



Inova Solutions
A Geomant Company

LightLink Data Analysis Data Source Manager Solution Guide

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1. Introduction

The LightLink® Data Analysis Data Source Manager (DADSM) provides a means to analyze, aggregate, and convert data types on LightLink data fields, and to then create new LightLink data fields with the results.

For example, the DADSM can:

- *Calculate a service level for specific queues across multiple switches, giving a high-level view of an organization's current activities.*
- *Create service levels for multiple different sets of data, providing a means for making comparisons within a suite of activities.*

The DADSM provides a way to perform sophisticated data analysis equations using arithmetic, comparison, and date-time operators, and to specify the desired data types of the equation results. The DADSM is configured as a data source in the LightLink system, with the capability to subscribe to data fields from any LightLink data source, use those data fields in its equations, and publish the results as new LightLink data fields.

1.1. How It Works

The DADSM user interface works like a scientific calculator. The calculator can be used to enter equations using real time data fields from the ACD and other systems. Those equations compute new named metrics and re-compute automatically on an ongoing basis roughly every 1.5 seconds. You can use these new metrics in other calculations or anywhere else in LightLink that a data value may be used.

1.2. Licensing

The DADSM is a licensed LightLink component.

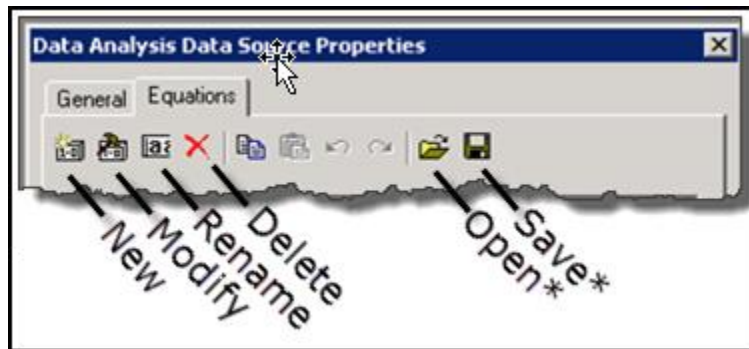
2. Creating Equations

2.1. Configuration

Once you have the basic properties of the DADSM configured (see section 3.1), you can then begin to create the equations. You can add, modify, and remove equations at any time after the DADSM is created.

Note: Whenever you click OK on the DADSM properties dialog, the DADSM will mark all existing DADSM data fields offline for a moment while it reconfigures to use the latest property values.

From the Data Analysis Data Source Properties dialog, select the *Equations* tab. On this tab, you have multiple options for manipulating equations through the icons at the top of the screen and in the context menu (Figure 1):



**Use the Open and Save functions to import and export equations. Refer to Section 3.7 for import / export details.*

Figure 1

The *Equations* tab also offers you several ways to sort or filter the equations you have already created.

To create a new equation, you can copy and paste from an existing equation, and then modify it to create a new data value; or you can create a new equation from scratch:

1. Select the *New* icon or select *New* from the Context Menu.
2. Enter the name of your new equation and click *OK*.
3. The Data Field Expression dialog will open. Select the *More* button to view the options for creating an equation.
4. Using the buttons and fields at the bottom of the Data Field Expression dialog, you can create your desired equation:

- a. Data field selection – To select data fields for your equation, use the Data Field tree at the top of the dialog. Double click on the specific data field to move it into the Expression field.
- b. Numeric keypad - Numbers 0-9 and the decimal point. Numbers can be added to any equation wherever needed.
- c. Arithmetic operators – Typical symbols that allow you to build mathematical equations.
- d. Other functions – Available through the drop down tab in the dialog, these functions add additional computation features.

Function	Purpose	Usage
AVERAGE	Returns the average of a series of numbers.	AVERAGE (Num1, Num2, Num3,...)
BEGINS	Returns true if the specified string begins with the provided substring	BEGINS (string, substring)
BLANK	Returns true if the specified string is empty	BLANK (string)
CONTAINS	Returns true if the specified string contains the provided substring	CONTAINS (string, substring)
DAY	Returns the day, given a date value.	DAY (date)
HOURS	Returns the hours, given a time value.	HOURS (time)
MAX	Returns the Maximum value from a series of numbers.	MAX (Num1, Num2, Num3,...)
MIN	Returns the Minimum value from a series of numbers.	MIN (Num1, Num2, Num3,...)
MINUTES	Returns the minutes, given a time value.	MINUTES (time)
MONTH	Returns the month, given a date value.	MONTH (date)
SECONDS	Returns the seconds, given a time value.	SECONDS (time)
TOTAL SECONDS	Returns the given time in total seconds.	TOTAL SECONDS (time)
YEAR	Returns the year given a date value.	YEAR (date)

Table 1 – DADSM Functions

5. Once you have completed your equation, click the *Check* button to check syntax. If there are errors, your cursor will jump to the general problem area.

Make changes as necessary to correct the syntax. Refer to *Section 3.6- Error Checking* for more information about correcting equation errors.

6. You can then save the equation by clicking *OK*.

Note that you can also use the Save button to save the equation in the Saved Expression portion of the Data Field panel at the top of the dialog. This can be useful when creating multiple equations with very similar features.

2.2. Data Types

You can specify the data type for the data field created by each equation. If the data type is left at “Default”, the data type will be set to Double for numeric results, Boolean for text results that map to Boolean values (such as T or F, True or False), and String data type for other values.

Note that the data type resulting from a default setting will not depend on the data type(s) of the input data, but rather only on the value of the result. Best practice is to set the data type for the result of each equation. You can do so after creating the equation on the Equations tab of the DADSM Properties dialog.

Once you have created your equations and have set their data types, click *OK* on the DADSM properties dialog. The DADSM will automatically begin processing. You will only be required to manually log in if you selected to logout of the data source manually.

2.3. Syntax Rules

Data Field Expressions are equations that are composed of elements, operators, and functions using standard algebraic notation and precedence. Refer to Table 2 for examples of how elements will be interpreted by the Data Field Expression dialog.

Sample Element	Interpretation
542	INT32
7654000	INT32
2.5	DOUBLE
“Rabbit”	STRING
"5:00:00"	TIME or STRING, depending on context
"9/22/02 3:15:00 AM"	DATETIME or STRING, depending on context
[Calls Waiting]	The name of the data field for Calls Waiting
true	BOOLEAN
false	BOOLEAN

Table 2

When composing an equation:

- Quoted strings are interpreted as TIME or DATETIME when used with an operator or function that requires one of these types.
- TIME can represent either a time of day or a quantity of time. Therefore "5:00:00" could mean "five hours" or it could mean "five o'clock AM." The interpretation depends on the operator or function with which it is used.
- A data field name in an equation must match a data field that is already defined in the system. An equation can refer to data fields created by other equations, but those other equations must be processed by the Data Analysis DSM before the resulting data fields can be used in another equation.

2.4. Sample Equations

Below are some sample data field equations:

2.4.1. Total Service Level

```
((([Application:TECH:Total Calls Answered] +
[Application:TECH:Total Calls Abandoned]) -
([Application:TECH:Calls Answered After Thresh] +
[Application:TECH:Calls Abandoned After Thresh])) /
([Application:TECH:Total Calls Answered] +
[Application:TECH:Total Calls Abandoned])) * 100
```

2.4.2. Average Speed of Answer (ASA)

```
(Calls Answered Skillset Delay / (total calls answered +
.001)) + 0.5
```

This equation contains a term in the denominator (0.001) to make sure that the equation will compute to zero when the center opens and total calls answered is zero; this avoids a divide by zero, which would show an asterisk in the result.

The equation also contains a term added to the result (0.5) which requires some explanation. As described above, each equation has a resulting data field type such as integer for whole number value or floating point for a value with a decimal portion. In computer terms these types are INT32 or Double. If the result of an equation is set to the INT32 type so only whole number values are displayed, then the decimal portion of the result is truncated so that a value of 3.2 or 3.8 would become 3. The 0.5 term is added to the result so that this truncation is actually a round up/round down to the nearest integer; therefore,

the value of 3.2 becomes 3.7, which truncates to an integer value of 3. A value of 3.8 becomes 4.3, which truncates to an integer value of 4.

2.4.3. Abandon Rate

$$(\text{Calls Abandoned} / \text{Calls Offered} + .001) * 100$$

Many ACD systems return a number of abandoned calls, but do not compute a percentage. This equation is used to compute the percentage for use in LightLink either for display purposes or to trigger threshold events.

3. Troubleshooting

3.1. Installation

Follow the steps below to install the DADSM:

1. In Administrator right click on *Input Manager*.
2. From the context menu, select *New Data Source Connection*.
3. From the New Data Source dialog, select *LightLink Data Analysis*.
4. Select *OK*.
5. The *Data Analysis Data Source Properties* dialog appears, with the following fields:
 - **Name** - This is the name of the connection. The default is LightLink Data Analysis
 - **Server ID** - This is the ID number of the Server (not editable)
 - **Preferred ID** - This is ID number of the Input Manager channel (the default value is usually sufficient)
 - **Remote Host** - This is the name of the host PC on which the Input Manager for this connection resides.

3.2. Capacity and Limitations

The DADSM subscribes to any data fields you reference in the data analysis equations you create. The DADSM evaluates the equations using the current values of the data fields and publishes the result in the data field for use within the entire LightLink system.

The DADSM runs on a timer, with the evaluation period set to 1.5 seconds; every 1.5 seconds it will reevaluate all the DADSM equations.

LightLink allows only one Data Analysis Data Source per Input Manager.

3.3. Prerequisites

Data Sources from which data is to be captured must be correctly configured, logged in, and running when the Data Analysis Data Source is activated; otherwise the DADSM doesn't have the source data to work with and resulting data fields will be marked offline.

The LightLink Middleware must be installed.

3.4. Compatibility

With Release 5.8.280, some DADSM functions available in previous releases have been removed. If upgrading from a previous release, you may need to confirm correct operation of equations developed in that previous release. This version supports the time-date functions, some string functions, and the AVG, MIN, and MAX functions, as well as all the logical functions available in the Data Field Expression dialog (see section 2.1 for details).

3.5. Equation Errors

It is possible to construct mathematical equations that will not evaluate correctly, such as when there are data values the equation doesn't expect or when input data fields are themselves offline. This causes no problems within the LightLink system because LightLink provides a data field status indication, but such a status may be visible operationally.

If an equation cannot be evaluated, the resulting data field is set to an offline state. Any part of LightLink, including another DADSM equation, will be aware of that offline status and will process the data field accordingly. This means that an output device, such as a wallboard or marquee desktop application or an XML output file, will recognize that offline status and show the data field value with asterisks. When the equation can be evaluated again, the equation is set to an online state and the appropriate mathematical result is published. This sequence might occur if the denominator of a fraction temporarily evaluates to zero. Because any value divided by zero is mathematically undefined, the equation cannot be evaluated until the data in the denominator takes on a different value.

Referring to the example in Figure 2, this equation uses Total Calls Answered in the denominator of an equation, say to compute a percentage of some sort of call. In this case, when the center first opens in the morning and there are no calls, the equation will fail to evaluate and will use asterisks to indicate a problem. The divide by zero error presents no problem to system operation; *the asterisks can be avoided by adding a small number to the denominator as shown.*

$$([\text{some calls}] / \text{Total Calls Answered}) * 100$$

This equation will show asterisks when the center first opens in the morning.

$$([\text{some calls}] / (\text{Total Calls Answered} + 0.001)) * 100$$

This equation will show 0 when the center first opens in the morning if the numerator is also 0.

Figure 2

3.6. Error Checking

The DADSM has support for detecting and reporting on syntax errors. This includes errors such as the data type of the value being passed in is incorrect for the function in which it is being applied.

If the DADSM evaluates an equation that results in an invalid number (such as a divide by zero), it will mark the resulting data field offline and create a corresponding log entry in the DADSM log. *Note that the equation will continue to evaluate, and when the error condition no longer occurs, the resulting data field will go back online and show the proper value automatically.*

If a source data field within an equation is not available at the time of evaluating a DADSM equation, the resulting data field is marked offline and a log entry to that effect is written to the DADSM log.

3.7. Importing and Exporting Equations

The DADSM provides a capability for exporting and importing equations, which is useful as a backup or for transferring to another DADSM instance.

Note that the DADSM import removes any already existing equations and replaces them with the equations specified by the import.

When performing a DADSM equations import, you can import equations that specify data fields that do not yet exist. For example, you can have two equations where the second equation refers to the data field created by the first. However, this also means that there is no way to validate the data field names in the imported equations, so if there is a typo in the equation, the DADSM will not be able to figure that out. If that condition exists, the data field for such an equation will never be created.

Note that you can import equations incrementally to DADSM with the following steps:

1. Export the currently configured equations.

2. Add that set to the new equations to be imported.
3. Import all equations together form a single file.

You can repeat these steps for any subsequent imports.