

## **webMethods EntireX**

### **Reliable RPC**

Version 10.7

October 2020

This document applies to webMethods EntireX Version 10.7 and all subsequent releases.

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

Copyright © 1997-2020 Software AG, Darmstadt, Germany and/or Software AG USA, Inc., Reston, VA, USA, and/or its subsidiaries and/or its affiliates and/or their licensors.

The name Software AG and all Software AG product names are either trademarks or registered trademarks of Software AG and/or Software AG USA, Inc. and/or its subsidiaries and/or its affiliates and/or their licensors. Other company and product names mentioned herein may be trademarks of their respective owners.

Detailed information on trademarks and patents owned by Software AG and/or its subsidiaries is located at <http://softwareag.com/licenses>.

Use of this software is subject to adherence to Software AG's licensing conditions and terms. These terms are part of the product documentation, located at <http://softwareag.com/licenses/> and/or in the root installation directory of the licensed product(s).

This software may include portions of third-party products. For third-party copyright notices, license terms, additional rights or restrictions, please refer to "License Texts, Copyright Notices and Disclaimers of Third-Party Products". For certain specific third-party license restrictions, please refer to section E of the Legal Notices available under "License Terms and Conditions for Use of Software AG Products / Copyright and Trademark Notices of Software AG Products". These documents are part of the product documentation, located at <http://softwareag.com/licenses> and/or in the root installation directory of the licensed product(s).

Use, reproduction, transfer, publication or disclosure is prohibited except as specifically provided for in your License Agreement with Software AG.

**Document ID: EXX-RELIABLERPC-107-20220422**

## Table of Contents

1 About this Documentation .....	1
Document Conventions .....	2
Online Information and Support .....	2
Data Protection .....	3
2 Overview of Reliable RPC .....	5
Introduction to Reliable RPC .....	6
Broker Configuration .....	7
3 Reliable RPC for C Wrapper .....	9
Writing a Client .....	10
Writing a Client using AUTO COMMIT .....	16
Writing a Server .....	17
4 Reliable RPC for COBOL Wrapper .....	19
Writing a Client .....	20
Writing a Server .....	26
5 Reliable RPC for DCOM Wrapper .....	27
Writing a Client .....	28
Writing a Server .....	29
6 Reliable RPC for .NET Wrapper .....	31
Writing a Client .....	32
Writing a Server .....	34
7 Reliable RPC for Java Wrapper .....	35
Writing a Client .....	36
Writing a Server .....	37
8 Reliable RPC for XML/SOAP Wrapper .....	39
Writing a Client .....	40
Writing a Server .....	40



# 1 About this Documentation

---

- Document Conventions ..... 2
- Online Information and Support ..... 2
- Data Protection ..... 3

## Document Conventions

---

Convention	Description
<b>Bold</b>	Identifies elements on a screen.
Monospace font	Identifies service names and locations in the format <code>folder.subfolder.service</code> , APIs, Java classes, methods, properties.
<i>Italic</i>	Identifies:  Variables for which you must supply values specific to your own situation or environment. New terms the first time they occur in the text. References to other documentation sources.
Monospace font	Identifies:  Text you must type in. Messages displayed by the system. Program code.
{ }	Indicates a set of choices from which you must choose one. Type only the information inside the curly braces. Do not type the { } symbols.
	Separates two mutually exclusive choices in a syntax line. Type one of these choices. Do not type the   symbol.
[ ]	Indicates one or more options. Type only the information inside the square brackets. Do not type the [ ] symbols.
...	Indicates that you can type multiple options of the same type. Type only the information. Do not type the ellipsis (...).

## Online Information and Support

---

### Product Documentation

You can find the product documentation on our documentation website at <https://documentation.softwareag.com>.

In addition, you can also access the cloud product documentation via <https://www.software-ag.cloud>. Navigate to the desired product and then, depending on your solution, go to “Developer Center”, “User Center” or “Documentation”.

### Product Training

You can find helpful product training material on our Learning Portal at <https://knowledge.softwareag.com>.

## Tech Community

You can collaborate with Software AG experts on our Tech Community website at <https://tech-community.softwareag.com>. From here you can, for example:

- Browse through our vast knowledge base.
- Ask questions and find answers in our discussion forums.
- Get the latest Software AG news and announcements.
- Explore our communities.
- Go to our public GitHub and Docker repositories at <https://github.com/softwareag> and <https://hub.docker.com/publishers/softwareag> and discover additional Software AG resources.

## Product Support

Support for Software AG products is provided to licensed customers via our Empower Portal at <https://empower.softwareag.com>. Many services on this portal require that you have an account. If you do not yet have one, you can request it at <https://empower.softwareag.com/register>. Once you have an account, you can, for example:

- Download products, updates and fixes.
- Search the Knowledge Center for technical information and tips.
- Subscribe to early warnings and critical alerts.
- Open and update support incidents.
- Add product feature requests.

## Data Protection

---

Software AG products provide functionality with respect to processing of personal data according to the EU General Data Protection Regulation (GDPR). Where applicable, appropriate steps are documented in the respective administration documentation.

---



# 2 Overview of Reliable RPC

---

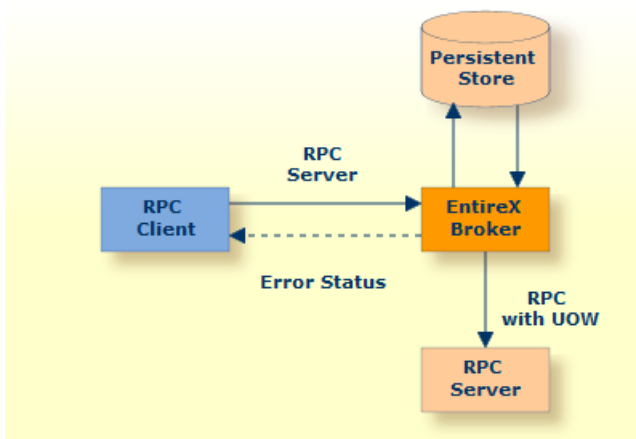
- Introduction to Reliable RPC ..... 6
- Broker Configuration ..... 7

## Introduction to Reliable RPC

In the architecture of modern e-business applications (such as SOA), loosely coupled systems are becoming more and more important. Reliable messaging is one important technology for this type of system.

Reliable RPC is the EntireX implementation of a reliable messaging system. It combines EntireX RPC technology and persistence, which is implemented with units of work (UOWs).

- Reliable RPC allows asynchronous calls (“fire and forget”)
- Reliable RPC is supported by most EntireX wrappers
- Reliable RPC messages are stored in the Broker's persistent store until a server is available
- Reliable RPC clients are able to request the status of the messages they have sent



Reliable RPC is used to send messages to a persisted Broker service. The messages are described by an IDL program that contains only `IN` parameters. The client interface object and the server interface object are generated from this IDL file, using the respective Software AG component.

Reliable RPC is enabled at runtime. The client has to set one of two different modes before issuing a reliable RPC request:

- `AUTO_COMMIT`
- `CLIENT_COMMIT`

While `AUTO_COMMIT` commits each RPC message implicitly after sending it, a series of RPC messages sent in a unit of work (UOW) can be committed or rolled back explicitly using `CLIENT_COMMIT` mode.

The server is implemented and configured in the same way as for normal RPC.

---

## Broker Configuration

---

A Broker configuration with `PSTORE` is recommended. This enables the Broker to store the messages for more than one Broker session. These messages are still available after Broker restart. The attributes `STORE`, `PSTORE`, and `PSTORE-TYPE` in the Broker attribute file can be used to configure this feature. The lifetime of the messages and the status information can be configured with the attributes `UOW-DATA-LIFETIME` and `UOW-STATUS-LIFETIME`. Other attributes such as `MAX-MESSAGES-IN-UOW`, `MAX-UOWS` and `MAX-UOW-MESSAGE-LENGTH` may be used in addition to configure the units of work. See *Broker Attributes*.

The following rules apply:

### Java

The result of the method `RPCService.getStatusOfMessage` depends on the configuration of the unit of work status lifetime. If the status is not stored longer than the message, the method returns (not available).

### C

The result of the procedure `ERXGetReliableStatus` depends on the configuration of the unit of work status lifetime in the EntireX Broker configuration. If the status is not stored longer than the message, the procedure returns the error code 00780305 (no matching UOW found).

### COBOL

The result of the generic RPC function call "RS" - get reliable status depends on the configuration of the unit of work status lifetime in the EntireX Broker configuration. See `COMM-FUNCTION`. If the status is not stored longer than the message, the function call returns the error code 00780305 (no matching UOW found).

### .NET

The result of the function `Service.GetReliableStatus` depends on the configuration of the unit of work status lifetime in the EntireX Broker configuration. If the status is not stored longer than the message, the function returns the error code 00780305 (no matching UOW found).

### DCOM

The result of the function `RPCService.get_StatusOfMessage` depends on the configuration of the unit of work status lifetime in the EntireX Broker configuration. If the status is not stored longer than the message, the function returns the error code 00780305 (no matching UOW found).



# 3

## Reliable RPC for C Wrapper

---

- Writing a Client ..... 10
- Writing a Client using AUTO COMMIT ..... 16
- Writing a Server ..... 17

## Writing a Client

---

This section shows a reliable RPC client for `CLIENT_COMMIT` mode. All methods for reliable RPC are defined in `erx.h`. The methods applicable to reliable RPC as described under *API Function Descriptions for Reliable RPC* are:

- `ERXGetReliableState`
- `ERXSetReliableState`
- `ERXReliableCommit`
- `ERXReliableRollback`
- `ERXGetReliableID`
- `ERXGetReliableStatus`

### Step 1: Base Declarations Required by the C Wrapper

#### Step 1a: Include the Generated Header File

Define the generated client header file. This header file includes the RPC runtime header file `erx.h` and defines structures and prototypes for your RPC messages.

```
/* include generated header file */
#include "cmail.h"
```

#### Step 1b: Define Global Variables to Communicate with the Client Interface Objects

```
/* Required global variables for the CLIENT interface */
ERXeReturnCode      ERXrc;
ERX_CLIENT_IDENTIFICATION  ERXClient;
ERX_SERVER_ADDRESS  ERXServer;
ERX_SERVER_ADDRESS  ERXServerDefault;
ERXCallId           ERXCallID;
ERX_ERROR_INFO      ERXErrorInfo;
```

## Step 2: Required Settings for the C Wrapper

### Step 2a: Identify the User with a Broker User ID

For *Implicit Logon*, if required in your environment, the client password can be given here. It is provided then through the RPC interface object call.

```
/* set client identification */
memset( &ERXClient, 0, sizeof(ERXClient) );
ERXClient.pUserId   = "ERX-USER";
ERXClient.pPassword = "ERX_PASS";
```

### Step 2b: Set the Broker and Service to be Called

Your application will wait a maximum of 55 seconds for a server response. If the server does not answer within this period, the broker gives your program control again with an error code 00740074.

```
ERXServer.Medium = ERX_TM_BROKER_LIBRARY;
ERXServer.ulTimeOut = 55;

/* set Broker-Id, server-name, class-name and service-name */
strcpy( (char*) ERXServer.Address.BROKER.szEtbidName, "ETB001" );
strcpy( (char*) ERXServer.Address.BROKER.szServerName, "SRV1" );
strcpy( (char*) ERXServer.Address.BROKER.szClassName, "RPC" );
strcpy( (char*) ERXServer.Address.BROKER.szServiceName, "CALLNAT" );
```

## Step 3: Register with the RPC Runtime

As a general rule, you have to register the RPC runtime before you use it. After registration, the RPC runtime holds information on a per-thread basis. See also *Using the RPC Runtime*.

```
/* register to the RPC runtime */
ERXrc = ERXRegister(ERX_CURRENT_VERSION );
If ( ERX_FAILED( ERXrc ) )
{
/* code for error handling */
}
```

#### Step 4: Broker Logon

We logon by EntireX Broker.

```
/* Logon to EntireX Broker Middleware */
ERXrc = ERXLogon( &ERXClient,
                 ERXServer.Address.BROKER_Library.szEtbidName );
if(ERX_FAILED(ERXrc))
{
/* code for error handling */
}
```

#### Step 5: Set Reliable-State

Before reliable RPC can be used, the reliable state must be set to either `ERX_RELIABLE_CLIENT_COMMIT` or `ERX_RELIABLE_AUTO_COMMIT`.

```
/* Set reliable RPC state to client commit */
ERXrc = ERXSetReliableState(ERX_RELIABLE_CLIENT_COMMIT);
if( ERX_FAILED(ERXrc) )
{
/* code for error handling */
}
```

#### Step 6: Send the RPC Message

The RPC interface object `SENDMAIL` is called as a C procedure. See *Calling Servers as Procedures or Functions*.

```
/* do the remote procedure call */
SENDMAIL( gTo, gSubject, gText);
```

#### Step 7: Get the Reliable RPC Message ID

Get the reliable RPC message ID before you commit any reliable RPC messages, otherwise the reliable ID will be lost and checking for the RPC message status will not be possible.

```
/* Get the reliable ID */
ERXrc = ERXGetReliableID( &ERXServer, pReliableID );
if( ERX_FAILED(ERXrc) )
{
/* code for error handling */
}
```



### Step 8: Check the Reliable RPC Message Status

After the reliable RPC message ID has been got, you can query the status of the reliable RPC message. This is a separate call independent of any reliable RPC messages, so we use the default server connection (`ERXServerDefault`). Valid reliable RPC message states can be found in header file `etbcbdef.h`. See *Broker ACI Control Block Definition*.

See *Using Persistence and Units of Work, Understanding UOW Status and Broker UOW Status Transition* in the platform-independent Administration documentation for more information.

```
/* Check the reliable RPC message status */
ERXrc = ERXGetReliableStatus( &ERXClient,
                             &ERXServerDefault,
                             pReliableID,
                             pReliableStatus );
if( ERX_FAILED(ERXrc) )
{
/* code for error handling */
}
```

### Step 9: Send a Second RPC message

Send a second reliable RPC message.

```
/* do the remote procedure call */
SENDMAIL( gTo, gSubject, gText);
```

### Step 10: Commit Both Reliable RPC Messages

Now we commit both reliable RPC messages. This will deliver all reliable RPC messages to the server if it is available.

```
/* Commit all made reliable RPC messages */
ERXrc = ERXReliableCommit( &ERXServer );
if( ERX_FAILED(ERXrc) )
{
/* code for error handling */
}
```

**Step 11: Reset ERX\_SERVER\_ADDRESS**

For reliable RPC, the ERX\_SERVER\_ADDRESS will be overwritten by the RPC runtime, so it is necessary to reset the ERX\_SERVER\_ADDRESS structure with the required values.

```
/*
 * After an ERXReliableCommit we have to use a new server connection
 * so we restore our default server connection for further calls.
 */
memcpy(&ERXServer, &ERXServerDefault, sizeof(ERX_SERVER_ADDRESS));
```

**Step 12: Check the Reliable RPC Message Status**

To determine that reliable RPC messages are delivered, we query the reliable RPC message status again. See also [Step 8](#) above.

**Step 13: Send a Third RPC message**

Send a third reliable RPC message.

```
/* do the remote procedure call */
SENDMAIL( gTo, gSubject, gText);
```

**Step 14: Get the Reliable RPC Message ID**

Get the reliable RPC message ID. See also [Step 7](#).

```
/* Get the reliable ID */
ERXrc = ERXGetReliableID( &ERXServer, pReliableID );
if( ERX_FAILED(ERXrc) )
{
/* code for error handling */
}
```

**Step 15: Check the Reliable RPC Message Status**

After the reliable RPC message ID has been got, query the status of the reliable RPC message again.

```
/* Check the reliable RPC message status */
ERXrc = ERXGetReliableStatus( &ERXClient,
                             &ERXServerDefault,
                             pReliableID,
                             pReliableStatus );
if( ERX_FAILED(ERXrc) )
{
/* code for error handling */
}
```

**Step 16: Roll back the Third Message**

Roll back the current reliable RPC message.

```
/* Roll back Message 3 */
ERXrc = ERXReliableRollback( &ERXServer );
if( ERX_FAILED(ERXrc) )
{
/* code for error handling */
}
```

**Step 17: Check the Reliable RPC Message Status**

After rolling back the reliable RPC message, query the status of the reliable RPC message.

```
/* Get the reliable RPC message status */
ERXrc = ERXGetReliableStatus( &ERXClient,
                             &ERXServerDefault,
                             pReliableID,
                             pReliableStatus );
if( ERX_FAILED(ERXrc) )
{
/* code for error handling */
}
```

**Step 18: Broker Logoff**

Log off from EntireX Broker.

```
/* Logoff from EntireX Broker Middleware */
ERXrc = ERXLogoff( &ERXClient,
                  ERXServerDefault.Address.BROKER_Library.szEtbidName );
if ( ERX_FAILED( ERXrc ) )
{
/* code for error handling */
}
```

**Step 19: Deregister with the RPC Runtime**

As a general rule, after using the RPC runtime you should unregister from it. This will free all resources held by the RPC runtime for the caller. See *Using the RPC Runtime* for more information.

```
/* unregister to the RPC runtime */  
ERXUnregister();
```

## Writing a Client using AUTO COMMIT

---

This section gives some hints for reliable RPC `AUTO_COMMIT` mode. It is not a complete example and shows only the correct order of reliable RPC method calls. The reliable ID to check the message status must be retrieved immediately after the reliable RPC message is sent and before any other RPC runtime calls - otherwise the reliable ID is lost and retrieving the message status is not possible.

```
/* Initialize pERXServer */  
...  
/*  
 * After initializing pERXServer with your connection settings (broker ID,  
 * server-name, class-name, service-name) create a copy of it  
 * (pERXDefaultServer). Use this copy to resolve the reliable status after  
 * a reliable RPC message.  
 */  
memcpy(pERXServer, pERXDefaultServer, sizeof(ERX_SERVER_ADDRESS));  
...  
/* Set reliable state to AUTO_COMMIT */  
ERXSetReliableState( ERX_RELIABLE_AUTO_COMMIT );  
...  
/* reliable RPC message 1 */  
SENDMAIL( gTo, gSubject, gText );  
/*  
 * The reliable ID must be resolved directly  
 * after a reliable RPC message  
 */  
ERXGetReliableID( pERXServer, pReliableID );  
...  
/* Resolve the reliable status */  
ERXGetReliableStatus( pERXClient, pERXDefaultServer, pReliableID,  
                    pReliableStatus );  
...
```

```

/* For a second AUTO_COMMIT RPC message, use a new server connection */
memcpy(pERXServer, pERXDefaultServer, sizeof(ERX_SERVER_ADDRESS));

...

/* reliable RPC message 2 */
SENDMAIL( gTo, gSubject, gText );
/*
 * The reliable ID must be resolved directly
 * after a reliable RPC message
 */
ERXGetReliableID( pERXServer, pReliableID );

...

/* Resolve the reliable status */
ERXGetReliableStatus( pERXClient, pERXDefaultServer, pReliableID,
                    pReliableStatus );

...

```

## Writing a Server

---

There are no server-side methods for reliable RPC. The server does not send back a message to the client. The server can run deferred, thus client and server do not necessarily run at the same time. If the server fails, it returns an error code greater than zero. This causes the transaction (unit of work inside the Broker) to be cancelled, and the error code is written to the user status field of the unit of work.

For writing reliable RPC servers, see *Using the C Wrapper for the Server Side (z/OS, UNIX, Windows, BS2000)*.

To execute a reliable RPC service with an RPC server, the parameter `logon` must be set to YES, see *Configuring the RPC Server* in the BS2000 Administration documentation or *Configuring the RPC Server* under *Administering the RPC Server for C*



# 4 Reliable RPC for COBOL Wrapper

---

- Writing a Client ..... 20
- Writing a Server ..... 26

## Writing a Client

---

The following steps describe how to write a COBOL reliable RPC client program with the scenario *Using the COBOL Wrapper for CICS with DFHCOMMAREA Calling Convention (z/OS and z/VSE)*:

- [Step 1: Declare the Data Structures and RPC Communication Area](#)
- [Step 2: Initialize the RPC Communication Area](#)
- [Step 3: Required Settings in the RPC Communication Area](#)
- [Step 4: Perform a Broker Logon](#)
- [Step 5: Enable Reliable RPC with CLIENT\\_COMMIT](#)
- [Step 6: Send the RPC Message](#)
- [Step 7: Check the Reliable RPC Message Status](#)
- [Step 8: Send a Second RPC Message](#)
- [Step 9: Check the Reliable RPC Message Status](#)
- [Step 10: Commit both Reliable RPC Messages](#)
- [Step 11: Send a Third RPC Message](#)
- [Step 12: Check the Reliable RPC Message Status](#)
- [Step 13: Roll Back the Third RPC Message](#)
- [Step 14: Check the Reliable RPC Message Status](#)
- [Step 15: Perform a Broker Logoff](#)



**Note:** Reliable RPC requires an explicit broker logon. See *Using Broker Logon and Logoff*.

### Step 1: Declare the Data Structures and RPC Communication Area

The customer data structures (all below COBOL label SM-COMA) must match the interfaces of the generated client interface objects with regard to format and lengths, otherwise unpredictable results will occur. See the following code snippet:

```
* Declare the customer data of the generated RPC interface (See Note 1)
01 SENDMAIL.
  02 SM-COMA.
    03 SM-TOADDRESS          PIC X(60).
    03 SM-SUBJECT           PIC X(20).
    03 SM-TEXT              PIC X(100).
* Declare RPC communication area
  02 ERX-COMMUNICATION-AREA.
    COPY ERXCOMM.
```



#### Notes:

1. As an alternative the generated IDL Interface copybooks can be used. See *Step 1: Declare IDL Structures and RPC Communication Area* under *Writing EXEC CICS LINK Clients* in the COBOL Wrapper documentation for usage examples.



## Step 2: Initialize the RPC Communication Area

See the following code snippet and refer to *Step 2: Initialize the RPC Communication Area* in the COBOL Wrapper documentation for additional hints and information.

```
* Initialize RPC communication area
INITIALIZE ERX-COMMUNICATION-AREA.
MOVE "2000"          to COMM-VERSION.
```

## Step 3: Required Settings in the RPC Communication Area

The following settings to the RPC communication area are required as a minimum to use the COBOL Wrapper. These settings have to be applied in your RPC client program. It is not possible to generate any defaults into your client interface objects:

```
* assign the broker to talk with
MOVE "localhost:1971" to COMM-ETB-BROKER-ID.

* assign the server to talk with
MOVE "RPC"           to COMM-ETB-SERVER-CLASS.
MOVE "SRV1"         to COMM-ETB-SERVER-NAME.
MOVE "CALLNAT"      to COMM-ETB-SERVICE-NAME.

* assign the user ID for Broker logon
MOVE "ERXUSER"      to COMM-USERID.
```

## Step 4: Perform a Broker Logon

```
MOVE "LO" TO COMM-FUNCTION.
EXEC CICS LINK
  PROGRAM ("COBSRVI")
  COMMAREA (ERX-COMMUNICATION-AREA)
  LENGTH (LENGTH OF ERX-COMMUNICATION-AREA)
  RESP (CICS-RESP1)
  RESP2 (CICS-RESP2)
END-EXEC.
IF WORKRESP = DFHRESP(NORMAL)
  IF (COMM-RETURN-CODE = 0) THEN
*   Perform success-handling
  ELSE
*   Perform error-handling (See Note 1)
  END-IF
ELSE
* Perform error-handling
END-IF.
```



### Notes:

1. The field `COMM-RETURN-CODE` in the RPC communication area contains the error provided by the COBOL Wrapper. For the error messages returned, see *Error Messages and Codes*.

### Step 5: Enable Reliable RPC with `CLIENT_COMMIT`

Before reliable RPC can be used, the reliable state must be set to either `ERX_RELIABLE_CLIENT_COMMIT` or `ERX_RELIABLE_AUTO_COMMIT`.

- "C" - `CLIENT_COMMIT`
- "A" - `AUTO_COMMIT`

```
* Set the reliable RPC mode
MOVE "C" TO COMM-RELIABLE-STATE.
```

### Step 6: Send the RPC Message

The RPC message is sent using the `EXEC CICS LINK` interface.

```
* Send the RPC message
MOVE DFHRESP(NORMAL) TO CICS-RESP1.
MOVE DFHRESP(NORMAL) TO CICS-RESP2.
MOVE ZEROES          TO COMM-RETURN-CODE.
EXEC CICS LINK
  PROGRAM ("SENDMAIL")
  RESP   (CICS-RESP1)
  RESP2  (CICS-RESP2)
  COMMAREA (SENDMAIL)
  LENGTH  (LENGTH OF SENDMAIL)
END-EXEC.
IF WORKRESP = DFHRESP(NORMAL)
  IF (COMM-RETURN-CODE = 0) THEN
*   Perform success-handling (See Note 1)
  ELSE
*   Perform error-handling (See Note 2)
  END-IF
ELSE
* Perform error-handling
END-IF.
```



#### Notes:

1. After successful call the `UOWID` is available in the RPC communication area field `COMM-ETB-UOW-ID`. See *The RPC Communication Area (Reference)*.
2. The field `COMM-RETURN-CODE` in the RPC communication area contains the error provided by the COBOL Wrapper. For the error messages returned, see *Error Messages and Codes*.

## Step 7: Check the Reliable RPC Message Status

To determine that reliable RPC messages are delivered, the reliable RPC message status can be queried. See *Understanding UOW Status* and *Broker UOW Status Transition* for more information.

```
MOVE DFHRESP(NORMAL) TO CICS-RESP1.
MOVE DFHRESP(NORMAL) TO CICS-RESP2.
MOVE "RS" TO COMM-FUNCTION.
MOVE ZEROES TO COMM-RETURN-CODE.
EXEC CICS LINK
  PROGRAM ("COBSRVI")
  RESP   (CICS-RESP1)
  RESP2  (CICS-RESP2)
  COMMAREA (ERX-COMMUNICATION-AREA)
  LENGTH  (LENGTH OF ERX-COMMUNICATION-AREA)
END-EXEC.
IF WORKRESP = DFHRESP(NORMAL)
  IF (COMM-RETURN-CODE = 0) THEN
*     Perform success-handling (See Note 1)
  ELSE
*     Perform error-handling (See Note 2)
  END-IF
ELSE
* Perform error-handling
END-IF.
```



### Notes:

1. After successful call the UOW status is available in the RPC communication area field COMM-ETB-UOW-STATUS. See *The RPC Communication Area (Reference)*.
2. The field COMM-RETURN-CODE in the RPC communication area contains the error provided by the COBOL Wrapper. For the error messages returned, see *Error Messages and Codes*.

## Step 8: Send a Second RPC Message

Send a second reliable RPC message. See [Step 6](#).

## Step 9: Check the Reliable RPC Message Status

Check the reliable RPC message before the commit call. See [Step 7](#).

## Step 10: Commit both Reliable RPC Messages

Now both reliable RPC messages are committed. This will deliver all reliable RPC messages to the server if it is available.

```
MOVE DFHRESP(NORMAL) TO CICS-RESP1.
MOVE DFHRESP(NORMAL) TO CICS-RESP2.
MOVE "RC" TO COMM-FUNCTION.
MOVE ZEROES TO COMM-RETURN-CODE.
EXEC CICS LINK
  PROGRAM ("COBSRVI")
  RESP   (CICS-RESP1)
  RESP2  (CICS-RESP2)
  COMMAREA (ERX-COMMUNICATION-AREA)
  LENGTH  (LENGTH OF ERX-COMMUNICATION-AREA)
END-EXEC.
IF WORKRESP = DFHRESP(NORMAL)
  IF (COMM-RETURN-CODE = 0) THEN
*   Perform success-handling (See Note 1)
  ELSE
*   Perform error-handling (See Note 2)
  END-IF
ELSE
* Perform error-handling
END-IF.
```



### Notes:

1. After successful call, both reliable RPC messages are committed. This will deliver all reliable RPC messages to the server if it is available.
2. The field `COMM-RETURN-CODE` in the RPC communication area contains the error provided by the COBOL Wrapper. For the error messages returned, see *Error Messages and Codes*.

## Step 11: Send a Third RPC Message

Send a third reliable RPC message. See [Step 6](#).

## Step 12: Check the Reliable RPC Message Status

Check the reliable RPC message before the rollback call. See [Step 7](#).

**Step 13: Roll Back the Third RPC Message**

Roll back the current reliable RPC message.

```

MOVE DFHRESP(NORMAL) TO CICS-RESP1.
MOVE DFHRESP(NORMAL) TO CICS-RESP2.
MOVE "RR" TO COMM-FUNCTION.
MOVE ZEROES TO COMM-RETURN-CODE.
EXEC CICS LINK
  PROGRAM ("COBSRVI")
  RESP   (CICS-RESP1)
  RESP2  (CICS-RESP2)
  COMMAREA (ERX-COMMUNICATION-AREA)
  LENGTH  (LENGTH OF ERX-COMMUNICATION-AREA)
END-EXEC.
IF WORKRESP = DFHRESP(NORMAL)
  IF (COMM-RETURN-CODE = 0) THEN
*   Perform success-handling
  ELSE
*   Perform error-handling (See Note 1)
  END-IF
ELSE
* Perform error-handling
END-IF.

```

**Step 14: Check the Reliable RPC Message Status**

When the rollback call is returned, check whether it was successful or not.

```

MOVE DFHRESP(NORMAL) TO CICS-RESP1.
MOVE DFHRESP(NORMAL) TO CICS-RESP2.
MOVE "RS" TO COMM-FUNCTION.
MOVE ZEROES TO COMM-RETURN-CODE.
EXEC CICS LINK
  PROGRAM ("COBSRVI")
  RESP   (CICS-RESP1)
  RESP2  (CICS-RESP2)
  COMMAREA (ERX-COMMUNICATION-AREA)
  LENGTH  (LENGTH OF ERX-COMMUNICATION-AREA)
END-EXEC.
IF WORKRESP = DFHRESP(NORMAL)
  IF (COMM-RETURN-CODE = 0) THEN
*   Perform success-handling
  ELSE
*   Perform error-handling (See Note 1)
  END-IF
ELSE
* Perform error-handling
END-IF.

```

**Notes:**

1. The field `COMM-RETURN-CODE` in the RPC communication area contains the error provided by the COBOL Wrapper. For the error messages returned, see *Error Messages and Codes*.

**Step 15: Perform a Broker Logoff**

```
MOVE "LF" TO COMM-FUNCTION.
EXEC CICS LINK
  PROGRAM ("COBSRVI")
  COMMAREA (ERX-COMMUNICATION-AREA)
  LENGTH (LENGTH OF ERX-COMMUNICATION-AREA)
  RESP (CICS-RESP1)
  RESP2 (CICS-RESP2)
END-EXEC.
IF WORKRESP = DFHRESP(NORMAL)
  IF (COMM-RETURN-CODE = 0) THEN
*   Perform success-handling
  ELSE
*   Perform error-handling (See Note 1)
  END-IF
ELSE
*   Perform error-handling
END-IF.
```

**Notes:**

1. The field `COMM-RETURN-CODE` in the RPC communication area contains the error provided by the COBOL Wrapper. For the error messages returned, see *Error Messages and Codes*.

## Writing a Server

---

There are no server-side methods for reliable RPC. The server does not send back a message to the client. The server can run deferred, thus client and server do not necessarily run at the same time. If the server fails, it returns an error code greater than zero. This causes the transaction (unit of work inside the Broker) to be cancelled, and the error code is written to the user status field of the unit of work. For writing reliable RPC servers, see *Using the COBOL Wrapper for the Server Side*.

To execute a reliable RPC service with an RPC server, the parameter `logon` (LOGN under CICS) must be set to YES. See `logon` under *z/OS (CICS | Batch | IMS) | BS2000* in the respective RPC Server documentation.

# 5 Reliable RPC for DCOM Wrapper

---

- Writing a Client ..... 28
- Writing a Server ..... 29

## Writing a Client

---

All methods for reliable RPC are available on the interface object. See *Standard Wrapper Properties* for details. The methods are

- `RPCService.Reliable` (put and get)
- `RPCService.ReliableCommit`
- `RPCService.ReliableRollback`
- `RPCService.MessageID`
- `RPCService.get_StatusOfMessage`

Create Broker object and interface object:

```
// DCOM Wrapper Object
MAILClass mail;
mail.Logon();
```

Disable reliable RPC:

```
mail.Reliable = mail.RELIABLE_OFF;
```

Enable reliable RPC with `AUTO_COMMIT` or `CLIENT_COMMIT`:

```
mail.Reliable = mail.RELIABLE_AUTO_COMMIT;
mail.Reliable = mail.RELIABLE_CLIENT_COMMIT;
```

The first RPC message:

```
mail.SENDMAIL("mail receiver", "Subject 1", "Text 1");
```

Check the status: get the message ID first and use it to retrieve the status:

```
String messageID = mail.MessageID;
String messageStatus = mail.get_StatusOfMessage(messageID);
System.out.println("Status: " + messageStatus + ", id: " + messageID);
```

The second RPC message:



```
mail.SENDMAIL("mail receiver", "Subject 2", "Text 2");
```

Commit the two messages:

```
mail.ReliableCommit();
```

Check the status again for the same message ID:

```
messageStatus = mail.get_StatusOfMessage(messageID);  
System.out.println("Status: " + messageStatus + ", id: " + messageID);
```

The third RPC message.

```
mail.SENDMAIL("mail receiver", "Subject 3", "Text 3");
```

Check the status: get the new message ID and use it to retrieve the status:

```
messageID = mail.MessageID();  
messageStatus = mail.get_StatusOfMessage(messageID);  
System.out.println("Status: " + messageStatus + ", id: " + messageID);
```

Roll back the third message and check status:

```
mail.ReliableRollback();  
messageStatus = mail.getStatusOfMessage(messageID);  
System.out.println("Status: " + messageStatus + ", id: " + messageID);  
mail.logoff();
```

### Limitations

- All program calls that are called in the same transaction (CLIENT\_COMMIT) must be in the same IDL library.
- It is not allowed to switch from CLIENT\_COMMIT to AUTO\_COMMIT in a transaction.
- Messages (IDL programs) must have only IN parameters.

## Writing a Server

---

Not applicable.



# 6 Reliable RPC for .NET Wrapper

---

- Writing a Client ..... 32
- Writing a Server ..... 34

## Writing a Client

---

All methods for reliable RPC are available on the service class object. See description of class `Service` for details. The methods are:

- `Service.SetReliableState`
- `Service.getReliableState`
- `Service.ReliableCommit`
- `Service.ReliableRollback`
- `Service.GetReliableId`
- `Service.GetReliableStatus`

Example:

Create Broker object and interface object.

```
Mail mail = new Mail();
mail.service.broker.logon();
```

Enable reliable RPC with `CLIENT_COMMIT`:

```
mail.SetReliableState(Service.ReliableState.RELIABLE_AUTO_COMMIT);
```

The first RPC message.

```
mail.Sendmail("mail receiver", "subject 1", "Text 1");
```

Check the status: get the message ID first and use it to retrieve the status.

```
StringBuilder reliableID = new StringBuilder();
StringBuilder reliableStatus = new StringBuilder();

mail.service.GetReliableID(ref reliableID);
mail.service.GetReliableStatus(reliableID, ref reliableStatus);
Console.Out.WriteLine("Reliable ID = " + reliableID.ToString());
Console.Out.WriteLine("Reliable Status = " + reliableStatus.ToString());
```

The second RPC message.

```
mail.Sendmail("mail receiver", "subject 2", "Text 2");
```

Commit the two messages.

```
mail.service.ReliableCommit();
```

Check the status again for the same message ID.

```
mail.service.GetReliableStatus(reliableID, ref reliableStatus);
Console.Out.WriteLine("Reliable ID = " + reliableID.ToString());
Console.Out.WriteLine("Reliable Status = " + reliableStatus.ToString());
```

The third RPC message.

```
mail.Sendmail("mail receiver", "subject 3", "Text 3");
```

Check the status: get the new message ID and use it to retrieve the status.

```
mail.service.GetReliableID(ref reliableID);
mail.service.GetReliableStatus(reliableID, ref reliableStatus);
Console.Out.WriteLine("Reliable ID = " + reliableID.ToString());
Console.Out.WriteLine("Reliable Status = " + reliableStatus.ToString());
```

Roll back the third message and check status.

```
mail.service.ReliableRollback();
mail.service.GetReliableStatus(reliableID, ref reliableStatus);

Console.Out.WriteLine("Reliable ID = " + reliableID.ToString());
Console.Out.WriteLine("Reliable Status = " + reliableStatus.ToString());

mail.service.broker.logoff();
```

## Limitations

1. All program calls that are called in the same transaction (CLIENT\_COMMIT) must be in the same IDL library.
2. It is not allowed to switch from CLIENT\_COMMIT to AUTO\_COMMIT in a transaction.
3. Messages (IDL programs) must have IN parameters only.

## Writing a Server

---

There are no server-side methods for reliable RPC. The server does not send back a message to the client. The server can run deferred, thus client and server do not necessarily run at the same time. If the server fails, it throws an exception. This causes the transaction (unit of work inside the broker) to be cancelled, and the error code is written to the user status field of the unit of work.

# 7 Reliable RPC for Java Wrapper

---

- Writing a Client ..... 36
- Writing a Server ..... 37

## Writing a Client

---

All methods for reliable RPC are available on the interface object. See `RPCService` for details. The methods are:

- `RPCService.setReliable`
- `RPCService.getReliable`
- `RPCService.reliableCommit`
- `RPCService.reliableRollback`
- `RPCService.getMessageId`
- `RPCService.getStatusOfMessage`

Create Broker object and interface object.

```
Broker broker = new Broker(Mail.DEFAULT_BROKERID, userID);
Mail mail = new Mail(broker);
broker.logon();
```

Enable reliable RPC with `CLIENT_COMMIT`

```
mail.setReliable(RPCService.RELIABLE_CLIENT_COMMIT);
```

The first RPC message.

```
mail.sendmail("mail receiver", "Subject 1", "Text 1");
```

Check the status: get the message ID first and use it to retrieve the status.

```
String messageID = mail.getMessageID();
String messageStatus = mail.getStatusOfMessage(messageID);
System.out.println("Status: " + messageStatus + ", id: " + messageID);
```

The second RPC message.

```
mail.sendmail("mail receiver", "Subject 2", "Text 2");
```

Commit the two messages.



```
mail.reliableCommit();
```

Check the status again for the same message ID.

```
messageStatus = mail.getStatusOfMessage(messageID);
System.out.println("Status: " + messageStatus + ", id: " + messageID);
```

The third RPC message.

```
mail.sendmail("mail receiver", "Subject 3", "Text 3");
```

Check the status: get the new message ID and use it to retrieve the status.

```
messageID = mail.getMessageID();
messageStatus = mail.getStatusOfMessage(messageID);
System.out.println("Status: " + messageStatus + ", id: " + messageID);
```

Roll back the third message and check status.

```
mail.reliableRollback();
messageStatus = mail.getStatusOfMessage(messageID);
System.out.println("Status: " + messageStatus + ", id: " + messageID);
broker.logoff();
```

### Limitations

1. All program calls that are called in the same transaction (CLIENT\_COMMIT) must be in the same IDL library.
2. It is not allowed to switch from CLIENT\_COMMIT to AUTO\_COMMIT in a transaction.
3. Messages (IDL programs) have IN parameters only.

## Writing a Server

The server implementation consists of the four classes:

- `Abstract<IDL library name>Server`
- `<IDL library name>`
- `<IDL library name>Server`
- `<IDL library name>Stub`

Add your implementation to the class `<IDL library name>Server`. There are no server-side methods for reliable RPC. The server does not send back a message to the client. The server can run deferred, thus client and server do not necessarily run at the same time. If the server fails, it

throws an exception. This causes a cancel of the transaction (unit of work inside the Broker) and the error code is written to the user status field of the unit of work.

# 8

## Reliable RPC for XML/SOAP Wrapper

---

- Writing a Client ..... 40
- Writing a Server ..... 40

See also *Reliable RPC for XML/SOAP Wrapper* in the XML/SOAP Wrapper documentation.

## Writing a Client

---

The client has to set the parameter `exx-reliable` in the HTTP header or in the XML/SOAP payload. See *The HTTP Interface* for list of supported HTTP headers and parameters.

## Writing a Server

---

Not applicable.