webMethods EntireX

EntireX Broker ActiveX Control

Version 9.7

October 2014

WEBMETHODS

This document applies to webMethods EntireX Version 9.7.

Specifications contained herein are subject to change and these changes will be reported in subsequent release notes or new editions.

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Preface

Broker ActiveX Control allows GUI application developers to use an ActiveX-based interface to access EntireX Broker. It can be used within ActiveX containers, such as Visual Basic, PowerBuilder, Delphi, Microsoft Excel, Microsoft Word.

Broker ActiveX Control Introduction	Broker ActiveX Control provides a programmatic interface to COM-enabled programming environments. It has two types of operation: the Broker ACI and transaction objects. Broker ActiveX Control enables you to create EntireX ACI clients and EntireX ACI servers.
Writing Applications - Broker ActiveX Control	Topics include calling a Broker function; viewing the type library; using internationalization; using property pages.
Broker ActiveX Control with Visual Basic	Visual Basic is used here as an example of a development environment in which applications using Broker ActiveX Control can work. Broker ActiveX Control can be used by any programming language or programming environment that can act as a container for ActiveX controls.
Using Broker ActiveX Control with Active Server Pages	Microsoft's Active Server Page (ASP) is an HTML page that includes one or more scripts and reusable ActiveX server components to create dynamic Web pages. The scripts and ActiveX components are processed on a Microsoft Web server before the page is sent to the user.
Using Broker ActiveX Control with .NET	How to use Broker ActiveX Control with Visual Studio .NET. An example is provided.
Transaction Objects in Broker ActiveX Control	Transaction objects (TOs) in Broker ActiveX Control are selections of logical methods that are stored in a transaction object repository (TOR). These logical methods contain all the connection and interface details necessary to communicate with the Broker.
Calling Broker ActiveX Control Remotely	You can call Broker ActiveX Control remotely if you use it as an automation server. This means you can use the Broker component from a separate process - either on the same machine or on another machine in the network.
Publish and Subscribe with the Broker ActiveX Control	Broker ActiveX Control provides five Broker functions to enable publishing and subscription. Publish and subscribe enables an application to send a message (publication) to multiple receivers (subscribers).
Reference - Broker ActiveX Control	Methods and properties of Broker ActiveX Control.

1 Broker ActiveX Control Introduction

Broker ActiveX Control provides a programmatic interface to COM-enabled programming environments. It has two types of operation: the Broker ACI and transaction objects. Broker ActiveX Control enables the user to create EntireX ACI clients and EntireX ACI servers.

Broker ACI

The Broker ACI provides a simple automation API that is one-to-one compatible with the published EntireX Broker ACI. It provides Broker ActiveX Control properties and corresponding property pages for the control parameters detailed in the Broker ACI fields. This API is conceptually compatible with current Broker programming practices. Further, the Broker ActiveX Control programmer can count on programmatic behavior consistent with programming the Broker API directly, such as non-blocking calls and polling for completion.

Transaction Objects

Broker ActiveX Control generates ActiveX automation server interfaces dynamically at runtime from files in the Transaction Object Repository (TOR).

Broker ActiveX Control transaction objects provide a dictionary subsystem and user interface that will allow the EntireX Broker developer to define a dynamic IDispatch interface. This interface allows received data to be accessed with the traditional automation methodology.

The transaction object definition of a method also includes parsing up the SEND and RECEIVE buffers of a Broker message into parameters and return properties respectively. The transaction objects are loaded at runtime and the ActiveX container can then call the methods of that transaction object to send/receive data.

See ***Transaction Objects in Broker ActiveX Control*** for more information.

2 Writing Applications - Broker ActiveX Control

Calling a Broker Function

Setting the Broker ActiveX Properties

You can set the Broker ActiveX properties either in the program or in the **property pages**.

Specifying the Send Parameters

Before executing a `send` function, specify the send parameters with the method `SetSendDataLong(String bsData, Long DataLen)` or `SetSendData(String bsData, Short DataLen)`.

This method sets only the send buffer.

The first parameter specifies the buffer that has to be sent to the server. The second parameter specifies the number of bytes to be transferred.

The following rules apply to the `SetSendData` method:

- The `DataLen` bytes of the string `bsData` are copied to the internal send buffer.
- A byte copy is performed (not a string character copy), which means that the string `bsData` can contain zero bytes.
- The function `BOOL SetSendData( String bsData, Short DataLen )` can be used if the send buffer is smaller than 32 KB.

Calling the Broker Function

- Set the required properties.
- When you use the `send` function, use the method `SetSendData` to set up the send buffer.
- When you use the `receive` function, use the property `ReceiveBufferSize` to set up the size of the internal receive buffer.
- Use the static automation method to call the Broker functions:

```
BOOL InvokeBrokerFunction()
```

This method executes the Broker function defined by the current value of the property `Function`. Depending on the function, the required Broker parameters are taken from the current values of the corresponding properties.

If the Broker call is successful:

- The function returns TRUE.

- The `ErrorCode` property is set to '00000000' and the `ErrorMsg` property is empty.

If the Broker call is a `Send` or `Receive` function, this call may also update the `ConvID` property.

If the Broker call is a `Receive` function and asterisks were specified for ServerClass, ServerName and Service, the call updates the `ServerClass`, `ServerName` and `Service` properties.

If the Broker call is a `Receive` or `Send` with implicit `Receive` (Wait > 0), the number of bytes received is stored in the property `ReturnDataLength` and the returned data can be retrieved with the `GetReceiveData` method.

If the Broker call fails:

- The function returns FALSE.
- The `ErrorCode` and `ErrorMsg` properties contain the corresponding error reason.

The error code has two parts:

- error class (first four digits), which provides information for the application on how to react to the returned error, and
- error number (last four digits), which indicates the reason for the error.

The `GetErrorText` method is still available and returns the value of the `ErrorMsg` property.

For more information see *Error Messages and Codes*.

Getting the Contents of the Receive Buffer

If a `Receive` function was executed, the receive buffer can be retrieved with the function

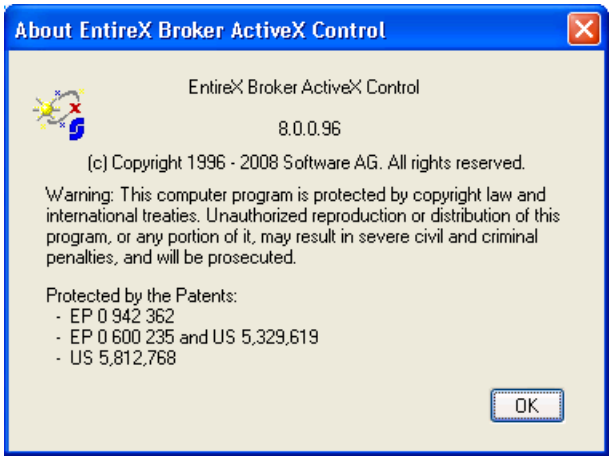
```
STRING GetReceiveData()
```

AboutBox

The `AboutBox` method is used to show the version of Broker ActiveX Control.

A message box will be displayed containing the **About** information.

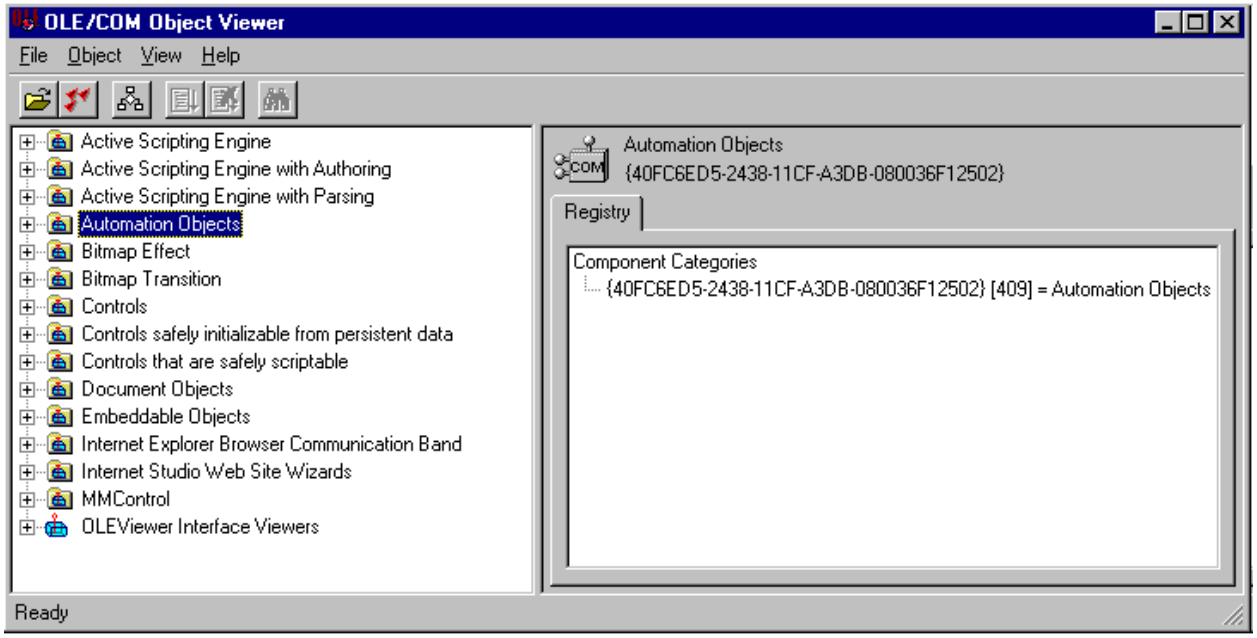
```
AboutBox ()
```



Viewing the Type Library

To view the Type Library of Broker ActiveX Control

- Use the OLE/COM Object Viewer (choose **EntireX Broker ActiveX Control** and choose **View Type Information**).

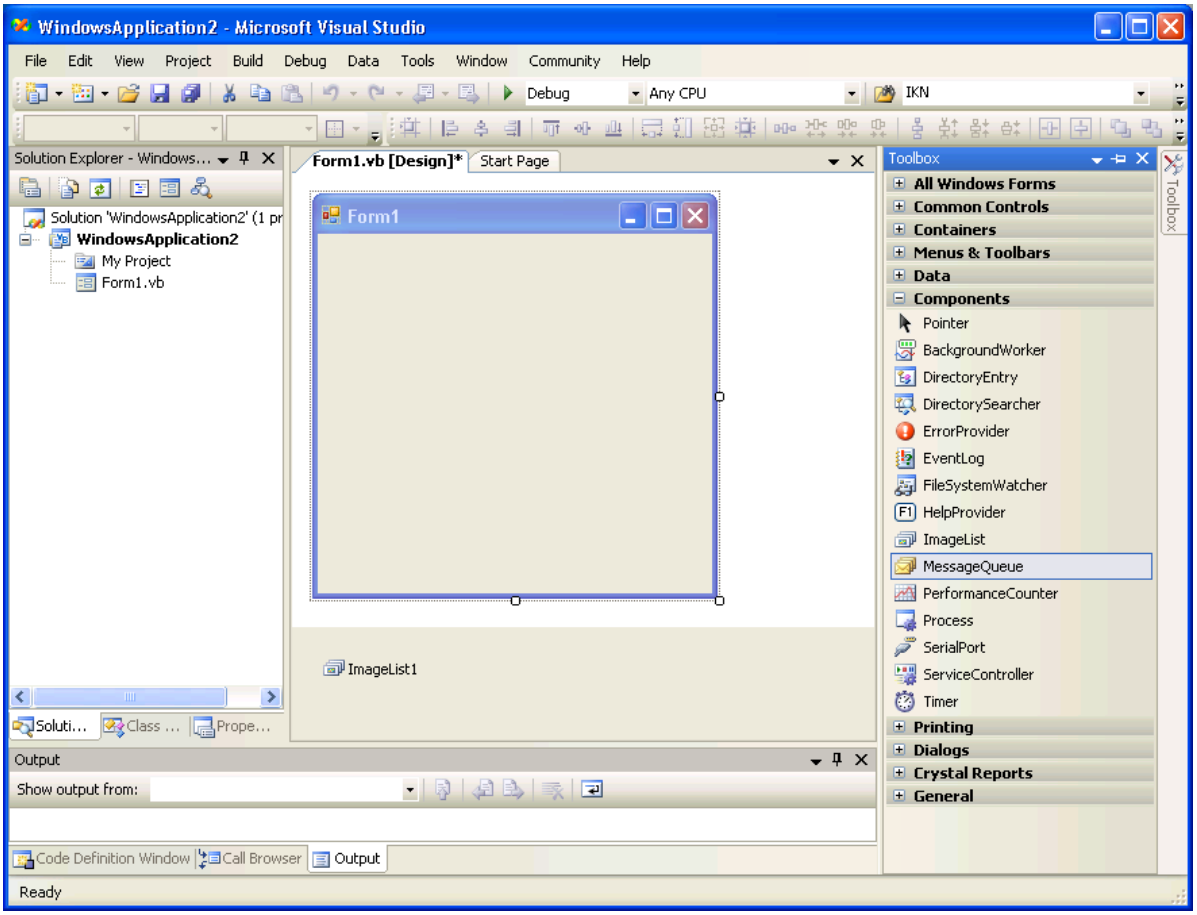


To do this with Visual Basic, see *Using Broker ActiveX Control as an Automation Server*.

Adding the Broker ActiveX Control Component to Visual Studio

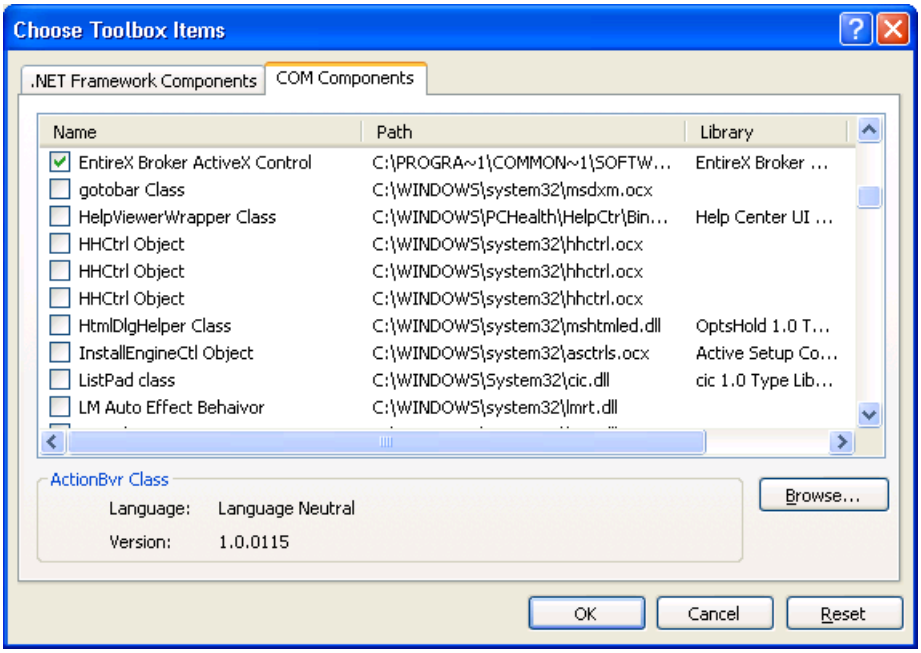
To add the Broker ActiveX Control component to Visual Studio

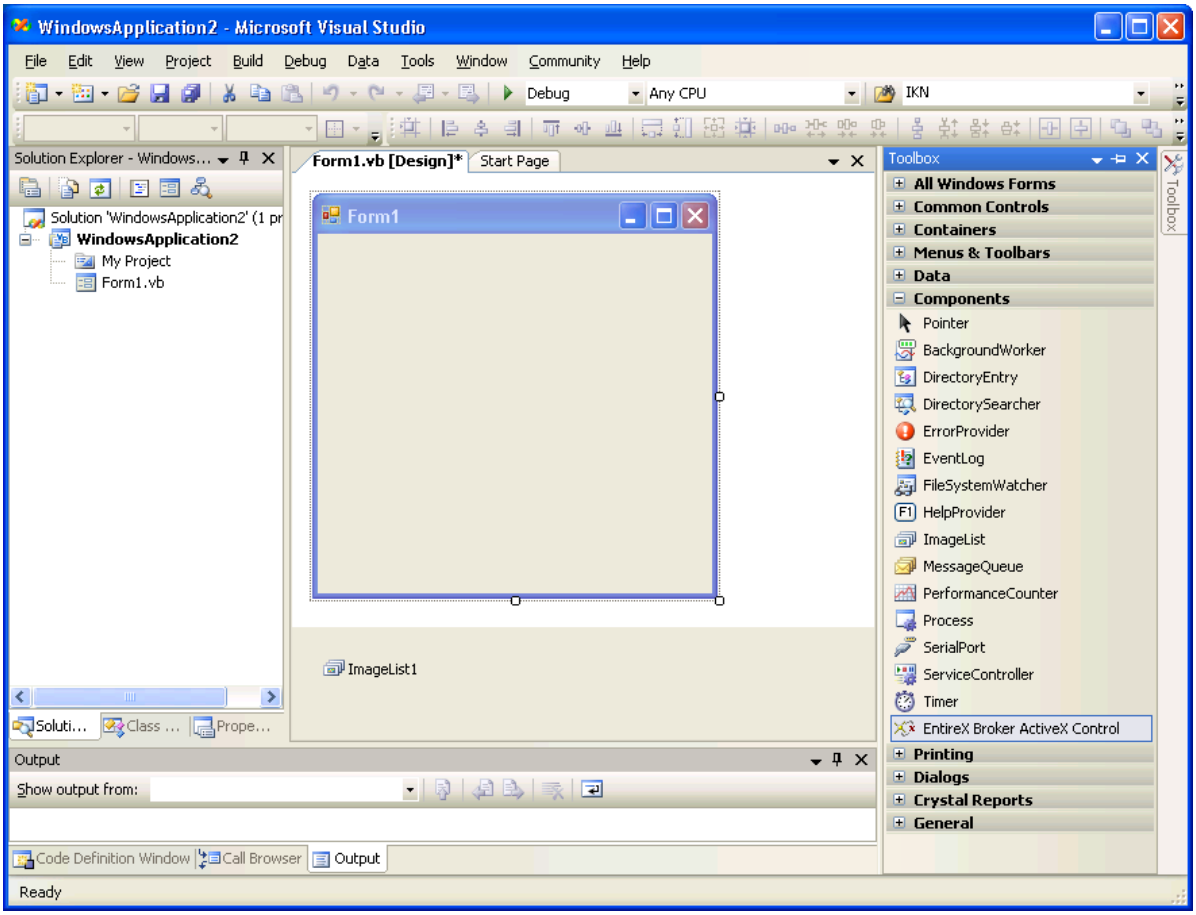
1 In Visual Studio, choose **Toolbox > Components**.



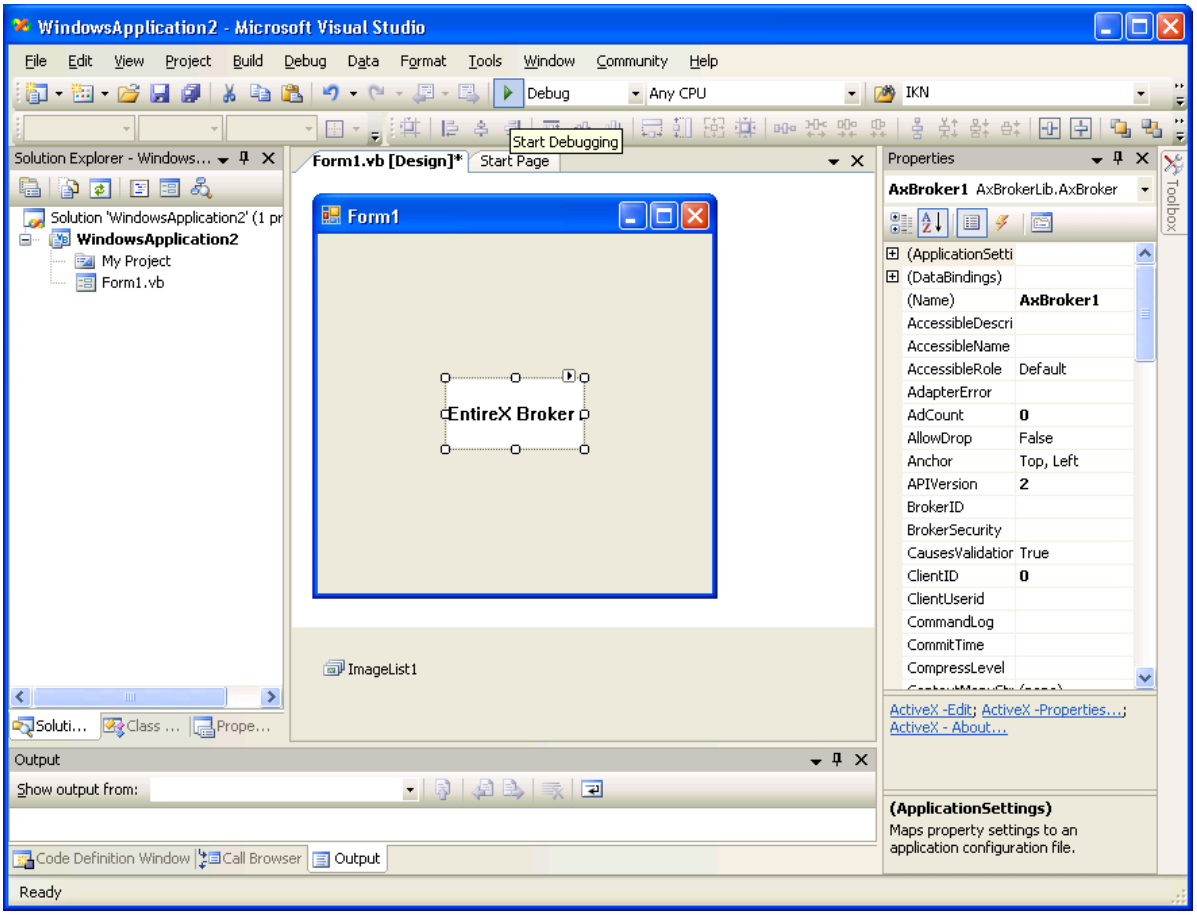
2 From the context menu, choose **Choose Item**.

3 In the **Choose Toolbox Items** dialog under **COM Components**, check "EntireX Broker ActiveX Control".


Choose Toolbox Items
.NET Framework Components
COM Components
Name
Path
Library
EntireX Broker ActiveX Control
C:\PROGRA~1\COMMON~1\SOFTW...
EntireX Broker ...
gotobar Class
C:\WINDOWS\system32\msdxm.ocx
HelpViewerWrapper Class
C:\WINDOWS\PCHealth\HelpCtr\Bin...
Help Center UI ...
HHCtrl Object
C:\WINDOWS\system32\hhctrl.ocx
HHCtrl Object
C:\WINDOWS\system32\hhctrl.ocx
HHCtrl Object
C:\WINDOWS\system32\hhctrl.ocx
HtmlDlgHelper Class
C:\WINDOWS\system32\mshtmled.dll
OptsHold 1.0 T...
InstallEngineCtl Object
C:\WINDOWS\system32\asctrls.ocx
Active Setup Co...
ListPad class
C:\WINDOWS\System32\cic.dll
cic 1.0 Type Lib...
LM Auto Effect Behaivor
C:\WINDOWS\system32\lmrt.dll
ActionBvr Class
Language: Language Neutral
Version: 1.0.0115
Browse...
OK
Cancel
Reset


WindowsApplication2 - Microsoft Visual Studio
File Edit View Project Build Debug Data Tools Window Community Help
Debug
Any CPU
Solution Explorer - Windows...
Solution 'WindowsApplication2' (1 pr
WindowsApplication2
My Project
Form1.vb
Form1.vb [Design]*
Start Page
Form1
ImageList1
Toolbox
All Windows Forms
Common Controls
Containers
Menus & Toolbars
Data
Components
Pointer
BackgroundWorker
DirectoryEntry
DirectorySearcher
ErrorProvider
EventLog
FileSystemWatcher
HelpProvider
ImageList
MessageQueue
PerformanceCounter
Process
SerialPort
ServiceController
Timer
EntireX Broker ActiveX Control
Printing
Dialogs
Crystal Reports
General
Output
Show output from:
Code Definition Window
Call Browser
Output
Ready

EntireX Broker ActiveX Control is now known to Visual Studio. It can be copied and pasted into the new form for later use.



Using Internationalization with Broker ActiveX Control

It is assumed that you have read the document *Internationalization with EntireX* and are familiar with the various internationalization approaches described there.

By default, Broker ActiveX Control uses the Windows ANSI codepage to convert the Unicode (UTF-16) representation within BSTRINGS to the multibyte or single-byte encoding sent to or received from the broker. This codepage is also transferred as part of the locale string to tell the broker the encoding of the data.

If you want to adapt the Windows codepage, see the Regional Settings in the Windows Control Panel and your Windows documentation.

With the property `LocaleString` (see **LocaleString** in *Reference - Broker ActiveX Control*) you can prevent a locale string from being sent if communicating with broker version 7.1.x and below (blank out the property for this purpose).

Restrictions

- Only the codepage configured for Windows in the Regional Settings can be used. It is not possible to use any codepage other than the codepage configured for Windows in the Regional Settings. Only LOCAL or blank is allowed as a value for the property. See *Using the Abstract Codepage Name LOCAL* under *Locale String Mapping* in the internationalization documentation for more information.
- No TOR file property is available. When you are using the TOR interface, you can set this property as usual in your own application.
- The Windows codepage used by Broker ActiveX Control must also be a codepage supported by the broker, depending on the internationalization approach. See *Locale String Mapping* in the internationalization documentation for information on how the broker derives the codepage from the locale string.

Using the Property Pages

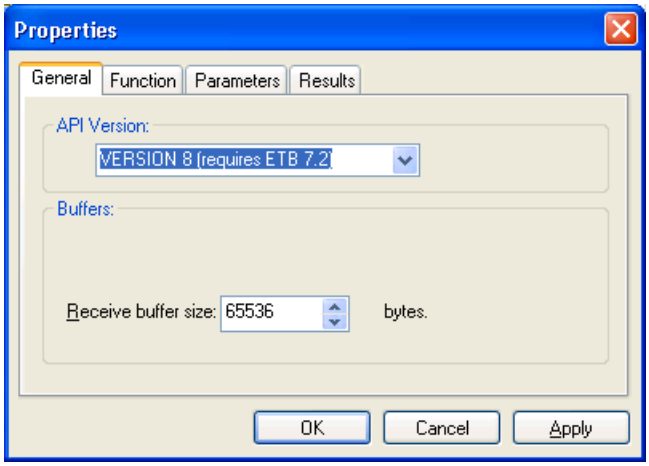
If you do not use Transaction Object Repository (TOR) files, you can also supply the properties using the property sheet of Broker ActiveX Control. (If you use Broker ActiveX Control as an automation server, the property pages are not available.)

The property sheet contains the following:

- General Page
- Function Page
- Parameters Page
- Results Page

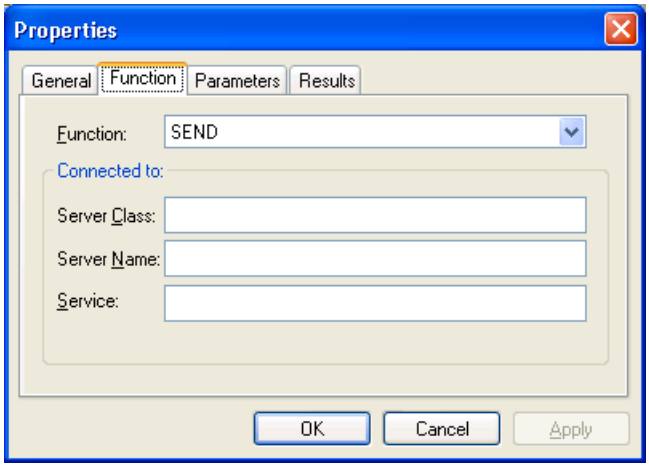
General Page

With this page you can specify the API version and the size of the receive buffer.



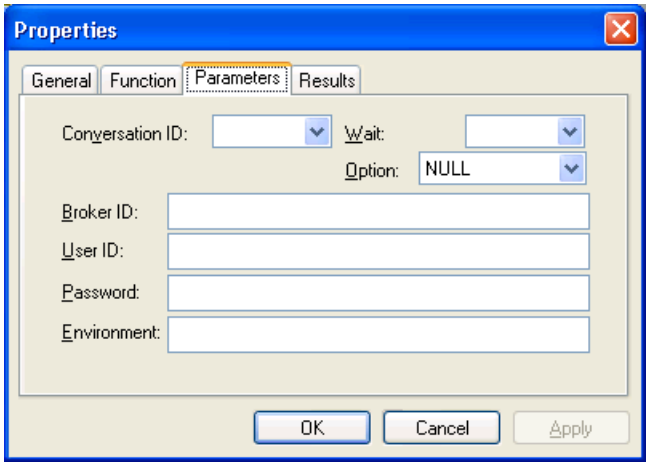
Function Page

With this page you can specify the function to be called and Service, Server Class and Server Name.



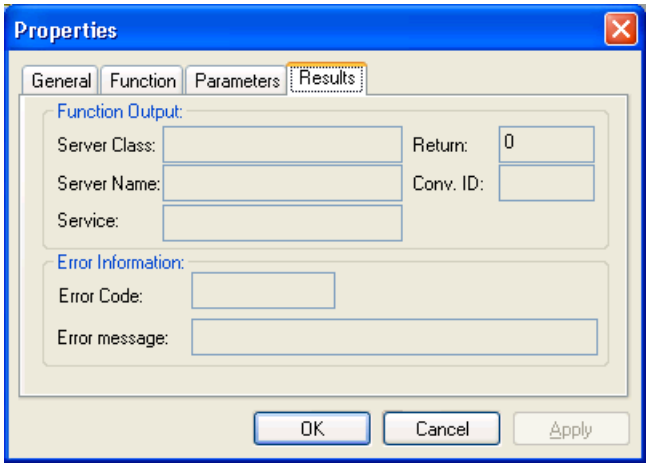
Parameters Page

With this page you can specify the Conversation ID, Broker ID, User ID, Password, Environment, Wait time, and Option.



Results Page

This page displays the results of the Broker function.



3 Broker ActiveX Control with Visual Basic

Visual Basic is used here as an example of a development environment in which applications using Broker ActiveX Control can work. Broker ActiveX Control can be used by any programming language or programming environment that can act as a container for ActiveX controls.

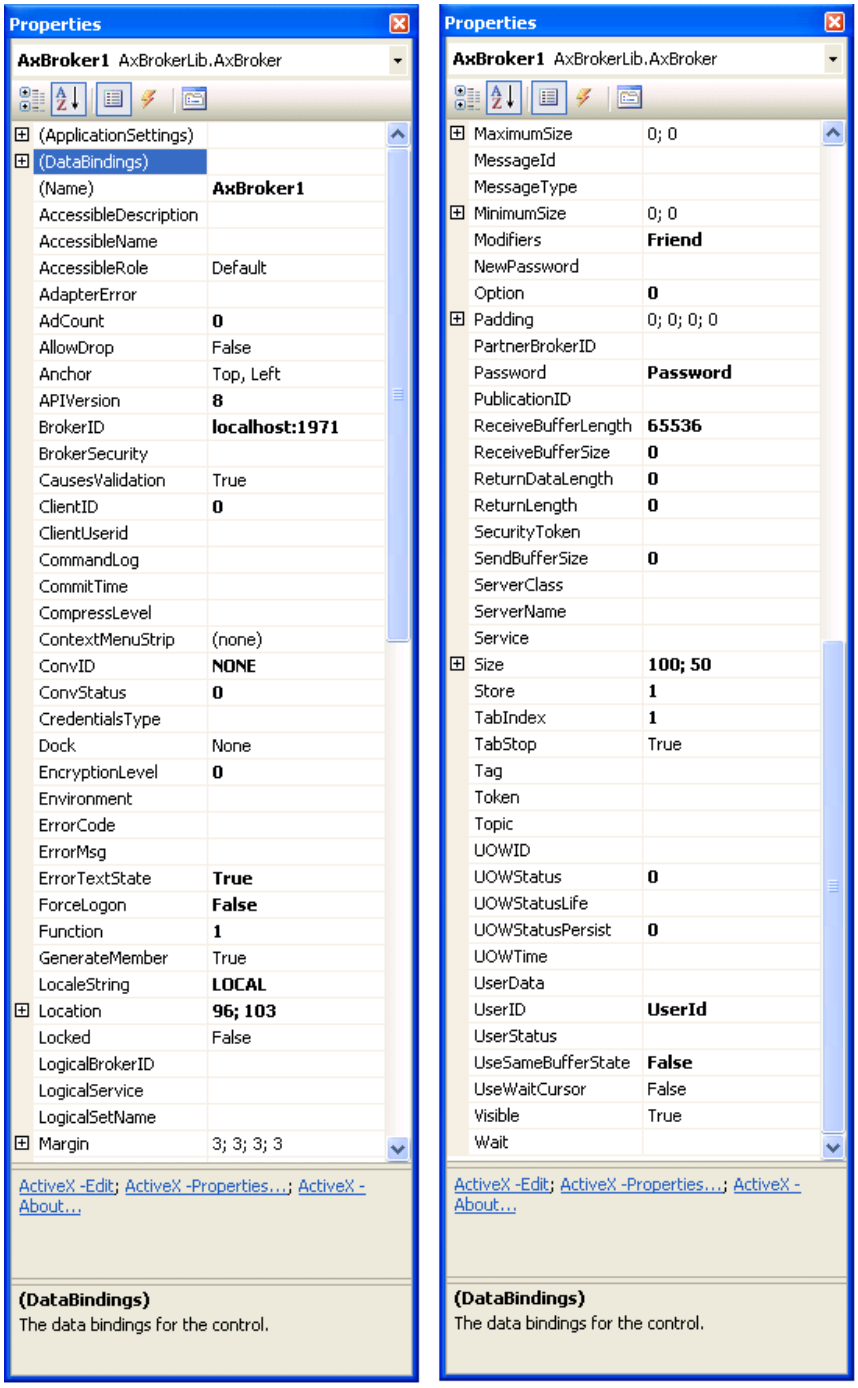
Note: If you edit a Visual Basic application that uses Broker ActiveX Control and save these changes with the new version of Broker ActiveX Control, you will not be able to use this application with Broker ActiveX Control version 1.2.1.

Step 1: Instantiate EntireX Broker ActiveX Control

To use Broker ActiveX Control as a control

1 From the **Project, Components, Controls** menu choose **EntireX Broker ActiveX Control**.

2 Drop it into your dialog.



In this example, Name is set to "BOX" in the **Properties** dialog:

Using Broker ActiveX Control as an Automation Server:

If you want to

- see the interface description of Broker ActiveX Control in the object browser or
- use the early bind feature,

from the **Project > References** menu choose **Browse** and then select Broker ActiveX Control in *<drive>:\SoftwareAG\EntireX\bin\ebx.dll*.

To use Broker ActiveX Control as an automation server, you can define the following in your code:

```
Dim BOX as Object
```

or

```
Dim BOX as Broker
Set BOX=CreateObject("EntireX.Broker.ACI")
```

If you use Broker ActiveX Control as an automation server, you will not be able to:

- call the methods `DefineTOMethods` and `AboutBox`
- use the property pages.

Step 2: Instantiate the Transaction Object

If a Transaction Object Repository (TOR) file is used, it is not necessary to set the other properties. If you want to use a transaction object, instantiate the transaction object with the command:

```
Dim TransObject As Object
Set TransObject = BOX.CreateTransObject("c:\\path\\to\\trans\\object\\object.tor")
```

BOX is the name set previously.

See the **list of methods** available for supporting transaction objects.

Step 3: Call Methods

Once a transaction object has been instantiated, the methods defined in that transaction object can be called. If the transaction object method being called has one or more return values, transaction object methods *always* return these values wrapped in a return object.

```
Dim ReturnObject As Object
Set ReturnObject = TransObject.MyMethod("Param1", 50, "Param3")
```

A return object is always used, as TO methods usually return multiple scalar data items, or arrays, structures or records. These in fact define the possible return values in a return object. They will be either scalars:

- 2-byte INT

- 4-byte INT
- etc., basically all scalar types handled through the automation VARIANT structure

or objects:

- structure objects
- collection objects
- arrays
- records

Alias custom types are mapped internally to the data type they alias, either scalars or objects.

Step 4: Access the Returned Data

You then access the returned data by interpreting the return object. The code required depends on whether you are accessing scalars, structures, or arrays and records.

Note: Care must be taken to avoid recursive complex type definitions. For example, a structure should not be defined that contains an instance of itself, or less directly, an array of structures should not be defined that contains an instance of the same array type. These and other permutations of recursive definitions cannot be resolved, and thus cannot be used.

Scalars

Scalars can be accessed through the return object with code like this:

```
Dim Str As String
Dim Int As Integer
Str = ReturnObject.MyString
Int = ReturnObject.MyInt
```

Structures

Structures can be accessed from the return object like this:

```
Dim Struct As Object
Dim Str As String
Set Struct = ReturnObject.MyStruct
Str = Struct.MyString
```

Arrays and Records Exposed as Collections

Arrays and records are exposed by Broker ActiveX Control as automation collections when the method `CreateTransObject` is used. As collections, they support the `Count` property, as well as the `Item` property that acts as the default value when subscripting is performed without the `Item` name. Thus, an array in the return object can be accessed like this:

```
Dim Array_Value As Object
Dim I As Integer
Dim MyInt As Integer
Set Array_Value = ReturnObject.MyArray
For I = 0 To Array_Value.Count - 1
  MyInt = Array_Value(I)
Next I
```

The elements of a record can be accessed with the following method:

```
Dim Array_Value,Struct As Object
Dim I As Integer
Set Array_Value = ReturnObject.MyArray
For I = 0 To Array_Value.Count - 1
  Set Struct = Array_Value(I)
  Str = Struct.Str
Next
```

or also:

```
Dim Array_Value,Struct As Object
Dim I As Integer
Set Array_Value = ReturnObject.MyArray
For Each Struct in Array_Value
  Str = Struct.str
Next
```

Arrays and Records Exposed as Safe Arrays

Arrays and Records are exposed as safe arrays when the method `CreateTransObjectSA(`*`torfilename`*`)` is used. Instead of the `Count` property, the `LBound` and `UBound` functions are supported.

An array in the return object can be accessed like this:

```
Dim Array_Value as Variant
Dim I as Integer
Dim Str as String

Array_Value = ReturnObject.MyArray
For I = LBound(Array_Value) To UBound(Array_Value)
  Str = Array_Value[I]
Next
```

The elements on a record can be accessed with the following method:

```
Dim Array_Value as Variant
Dim Struct as Variant
Dim I as Integer
Dim Str as String

Array_Value = ReturnObject.MyArray
For I = LBound(Array_Value) To UBound(Array_Value)
  Set Struct = Array_Value[I]
  Str = Struct.Str
Next
```

Another possible `For` statement:

```
For Each Struct in Array_Value
  Str = Struct.Str
Next
```

There are no limitations to the number of complex types or their relationship to each object in a transaction object. Arrays can exist within structures, and conversely, structures and arrays can exist within records, etc. Thus, multidimensional arrays can easily be simulated if the given Broker service that the method maps to provides data in such a format.

Step 5: Cleanup Resources

When objects in your automation code are no longer used, be sure to call:

```
Set ObjectName = Nothing
```

This decrements the reference count of the object, thus allowing cleanup of object resources. While the above information pertains specifically to Visual Basic, the concepts are also relevant to other automation controllers, such as Delphi and FoxPro.

Step 6: Error Handling in Transaction Object Methods

TO methods do not return an error flag; they raise a standard ActiveX exception instead. In Visual Basic, this exception can be caught with an 'On error' clause. The most likely reason for the failure of a TO method is that the Broker call that was issued returned an error. In Visual Basic, use the standard Err object to retrieve the error number and message (Err.Number and Err.Description).

If the error is a Broker error, Err.Description shows a generic error message "Automation Error". For a detailed error description use the `ErrorCode` and `ErrorMsg` properties.

Examples: Writing an ACI Client and Server with Broker ActiveX Control

Writing an ACI Client with Broker ActiveX Control

```
On Error Resume Next
Dim ebx As Object
Dim senddata As String
Dim loopcount As Integer

 loopcount = 0
' simple data to send
senddata = "Hello"

 Set ebx = CreateObject("EntireX.Broker.ACI")
ebx.BrokerID = "localhost"
ebx.ServerClass = "ACLASS"
ebx.ServerName = "ASERVER"
```

```
ebx.Service = "ASERVICE"
ebx.UserId = "EBX-USER"

ebx.function = 9 ' Logon
ebx.InvokeBrokerFunction
If ebx.ErrorCode <> 0 Then
MsgBox ebx.ErrorMessage
Exit Sub
End If

Do
ebx.function = 1 ' Send
ebx.ConvID = "NONE"
' SetSendData data, length of data
ebx.SetSendData senddata, Len(senddata)
ebx.wait = "10s" ' wait 10 seconds for a response from server
ebx.InvokeBrokerFunction
If ebx.ErrorCode <> 0 Then
MsgBox ebx.ErrorMsg
Else
MsgBox "Received " + Str(ebx.ReturnDataLength) + " bytes (" + ebx.GetReceiveData + ")"
End If
loopcount = loopcount + 1
If loopcount = 2 Then
senddata = " shutdown"
End If

Loop Until loopcount > 2

ebx.function = 10 ' Logoff
ebx.InvokeBrokerFunction
If ebx.ErrorCode <> 0 Then
MsgBox ebx.ErrorMessage
End If
```

Writing an ACI Server with Broker ActiveX Control

```
On Error Resume Next

Dim ebx As Object
Dim senddata As String
Dim receivedata As String

' simple data to send
senddata = "Hello"

Set ebx = CreateObject("EntireX.Broker.ACI")
ebx.BrokerID = "localhost"
ebx.ServerClass = "ACLASS"
ebx.ServerName = "ASERVER"
ebx.Service = "ASERVICE"
```

```
ebx.UserId = "EBX-USER"

ebx.function = 9 ' Logon
ebx.InvokeBrokerFunction
If ebx.ErrorCode <> 0 Then
MsgBox ebx.ErrorMessage
Exit Sub
End If

ebx.function = 6 ' Register
ebx.InvokeBrokerFunction
If ebx.ErrorCode <> 0 Then
MsgBox ebx.ErrorMessage
End If

Do
ebx.function = 2 ' Receive
ebx.wait = "yes" ' wait until data is received
ebx.ConvID = "NEW"
ebx.SetReceiveBufferLength = 1024 ' we are now able to receive messages up to 1024 ↩
bytes
ebx.InvokeBrokerFunction
If ebx.ErrorCode <> 0 Then
MsgBox ebx.ErrorMsg
Else

' save received data
receivedata = ebx.GetReceiveData
' send response
ebx.function = 1 ' Send
' SetSendData data, length of data
ebx.SetSendData senddata, Len(senddata)
ebx.wait = "no" ' don't wait for a response
ebx.InvokeBrokerFunction
If ebx.ErrorCode <> 0 Then
MsgBox ebx.ErrorMsg
Else
MsgBox "Received data: " + receivedata
End If
End If
' loop until the received data has the string "shutdown" from the position 20
receivedata = Mid(receivedata, 20, 8)
Loop Until receivedata = "shutdown"

ebx.function = 7 ' DeRegister
ebx.InvokeBrokerFunction
If ebx.ErrorCode <> 0 Then
MsgBox ebx.ErrorMessage
End If

ebx.function = 10 ' Logoff
ebx.InvokeBrokerFunction
```

```
If ebx.ErrorCode <> 0 Then
MsgBox ebx.ErrorMessage
End If
```

4 Using Broker ActiveX Control with Active Server Pages

Microsoft's Active Server Page (ASP) is an HTML page that includes one or more scripts and reusable ActiveX server components to create dynamic Web pages. The scripts and ActiveX components are processed on a Microsoft Web server before the page is sent to the user.

Prerequisites

Installation prerequisites for all EntireX components are described centrally. See *Prerequisites* in the EntireX Release Notes.

To use Broker ActiveX Control with ASP, you must have a running Web server.

Designing a Web Page with ASP and Broker ActiveX Control

Creating an Instance of the ActiveX Control and the Transaction Object

```
<%
Set EBX    = server.Createobject("EntireX.Broker.ACI")

Set torobj = EBX.CreateTransObject("calc.tor")
```

or

```
Set torobj = EBX.CreateTransObjectSA("calc.tor") (if returnvalue contains array)
%>
```

Calling a TOR Method

```
Set retobj = torobj.calc(op,op1,op2)
```

Accessing the Data

Scalars

```
     <% string = retobj.result %>
```

Structures

```
     <% string = retobj.result.str %>
```

Arrays

You can have access to array elements:

```
<%string = retobj.retarr(0) %>
```

or

```
<%
return = retobj.retarr
string = return(0)
%>
```

or

```
<%
For Each element in retobj.retarr
  string = element
Next
%>
```

Records

You can have access to record elements:

```
<%string = retobj.retrec(0).str %>
```

or

```
<%
Set return = retobj.retrec(3)
Response.Write return.str
%>
```

or

```
<%
For Each struct in retobj.retrec
  string = struct.str
Next
%>
```

or

```
<%
Array_Value = retobj.retrec
For I = LBound(Array_Value) To UBound(Array_Value)
  string = Array_Value(I).str
Next
%>
```

Using Broker ActiveX Control in Multiple Pages

Objects created by `Server.CreateObject` or `CreateTransObject` have page scope. They will be destroyed automatically when the current ASP page is finished.

To create an object with session or application scope, you can either use the `<OBJECT>` tag and set the `SCOPE` parameter to SESSION or APPLICATION, or store the object in a session or application variable.

For example, an object stored in a session variable, as shown in the following script, is destroyed when the Session object is destroyed. That is, when the session times out, or the `Abandon` method is called.

```
<% Set Session("torobj") = EBX.CreateTransObject("calc.tor")%>
```

You can destroy the object by setting the variable to "Nothing" or setting the variable to a new value.

```
<% Session("torobj") = Nothing %>
```

5 Using Broker ActiveX Control with .NET

Using Broker ActiveX Control with Visual Studio .NET

To use Broker ActiveX Control with Visual Studio .NET

1 Add Broker ActiveX Control to the Project references.

2 Add a Broker Control variable `BrokerLib.BrokerClass()`.

While you are using Broker ActiveX Control, the properties and methods of the object are listed in the member list.

Using Custom Data Types

Important: To use **custom data types** you have to access the items through a temporary object.

A Small Visual Basic .NET Example

```
' create new ActiveX Control
Dim broker As New BrokerLib.BrokerClass()

Dim TransactionObject As Object
Dim SomeObject As Object
Dim CTObject As Object

' load tor object
TransactionObject = broker.CreateTransObject("Broker.tor")

' call a method from the tor object
SomeObject = TransactionObject.GetData("Person1")

'
reference a temporary object to the Customer Data type


CTObject = SomeObject.CustData

' access to the items of the Customer Data
Console.WriteLine("Name  :" & CTObject.Name)
Console.WriteLine("Address :" & CTObject.Address)
```

6 Transaction Objects in Broker ActiveX Control

Transaction Object (TOs) in Broker ActiveX Control are selections of logical methods that are stored in a transaction object repository (TOR). These logical methods contain all the connection and interface details necessary to communicate with EntireX Broker.

Advantages of Transaction Objects

The advantages of using transaction objects are:

- Services are defined once, in one place, and distributed as needed. They can then be used by anyone from many different applications to access back-end applications.
- Transaction objects can encapsulate all connection and conversational information from the developer, which simplifies the implementation and administration of distributed applications.
- The SEND-BUFFER of a message is broken down into parameters, and the RECEIVE-BUFFER is mapped to the return object. This means you do not have to worry about offsets, data types, repeating fields (arrays), or structures.

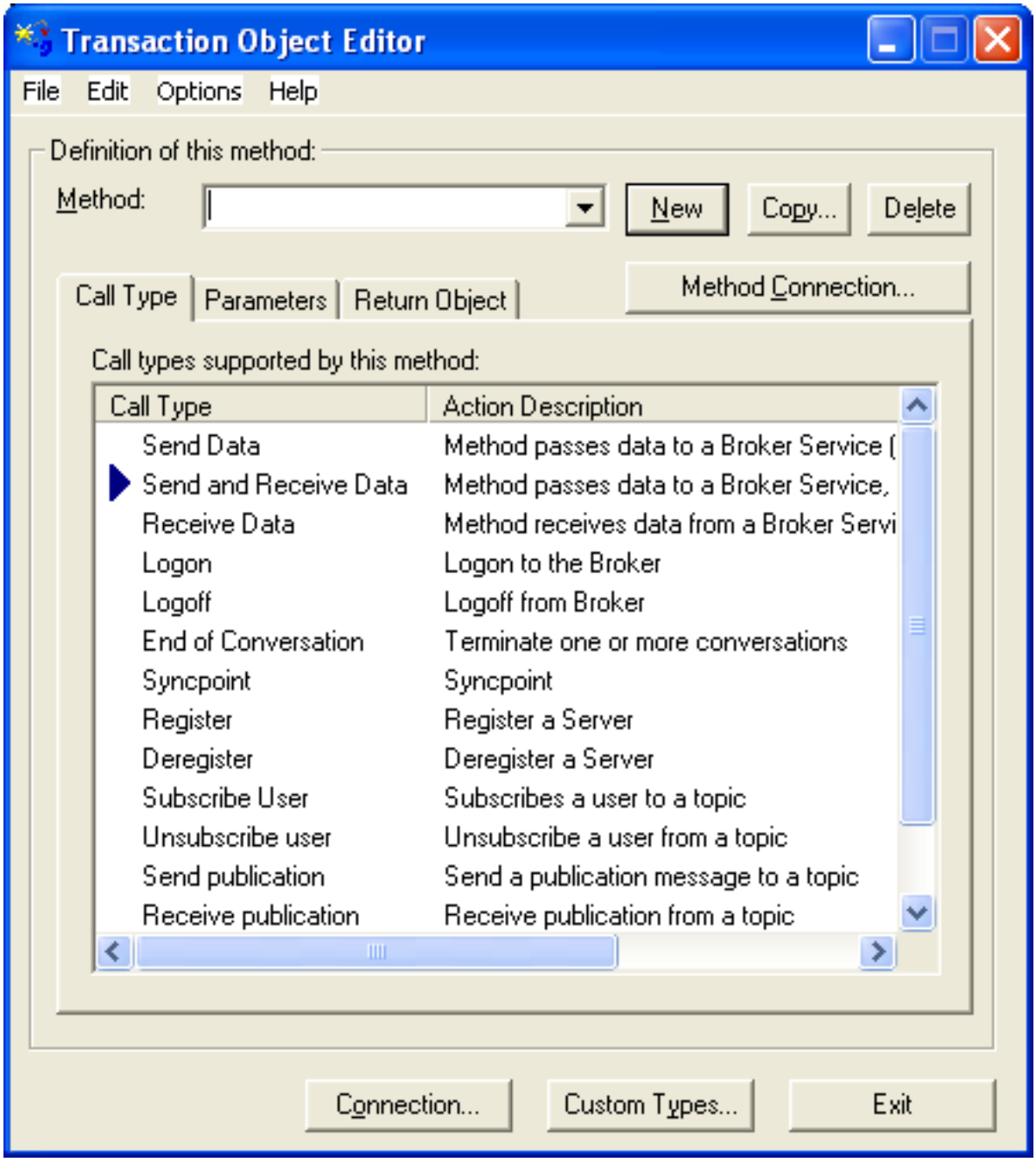
Calling the Transaction Object Editor

The Transaction Object Editor is a tool within Broker ActiveX Control with which you can define and maintain transaction objects. It is invoked by calling the method `DefineTOMethods` from a form that includes an ActiveX control.

The Transaction Object Editor can be called directly using the `TORedit` executable. The extension ".tor" is registered as a file type, so you can call the Transaction Object Editor with a double click from the Windows Explorer.

When the Transaction Object Editor is started, a license check is performed. If there is no license file or if the license has expired, the editor will be closed.

Note: Before you start the TOR Editor for the first time, you need to register the required DLL *ebx.dll* to your Windows system manually. Simply open a DOS prompt in folder *<drive>:\SoftwareAG\EntireX\bin* and run the command `regsvr32 ebx.dll`. If you later want to use a TOR Editor from a different installation directory, register the corresponding *ebx.dll* as above.



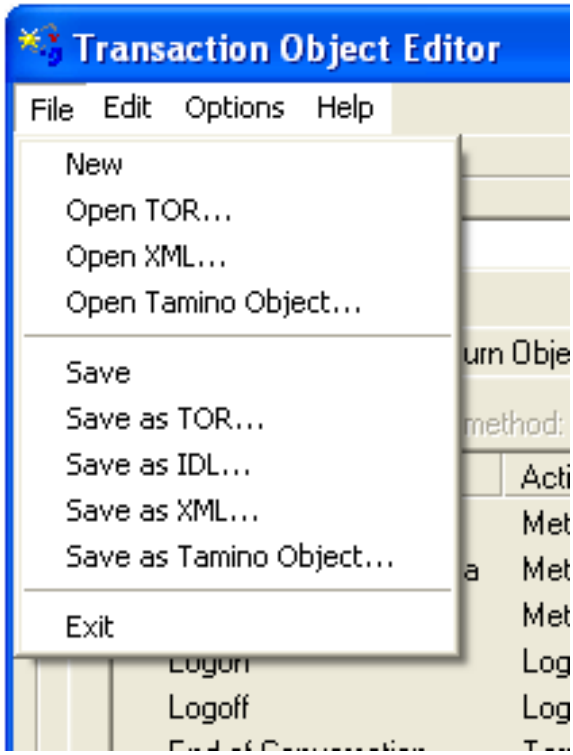
When a transaction object is loaded, the corresponding file name will be displayed in the title bar. If loading or saving fails, an error message will be displayed in the title bar.

Managing TOR Files

The following functions are available for managing TOR files.

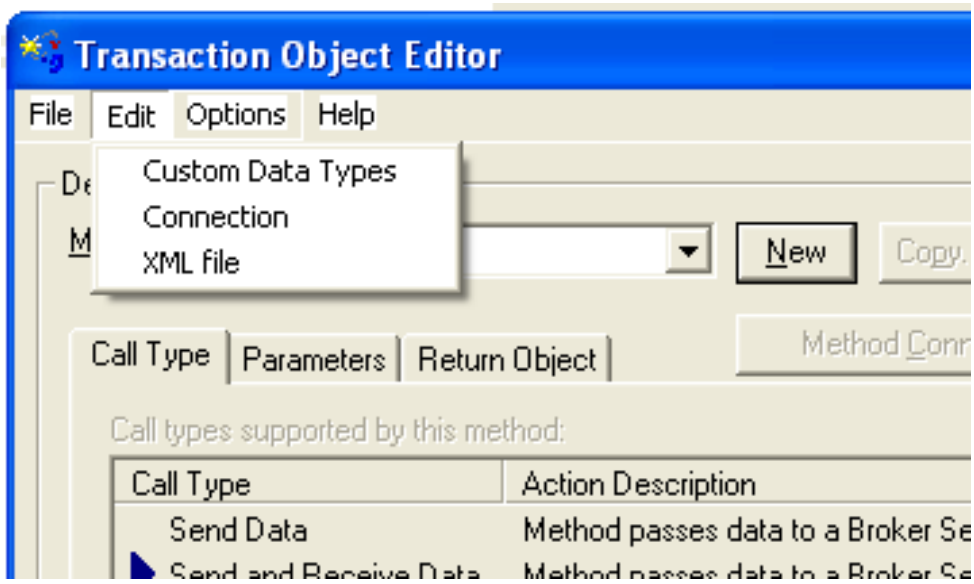
- Help Menu

File Menu



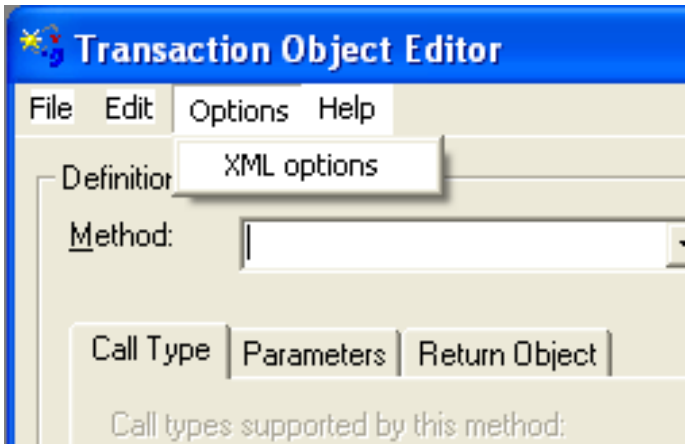
Menu Item	Description
New	Resets the TOR Editor.
Open TOR	Loads an existing TOR file. A standard **Open File** dialog will be displayed. This function is needed to modify an existing TOR file.
Open XML	Loads an existing XML file. A standard **Open File** dialog will be displayed. This function is needed to modify an existing XML file (see **Loading an XML File**).
Open Tamino Object	Loads an existing Tamino Object. The **Open Tamino Object** dialog will be displayed. This function is needed to modify an existing Tamino object (see **Loading Tamino Objects**).
Save	Saves a TOR file.
Save as TOR	Saves a new or modified TOR file. A standard **Save File** dialog will be displayed.
Save as IDL	Saves a file in IDL format. If you have made any changes to the TOR file, you must first save it in TOR file format.
Save as XML	Saves a file in XML format. A standard **Save File** dialog will be displayed.
Save as Tamino Object	This function saves a file in Tamino. The **Save Tamino Object** dialog will be displayed.
EXIT	Closes the TOR Editor.

Edit Menu



Menu Item	Description
Custom Types	Calls the **Custom Data Types** dialog.
Connection	Calls the **Connection** dialog.
XML File	Calls a standard **Open File** dialog. When a file is selected, a text editor will be opened.

Options Menu



Menu Item	Description
XML options	Calls an **XML Options** dialog.

Help Menu

Menu Item	Description
Contents	Displays the Broker ActiveX Control online help.
About	Displays the About box.

Defining Methods

The following buttons are available in the transaction method definition model:

- The **New** button causes the method name within the dialog box to be added to the store.
- The **Copy** button copies the currently selected method to a new method.
- The **Delete** button removes the selected method from the store.

Methods are logically grouped in a transaction object. Each method specified in the transaction object relates directly to a specific Broker service. To define a new method, therefore, you need to know which services are available. Each method requires the following information:

- Connection
- Call Type
- Parameters

- Return Object

Connection

Connection information is specified using the **Broker Connection Information** dialog. Each TOR file has default connection information, and each method has its individual connection information. If a parameter is not defined in the connection information of a method, the default is taken. For a description of the parameters, see **Defining Connection Information**.

Call Type

The **Call Type** tab represents the call types that can be used for this method.

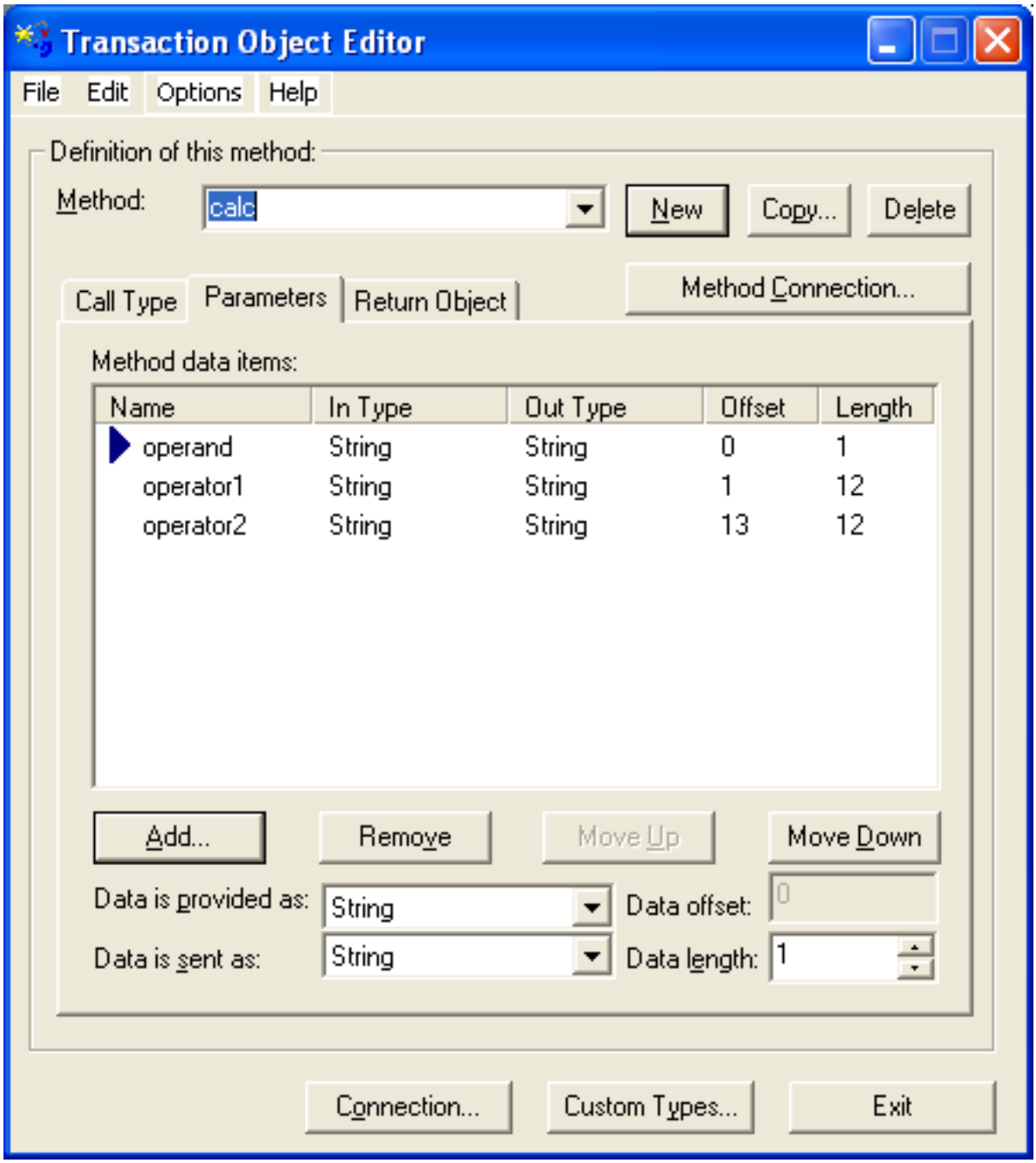
Call Type	Description
Send Data	Used to define a method that accepts parameters but does not return data from the service. This could be used to notify a back-end application of some event without waiting for a response.
Send and Receive Data	Used to define a method that accepts parameters and returns data from that service.
Receive Data	Can be used to get information from a back-end application that requires no input, for example MOTD (message of the day) information. It is also used to wait for incoming requests if you are using Broker ActiveX Control to write Broker Server applications.
Logon	Logon to EntireX Broker.
Logoff	Logoff from EntireX Broker.
End of Conversation	Used to end a conversation.
Syncpoint	Used to commit, backout, or cancel a unit of work, obtain the status of a unit of work, or delete the persistent status of a unit of work.
Register	Informs EntireX Broker that a service is available.
Deregister	Removes previously registered services from EntireX Broker's active list.
Subscribe User	Used to subscribe a user to a topic.
Unsubscribe User	Used to unsubscribe a user from a topic.
Send Publication	Used to send a publication message to a topic.
Receive Publication	Used to receive a publication message from a topic to which the user was previously subscribed.
Control Publication	Used to commit or backout a publication message.

The **Call Type** tab is shown in the **screen above**.

Parameters

The **Parameter** tab exposes a multiline box containing individual parameter variables.

These parameters are placed into the SEND-BUFFER of the EntireX Broker call. Each parameter has a data type (Integer, Real, String etc.) and a length.



Defining a Parameter List

If data is sent, it is necessary to define a parameter list for this method. The `TO` method parameter list serves as a "map" between the types passed as parameters, and the data types and locations within the method's send buffer. Items within the `TO` method parameter list are ordered sequentially as they will be passed when the method is invoked.

List Control

A list control is used for defining, removing and ordering parameters of the current method. The list control supports in-place editing of items names, and works together with the item configuration controls positioned below. When a particular item is selected, it can be moved up and down the list sequentially. The order of the list defines the order in which parameters are passed when the method is invoked. Note that offsets are automatically generated for each list item, relative to the start of the list, and the items (and their sizes) that precede it.

The `Add` function adds the field after the selected position.

Data Conversion

Data conversion is also supported between a type provided by the client and the type expected by the Broker service. For parameters, the user can specify the data type that will be provided, and the type that will be sent to the Broker service. For return objects, the data received by the Broker service can be set to the data type retrieved by the user. The important data types are those sent to and received from a Broker service. Broker ActiveX Control automatically converts between the data type received from the Broker and a data type specified by the user (see the **Data is received as** and **Data is retrieved as** fields in the screen below).

Implemented Data Types

The scalar data types supported by the Broker ActiveX are a subset of the standard Automation VARIANT types and are listed below. In cases where the selected data type is of fixed length, the data length edit control is set to the appropriate length and grayed.

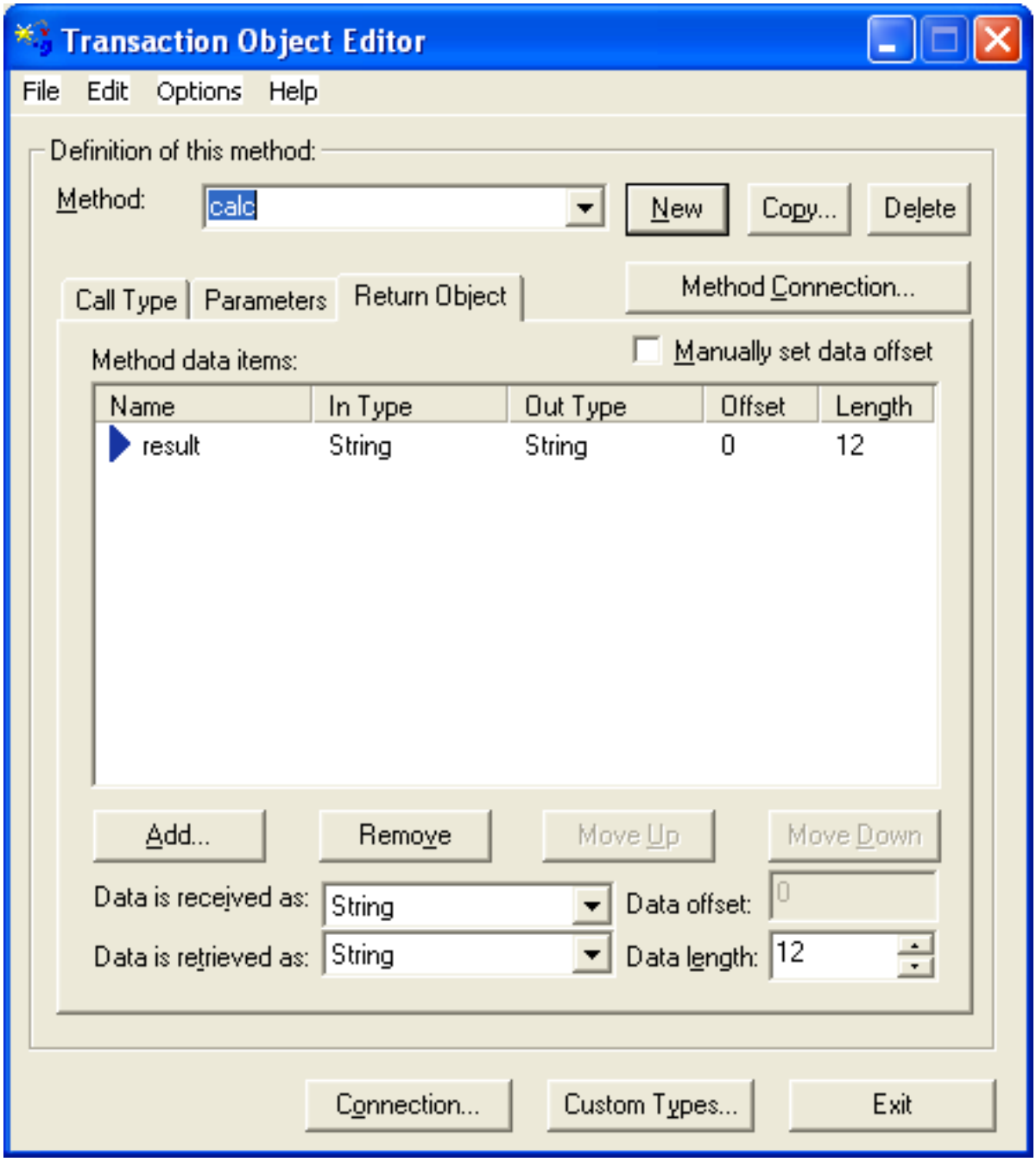
Transaction Object Method Data Types	Description
1-byte Integer	1-byte Integer used for signed and unsigned.
2-byte Integer	2-byte Integer used for signed and unsigned.
4-byte Integer	4-byte Integer used for signed and unsigned.
4-byte Real	4-byte Real compatible with "C" float.
8-byte Real	8-byte Real compatible with "C" double.
Bool	Boolean variable.
String	String of specified length.
Blob	Generic byte block.

Transaction Object Method Data Types	Description
Padding	Used to separate types in the buffer.

Return Object

If the transaction object method is invoked with call type 'Send and Receive' or 'Receive', a Return Object is created. This is a logical object that enables you to retrieve multiple scalar values or records by referencing its properties.

The **Return Object** tab exposes the individual properties that are mapped onto the RECEIVE-BUFFER of the Broker call. When the data is returned from the Broker service, Broker ActiveX Control uses the types and lengths of the defined properties to populate the values of the properties. You can now access the contents of the receive buffer as ActiveX properties of the method that is created by loading the transaction object.



As with the parameters, Broker ActiveX Control calculates the offset in the RECEIVE-BUFFER for each property. For information on list control, data conversion and implemented data types, see *Defining a Parameter List*.

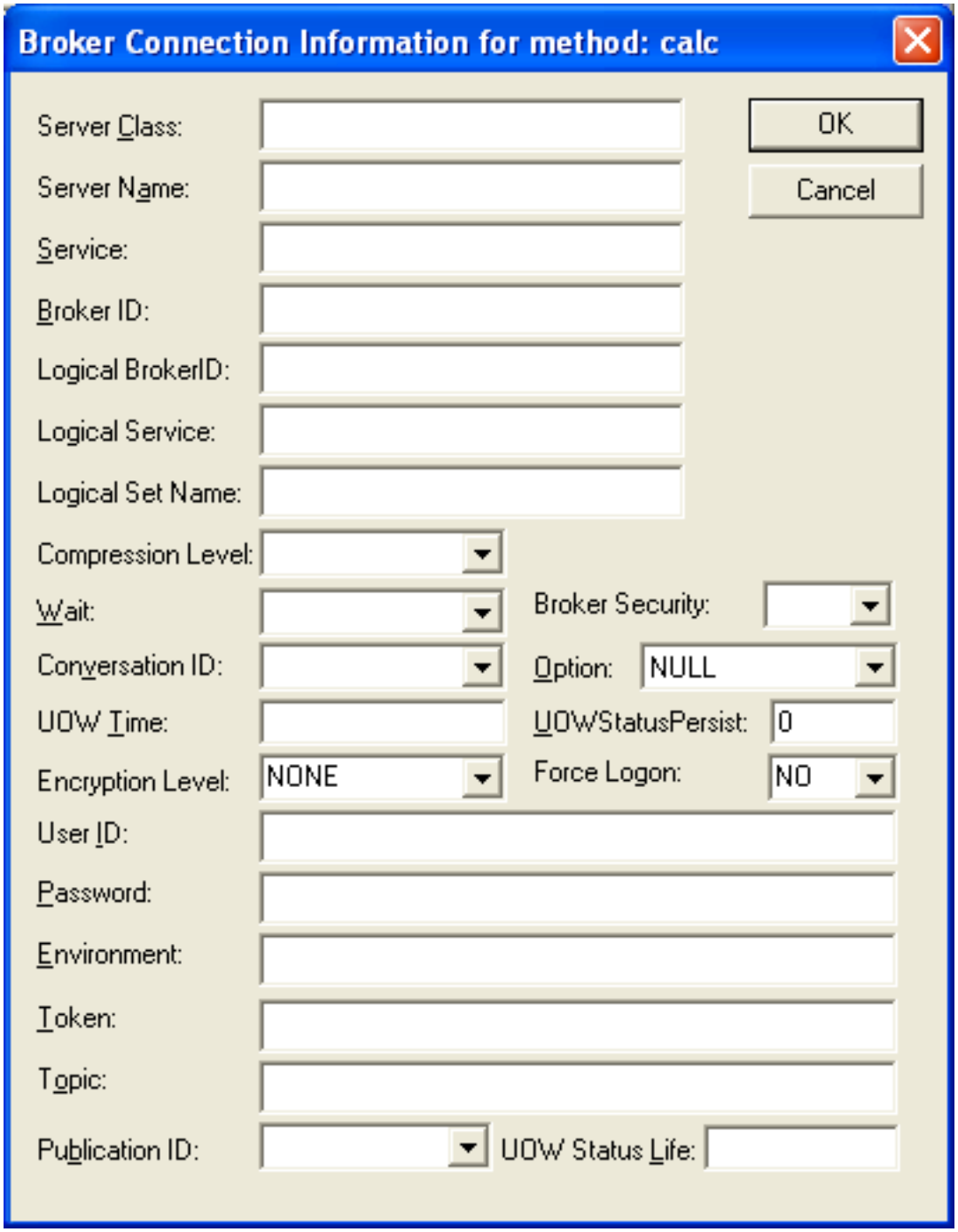
Custom Data Types are used for non-scalar data types such as arrays and structures. They are also used to assign aliases to parameters for consistent naming purposes.

The **Manually set data offset** check box allows the transaction object designer to override automatic offset calculation and specify offsets manually. This feature is powerful, but also potentially dangerous, because no base type checking can be performed.

Specifying Connection Information

Connection information relates directly to the Broker service that you want to communicate with when using this method.

Transaction methods are defined using the Transaction Object Editor. Connection information is specified using the **Broker Connection Information** dialog. Each TOR file has default connection information, and each method has its individual connection information. If a parameter is not specified in the connection information of a method, the default is taken. The Broker parameters are part of this connection information (with the exception of `Function`, which depends on the Call Type).



The **Broker Connection Information** dialog box accepts all the parameters required for establishing the necessary Broker connection to execute the defined method/call type.

Connection Information Parameters

Parameter	Description
BrokerID	The unique name of the Broker node that the services are attached to. Information in this dialog can be changed without affecting the application code. For example, if the `BrokerID` changed, you would change the connection information in the methods (services) affected and distribute the new transaction object file. The next time the application code loads the transaction object file and calls a method, the new connection information will be used.
CompressLevel	Compression level. Valid values: N|Y|0-9. See also *Data Compression in EntireX Broker* in the general administration documentation.
ServerClass, ServerName, Service	These three parameters represent the unique "signature" of this method call.
Wait	The following values are set for this parameter, depending on the operation: Operation — Wait Value (in seconds) Send — 0 Send and Receive — 30 (*) Receive — 59 (*) (*) if no value is specified in the **Connection** info.

See ***Properties of Broker ActiveX Control*** for a description of the other parameters.

Setting the Broker Call Parameters

Calling a method of a transaction object results in a Broker call. The parameters for the Broker call are taken either

- from the **Broker Connection Information** dialog, see above, or
- from the properties (see ***Properties of Broker ActiveX Control***).

If a value is specified in the **Connection Information** dialog, this value is taken and overrides any value specified in the properties.

If no value is specified in the **Connection Information** dialog, the current setting of the properties is taken. Leaving these parameters blank in the **Connection Information** dialog enables you to change these parameters dynamically, and also enables Broker communication in conversational mode. See example below:

Visual Basic Example

This example shows a possible usage of dynamic parameter assignment:

```
Set TransObject=BOCX.CreateTransObject ("...calc.tor")
BOCX.UserID = "USER1"
BOCX.BrokerID = "ETB121"
Set ReturnOb = TransObject.calc("+", "000000000001", "000000000002")
```

Defining Custom Data Types

The **Custom Data Types** dialog allows you to define new data types that will appear in the **Return Object** tag. With the **Apply** button you can embed a custom type within another custom type as long as this does not result in a recursive inclusion.

The following four classes of custom data types are supported:

- Custom Data Type 'Alias'
- Custom Data Type 'Array '
- Custom Data Type 'Record'
- Custom Data Type 'Structure'

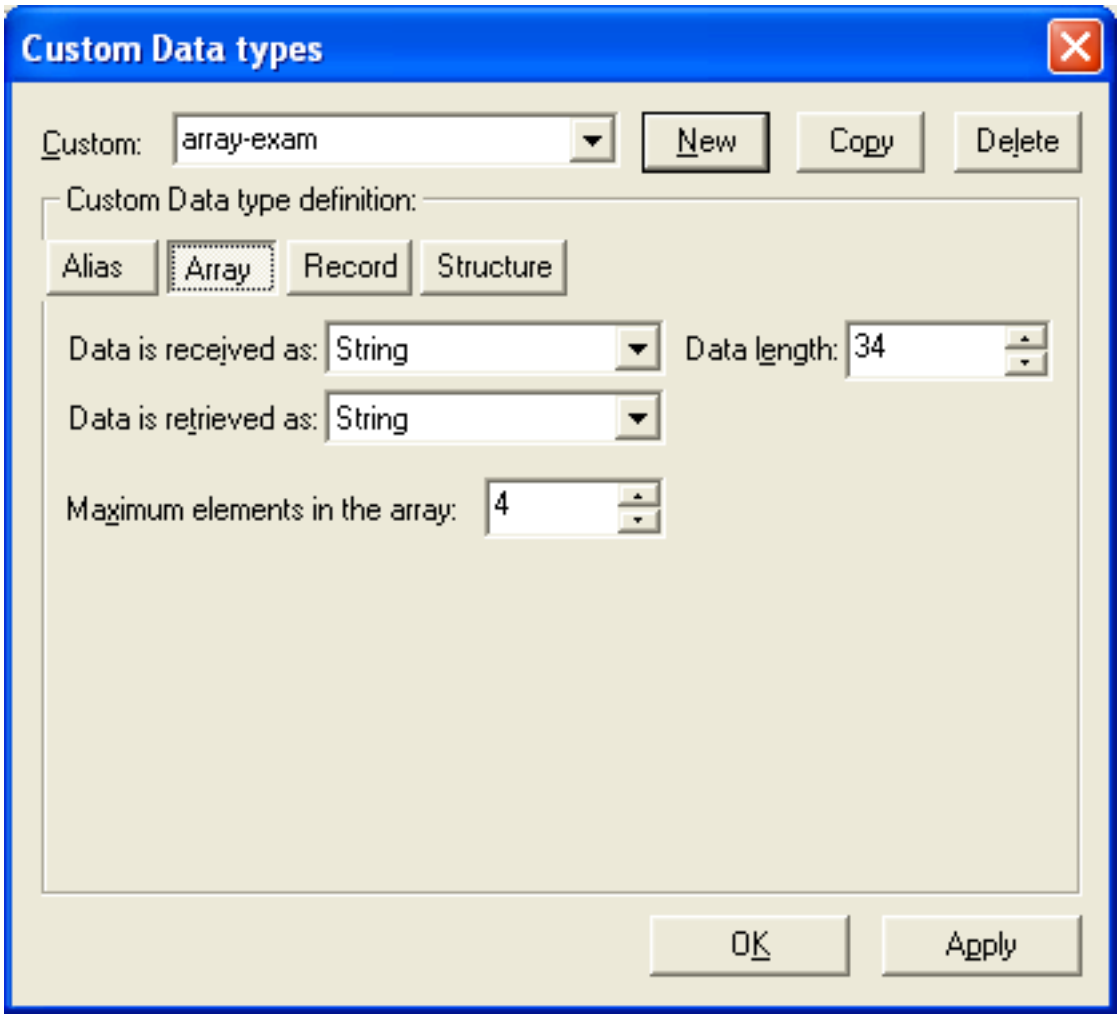
Any custom data type can be used in transaction objects return objects. Custom data types are not supported as method parameters.

Note: All custom data types can be used recursively. That is, any custom data type can be used as a member or base type for any other custom type. This allows for nested structures, as well as arrays within structures and records.

Custom Data Type 'Alias'

An *alias* is a custom data type that allows an administrator to specify an alias for any defined data type - custom or not. Aliasing also allows the definition of data types with specific in and out data types (type translation).

Custom Data Type 'Array '



An *array* consists of multiple serial elements of the same data types. Arrays can be made up of either scalar or custom data types. The number of elements in an array must be specified.

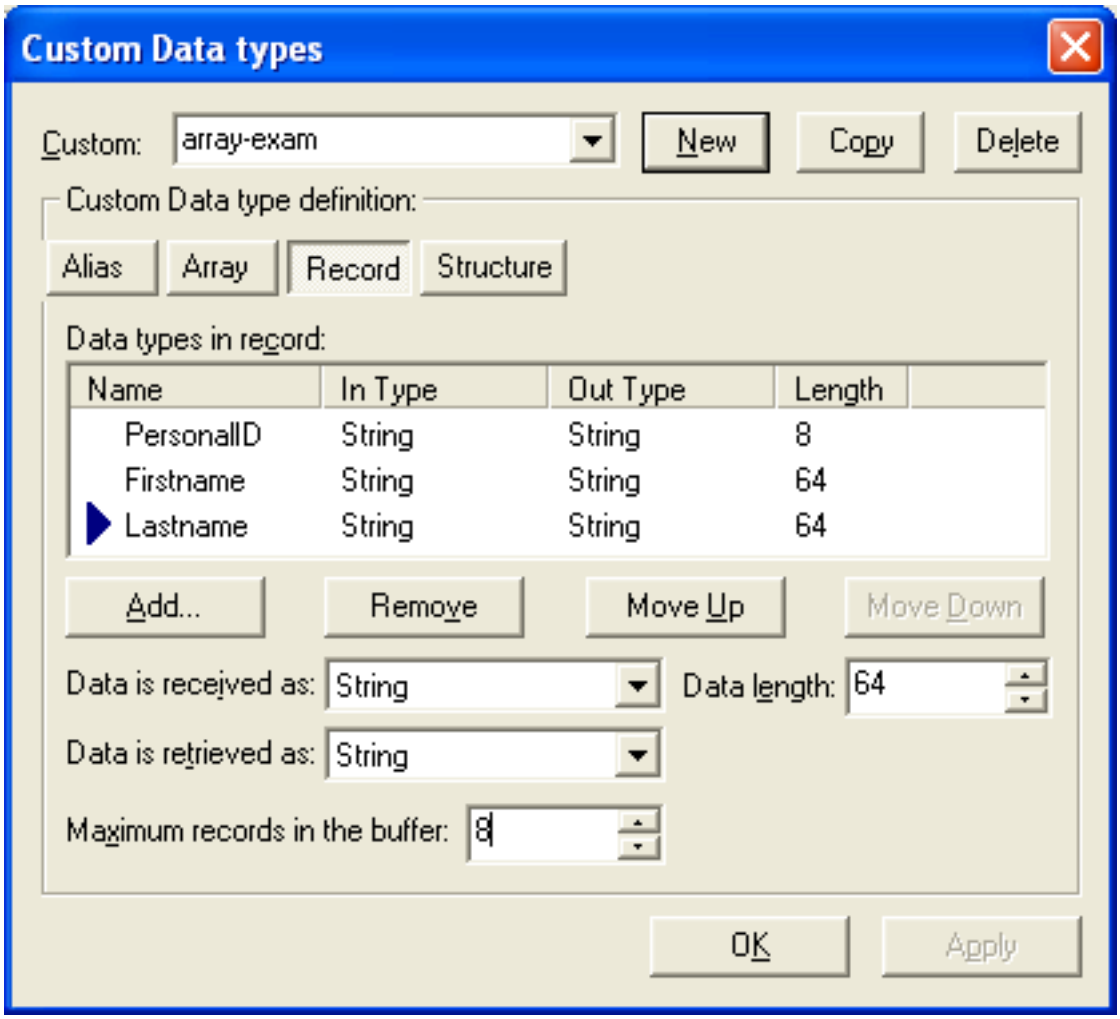
Array custom data types accept the same basic information as alias data types, with the addition of the number of elements in the array. Arrays allow elements of the specified base type to be accessed in a subscripted fashion.

Note: Multidimensional arrays and arrays of structures can be implemented by specifying a custom array or record data type as the base type of this array.

Custom Data Type 'Record'

A *record* is a repeating collection of data types - scalar or custom.

This custom data type allows you to define a collection of data types that can be accessed in a subscripted fashion. The order of defined types in the **Record** can be changed. Also, the number of records within the receive buffer can be specified if known.



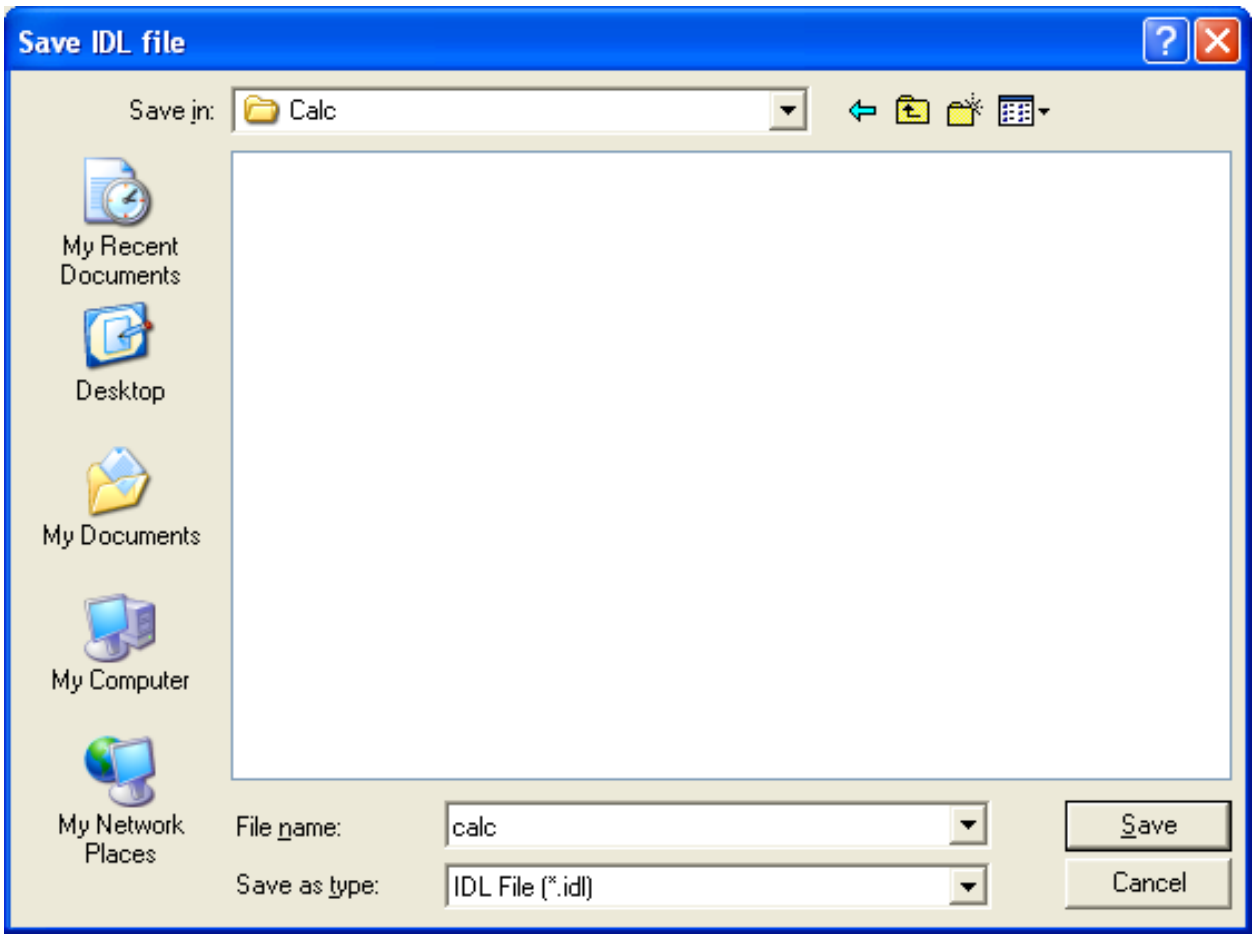
Custom Data Type 'Structure'

A *structure* is a named collection of data types.

The controls for this custom data type are identical to those of the data type 'record', with the exception of a repetitive count, which is not applicable.

TOR Files in IDL Format

When a TOR file is saved in IDL format, a file with extension .idl is generated. (The file must have been saved as a TOR file before).



This IDL file can be used by other EntireX tools such as DCOM Wrapper or Java Wrapper. It can be modified with any editor like a regular IDL file.

Conversion Rules

List of the performed conversions:

In TOR file	Converted to ... in IDL file
TOR file name	Library name
Methodname	Program name
Connection Info	"Server address" as comment
DataItems in Parameter Map	"In" Parameters
DataItems in Return Map	"Out" Parameters
Manual Offsets in Return Map	Will not be converted. If "manual offsets" is marked in a method, a comment is generated for this program.
Custom Data Types	The names of the CDTs used are displayed in a comment.
- Alias	Nothing
- Array	A dimension specification
- Record	A dimension specification and a group
- Structure	A group
Format Conversion	The IN-Type of the Parameter Map and the OUT-Type of the Return Map are used.
- I1	I1
- I2	I2
- I4	I4
- Real 4	F4
- Real 8	F8
- Bool	L
- String	A<size>
- Blob	B<size>
- Padding	B<size>

TOR Files in XML Format

To use TOR files in XML format, Internet Explorer 5 or above is required.

Loading an XML File

When you load an XML file, the XML file is checked against the defined DTD (see *The DTD File* list below). When you use the XML file, it is not necessary to store the transaction object in TOR file format.

Saving an XML File

When a TOR file is saved in XML format, a file with the extension .xml is generated.

This XML file can be viewed with a browser that supports XML. It can also be viewed and edited with any XML notepad or any text editor.

The DTD File

The structure of the XML file is defined in the DTD file. When you use a tool that validates XML files, the XML file is checked against these definitions.

Entry in the DTD file	Explanation
`<!ELEMENT EntireXTorFile (DefaultConnection? , ↩ Method*, CDT*)>`	The root must always be defined. It contains: ■ 0-1 default connections ■ 0-n methods ■ 0-n CDT (= custom data types)
`<!ATTLIST EntireXTorFile Name CDATA #IMPLIED Version CDATA #IMPLIED>`	**Name** The name of the TOR file. **Version** The EntireX version with which the XML file was generated
`<!ELEMENT DefaultConnection EMPTY>`	The global connection information is stored here.
`<!ATTLIST DefaultConnection %Connection;>`	All parameters in the default connection are stored as attributes. See the detailed description of the %Connection at the end of this table.

Entry in the DTD file	Explanation
`<!ELEMENT Method (MethodConnection? , ↩ Parameter*)>`	Each method contains: ■ 0-1 method connections ■ 0-n parameter

`<!ATTLIST Method Name CDATA #REQUIRED`
`CallType (SEND | RECEIVE | SEND-RECEIVE |`
`LOGON | LOGOFF |EOC | SYNCPOINT |`
`REGISTER | DEREGISTER | SUBSCRIBE |`
`UNSUBSCRIBE | SEND_PUB | RECEIVE_PUB |`
`CONTROL_PUB) #REQUIRED`
`ManualOffset (YES | NO) #IMPLIED>`
	A name and a call type must be defined for each method. The manual offset contains the manual offset switch of the return map.

`<!ELEMENT MethodConnection EMPTY>`	The connection information of each method is stored here.
`<!ATTLIST MethodConnection %Connection;>`	All parameters belonging to the method connection are stored as attributes. See the detailed description of the **%Connection** at the end of this table.
`<!ELEMENT Parameter (InFormat, OutFormat, ↩ Length?)>`	Each parameter contains: ■ 1 in format ■ 1 out format ■ 0-1 length

`<!ATTLIST Parameter Name CDATA #IMPLIED`
`Direction (IN | OUT | INOUT) ↩ #IMPLIED`
`Offset CDATA #IMPLIED>`
	Name: Name of the parameter
	Direction: IN: if parameter is from the parameter map
	OUT: if it is from the return map
	Offset: Offset value of the return map, if ManualOffset = YES

`<!ELEMENT CDT (Alias | Array | Record | ↩ Structure) >`	A custom data type (CDT) is an alias, an array, a record or a structure.
`<!ATTLIST CDT Name ID #REQUIRED>`	The name of the CDT is required.
`<!ELEMENT Alias (InFormat, OutFormat, Length?)>`	An alias contains: ■ 1 in format ■ 1 out format ■ 0-1 length

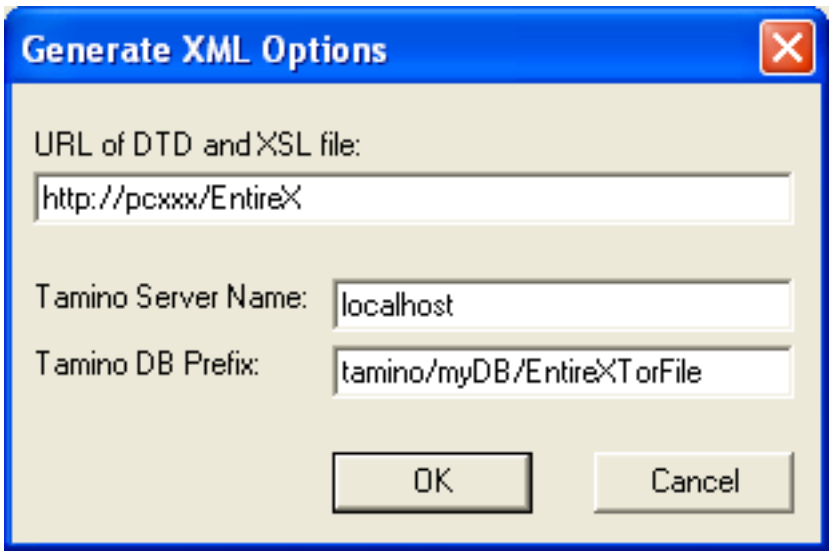
Entry in the DTD file	Explanation
`<!ELEMENT Array (InFormat, OutFormat, Length?)>`	An array contains: ■ 1 in format ■ 1 out format ■ 0-1 length
`<!ATTLIST Array NumberEle CDATA #IMPLIED>`	The numbers of elements for an array are stored here.
`<!ELEMENT Record (Parameter*)>`	The record contains: ■ 0-n parameter
`<!ATTLIST Record NumberEle CDATA #IMPLIED>`	The numbers of elements for a record are stored here.
`<!ELEMENT Structure (Parameter*) >`	The structure contains: ■ 0-n parameter
`<!ELEMENT InFormat (Scalar | UsedCDT)>`	An InFormat is a scalar value or a reference to a CDT.
`<!ELEMENT Scalar EMPTY>`	
`<!ATTLIST Scalar Format (I1 | I2 | I4 | F4 | F8 | Bool | String | Blob | Padding) #REQUIRED>`	A scalar must be in one of the listed formats.
`<!ELEMENT UsedCDT EMPTY>`	
`<!ATTLIST UsedCDT Target IDREF #REQUIRED>`	A UsedCDT must reference the name of a defined CDT.
`<!ELEMENT OutFormat (Scalar | UsedCDT)>`	An OutFormat is a scalar value or a reference to a CDT.
`<!ELEMENT Length EMPTY>`	
`<!ATTLIST Length Value CDATA #IMPLIED>`	A length must be defined for scalars with the values: string, BLOB and padding or UsedCDTs.

`<!ENTITY % Connection`
`'ServerClass CDATA #IMPLIED`
`ServerName CDATA #IMPLIED`
`Service CDATA #IMPLIED`
`ConversationID (NONE | NEW | OLD | ANY)`
`#IMPLIED`
`UOWTime CDATA #IMPLIED`
`BrokerID CDATA #IMPLIED`
`UserID CDATA #IMPLIED`
`Password CDATA #IMPLIED`
	All connection parameters are defined as attributes.

Entry in the DTD file	Explanation
Environment CDATA #IMPLIED Wait CDATA #IMPLIED UOWStatusPersist CDATA #IMPLIED Option (NULL | MSG | HOLD | IMMED | ↩ QUIESCE | EOC | CANCEL | LAST | NEXT | PREVIEW | COMMIT | BACKOUT | SYNC | ATTACH | DELETE | EOCCANCEL | QUERY | SETUSTATUS | ANY | TERMINATE |DURABLE |CHECKSERVICE) #IMPLIED Encryption (NONE | TO-BROKER | TO-TARGET) #IMPLIED ForceLogon (NO | YES) #IMPLIED CompressLevel CDATA #IMPLIED Token CDATA #IMPLIED Topic CDATA #IMPLIED PublicationID CDATA #IMPLIED UOWStatusLife CDATA #IMPLIED BrokerSecurity CDATA #IMPLIED" >	

Defining the Location of the DTD and XSL File

A DTD file is used to check the XML file. An XSL file is used to view the XML file. To locate these files, enter a reference in the **XML Options**:



This reference can be a URL (like above) or a regular path (e.g., the default: the EntireX *etc* directory).

Using the XML Objects During Runtime

The XML file can also be used during runtime. It must be defined in the same way as the TOR file.

Visual Basic Example

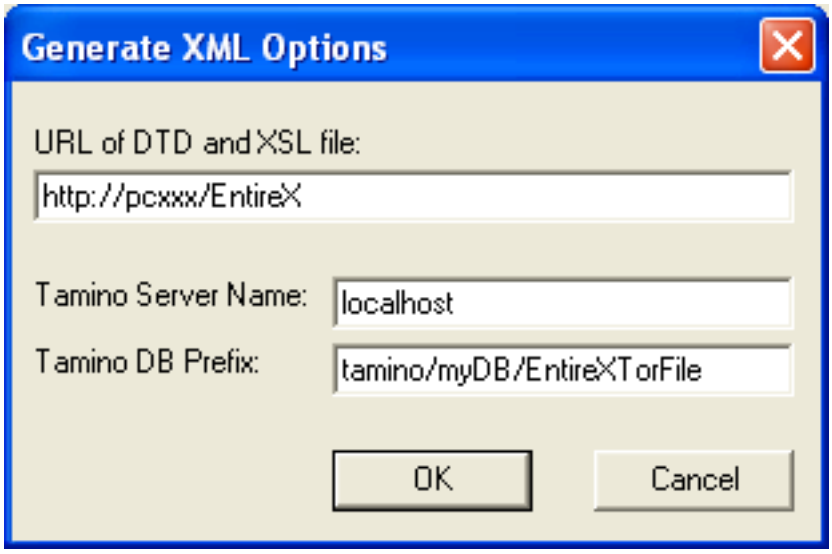
```
Set TransObject=BOCX.CreateTransObject ("...\\calc.xml")
```

Storing TOR Files in a Tamino Database

To store and use TOR files in a Tamino database, Tamino 4.2.1 or higher and Internet Explorer 5 or higher are required.

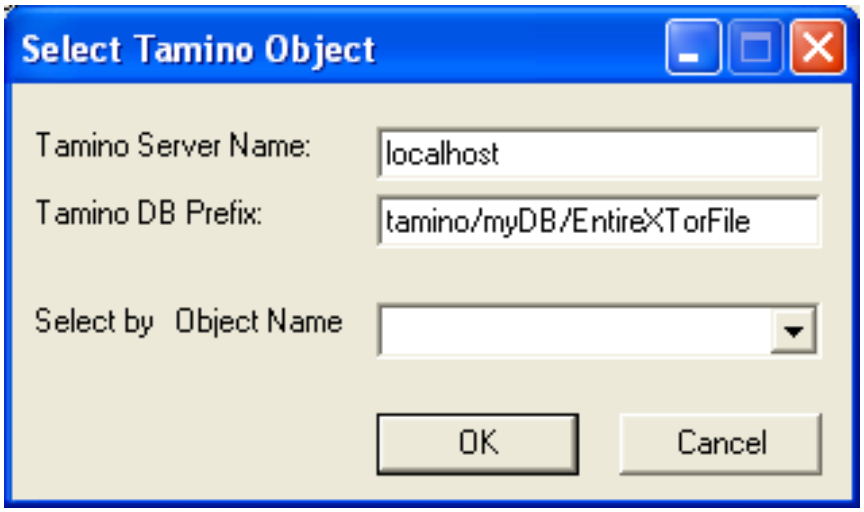
Creating a Tamino Database for the TOR Files

In the EntireX *etc* directory an *EntireXTorIno vrs.xml* is provided. This file can be used to define the schema in Tamino (_define function). It is very close to the DTD file. The XML files generated can be directly stored in Tamino. The database prefix defined in Tamino must be defined in the **XML Options** screen as well as the server name of the Tamino database.



Loading Tamino Objects using the TOR Editor

When loading a Tamino object, the following dialog will be displayed:



If necessary, the Tamino server name and the Tamino database prefix can be changed here. The name of the desired object can be entered directly or selected from the drop-down menu **Select by Object Name**.

Storing Tamino Objects using the TOR Editor

When saving a Tamino object, the following dialog will be displayed:

If necessary, the Tamino server name and the Tamino DB prefix can be changed here. The name of the object must be entered in the **Tamino Object Name** field. If a Tamino object with this name already exists, you can overwrite the existing file or cancel the save operation.

Using Tamino Objects During Runtime

The Tamino object can also be used during runtime. It must be defined like the XML file:

Visual Basic Example

```
Set TransObject=BOCX.CreateTransObject ("Calc")
```

Note: The name of the Tamino object is case-sensitive.

The Tamino server name and the Tamino DB prefix from the **General XML Options** screen are used.

7 Calling Broker ActiveX Control Remotely

You can call Broker ActiveX Control remotely if you use it as an automation server. This means you can use the Broker component from a separate process - either on the same machine or on another machine in the network.

Setting up the Server Environment

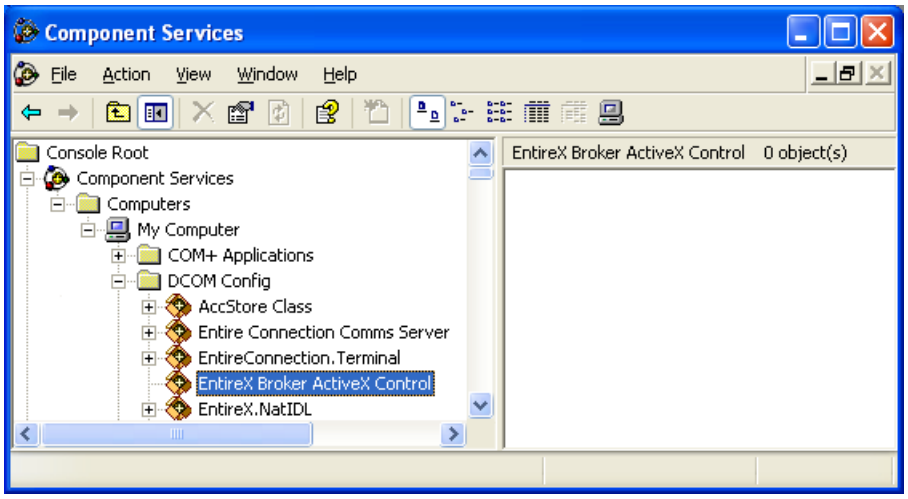
To configure the security settings use **Component Services** from the **Administrative Tools** in the **Control Panel**.

Below is a step-by-step guide on how to configure the server environment:

Step 1

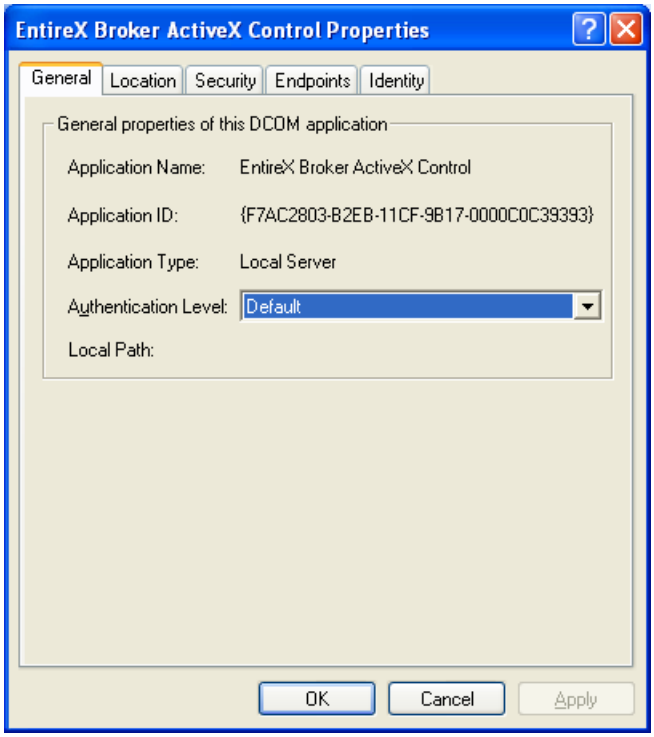
Open the **Component Services** on the server.

The following dialog box will be displayed:



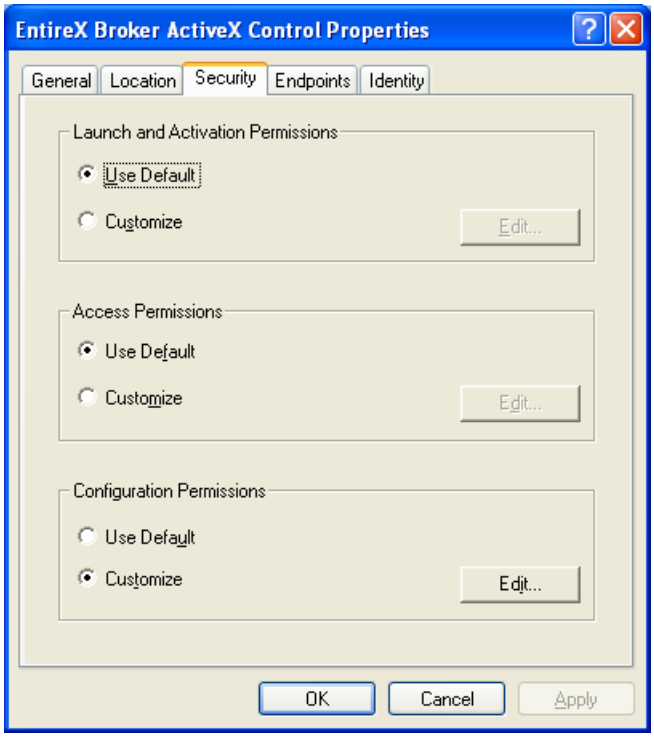
Select **EntireX Broker ActiveX Control** in the **DCOM Config** list box and choose the properties from the context menu.

The following dialog box will be displayed:



Step 2

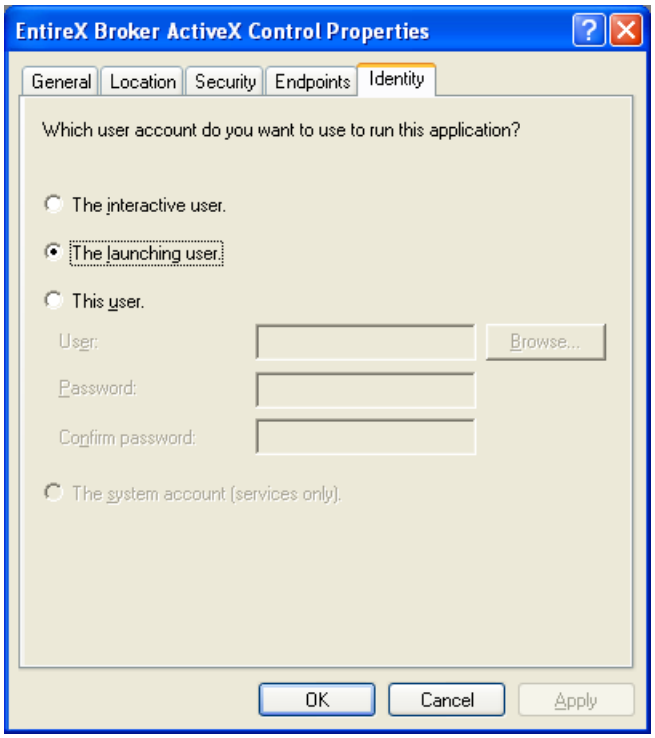
Click the **Security** tab.



In the dialog box displayed above, keep the defaults for access, launch and configuration permissions.

Step 3

Click the **Identity** tab.



There are three options to define the user account to be used to run the application:

- **The interactive user**

  This implies that a user with permission to launch the application must be logged on to the server machine.

- **The launching user**

  This implies that an account must be created on the server machine with the same username/password as on the client machine. This account will then be used to launch the application.

- **This user**

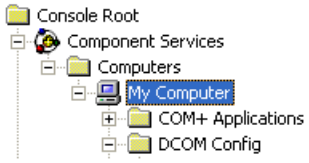
  A final option is to specify a user account to be used when launching the application.

In each case, the username/password of the client machine must also exist on the server machine.

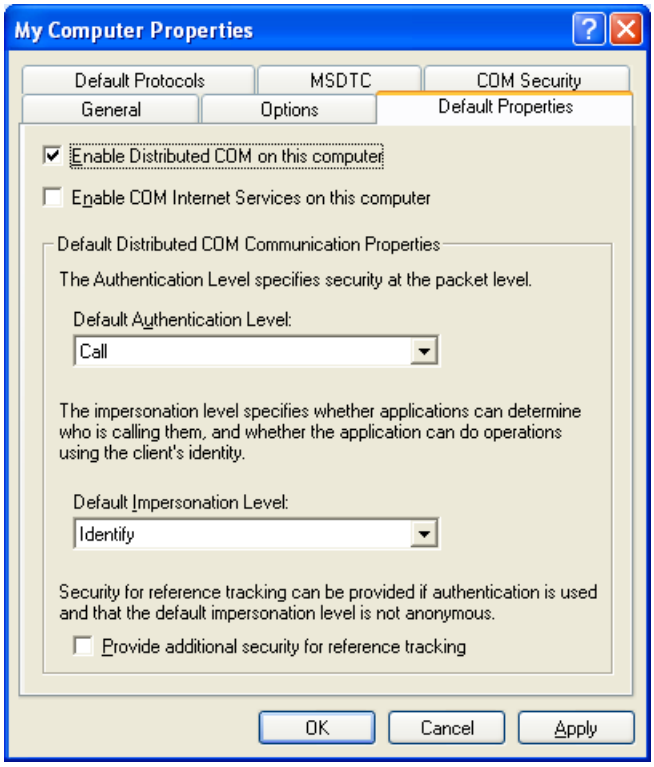
Select one of the options and choose **OK** to return to the **Component Services**.

Step 4

Click on **My Computer** and choose the properties from the context menu.



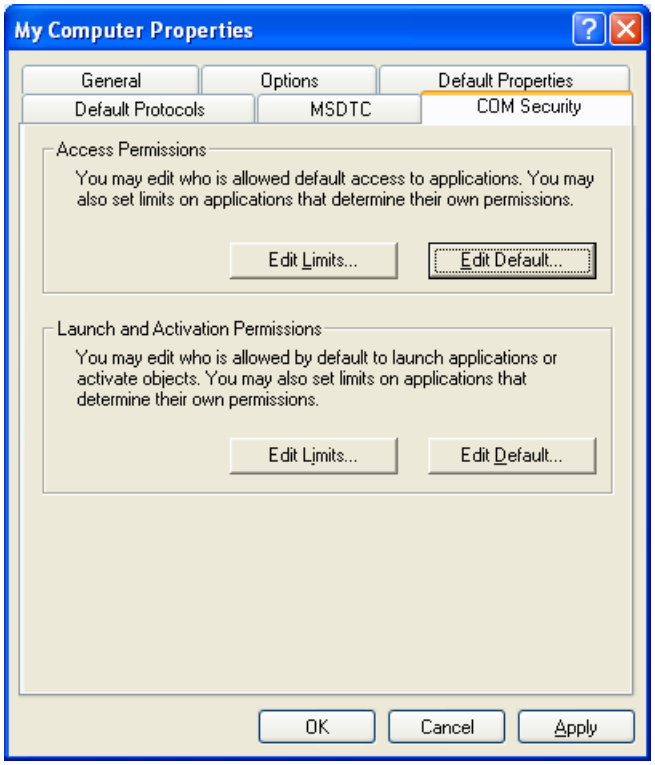
The following dialog box will be displayed; click on the **Default Properties** tab.



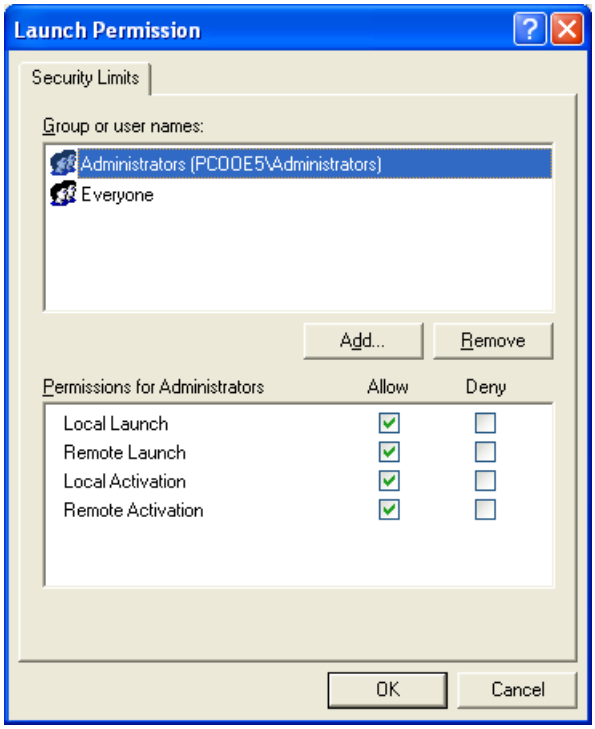
Choose the options as shown in the dialog box above.

Step 5

Click on the **COM Security** tab.



In the **Launch and Activation Permissions** area of the dialog box displayed above, choose **Edit Default**. The following dialog box will be displayed:



Make sure that either the user corresponding to the client machine account, or a group to which the user belongs, has **Allow Launch** as **Type of Access**.

Choose **OK** in this screen and then **Apply**, and exit **Component Services** on the server.

Setting up the Client Environment

The *EbxProxy.dll* is installed by default on the server in directory *<drive>:\SoftwareAG\EntireX\bin*. Copy the file from the server machine to the client machine.

The DLL must then be registered with: `REGSVR32 <path>\EBXproxy.dll`.

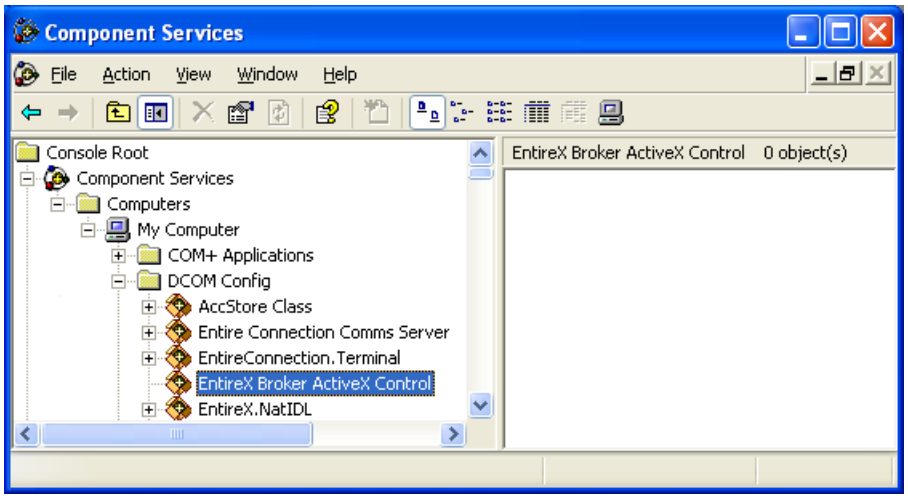
To configure the client environment use **Component Services** from the **Administrative Tools** in the **Control Panel**.

Below is a step-by-step guide on how to configure the client environment:

Step 1

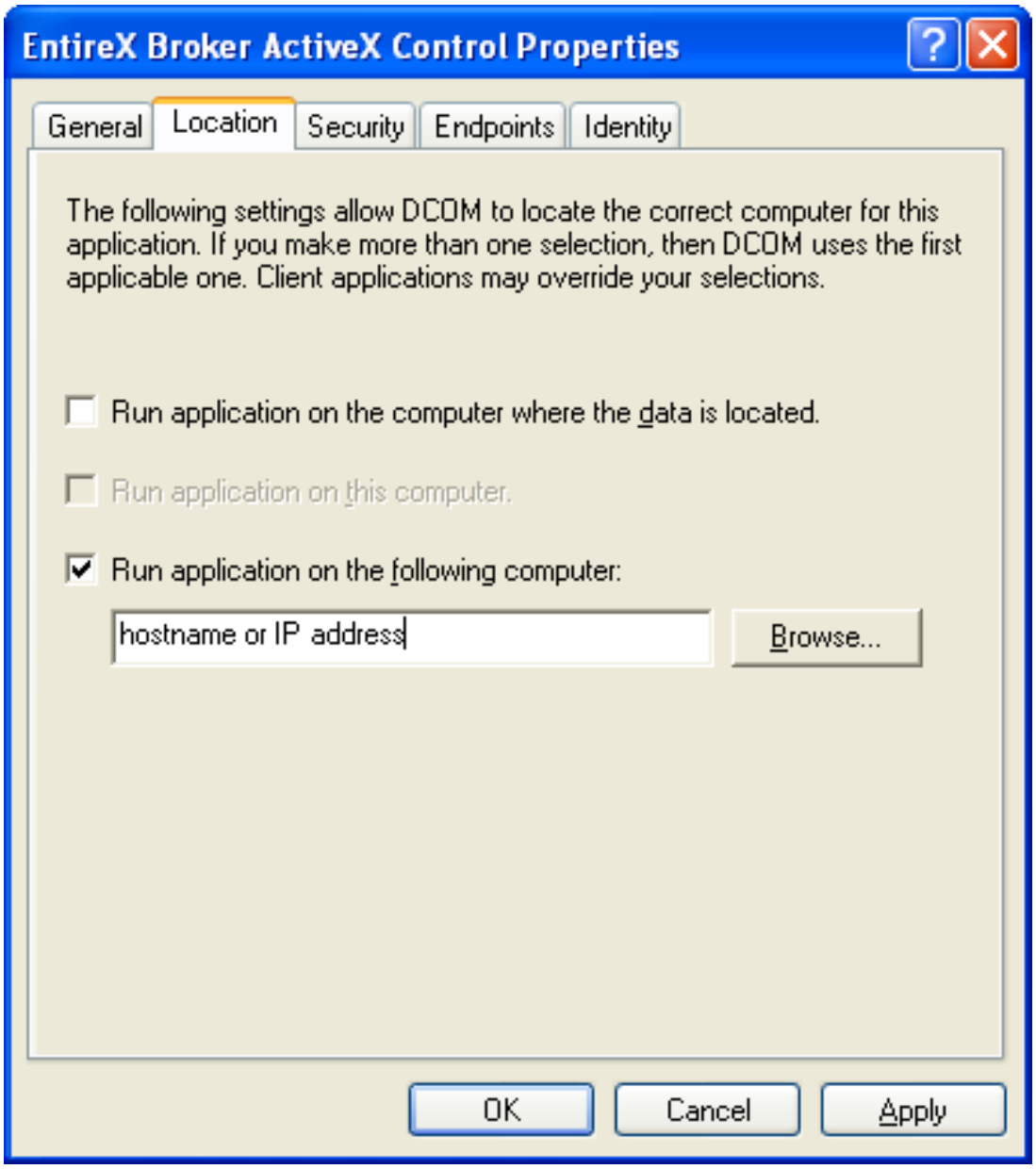
Open the **Component Services** on the client.

The following dialog box will be displayed:



Select **EntireX Broker ActiveX Control** in the **DCOM Config** list box, choose the properties from the context menu and click the **Location** tab.

Step 2

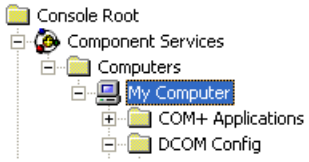


In the **Location** tab of the **ActiveX Control Properties** dialog box above, select the check box **Run application on the following computer:** and enter either the hostname or the IP address of the server machine.

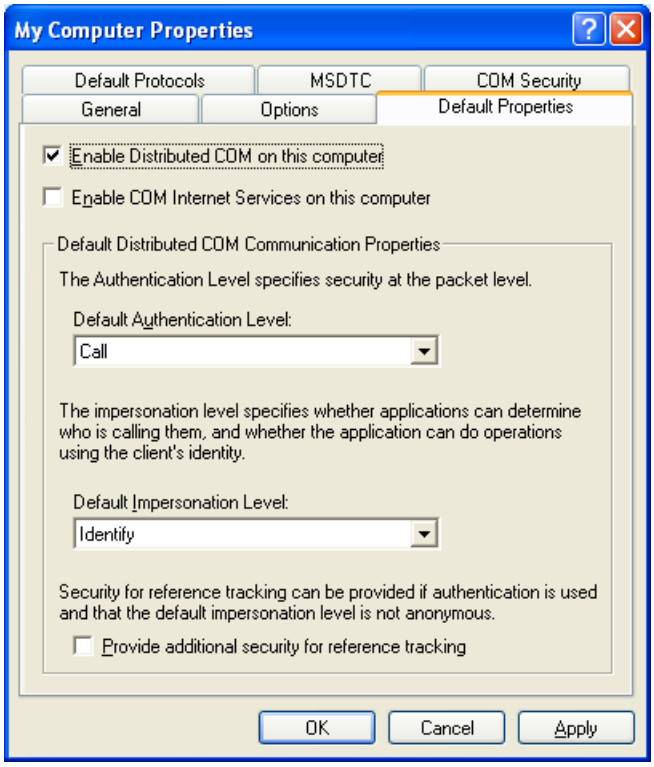
Choose **Apply** and then **OK**.

Step 3

Select **My Computer** and choose the properties from the context menu.



The **My Computer Properties** dialog box will be displayed. Select the **Default Properties** tab.



Choose the check box **Enable Distributed COM on this computer**, set the default authentication level to **Call** and the default impersonation level to **Identify**.

Choose **OK**.

Testing the Connection

You are now ready to test the connection between the client machine and the server machine.

Test the TCP/IP Connection

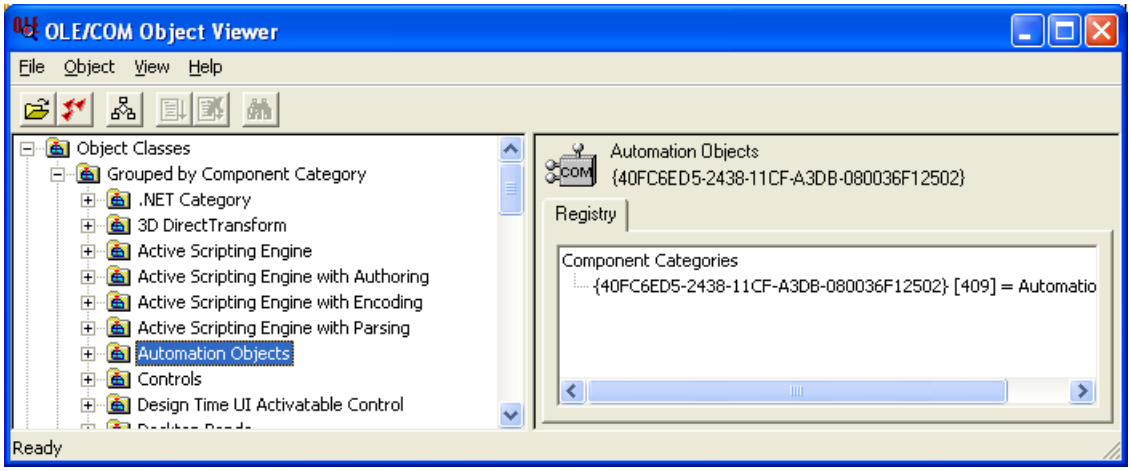
Test the TCP/IP connection between the client and the server (use, for example, PING).

Test the Remote Call

To test whether an application can be called remotely, you can use the OLE/COM Object Viewer:

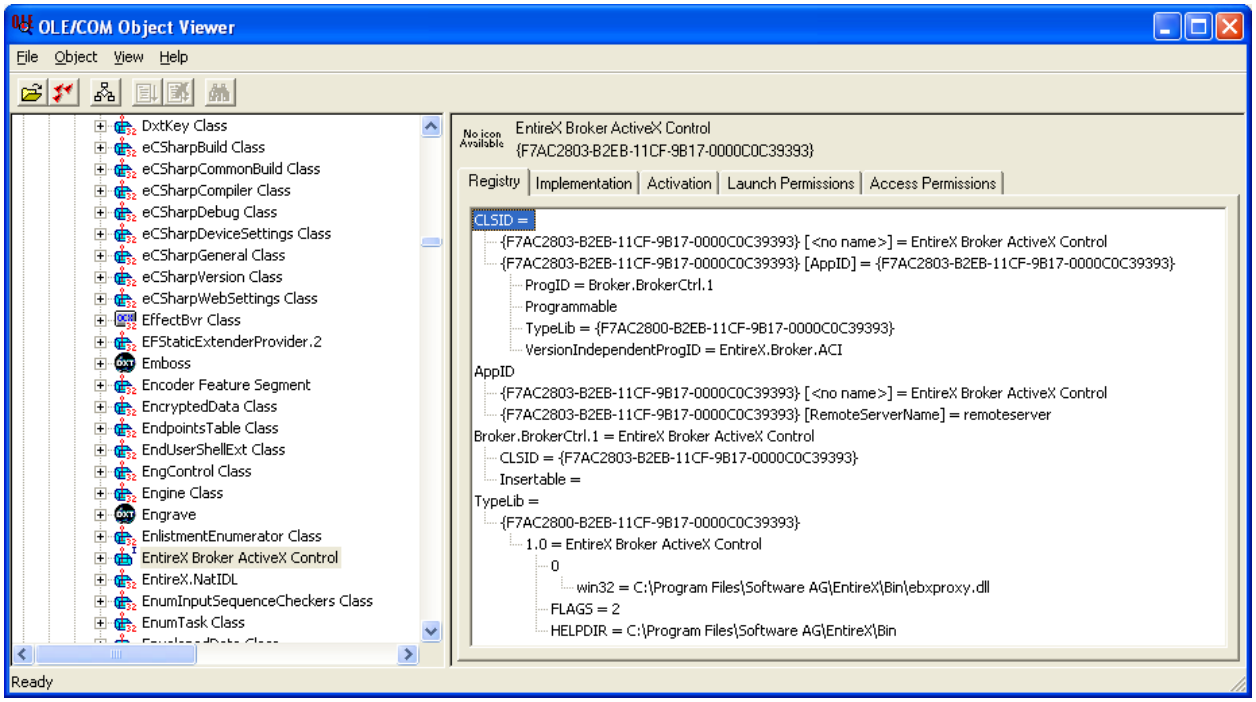
Run the OLE/COM Object Viewer on the client.

The **OLE/COM Object Viewer** dialog box will be displayed:



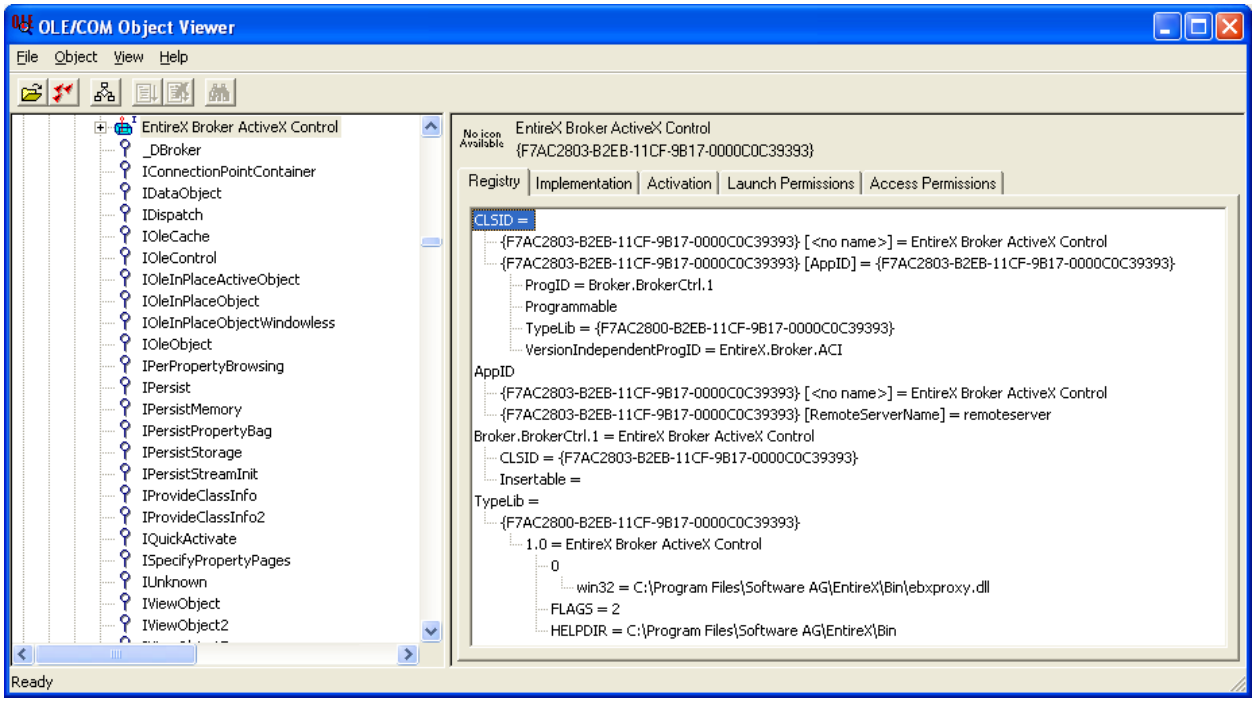
Select **Automation Objects** in the navigation frame to display a list of all the automation objects on the client machine.

A screen similar to the one displayed below will be displayed:



Select **EntireX Broker ActiveX Control**, open its context menu and choose **Create Instance**.

If the remote call is successful, the EntireX Broker component on the server machine will be called and the following screen will be displayed:



If you receive an error message (for example “Class not registered”) please check the following:

- the TCP/IP connection (with PING)
- the security definitions on the server with **Component Services**
- the remote server name on the client (this can also be checked with the OLE/COM Object Viewer)

When the connection has been established, you will be able to run your application on the client. Please remember that Broker ActiveX Control must be used as automation server. For information on how to use Broker ActiveX Control with Visual Basic see ***Broker ActiveX Control as an Automation Server***.

8 Publish and Subscribe with Broker ActiveX Control

Broker ActiveX Control provides five Broker functions to enable publishing and subscription. Publish and subscribe enables an application to send a message (publication) to multiple receivers (subscribers).

This functionality is supported by the native COM interface as well as by the Transaction Object Repository interface (TOR file).

Some examples of publish and subscribe for the native interface are given below.

Writing Subscriber Applications

A subscriber receives the publications that are sent by the publisher. Subscribers will only receive publications that are sent *after* they have subscribed to a topic. Similarly, publishers can only send a publication if at least one subscriber has already subscribed to a topic.

To learn more about a particular topic, see *Writing Applications: Publish and Subscribe* in the ACI Programming documentation.

The methods, functions, properties and steps required to operate as subscriber are described here.

Methods

Method	Description
`InvokeBrokerFunction`	Invoke the Broker function call.
`GetReceiveData`	Return the most recently received publication as string.

Functions

These will be set in the `function` property. For all function calls, the `UserID`, `Password` (if security Broker), `Token` and `Topic` properties must be set.

Function	Option
Logon	
Subscribe	Option = None
Receive Publication	Option = None, Publication ID = NEW
Control Publication	Option = Commit
Unsubscribe	Option = None
Logoff	

Properties

Property	Description
APIVersion	Must be set to 8 or above
Function	See the Functions table.
Option	Needed to receive and control publications.
UserID	Your user ID.
Password	Your password.
Wait	Set an adequate amount of time to wait for a publication. The length of time depends on your application and can be set to Yes to wait until a publication has been received.
UOWstatus	Broker returns the current status of the publication.
ReceiveBufferLength	Set to the maximum possible publication length.
Token	Additional caller identifier. The combination of the user ID and the token must be unique.
Topic	The topic of the publication that is to be received. Use a topic that has been registered with the EntireX Broker. Ask your broker administrator to get a valid topic.
Publication ID	Always NEW for the first call to receive a publication. For subsequent messages, reuse the received publication ID. See the step Check UOW status to find out whether it is a multi-message publication.

Important: Please check the Error Status regularly; at least after every InvokeBrokerFunction.

To operate as subscriber

1 Set the APIVersion property to 8, the functionality Publish and Subscribe is only available with API version 8 and above.

2 Set the BrokerID property for your EntireX Broker.

3 Set the UserID, Password (if required), Token and Topic properties.

4 Set the Option property to 0 (None).

5 Set the Function property to 9 (Logon). You must be logged on to use the publish-and-subscribe functionality.

6 Call the method InvokeBrokerFunction to perform the logon function. The application has now been logged on to the EntireX Broker.

7 After successful logon to the Broker, set the function property to 19 (subscribe).

8 Call the method InvokeBrokerFunction to subscribe. The application has now been subscribed as a non-durable subscriber for this topic. If you want to be a durable subscriber, set the Option property to **Durable** when calling the method InvokeBrokerFunction. To learn more about

the difference between durable and non-durable subscribers, see *Concepts of Persistent Messaging*.

9 Set the `Wait` property to the required value, for example 60s (s = seconds).

10 Set the `Option` property to 0 (None).

11 Set the `PublicationID` property to NEW.

12 Set the `Function` property to 18 (Receive Publication).

13 Set the `ReceiveBufferLength` property to your maximum expected publication length (can be up to 2048).

14 Call the method `InvokeBrokerFunction` to receive publications. The application will now wait to receive a publication. With the current settings the application would receive a publication within 60 seconds or time out after 60 seconds. If the publication is larger than 2048 characters, Broker ActiveX Control will return an error. Assuming that an application has received a publication, that publication now has a publication ID, assigned to it by the EntireX Broker.

15 Get the received data with the method `GetReceiveData`.

16 The current status of the publication is stored in the `UOWstatus` property. Check this UOWstatus now. A UOWstatus of 12 (Received Only), means that the received publication has only one message. A UOWstatus of 9 (Received First) means that you have received the first message of a multi-message publication. In this case you should request the other messages of this publication, until a UOWstatus of 11 (Received Last) is returned. See *Concepts of Persistent Messaging* for more information. To inform the EntireX Broker that the subscriber has received and retrieved the publication the subscriber must commit this.

17 Do not change the `PublicationID` property. This is required to refer to the received publication.

18 Set the `Option` property to 10 (Commit).

19 Set the `Function` property to 21 (**Control Publication**).

20 Call the method `InvokeBrokerFunction` to control the publication.

21 Get the `UOWstatus` property and check the status. The value of the UOWstatus should now be 5 (Processed). Your application may now run in a loop between steps 9 and 21 to receive several publications.

22 Set the `Option` property to 0 (None).

23 Set the `Function` property to 20 (Unsubscribe).

24 Call the method `InvokeBrokerFunction` to unsubscribe. The application has now been unsubscribed from the topic.

25 Set the `Function` property to 10 (Log off).

26 Call the method `InvokeBrokerFunction` to log off. The application has now been logged off from the EntireX Broker.

C# Example with a simple Subscriber who has Received only one Publication

```
using System;
// add the "EntireX Broker ActiveX Control" in COM references
using BrokerLib;

namespace Pubsub
{
    class Class1
    {
        static BrokerClass ebx;
        // EntireX Broker ACI definitions.
        const int function_logon = 9;
        const int function_logoff = 10;
        const int function_subscribe = 19;
        const int function_unsubscribe = 20;
        const int function_receive_publication = 18;
        const int function_control_publication = 21;
        const int option_none = 0;
        const int option_commit = 10;
        const int uowstatus_receive_only = 12;
        const int uowstatus_receive_last = 11;

        // procedure to invoke an entirex broker function call.
        static bool invokeEBX(short function, short option)
        {
            bool rc = true;
            ebx.Option = option;
            ebx.Function = function;
            ebx.InvokeBrokerFunction();
            // check the error status after the broker call.
            if (ebx.ErrorCode != "00000000")
            {
                Console.WriteLine(ebx.ErrorMsg);
                rc = false;
            }
            return rc;
        }

        [STAThread]
        static void Main(string[] args)
        {
            bool receive_error = false;
            bool subscribe_error = false;
            ebx = new BrokerClass();

            ebx.APIVersion = 8;
            ebx.BrokerID = "localhost";
            ebx.UserID = "EBXUSER";
            ebx.Token  = "EBXTOKEN";
            ebx.Topic  = "NYSE";
```

```
            Console.WriteLine("Log on");
            if (!invokeEBX(function_logon, option_none))
                return; // logon failed

            Console.WriteLine("Subscribe");
            if (!invokeEBX(function_subscribe, option_none))
                subscribe_error = true; // subscribe failed

            if (!subscribe_error)
            {
                ebx.PublicationID = "NEW";
                ebx.ReceiveBufferLength = 2048;
                ebx.Wait = "60s";
                // loop until all messages of the publication have been received.
                do
                {
                    Console.WriteLine("Receive Publication");
                    if (!invokeEBX(function_receive_publication, option_none))
                    {
                        receive_error = true;   // receive failed
                        break;          // cancel the while loop
                    }
                    else
                    {
                        // work with the received publication.
                        Console.WriteLine(ebx.GetReceiveData());
                    }
                } while ((ebx.UOWStatus != uowstatus_receive_only) &&
                       (ebx.UOWStatus != uowstatus_receive_last));

                if (!receive_error)
                {
                    Console.WriteLine("Control Publication");
                    invokeEBX(function_control_publication, option_commit);
                    // the publication status should be 5 (= processed)
                    Console.WriteLine("Publication status = " + ebx.UOWStatus);
                }
                Console.WriteLine("Unsubscribe");
                invokeEBX(function_unsubscribe, option_none);
            }
            Console.WriteLine("Log off");
            invokeEBX(function_logoff, option_none);
        }
    }
}
```

Writing Publisher Applications

The publisher sends publications to subscribers. Publications will fail if there is no subscriber for this topic. See *Writing Applications: Publish and Subscribe* in the ACI Programming documentation for a list of the valid topics.

The methods, functions, properties and steps required to operate as Publisher are described below.

Methods

Method	Description
`InvokeBrokerFunction`	Invoke the broker function call.
`SetSendData` or `SetSendDataLong`	Set the publication to be sent.

Functions

These will be set in the `Function` property. For all function calls, the `UserID`, `Password` (if secure Broker), `Token` and `Topic` properties must be set.

Function	Option
Logon	
Send Publication	Option = Sync, Publication ID = NEW.
Control Publication	Option = Commit. A publication can also be committed with function=send_publication option=commit.
Logoff	

Properties

Property	Description
`APIVersion`	Must be set to 8 or above.
`Function`	See the function table.
`Option`	Needed to send and control publication.
`UserID`	Your user ID.
`Password`	Your password.
`Wait`	Must be set to NO.
`UOWstatus`	Broker returns the current status of the publication.
`Token`	Additional identifier of the caller. The combination of the user ID and the token must be unique.

Property	Description
Topic	The topic of the publication that is to be received. Use a topic that has been registered with the EntireX Broker. Ask your Broker administrator to get a valid topic.
PublicationID	Always NEW for the first call to send a publication. If you want to send a multi-message publication, reuse the received publication ID to send the other messages.

Important: Please check the Error Status regularly; at least after every InvokeBrokerFunction.

To operate as publisher

1 Set the APIVersion property to 8, the publish-and-subscribe functionality is only available with API version 8 or above.

2 Set the BrokerID property for your EntireX Broker.

3 Set the UserID, Password (if required), Token and Topic properties.

4 Set the Option property to 0 (None).

5 Set the Function property to 9 (Logon). You must log on to use the publish-and-subscribe functionality.

6 Call the method InvokeBrokerFunction to perform the Logon function.

The application has now been logged on to the EntireX Broker.

7 Set the Option property to 10 (Commit).

8 Set the Function property to 17 (Send Publication).

9 Set the Wait property to NO.

10 Set the PublicationID property to NEW.

11 Call the method SetSendData or SetSendDataLong to set the publication data.

12 Call the method InvokeBrokerFunction to send the publication.

13 Get the UOWstatus property and check this. It should be 2 (Accepted).

A publication has now been sent. Please note that the publication will fail if there are no subscribers to this topic. If your publication has more than one message, the steps beginning with Set the Option property to 10 (Commit) will change. See *Concepts of Persistent Messaging*.

14 Set the Option property to 0 (None).

15 Set the Function property to 10 (Logoff).

16 Call the method InvokeBrokerFunction to log off.

The application has now been logged off from the EntireX Broker.

C# Example with a simple Publisher who Sends only one (single-message) Publication

```
using System;
// add the "EntireX Broker ActiveX Control" in COM references
using BrokerLib;

namespace Pubsub
{
    class Class1
    {
        static BrokerClass ebx;
        // EntireX Broker ACI definitions
        const int function_logon = 9;
        const int function_logoff = 10;
        const int function_send_publication = 17;
        const int function_control_publication = 21;
        const int option_none = 0;
        const int option_commit = 10;

        // procedure to invoke an entirex broker function call
        static bool invokeEBX(short function, short option)
        {
            bool rc = true;
            ebx.Option = option;
            ebx.Function = function;
            ebx.InvokeBrokerFunction();
            if (ebx.ErrorCode != "00000000")
            {
                Console.WriteLine(ebx.ErrorMsg);
                rc = false;
            }
            return rc;
        }

        [STAThread]
        static void Main(string[] args)
        {
            ebx = new BrokerClass();
            String s = "A small c# publisher example with EntireX Broker ActiveX ↩
Control.";

            ebx.APIVersion = 8;
            ebx.BrokerID = "localhost";
            ebx.UserID = "EBXUSER";
            ebx.Token  = "EBXTOKEN";
            ebx.Topic  = "NYSE";

            Console.WriteLine("Log on");
            if (!invokeEBX(function_logon, option_none))
                return; // logon failed
```

```
            ebx.Wait = "NO";            // set to NO because we cannot receive data
            ebx.PublicationID = "NEW";
            ebx.SetSendDataLong(s, s.Length);   // set the sent data

            Console.WriteLine("Send Publication");
            invokeEBX(function_send_publication, option_commit);
            // Check the status of the UOW. It should be 2 (= Accepted).
            Console.WriteLine("Publication status = " + ebx.UOWStatus);

            Console.WriteLine("Log off");
            invokeEBX(function_logoff, option_none);
        }
    }
}
```

9 Reference - Broker ActiveX Control

Methods of Broker ActiveX Control

This section describes the methods of Broker ActiveX Control.

Broker ACI

The following methods are useful for writing applications using the native interface.

Method	Description
`BSTR GetReceiveData()`	Return the received data inner string
`BSTR GetErrorText()`	Return the last received error message.
`BOOL SetSendDataLong(String, Long)` or `BOOL SetSendData (String, Short)`	Copy user's data buffer into the send buffer.
`BOOL InvokeBrokerFunction()`	Invoke the broker function call. Set the properties `Function` and `Option`.

Transaction Objects

Method	Description
`Bool DefineTOMethods(String)`	Starts the TO editor. If you specify a valid TOR name, this TO is then loaded into the editor. If a valid TOR name is not specified, the currently loaded TO will be displayed or an empty editor will be started.
`Bool LoadTransObject(String)`	Loads and initializes a transaction object. You must specify a valid TOR file name; otherwise FALSE will be returned.
`Object CreateTransObject(String)`	Loads and initializes a transaction object. You must specify a valid TOR file name. An object reference will be returned, which can be used to call the methods defined in the TO. If loading fails, a null reference will be returned.
`Object CreateTransObjectSA(String)`	This method uses the safe array implementation for arrays instead of the collection implementation. If you experience problems accessing arrays with an automation controller, try using this method to instantiate a TOR object.

Properties of Broker ActiveX Control

Most properties of Broker ActiveX Control correspond to the Broker ACI fields. The properties must be set to the appropriate values before using any function.

If transaction object repository (TOR) files are used, it will not be necessary to set all the properties. See section ***Transaction Objects in Broker ActiveX Control***. The properties can also be supplied by means of the property pages (see ***Using the Property Pages*** in section *Writing Applications - Broker ActiveX Control*).

Property Name	Broker ACI Field	Format	Length	API Version	Description
`AdapterError`	not used	String	8	2	
`AdCount`	not used	Long		2	
`APIVersion`	`API-VERSION`	Short		2	Possible values: 1, 2, 3, 4, 5, 6, 7, 8, 9. The default is 2. This value can be changed dynamically by setting the property. If the current value of the `Function` or `Option` property requires a minimal API version, the value of `APIVersion` will be adjusted automatically.
`BrokerID`	`BROKER-ID`	String	32	1	Target Broker ID. See *Using the Broker ID in Applications* in the ACI Programming documentation and details on TCP/IP in *Transport Methods* under *Writing Applications: Client and Server | Publish and Subscribe* in the ACI Programming documentation.
`BrokerSecurity`	`KERNELSECURITY`	String	1	7	
`ClientUserid`	`CLIENT-UID`	String	32	2	The partner's user ID.

Property Name	Broker ACI Field	Format	Length	API Version	Description
CommitTime	COMMITTIME	String	17	7	Readonly property. Time when UOW was committed. Format: YYYYMMDDHHMMSSms ms = milliseconds in Possible Values field.
CompressLevel	COMPRESSLEVEL	String	1	7	Compression level. Possible values: N/Y/0-9. The first character of the string will be used as the compression value. If you type YES, the character Y will be used and ES will be cut off. Example: Broker1.CompressLevel = "6". See also *Data Compression* under *Writing Applications: Client and Server | Publish and Subscribe* in the ACI Programming documentation.
ConvID	CONV-ID	String	16	1	Conversation ID, see *Managing Conversation Contexts* under *Writing Applications: Client and Server* in the EntireX Broker ACI Programming documentation.
ConvStatus	CONV-STAT	Short		2	Contains the status of the conversation when the RECEIVE function is complete. See *Managing Conversation Contexts* under *Writing Applications: Client and Server* in the EntireX Broker ACI Programming documentation. Possible values: 1 NEW 2 OLD 3 NONE

Property Name	Broker ACI Field	Format	Length	API Version	Description
EncryptionLevel	ENCRYPTION-LEVEL	Short		6	Possible values: 0, 1, 2. See *Encryption* under *Writing Applications using EntireX Security* in the ACI Programming documentation.
Environment	ENVIRONMENT	String	32	1	
ErrorCode	ERROR-CODE	String	8	1	Broker error code, see *Error Handling* under *Writing Applications: Client and Server | Publish and Subscribe* in the ACI Programming documentation.
ErrorMsg	not used	String	40	1	Contains the error message to the corresponding error code.
ForceLogon	FORCE-LOGON	Boolean		6	Possible values: Y, N.
Function	FUNCTION Possible values: 1 SEND 2 RECEIVE 4 UNDO 5 EOC 6 REGISTER 7 DEREGISTER 8 VERSION 9 LOGON 10 LOGOFF 13 SYNCPOINT 14 KERNELVERS 17 SEND_PUBLICATION 18 RECEIVE_PUBLICATION 19 SUBSCRIBE 20 UNSUBSCRIBE 21 CONTROL_PUBLICATION	Short		1	The functions to be performed by Broker.
LocaleString	LOCALE-STRING	String	40	4	For sending locale strings to the broker (see ***Using Internationalization*** in

<table>
<tr><th>Property Name</th><th>Broker ACI Field</th><th>Format</th><th>Length</th><th>API Version</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>Writing Applications - Broker ActiveX Control).</td></tr>
<tr><td>MessageId</td><td>not used</td><td>String</td><td>32</td><td>2</td><td></td></tr>
<tr><td>MessageType</td><td>not used</td><td>String</td><td>32</td><td>2</td><td></td></tr>
<tr><td>NewPassword</td><td>NEWPASSWORD</td><td>String</td><td>32</td><td>2</td><td></td></tr>
<tr><td>Option</td><td>OPTION
Possible values:<table><tr><td>0</td><td>NULL</td></tr><tr><td>1</td><td>MSG</td></tr><tr><td>2</td><td>HOLD</td></tr><tr><td>3</td><td>IMMED</td></tr><tr><td>4</td><td>QUIESCE</td></tr><tr><td>5</td><td>EOC</td></tr><tr><td>6</td><td>CANCEL</td></tr><tr><td>7</td><td>LAST</td></tr><tr><td>8</td><td>NEXT</td></tr><tr><td>9</td><td>PREVIEW</td></tr><tr><td>10</td><td>COMMIT</td></tr><tr><td>11</td><td>BACKOUT</td></tr><tr><td>12</td><td>SYNC</td></tr><tr><td>13</td><td>ATTACH</td></tr><tr><td>14</td><td>DELETE</td></tr><tr><td>15</td><td>EOCCANCEL</td></tr><tr><td>16</td><td>QUERY</td></tr><tr><td>17</td><td>SETUSTATUS</td></tr><tr><td>18</td><td>ANY</td></tr><tr><td>19</td><td>no longer used</td></tr><tr><td>20</td><td>DURABLE</td></tr><tr><td>21</td><td>CHECKSERVICE</td></tr></table></td><td>Short</td><td></td><td>1</td><td></td></tr>
<tr><td>Password</td><td>PASSWORD</td><td>String</td><td>32</td><td>1</td><td></td></tr>
<tr><td>ReceiveBufferLength</td><td>RECEIVE-LENGTH</td><td>Long</td><td></td><td>3</td><td>Length of the receive buffer.</td></tr>
<tr><td>ReceiveBufferSize</td><td>RECEIVE-LENGTH</td><td>Short</td><td></td><td>1</td><td>This is an old property. Can be used instead of ReceiveBufferLength - for buffers with less than 32 KB only.</td></tr>
</table>

Property Name	Broker ACI Field	Format	Length	API Version	Description
ReturnDataLength	RETURN-LENGTH	Long		3	Length of returned data.
ReturnLength	RETURN-LENGTH	Short		1	This is an old property. Can be used instead of ReturnDataLength - for buffers with less than 32 KB only.
SecurityToken	SECURITY-TOKEN	String	32	2	This is handled automatically, but can be filled in by the user if required.
SendBufferSize		Short		1	No longer used.
ServerClass	SERVER-CLASS	String	32	1	These three Broker parameters form the target service.
ServerName	SERVER-NAME	String	32	1	
Service	SERVICE	String	32	1	
Store	STORE	Short		2	Possible values: 0 NULL 1 OFF 2 BROKER
Token	TOKEN	String	32	1	
UOWID	UOWID	String	16	3	
UOWStatus	UOWSTATUS Possible values: 0 NONE 1 RECEIVED 2 ACCEPTED 3 DELIVERED 4 BACKEDOUT 5 PROCESSED 6 CANCELLED 7 TIMEOUT 8 DISCARDED 9 FIRST 10 MIDDLE 11 LAST 12 ONLY	Short		3	
UOWStatusPersist	UOW-STATUS-PERSIST	Short		3	

Property Name	Broker ACI Field	Format	Length	API Version	Description
UOWTime	UWTIME	String	8	3	
UserData	USER-DATA	String	16	2	This field is not converted by the Broker. If the field contains H'00', only the data up to the first H'00' will be sent.
UserID	USER-ID	String	32	1	User ID.
UserStatus	USTATUS	String	32	3	
Wait	WAIT	String	8	1	Possible values: Yes No <n>S - waiting n Seconds (max 99999) <n>M - waiting n Minutes (Max 99999) <n>H - waiting n Hours (max 99999). See *Blocked and Non-blocked Broker Calls* under *Writing Applications: Client and Server* in the EntireX Broker ACI Programming documentation.
Topic		String		8	Required for handling with publish and subscribe.
PublicationID		String	16	8	Required for handling with publish and subscribe.
UOWStatusLife		String	8	8	