Inova Solutions
A Geomant Company

LightLink Data Field Expression Solution Guide

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1. Introduction to Data Field Expression

In Inova LightLink®, the Data Field Properties dialog provides you with an interface for viewing or modifying Data Field Formatting Attributes and Data Field Thresholds. Once the Data Field Expressions are created, then you can insert into your message using your specified criteria. Inova LightLink components that support Data Field Expressions are Message Editor, Broadcaster Designer, TaskLink, and DataLink.

1.1. Data Field Expression Dialog

The Data Field Expression dialog allows you to modify the expression that you have specified. It will perform necessary validation to ensure that thresholds are defined in a contiguous, ascending set of values appropriate to the data fields' type and will allow all threshold-specific formatting options specified in the DataFieldThreshold. The Data Field Expression dialog presents a hierarchical list of data fields, organized by Data Source and Data Field Group. It will be populated from Data Field information in the Data Directory.

The Data Item Selection Dialog is also part of the Data Field Expression Dialog Library. It uses the same underlying tree structure, but does not support expressions. It supports the display and selection of a single Data Source, Data Group, or Data Field.

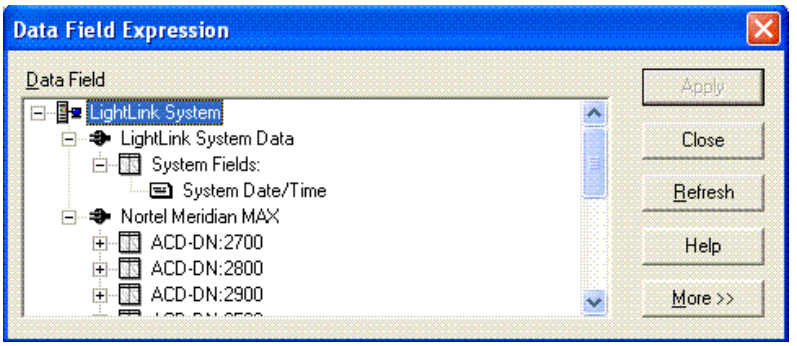

Figure 1

1.2. Process Overview

To insert a data field, you will follow the process below. Refer to the following sections for more details on each step.

1. Insert the data field.
2. Format the properties of the data field.
3. Create a data field expression.
4. Add threshold to the data field expression.

2. Inserting a Data Field

To insert a data field into a LightLink message, decide which statistic you want to display and then select each statistic for insertion into your messages. The value in the Data Field is continuously updated by the Inova LightLink System when the message is displayed.

The following steps detail how to insert a Data Field into a LightLink message:

1. Place the cursor where you want the data to appear.
2. Select Insert > Data Field. The Data Field Expression dialog appears (Figure 2).

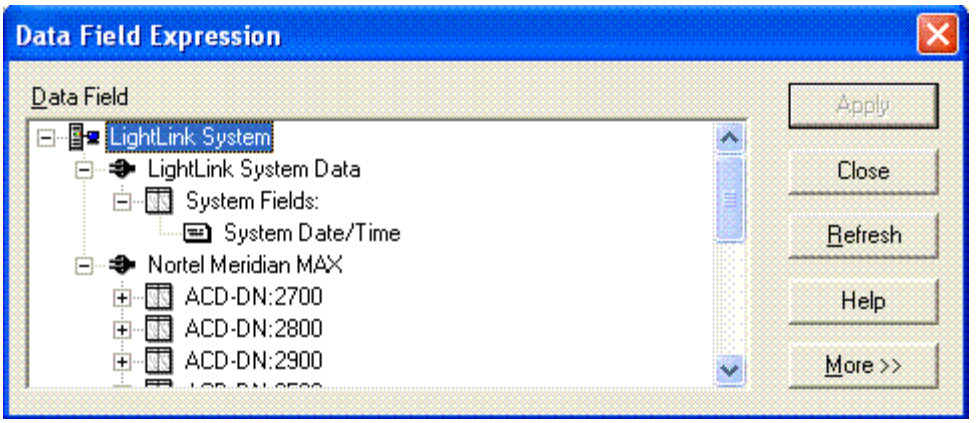

Figure 2

3. Click on the Inova LightLink System Tree to display the data source connections available.
   - Click on the + node of a data source connection to show the System Groups.
   - Click on the + node of a System Group to see the Data Fields available.
4. Highlight the desired field and click *Apply* to insert the field**.**
5. If you are simply inserting a data field, click *Close* to dismiss the Data Field Expression dialog. If you wish to format the data field, refer to Section 3.

In the application, the Data Field will appear in the message as a series of asterisks.

3. Formatting the Properties of a Data Field

The following details how to use the Format tab options for a Data Field.

1. After you have selected a data field and clicked *Apply,* then select *Properties.* The *Data Field Properties* dialog for that Data Field appears.
2. Select the Format tab.
3. Complete the Data Field Properties options for the descriptions below.
   - **Type** - Displays the format type of the Data Field selected (read only).
   - **Alignment -** Specifies the alignment of the Data Field as it increases or decreases. Your options are to at the align left, right, or center of the width (selected below).
   - **Format –** Changes the format of the data value. Choose from the drop-down menu.
   - **Width** - Specifies the maximum number of spaces the field value should occupy in any message.

     If you select a Data Field Width that is not wide enough, Inova LightLink will display the pound sign at run time for each overflow "digit" of the Data Field value.
4. Select *OK* to accept the configurations.

4. Creating a Data Field Expression

4.1. Rules for Data Expression Syntax

Expressions are composed of elements, operators, and functions using standard algebraic notation and precedence. Refer to Table 1 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 1

When composing a data field expression, remember these hints:

- The Data Field Expression dialog will only use INT32 when defining integers.
- 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.
- The data field name must match a data field that is defined in the system.
- Each expression and sub-expression has a resulting type that is one of the Inova LightLink data field types.
- The type requirements and results for the operators is as follows:

Following are the operator types allowed on left and right side Result type:

- Comparison STRING and STRING BOOLEAN
- NT and INT
- INT and DOUBLE
- TIME and TIME
- DATE and DATE

- DATETIME and DATETIME
- TIME and DATETIME - (Only the TIME component of the DATETIME is compared)
- DATE and DATETIME - (Only the DATE component of the DATETIME is compared)
- Logical BOOLEAN and BOOLEAN BOOLEAN
- Arithmetic INT and INT INT
- INT and DOUBLE DOUBLE

4.2. Tools for Creating Data Field Expressions

4.2.1. Keypad

You can see the keypad by selecting the More tab on the Data Field Expression Dialog. The keypad is located on the expandable window of the Data Field Expression dialog (Figure 3).

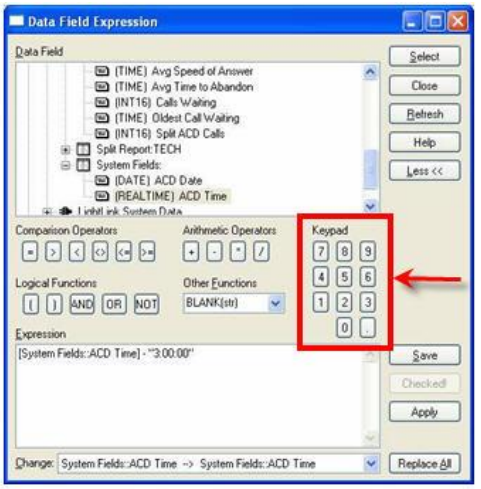

Figure 3

The keypad allows you to choose numbers 0-9 to be manipulated with the Comparison Operators, Arithmetic Operators, Logical Functions and Other Functions. The Keypad includes the numbers 0 through 9 and the decimal point.

4.2.2. Arithmetic Operators

The Operators and Function for the Data Field Expression are symbols which allow you to set the criteria with the function keys. These are located on the The LightLink Database folders and the files within those folders should also be excluded from antivirus scans. Refer to Table 2 for a list of these folders and files. Note that **Error!**

Reference source not found. expandable window of the Data Field Expression dialog (Figure 4). Expressions are built up by combining simpler sub-expressions with operators.

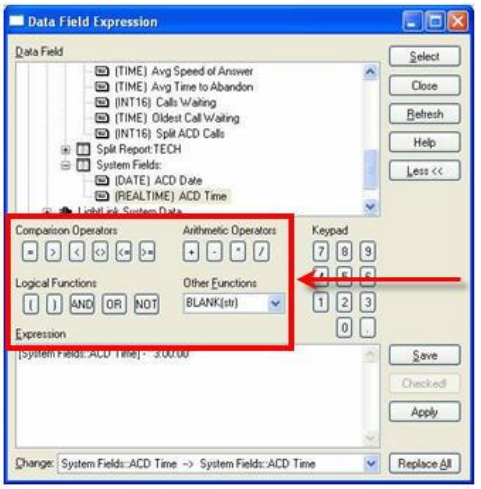

Figure 4

For example:

- **2 + 2** is a simple expression having only one operator.
- **2 + 2 + 5** is a more complex expression consisting of the sub-expression **2 + 2** combined with the element **5** via operator **+.**

4.2.3. Descriptions of Elements

An element is part of the symbols for arithmetic functions that allow you to set the criteria for the data field. Elements correspond with specific Inova LightLink data field types. Refer to Table 2 for the elements and their corresponding descriptions and data field types.

Element	Description	Data Field Type
Integer	A whole number with an optional minus sign.	INT16, INT32, UINT16, UINT32
Floating point number	A number that includes places after the decimal point or scientific notation.	DOUBLE
Quoted string	A sequence of characters enclosed in "double quotes".	STRING, DATE, TIME, DATETIME
Data field name	The full name of a data field in the system, enclosed in [square brackets].	Any type; depends on the data source
Boolean value	Data with a true or false value.	True or False Boolean

Table 2

4.2.4. Descriptions of Logical Operators

Refer to Table 3 for descriptions of the logical operator functions.

Function	Description
(	Beginning parentheses to be used with ending parentheses to set the priority of the equation.
)	Ending parentheses to be used with beginning parentheses to set the priority of the equation.
AND	AND returns TRUE if both inputs are TRUE (if 'this' AND 'that' are true). *The AND operator is evaluated before the OR operator.* For example: • (1) AND (0) would evaluate to zero because one input is false. • (1) AND (1) evaluates to 1. • (any number but 0) AND (0) evaluates to 0.
OR	For an OR statement, if either (or both) of the two values it checks are TRUE then it returns TRUE. *OR will be evaluated after AND.* For example: • (1) OR (0) evaluates to 1. • (0) OR (0) evaluates to 0.
NOT	The NOT operator accepts one input. If that input is TRUE, it returns FALSE, and if that input is FALSE, it returns TRUE. *NOT is evaluated prior to both AND and OR.* For example: • NOT (1) evaluates to 0, and NOT (0) evaluates to 1. • NOT (any number but zero) evaluates to 0.

Table 3

4.2.5. Descriptions of Other Functions

The Other Functions are accessible through a drop down tab on the Data Field Expression dialog. Refer to Table 4 for further details about the other functions.

Function	Description	Examples
BLANK (str)	Returns true when the string passed in is empty.	• BLANK ("") returns true. • BLANK ("Hello") returns false. • BLANK([Output Device Status::SRV:1 CHN:1 DSP:1]) would return true only if the data field evaluated to "".
CONTAINS (str, substr)	Returns true when the string passed in as the first parameter contains the substring passed in as the second parameter anywhere within the string.	• CONTAINS ("INOVA Corporation", "Corp") returns true. • CONTAINS ("INOVA Corporation", "Hello") returns false. • CONTAINS ([Output Device Status::SRV:1 CHN:1 DSP:1], "nect") would return true if the data field evaluated to "Connected".
BEGINS (str, substr)	Returns true when the string passed in as the first parameter begins with the substring passed in as the second parameter.	• BEGINS ("INOVA Corporation", "INOVA") returns true. • BEGINS ("INOVA Corporation", "Corp") returns false. • BEGINS ([Output Device Status::SRV:1 CHN:1 DSP:1], "Conn") would return true if the data field evaluated to "Connected".
YEAR(date), DAY(date) , HOURS (time), MNUTES (time), SECONDS (time)	Parses date or time fields.	• The following "if condition" could be used to schedule a birthday message to play on April 18th: (MONTH([System Fields::System Date/Time]) = 4) AND (DAY([System Fields::System Date/Time]) = 18)

Table 4

5. Assigning Threshold Values to a Data Field

The following details how to assign threshold values to a data field. Any thresholds you define here will be saved as the default thresholds to be used whenever this Data Field appears in an Inova LightLink application.

When setting up your system, you may want to select Data Fields and determine their thresholds before you include the Data Fields in your messages or DataLink views.

The advantage to this method is that the threshold values selected from this dialog are saved with the Data Field until you decide to edit them, thus eliminating the need to define threshold values and settings with each new instance of the Data Field.

To access the thresholds, click the Thresholds tab on the Data Field Properties dialog (Figure 5); note that the Thresholds tab will look slightly different depending on which application you are using.

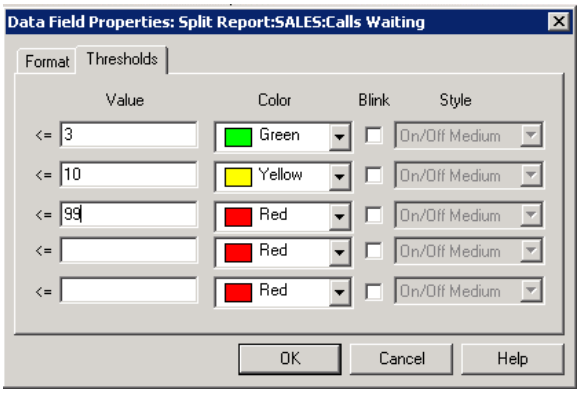

Figure 5

To modify the thresholds, enter the values in ascending order for this Data Field, selecting the color each time. Generally, users prefer to apply these colors:

- **Green** – for fields within an acceptable range.
- **Yellow** - for fields bordering an unacceptable range and may need attention.
- **Blinking Red** – for fields in an unacceptable range.

Note that for threshold notifications to work properly, you must enter the values in ascending order.

Appendix A. Sample Data Field Expressions

The following displays examples of Data Field Expressions for Inova LightLink.

A1. Example of a Time Zone in Data Field Expression

This example shows time offset to Pacific Time on the display in an Eastern Time Zone using Inova LightLink Message Editor.

1. Select Message Editor > Insert a Data Field. The Data Field Expression dialog appears (Figure 6).

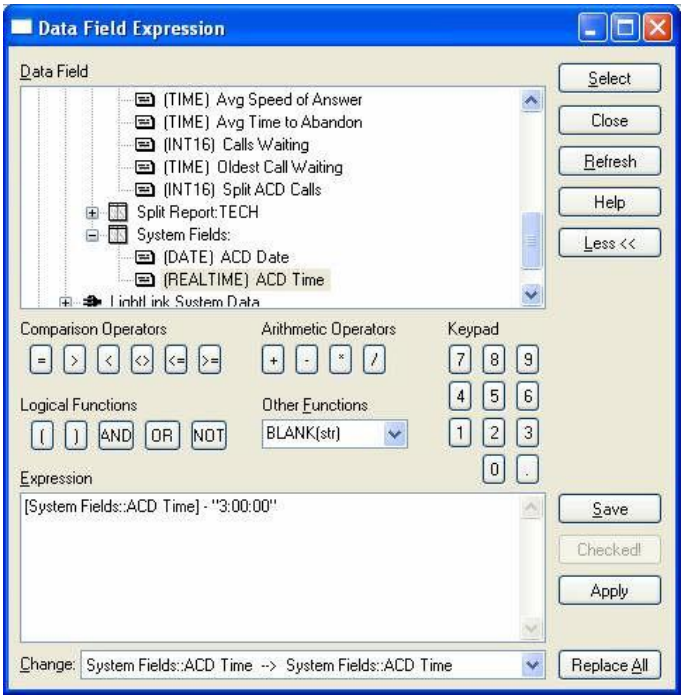

Figure 6

2. Select a Data Field. In this example, select the [Realtime] ACD Time under System Fields.
3. Click the *Select* button.
4. This Selection appears in the Expression pane: [System Fields::ACD Time].
5. Use the Minus symbol from the Arithmetic Operators to create a hyphen.
6. Type in the time to which you want to convert. *You must use the quotation marks around the time.* To present time as a data field:
   - " 00:00:00" shows hour:minutes:seconds.
   - "00:00" shows minutes and seconds.

- "00" shows seconds.

To convert time zones:

- Atlantic Time - Add 1 hour from the current Eastern Time
- Central Time - Subtract 1 hour from the current Eastern Time
- Mountain Time - Subtract 2 hours from the current Eastern Time
- Pacific Time - Subtract 3 hours from the current Eastern Time
- Alaska Time - Subtract 4 hours from the current Eastern Time
- Hawaii Time - Subtract 5 hours from the current Eastern Time
- United Kingdom - Add 6 hours to the current Eastern Time

7. When you are finished, click *Apply* to add this to your message. Select *Save* to keep this expression.

Once you have created this expression, you can add it to display in your message.

A2. Example of a Threshold in Data Field Expression

This example shows a Threshold for the oldest call waiting using Inova Solutions LightLink Message Editor.

1. Select Message Editor > File > Schedule.
2. The Schedule dialog appears (Figure 7). Select the Durations tab.

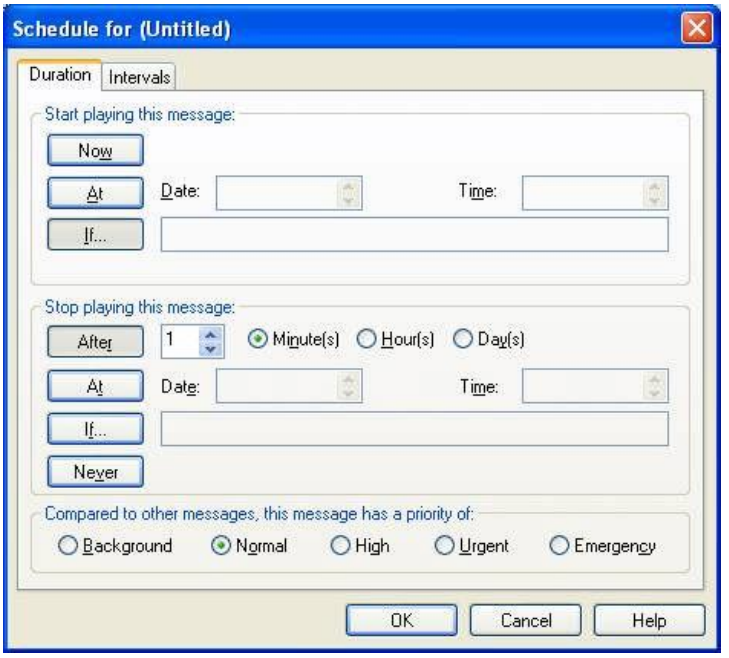

Figure 7

3. Select If... button. The Data Field Expression dialog appears.
4. Enter your data field expression as shown in the steps above. Below is the **incorrect** way to write a threshold for a time field keying on 1 minute:

   ```
   [Split Report:SALES:Oldest Call Waiting] > 60
   ```

   The expression is written with the call waiting as 60, which is incorrect because it does not have the quotation marks around the number to convert it to time.
5. The Check Failed dialog appears. Click *OK.*
6. Reenter the correct expression, with quotation marks to indicate time. Below shows the **correct** way to write a threshold for a time field keying on 1 minute:

   ```
   [Split Report:SALES:Oldest Call Waiting] > "60"
   ```

   --OR--

   ```
   [Split Report:SALES:Oldest Call Waiting] > "0:01:00"
   ```

A3. Additional Data Field Expressions

Below are some additional sample data field expressions:

Total Service Factor

```
((([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
```

ASA

```
 ((Calls Answered Skillset Delay /  Total Calls Answered)
+.001) + .5
```

This calculation does the calculation if the value is 0 (+ .001) And rounds to the next highest integer (+ .5)

Abandoned

```
((Calls Answered – Calls answered after threshold) * 100 ) /
Calls Answered
```


Appendix B – Available Functions

The available data analysis functions are listed in Table 5.

Function	Purpose	Usage
AVERAGE	Returns the average of a series of numbers. *	AVERAGE(Num1, Num2, Num3, … as double; Num as Integer) as double
DAY	Returns the day given a date value.	DAY (date) as integer
HOURS	Returns the hours given a time value.	HOURS (time) as integer
MAX	Returns the Maximum value from a series of numbers. *	MAX(Num1, Num2, Num3, … as double; Num as Integer) as double
MIN	Returns the Minimum value from a series of numbers.	MIN(Num1, Num2, Num3, … as double; Num as Integer) as double
MINUTES	Returns the minutes given a time value.	MINUTES (time) as integer
MONTH	Returns the month given a date value.	MONTH (date) as integer
SECONDS	Returns the seconds a time value.	SECONDS (time) as integer
TOTAL SECONDS	Returns the given time in total seconds.	TOTAL SECONDS (time) as integer
YEAR	Returns the year given a date value.	YEAR (date) as integer

Table 5

*Num is the number of numbers in the call and must be from 0 to 1024.

