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, XlTable and CF-TEXT. XlTable 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 XlTable 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**

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 XlTable 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**, **false**, **0** or **1**, or **on** or **off**.

## DDE Alarms

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 (advises) 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.