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## Dynamic Data Exchange

This chapter explains how to use Dynamic Data Exchange (DDE) with *LookoutDirect*. DDE is the Microsoft message-based protocol used by applications like Microsoft Excel and *LookoutDirect* to link to data in other applications.

When the data in a source application changes, it dynamically updates all linked data (in real-time). With DDE, you can dynamically link other Windows applications to *LookoutDirect*.

There are several DDE protocol formats. *LookoutDirect* supports the standard Microsoft formats, XITable and CF-TEXT. XITable is often referred to as the Fast table format; CF-TEXT is often called text format. *LookoutDirect* also supports hot DDE links and NetDDE.

Any two applications participating in dynamic data exchange are engaging in a DDE conversation. In such a conversation, *LookoutDirect* acts as either the client application or the server application (or both, in a peer-to-peer configuration). If *LookoutDirect* is getting data from another application, *LookoutDirect* is the client. But if another application is getting data from *LookoutDirect*, then *LookoutDirect* is the server.

The client application is responsible for establishing a DDE link with the server. When *LookoutDirect* is a client, it first tries to establish an XITable DDE connection (because this is the most efficient). If the server application does not support this format, *LookoutDirect* uses the CF-TEXT DDE format.

To establish a DDE link, the client application must identify the location of the desired data. A three-tier address identifies the location of the data: Service, Topic, and Item. Look in the application documentation to determine its service, topic, and item.

Service specifies the name of the server application the client is linking to. Each application that supports DDE has a unique service name. For example, *LookoutDirect* is the service name of *LookoutDirect*, and EXCEL is the service name of Microsoft Excel.

Topic is the second level in the three-tier address. For many server applications like Excel and *LookoutDirect*, topic specifies a particular file.

In *LookoutDirect*, the topic is the process file name, minus the `.LKP` extension. For example, you would refer to a process file named `PLANT.LKP` as `Plant` when using it as the topic in a DDE link.

Item identifies the specific data or value being linked between the server and the client. A *LookoutDirect* item is the object name, followed by a specific data member (such as `Name.datamember`) if needed. See *Identifying Object Data Members* in Chapter 4, *Using LookoutDirect*, of your *Getting Started with LookoutDirect* manual for detailed information on selecting objects and data members. An item in a spreadsheet, such as cell B3 in Microsoft Excel, would be `r3c2`.

## Linking *LookoutDirect* to Other Applications

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*LookoutDirect* can act as a DDE client, DDE server, and both DDE client and server. Therefore, there are three basic ways to link *LookoutDirect* to another application using DDE:

- *LookoutDirect* as the server
- *LookoutDirect* as the client
- *LookoutDirect* as both client and server (peer-to-peer)



**Note** All readable numeric, logical, and text values in *LookoutDirect* are automatically available to any other application through DDE. No special setup is required.

Because Microsoft Excel is widely used and accepted, it is used in the *LookoutDirect* DDE examples.

### DDE Server Example

In this example, you can send information from *LookoutDirect* to another application, making *LookoutDirect* the server. First, create a potentiometer in *LookoutDirect* so you can link its value in real-time to a cell in Excel. Any time the Pot is adjusted, the value in the spreadsheet cell automatically changes.

1. Make sure *LookoutDirect* is not in edit mode.
2. Hold down the <Ctrl> key and click on the object you want to link to. In this case, select the Pot object you just created.
3. *LookoutDirect* beeps when it successfully copies the object value to the clipboard. The object can be a slider, bar graph, switch, pushbutton, digital display, text entry object, knob or almost anything else in *LookoutDirect* that contains a value.
4. Start Excel and select the cell you want to link to.

5. If your version of Excel is 5.0 or later, select **Edit»Paste Special**, then click on **Paste Link**. If you have an older version of Excel, select **Edit»Paste Link**.

You have just created your first DDE link. Repeat this process as many times as you need. If you are linking large numbers of objects to Excel, you might want to use the Excel copy and edit tools to speed up the process.

Not all applications support the Windows clipboard shortcut method as described above. Therefore, you might have to manually enter the appropriate *LookoutDirect* service, topic, and item in the other application to create a DDE link to that package. The format in which you enter this information varies from one package to another. For this reason, you should refer to the documentation of the client application for instructions.

## DDE Client Example

In this example, you import information from another application into *LookoutDirect*. For instance, you might want to use a value calculated inside a spreadsheet as a process control setpoint for a *LookoutDirect* application. In this kind of DDE link, *LookoutDirect* is the client and the spreadsheet application is the server. Because *LookoutDirect* is the client, it is responsible for establishing the link to the server data. Therefore, you must identify the service, topic and item in *LookoutDirect*. These are object parameters in the *DdeLink* object class.

1. Select **Object»Create** and select the *DdeLink* object class.



2. In **Service**, enter the name of the software package (`Excel` in this example).
3. In **Topic**, enter the name of the spreadsheet file.
4. In **Item**, enter the address of the cell you want to read a value from.

Notice that the entered cell address is `r1c1`. This translates to row1/column1 (cell A1) in Excel. The Excel DDE structure requires this format.

5. Click on **OK**, and then select **OK** again when *LookoutDirect* prompts you to insert the expression `DDE1`. Finally, pick the desired display format and click on **OK**.

To test your link, enter a numeric value into cell A1 of your spreadsheet. Whatever value you enter into the spreadsheet is immediately written to the DDE expression on your panel. You can also connect the *DdeLink* object you just created to other *LookoutDirect* objects. Refer to the *DdeLink* definition in the online help for more information.

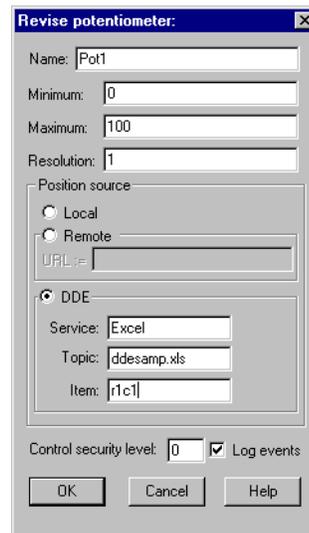


**Note** The *DdeTable* object is another way of linking data to *LookoutDirect* using DDE. This object class links large quantities of data though the more efficient *XITable* format. Refer to the *DdeTable* definition in the online help for more information.

## DDE Peer-to-Peer Example

Assume you want to take the *LookoutDirect* as a DDE server example one step farther. Suppose you want to adjust the Pot to change a value in Excel and also be able to enter a different value in Excel to adjust the Pot. That is, you want to send data both ways through a DDE link. You can easily create such two-way links for user-controlled objects (that is, Switches, Pots, and Pushbuttons).

Select **Object»Create** and define a new Pot; or select **Object»Modify** and select the existing Pot object.



1. Change **Position source** from **Local** to **DDE**.

2. In **Service**, enter the name of the software package (in this case, Excel).
3. In **Topic**, enter the name of the data file.
4. In **Item**, enter the address of the cell you want to read a value from, such as r1c1 (for cell A1 in Excel).
5. Click on **OK** to create or modify the definition of the object.
6. If the object is new, insert its display member into the panel so you can test your link.

To test your link, enter a value into the spreadsheet cell you specified and watch the Pot. Then adjust the Pot and watch the spreadsheet cell. You should see the values within the two applications change in unison.



**Note** If you link to a Pot object, the linked value is numeric, so you enter a numeric value into the spreadsheet cell. But if you link to a Switch or Pushbutton object, the linked value is logical. Linked logical values are shown in spreadsheet cells as `true` or `false`. To change the value of a logical value in a spreadsheet cell, enter `true` or `false`, `0` or `1`, or `on` or `off`.

## DDE Alarms

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The following section explains alarms that might appear in the *LookoutDirect* alarm window.

### **Cannot establish DDE conversation with <service>, <topic>**

This alarm occurs if a *LookoutDirect* client is unable to connect to the server corresponding to the given service and topic. The alarm also occurs if the server terminates the conversation (for example, if the server is shut down). The alarm is deactivated when the *LookoutDirect* client successfully connects to an item on the server.

Verify that the service and topic were typed correctly when you created the object that is using DDE. Verify that the server application is running. If the server is on another computer on the network, verify that the network is up. If the server is on a computer running Windows NT, verify that you are authorized to log on to that computer and that the current user logged onto the NT machine has trusted the DDE share to which you are trying to connect. For more information, refer to the section *Adding a Trusted DDE Share* in Appendix A, *Networking With DDE*.

### **DDE client error for <service>, <topic>, <item>: (received NACK for advise)**

**DDE client error for <service>, <topic>, <item>: (received NACK for request)**

Verify that the named item exists on the server and that the server supports DDE links for the item. This alarm occurs when LookoutDirect is a client.

**DDE client error for <service>, <topic>, <item>: (received NACK for poke)**

This alarm occurs if you are using LookoutDirect as both client and server, and have made a remote connection to an item that is not writable in a DataTable, Pushbutton, Pot, Switch, or TextEntry. The only LookoutDirect objects that support writes (pokes) are DataTable, PushButton, Pot, Switch, and TextEntry. These support writes into their implicit data members only.

If the server is running Windows NT, it is possible that the DDE share on the computer is configured to support reads (advise) but not writes (pokes).

**DDE client error for <service>, <topic>, <item>: (advise timed out)**

**DDE client error for <service>, <topic>, <item>: (request timed out)**

**DDE client error for <service>, <topic>, <item>: (poke timed out)**

Verify that the server application is running. Verify that the item exists on the server. If the server is on another computer on the network, verify that the network is up.

**DDE client error for <service>, <topic>, <item>: (received invalid data)**

**DDE server: corrupt data block poked to item <item>, topic <topic>**

Either the server received a corrupt data block from the client, or the client received a corrupt data block from the server. This might be the result of network trouble. If the alarm is consistent and predictable, you might have discovered a bug. Call National Instruments technical support for further help.

**DDE server: failed to post advise for item <item>, topic <topic>**

Verify that the client application is running. Verify that the item still exists on the client. If the client is on another computer on the network, verify that the network is up.