost-call rate exceeding the target set.
The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmAgtsLoss(CDUR,CRTE,ITVL,TGLS,MXWT:double;var ECDE:longint):longint;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmAgtsLoss Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGLS As Double, _
   ByVal MXWT As Double,ByRef ECDE As Long) As long
```

The function LwtmAgtsLoss is suitable for programming use only. The meaning of each of the parameters is shown in table 224

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGLS	double	Target loss rate, % of offered calls.
MXWT	double	Maximum waiting time, in seconds.
ECDE	longint	Error code.

Table 224: Parameters for LwtmAgtsLoss

10.2.12 LwtmAgtsSlvl : agents needed for service level (P)

LwtmAgtsSlvl calculates the number of agents needed to achieve the target service level according to Limited Waiting Time.
The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmAgtsSlvl(CDUR,CRTE,ITVL,TGPC,TGTM,MXWT:double;var ECDE:longint)
                      :longint;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmAgtsSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double,ByVal MXWT As Double, _
   ByRef ECDE As Long) As long
```

The function LwtmAgtsSlvl is suitable for programming use only. The meaning of each of the parameters is shown in table 225

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
MXWT	double	Maximum waiting time, in seconds.
ECDE	longint	Error code.

Table 225: Parameters for LwtmAgtsSlvl

10.2.13 LwtmLossRate : % of calls lost (P)

LwtmLossRate calculates the percentage of calls that will be lost.
The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmLossRate(CDUR,CRTE,ITVL:double;AGTS:longint;MXWT:double;
                      var ECDE:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmLossRate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long, _
   ByVal MXWT As Double,ByRef ECDE As Long) As double
```

The function LwtmLossRate is suitable for programming use only. The meaning of each of the parameters is shown in table 226

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXWT	double	Maximum waiting time, in seconds.
ECDE	longint	Error code.

Table 226: Parameters for LwtmLossRate

10.2.14 LwtmSvcLevel : % service level (P)

LwtmSvcLevel calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Limited Waiting Time.
The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmSvcLevel(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;MXWT:double;
                      var ECDE:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmSvcLevel Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal MXWT As Double, _
   ByRef ECDE As Long) As double
```

The function LwtmSvcLevel is suitable for programming use only. The meaning of each of the parameters is shown in table 227

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXWT	double	Maximum waiting time, in seconds.
ECDE	longint	Error code.

Table 227: Parameters for LwtmSvcLevel

10.2.15 LwtmPerf : performance statistics (P)

LwtmPerf calculates most of the performance statistics of interest for Limited Waiting Time. LwtmPerf is intended for programming use, and is not suitable for use in a spreadsheet.
The Delphi or Lazarus (Pascal) definition is:

```
Procedure LwtmPerf(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;MXWT:double;
                   var ELGS,COFU,CUTL,CIMD,CSLV,CLTE,CBSY,ATME,DLAY,QSZE:double;
                   var ECDE:longint);stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Sub LwtmPerf Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal MXWT As Double, _
   ByRef ELGS As Double,ByRef COFU As Double, _
   ByRef CUTL As Double,ByRef CIMD As Double, _
   ByRef CSLV As Double,ByRef CLTE As Double, _
   ByRef CBSY As Double,ByRef ATME As Double, _
   ByRef DLAY As Double,ByRef QSZE As Double, _
   ByRef ECDE As Long)
```

The function LwtmPerf is suitable for programming use only. The meaning of each of the parameters is shown in table 228

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
MXWT	double	Maximum waiting time, in seconds.
ELGS	double	"Traffic" or workload in erlangs.
COFU	double	% offered agent utilisation.
CUTL	double	% actual agent utilisation.
CIMD	double	% calls answered immediately.
CSLV	double	% calls answered within target.
CLTE	double	% calls answered later than target.
CBSY	double	% calls getting busy signal.
ATME	double	Average answer-time (ASA) in seconds.
DLAY	double	Average delay in seconds.
QSZE	double	Average queue size.
ECDE	longint	Error code.

Table 228: Parameters for LwtmPerf

10.3 Fractional agents

10.3.1 LwtmFracAgls : fractional agents needed for loss rate (S/P)

LwtmFracAgls calculates the fractional number of agents needed to achieve the target loss rate. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LwtmFracAgls(CDUR,CRTE,ITVL,TGLS,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmFracAgls(CDUR,CRTE,ITVL,TGLS,MXWT:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmFracAgls Lib "tlib01.dll" _
   (ByVal CDUR As Double,ByVal CRTE As Double, _
    ByVal ITVL As Double,ByVal TGLS As Double, _
    ByVal MXWT As Double) As double
```

The function LwtmFracAgls is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 229

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGLS	double	Target loss rate, % of offered calls.
MXWT	double	Maximum waiting time, in seconds.

Table 229: Parameters for LwtmFracAgls

10.3.2 LwtmFracAgsl : fractional agents needed for loss rate (S/P)

LwtmFracAgsl calculates the fractional number of agents needed to achieve the target loss rate. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LwtmFracAgsl(CDUR,CRTE,ITVL,TGPC,TGTM,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmFracAgsl(CDUR,CRTE,ITVL,TGPC,TGTM,MXWT:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmFracAgsl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double,ByVal MXWT As Double) As double
```

The function LwtmFracAgsl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 230

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
MXWT	double	Maximum waiting time, in seconds.

Table 230: Parameters for LwtmFracAgsl

10.3.3 LwtmFracOfut : % offered utilisation (S/P)

LwtmFracOfut calculates the ”offered utilisation”, which is the agent utilisation that would occur if all calls were answered. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LwtmFracOfut(CDUR,CRTE,ITVL,TGTM,AGFR,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmFracOfut(CDUR,CRTE,ITVL,TGTM,AGFR,MXWT:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmFracOfut Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByVal MXWT As Double) As double
```

The function LwtmFracOfut is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 231

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXWT	double	Maximum waiting time, in seconds.

Table 231: Parameters for LwtmFracOfut

10.3.4 LwtmFracUtil : % agent utilisation for calls (S/P)

LwtmFracUtil calculates the average agent utilisation for Limited Waiting Time. Utilisation, also referred to as ”occupancy”, means the percentage of an agents time spent handling calls. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LwtmFracUtil(CDUR,CRTE,ITVL,TGTM,AGFR,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmFracUtil(CDUR,CRTE,ITVL,TGTM,AGFR,MXWT:double):double;
                             stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmFracUtil Lib "tlib01.dll" _
   (ByVal CDUR As Double,ByVal CRTE As Double, _
    ByVal ITVL As Double,ByVal TGTM As Double, _
    ByVal AGFR As Double,ByVal MXWT As Double) As double
```

The function LwtmFracUtil is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 232

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXWT	double	Maximum waiting time, in seconds.

Table 232: Parameters for LwtmFracUtil

10.3.5 LwtmFracImed : % calls answered immediately (S/P)

LwtmFracImed calculates the percentage of calls that are answered immediately for Limited Waiting Time. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LwtmFracImed(CDUR,CRTE,ITVL,TGTM,AGFR,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmFracImed(CDUR,CRTE,ITVL,TGTM,AGFR,MXWT:double):double;
                             stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmFracImed Lib "tlib01.dll" _
   (ByVal CDUR As Double,ByVal CRTE As Double, _
    ByVal ITVL As Double,ByVal TGTM As Double, _
    ByVal AGFR As Double,ByVal MXWT As Double) As double
```

The function LwtmFracImed is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 233

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXWT	double	Maximum waiting time, in seconds.

Table 233: Parameters for LwtmFracImed

10.3.6 LwtmFracSlvl : % service level (S/P)

LwtmFracSlvl calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Limited Waiting Time. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LwtmFracSlvl(CDUR,CRTE,ITVL,TGTM,AGFR,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmFracSlvl(CDUR,CRTE,ITVL,TGTM,AGFR,MXWT:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmFracSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByVal MXWT As Double) As double
```

The function LwtmFracSlvl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 234

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXWT	double	Maximum waiting time, in seconds.

Table 234: Parameters for LwtmFracSlvl

10.3.7 LwtmFracLoss : % of calls lost (S/P)

LwtmFracLoss calculates the percentage of calls that will be lost. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LwtmFracLoss(CDUR,CRTE,ITVL,TGTM,AGFR,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmFracLoss(CDUR,CRTE,ITVL,TGTM,AGFR,MXWT:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmFracLoss Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByVal MXWT As Double) As double
```

The function LwtmFracLoss is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 235

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXWT	double	Maximum waiting time, in seconds.

Table 235: Parameters for LwtmFracLoss

10.3.8 LwtmFracAtme : average answer time (wait or ASA) (S/P)

LwtmFracAtme calculates the average time a call waits for an answer for Limited Waiting Time. This is also known as "average speed of answer" or ASA. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LwtmFracAtme(CDUR,CRTE,ITVL,TGTM,AGFR,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmFracAtme(CDUR,CRTE,ITVL,TGTM,AGFR,MXWT:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmFracAtme Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByVal MXWT As Double) As double
```

The function LwtmFracAtme is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 236

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXWT	double	Maximum waiting time, in seconds.

Table 236: Parameters for LwtmFracAtme

10.3.9 LwtmFracDlay : average answer time if not immediate (S/P)

LwtmFracDlay calculates the average delay for Limited Waiting Time. Delay means the average wait time for calls that do not get answered immediately. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LwtmFracDlay(CDUR,CRTE,ITVL,TGTM,AGFR,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmFracDlay(CDUR,CRTE,ITVL,TGTM,AGFR,MXWT:double):double;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmFracDlay Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByVal MXWT As Double) As double
```

The function LwtmFracDlay is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 237

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXWT	double	Maximum waiting time, in seconds.

Table 237: Parameters for LwtmFracDlay

10.3.10 LwtmFracQsze : average calls waiting (S/P)

LwtmFracQsze calculates the average queue size, or number of calls waiting, for Limited Waiting Time. See fractional agents and shrinkage agents.
The Excel spreadsheet call format is:

```
=LwtmFracQsze(CDUR,CRTE,ITVL,TGTM,AGFR,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmFracQsze(CDUR,CRTE,ITVL,TGTM,AGFR,MXWT:double):double;
                    stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmFracQsze Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByVal MXWT As Double) As double
```

The function LwtmFracQsze is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 238

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXWT	double	Maximum waiting time, in seconds.

Table 238: Parameters for LwtmFracQsze

10.3.11 LwtmFracAgtsLoss : fractional agents needed for loss rate (P)

LwtmFracAgtsLoss calculates the fractional number of agents needed to achieve the target loss rate. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmFracAgtsLoss(CDUR,CRTE,ITVL,TGLS,MXWT:double;var ECDE:longint):double;
                    stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmFracAgtsLoss Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGLS As Double, _
   ByVal MXWT As Double,ByRef ECDE As Long) As double
```

The function LwtmFracAgtsLoss is suitable for programming use only. The meaning of each of the parameters is shown in table 239

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGLS	double	Target loss rate, % of offered calls.
MXWT	double	Maximum waiting time, in seconds.
ECDE	longint	Error code.

Table 239: Parameters for LwtmFracAgtsLoss

10.3.12 LwtmFracAgtsSlvl : fractional agents needed for service level (P)

LwtmFracAgtsSlvl calculates the fractional number of agents needed to achieve the target service level. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmFracAgtsSlvl(CDUR,CRTE,ITVL,TGPC,TGTM,MXWT:double;var ECDE:longint)
                          :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmFracAgtsSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double,ByVal MXWT As Double, _
   ByRef ECDE As Long) As double
```

The function LwtmFracAgtsSlvl is suitable for programming use only. The meaning of each of the parameters is shown in table 240

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
MXWT	double	Maximum waiting time, in seconds.
ECDE	longint	Error code.

Table 240: Parameters for LwtmFracAgtsSlvl

10.3.13 LwtmFracLossRate : % of calls lost (P)

LwtmFracLossRate calculates the percentage of calls that will be lost. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmFracLossRate(CDUR,CRTE,ITVL,AGFR,MXWT:double;var ECDE:longint):double;
                          stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmFracLossRate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGFR As Double, _
   ByVal MXWT As Double,ByRef ECDE As Long) As double
```

The function LwtmFracLossRate is suitable for programming use only. The meaning of each of the parameters is shown in table 241

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXWT	double	Maximum waiting time, in seconds.
ECDE	longint	Error code.

Table 241: Parameters for LwtmFracLossRate

10.3.14 LwtmFracSvcLevel : % service level (P)

LwtmFracSvcLevel calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Limited Waiting Time. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmFracSvcLevel(CDUR,CRTE,ITVL,TGTM,AGFR,MXWT:double;var ECDE:longint)
                          :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmFracSvcLevel Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByVal MXWT As Double, _
   ByRef ECDE As Long) As double
```

The function LwtmFracSvcLevel is suitable for programming use only. The meaning of each of the parameters is shown in table 242

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXWT	double	Maximum waiting time, in seconds.
ECDE	longint	Error code.

Table 242: Parameters for LwtmFracSvcLevel

10.3.15 LwtmFracPerf : performance statistics (P)

LwtmFracPerf calculates most of the performance statistics of interest for Limited Waiting Time. LwtmFracPerf is intended for programming use, and is not suitable for use in a spreadsheet. See fractional agents and shrinkage agents.
The Delphi or Lazarus (Pascal) definition is:

```
Procedure LwtmFracPerf(CDUR,CRTE,ITVL,TGTM,AGFR,MXWT:double;
                       var ELGS,COFU,CUTL,CIMD,CSLV,CLTE,CBSY,ATME,DLAY,QSZE:double;
                       var ECDE:longint);stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Sub LwtmFracPerf Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGFR As Double,ByVal MXWT As Double, _
   ByRef ELGS As Double,ByRef COFU As Double, _
   ByRef CUTL As Double,ByRef CIMD As Double, _
   ByRef CSLV As Double,ByRef CLTE As Double, _
   ByRef CBSY As Double,ByRef ATME As Double, _
   ByRef DLAY As Double,ByRef QSZE As Double, _
   ByRef ECDE As Long)
```

The function LwtmFracPerf is suitable for programming use only. The meaning of each of the parameters is shown in table 243

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGFR	double	Agents assigned, fractional agents.
MXWT	double	Maximum waiting time, in seconds.
ELGS	double	”Traffic” or workload in erlangs.
COFU	double	% offered agent utilisation.
CUTL	double	% actual agent utilisation.
CIMD	double	% calls answered immediately.
CSLV	double	% calls answered within target.
CLTE	double	% calls answered later than target.
CBSY	double	% calls getting busy signal.
ATME	double	Average answer-time (ASA) in seconds.
DLAY	double	Average delay in seconds.
QSZE	double	Average queue size.
ECDE	longint	Error code.

Table 243: Parameters for LwtmFracPerf

10.4 Shrinkage

10.4.1 LwtmShrkAgls : shrinkage agents needed for loss rate (S/P)

LwtmShrkAgls calculates the number of agents with shrinkage needed to achieve the target loss rate. The Excel spreadsheet call format is:

```
=LwtmShrkAgls(CDUR,CRTE,ITVL,TGLS,UMPH,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmShrkAgls(CDUR,CRTE,ITVL,TGLS,UMPH,MXWT:double):longint;
                    stdcall; external ’tlib01.dll’;
```

The Visual Basic definition is:

```
Public Declare Function LwtmShrkAgls Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGLS As Double, _
   ByVal UMPH As Double,ByVal MXWT As Double) As long
```

The function LwtmShrkAgls is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 244

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGLS	double	Target loss rate, % of offered calls.
UMPH	double	Unaccounted minutes per hour.
MXWT	double	Maximum waiting time, in seconds.

Table 244: Parameters for LwtmShrkAgls

10.4.2 LwtmShrkAgsl : agents with shrinkage needed for service level (S/P)

LwtmShrkAgsl calculates the number of agents with shrinkage needed to achieve the target service level according to Limited Waiting Time.
The Excel spreadsheet call format is:

```
=LwtmShrkAgsl(CDUR,CRTE,ITVL,TGPC,TGTM,UMPH,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmShrkAgsl(CDUR,CRTE,ITVL,TGPC,TGTM,UMPH,MXWT:double):longint;
                        stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmShrkAgsl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double,ByVal UMPH As Double, _
   ByVal MXWT As Double) As long
```

The function LwtmShrkAgsl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 245

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
UMPH	double	Unaccounted minutes per hour.
MXWT	double	Maximum waiting time, in seconds.

Table 245: Parameters for LwtmShrkAgsl

10.4.3 LwtmShrkOfut : % offered utilisation (S/P)

LwtmShrkOfut calculates the ”offered utilisation”, which is the agent utilisation that would occur if all calls were answered.
The Excel spreadsheet call format is:

```
=LwtmShrkOfut(CDUR,CRTE,ITVL,TGTM,AGTS,UMPH,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmShrkOfut(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH,MXWT:double)
                        :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmShrkOfut Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByVal MXWT As Double) As double
```

The function LwtmShrkOfut is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 246

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXWT	double	Maximum waiting time, in seconds.

Table 246: Parameters for LwtmShrkOfut

10.4.4 LwtmShrkUtil : % agent utilisation for calls (S/P)

LwtmShrkUtil calculates the average agent utilisation for Limited Waiting Time. Utilisation, also referred to as ”occupancy”, means the percentage of an agents time spent handling calls.
The Excel spreadsheet call format is:

```
=LwtmShrkUtil(CDUR,CRTE,ITVL,TGTM,AGTS,UMPH,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmShrkUtil(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH,MXWT:double)
                            :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmShrkUtil Lib "tlib01.dll" _
   (ByVal CDUR As Double,ByVal CRTE As Double, _
    ByVal ITVL As Double,ByVal TGTM As Double, _
    ByVal AGTS As Long,ByVal UMPH As Double, _
    ByVal MXWT As Double) As double
```

The function LwtmShrkUtil is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 247

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXWT	double	Maximum waiting time, in seconds.

Table 247: Parameters for LwtmShrkUtil

10.4.5 LwtmShrkImed : % calls answered immediately (S/P)

LwtmShrkImed calculates the percentage of calls that are answered immediately for Limited Waiting Time.
The Excel spreadsheet call format is:

```
=LwtmShrkImed(CDUR,CRTE,ITVL,TGTM,AGTS,UMPH,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmShrkImed(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH,MXWT:double)
                            :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmShrkImed Lib "tlib01.dll" _
   (ByVal CDUR As Double,ByVal CRTE As Double, _
    ByVal ITVL As Double,ByVal TGTM As Double, _
    ByVal AGTS As Long,ByVal UMPH As Double, _
    ByVal MXWT As Double) As double
```

The function LwtmShrkImed is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 248

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXWT	double	Maximum waiting time, in seconds.

Table 248: Parameters for LwtmShrkImed

10.4.6 LwtmShrkSlvl : % service level (S/P)

LwtmShrkSlvl calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Limited Waiting Time.
The Excel spreadsheet call format is:

```
=LwtmShrkSlvl(CDUR,CRTE,ITVL,TGTM,AGTS,UMPH,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmShrkSlvl(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH,MXWT:double)
                          :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmShrkSlvl Lib "tlib01.dll" _
   (ByVal CDUR As Double,ByVal CRTE As Double, _
    ByVal ITVL As Double,ByVal TGTM As Double, _
    ByVal AGTS As Long,ByVal UMPH As Double, _
    ByVal MXWT As Double) As double
```

The function LwtmShrkSlvl is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 249

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXWT	double	Maximum waiting time, in seconds.

Table 249: Parameters for LwtmShrkSlvl

10.4.7 LwtmShrkLoss : % of calls lost (S/P)

LwtmShrkLoss calculates the percentage of calls that will be lost.
The Excel spreadsheet call format is:

```
=LwtmShrkLoss(CDUR,CRTE,ITVL,TGTM,AGTS,UMPH,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmShrkLoss(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH,MXWT:double)
                          :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmShrkLoss Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByVal MXWT As Double) As double
```

The function LwtmShrkLoss is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 250

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXWT	double	Maximum waiting time, in seconds.

Table 250: Parameters for LwtmShrkLoss

10.4.8 LwtmShrkAtme : average answer time (wait or ASA) (S/P)

LwtmShrkAtme calculates the average time a call waits for an answer for Limited Waiting Time. This is also known as ”average speed of answer” or ASA.
The Excel spreadsheet call format is:

```
=LwtmShrkAtme(CDUR,CRTE,ITVL,TGTM,AGTS,UMPH,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmShrkAtme(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH,MXWT:double)
                     :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmShrkAtme Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByVal MXWT As Double) As double
```

The function LwtmShrkAtme is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 251

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXWT	double	Maximum waiting time, in seconds.

Table 251: Parameters for LwtmShrkAtme

10.4.9 LwtmShrkDlay : average answer time if not immediate (S/P)

LwtmShrkDlay calculates the average delay for Limited Waiting Time. Delay means the average wait time for calls that do not get answered immediately.
The Excel spreadsheet call format is:

```
=LwtmShrkDlay(CDUR,CRTE,ITVL,TGTM,AGTS,UMPH,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmShrkDlay(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH,MXWT:double)
                      :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmShrkDlay Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByVal MXWT As Double) As double
```

The function LwtmShrkDlay is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 252

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXWT	double	Maximum waiting time, in seconds.

Table 252: Parameters for LwtmShrkDlay

10.4.10 LwtmShrkQsze : average calls waiting (S/P)

LwtmShrkQsze calculates the average queue size, or number of calls waiting, for Limited Waiting Time. The Excel spreadsheet call format is:

```
=LwtmShrkQsze(CDUR,CRTE,ITVL,TGTM,AGTS,UMPH,MXWT)
```

The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmShrkQsze(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH,MXWT:double)
                      :double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmShrkQsze Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByVal MXWT As Double) As double
```

The function LwtmShrkQsze is suitable for spreadsheet or programming use. The meaning of each of the parameters is shown in table 253

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXWT	double	Maximum waiting time, in seconds.

Table 253: Parameters for LwtmShrkQsze

10.4.11 LwtmShrkAgtsLoss : shrinkage agents needed for loss rate (P)

LwtmShrkAgtsLoss calculates the number of agents with shrinkage needed to achieve the target loss rate.
The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmShrkAgtsLoss(CDUR,CRTE,ITVL,TGLS,UMPH,MXWT:double;var ECDE:longint)
                         :longint;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmShrkAgtsLoss Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGLS As Double, _
   ByVal UMPH As Double,ByVal MXWT As Double, _
   ByRef ECDE As Long) As long
```

The function LwtmShrkAgtsLoss is suitable for programming use only. The meaning of each of the parameters is shown in table 254

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGLS	double	Target loss rate, % of offered calls.
UMPH	double	Unaccounted minutes per hour.
MXWT	double	Maximum waiting time, in seconds.
ECDE	longint	Error code.

Table 254: Parameters for LwtmShrkAgtsLoss

10.4.12 LwtmShrkAgtsSlvl : agents with shrinkage needed for service level (P)

LwtmShrkAgtsSlvl calculates the number of agents with shrinkage needed to achieve the target service level according to Limited Waiting Time.
The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmShrkAgtsSlvl(CDUR,CRTE,ITVL,TGPC,TGTM,UMPH,MXWT:double;var ECDE:longint)
                         :longint;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmShrkAgtsSlvl Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGPC As Double, _
   ByVal TGTM As Double,ByVal UMPH As Double, _
   ByVal MXWT As Double,ByRef ECDE As Long) As long
```

The function LwtmShrkAgtsSlvl is suitable for programming use only. The meaning of each of the parameters is shown in table 255

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGPC	double	Target percentage of calls.
TGTM	double	Target answer time, in seconds.
UMPH	double	Unaccounted minutes per hour.
MXWT	double	Maximum waiting time, in seconds.
ECDE	longint	Error code.

Table 255: Parameters for LwtmShrkAgtsSlvl

10.4.13 LwtmShrkLossRate : % of calls lost (P)

LwtmShrkLossRate calculates the percentage of calls that will be lost.
The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmShrkLossRate(CDUR,CRTE,ITVL:double;AGTS:longint;UMPH,MXWT:double;
                          var ECDE:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmShrkLossRate Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal AGTS As Long, _
   ByVal UMPH As Double,ByVal MXWT As Double, _
   ByRef ECDE As Long) As double
```

The function LwtmShrkLossRate is suitable for programming use only. The meaning of each of the parameters is shown in table 256

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXWT	double	Maximum waiting time, in seconds.
ECDE	longint	Error code.

Table 256: Parameters for LwtmShrkLossRate

10.4.14 LwtmShrkSvcLevel : % service level (P)

LwtmShrkSvcLevel calculates the percentage of calls that will be answered within the target answer time or number of call attempts, according to Limited Waiting Time.
The Delphi or Lazarus (Pascal) definition is:

```
Function LwtmShrkSvcLevel(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH,MXWT:double;
                          var ECDE:longint):double;stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Function LwtmShrkSvcLevel Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByVal MXWT As Double,ByRef ECDE As Long) As double
```

The function LwtmShrkSvcLevel is suitable for programming use only. The meaning of each of the parameters is shown in table 257

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXWT	double	Maximum waiting time, in seconds.
ECDE	longint	Error code.

Table 257: Parameters for LwtmShrkSvcLevel

10.4.15 LwtmShrkPerf : performance statistics (P)

LwtmShrkPerf calculates most of the performance statistics of interest for Limited Waiting Time. LwtmShrkPerf is intended for programming use, and is not suitable for use in a spreadsheet.
The Delphi or Lazarus (Pascal) definition is:

```
Procedure LwtmShrkPerf(CDUR,CRTE,ITVL,TGTM:double;AGTS:longint;UMPH,MXWT:double;
                       var ELGS,COFU,CUTL,CADH,CIMD,CSLV,CLTE,CBSY,ATME,DLAY:double;
                       var QSZE:double;var ECDE:longint);
                       stdcall; external 'tlib01.dll';
```

The Visual Basic definition is:

```
Public Declare Sub LwtmShrkPerf Lib "tlib01.dll" _
  (ByVal CDUR As Double,ByVal CRTE As Double, _
   ByVal ITVL As Double,ByVal TGTM As Double, _
   ByVal AGTS As Long,ByVal UMPH As Double, _
   ByVal MXWT As Double,ByRef ELGS As Double, _
   ByRef COFU As Double,ByRef CUTL As Double, _
   ByRef CADH As Double,ByRef CIMD As Double, _
   ByRef CSLV As Double,ByRef CLTE As Double, _
   ByRef CBSY As Double,ByRef ATME As Double, _
   ByRef DLAY As Double,ByRef QSZE As Double, _
   ByRef ECDE As Long)
```

The function LwtmShrkPerf is suitable for programming use only. The meaning of each of the parameters is shown in table 258

Parameter	Type	Description
CDUR	double	Average call duration, in seconds.
CRTE	double	Calls expected during the interval.
ITVL	double	Interval length, in seconds.
TGTM	double	Target answer time, in seconds.
AGTS	longint	Agents assigned, whole agents.
UMPH	double	Unaccounted minutes per hour.
MXWT	double	Maximum waiting time, in seconds.
ELGS	double	”Traffic” or workload in erlangs.
COFU	double	% offered agent utilisation.
CUTL	double	% actual agent utilisation.
CADH	double	% agent unaccounted time.
CIMD	double	% calls answered immediately.
CSLV	double	% calls answered within target.
CLTE	double	% calls answered later than target.
CBSY	double	% calls getting busy signal.
ATME	double	Average answer-time (ASA) in seconds.
DLAY	double	Average delay in seconds.
QSZE	double	Average queue size.
ECDE	longint	Error code.

Table 258: Parameters for LwtmShrkPerf