

RPC Broker



Technical Manual

Software Version 1.1

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**Department of Veterans Affairs (VA)
Office of Information and Technology (OIT)
Product Development (PD)**

Revision History

Documentation Revisions

Table 1. Documentation Revision History

Date	Revision	Description	Authors
03/26/2014	5.2	<p>Tech Edit:</p> <ul style="list-style-type: none">• Changed references from "Broker.hlp" to "Broker_1_1.chm" throughout.• Updated other help references and instructions related to updated Broker help; replacing WinHelp (Broker.hlp) to HTML help (Broker_1_1.zip with Broker_1_1.chm file and Broker_1_1-HTML_Files.zip with multiple HTML files).• Changed references from "programmer" to "developer" throughout.• Made other minor grammar and punctuation corrections throughout.	<ul style="list-style-type: none">• Technical Writer: T. B.
12/04/2013	5.1	<p>Tech Edit:</p> <ul style="list-style-type: none">• Updated document for RPC Broker Patch XWB*1.1*50 based on feedback from H Westra.• Removed references related to Virgin Installations throughout.• Updated file name references throughout.• Removed distribution files that are obsolete or no longer distributed throughout.• Updated RPC Broker support on the following software:<ul style="list-style-type: none">○ Microsoft® XP and 7.0 (operating system) throughout.○ Microsoft® Office Products 2010 throughout.○ Changed references from "Borland" to "Embarcadero" and updated support for Delphi Versions XE5, XE4, XE3, and XE2 throughout.• Updated all images for prior Microsoft® Windows operating systems to Windows 7 dialogues.	<ul style="list-style-type: none">• Developer: H. W.• Technical Writer: T. B.

Date	Revision	Description	Authors
		<ul style="list-style-type: none"> Updated Section 3.2. Updated Section 4.1. Updated Table 7. Updated the option list and descriptions in Section 6 and Table 8. Reformatted Section 7. Added the TContextorControl component to the list in Section 9.1. Updated Section 10.3. Updated Sections 13.3.1 and 13.3.2. Redacted document for the following information: <ul style="list-style-type: none"> Names (replaced with role and initials). Production IP addresses and ports. Intranet websites. RPC Broker 1.1	
07/25/2013	5.0	Tech Edit: <ul style="list-style-type: none"> Baselined document. Updated all styles and formatting to follow current internal team style template. Updated all organizational references. 	<ul style="list-style-type: none"> Developer: H. W. Technical Writer: T. B.
08/26/2008	4.3	Updates for RPC Broker Patch XWB*1.1*50: <ul style="list-style-type: none"> Added new properties. Support for Delphi 5, 6, 7, 2005, 2006, and 2007. Changed references form Patch 47 to Patch 50 where appropriate. 	<ul style="list-style-type: none"> Project Manager: J. Sch. Developer: J. I. SQA: G. S. Technical Writer: T. B.
07/03/2008	4.2	Updates for RPC Broker Patch XWB*1.1*47: <ul style="list-style-type: none"> No content changes required; no new public classes, methods, or properties added to those available in XWB*1.1*40. Bug fixes to the ValidAppHandle function and fixed memory leaks. Support added for Delphi 2005, 2006, and 2007. Reformatted document. Changed references form Patch 40 to Patch 47 where appropriate. 	<ul style="list-style-type: none"> Project Manager: J. Sch. Developer: J. I. SQA: G. S. Technical Writer: T. B.

Date	Revision	Description	Authors
08/29/2006	4.1	Added new REMOTE APPLICATION file (#8994.5) to the file list. This file was released with RPC Broker Patch XWB*1.1*45 as part of the Broker Security Enhancement (BSE) Project.	<ul style="list-style-type: none"> • Project Manager: J. She. • Project Planner: L. R. • Developers: W. F. & J. I. • SQA: M. A. • Functional Analyst: L. G. • Technical Writer: T. B. • Security Engineer: J. M. • Release Managers: M. P. and L. T.
02/28/2005	4.0	<p>Revised Version for RPC Broker Patches XWB*1.1*35 and 40.</p> <p>Also, reviewed document and edited for the "Data Scrubbing" and the "PDF 508 Compliance" projects.</p> <ul style="list-style-type: none"> • Data Scrubbing—Changed all patient/user TEST data to conform to standards and conventions as indicated below: <ul style="list-style-type: none"> ○ The first three digits (prefix) of any Social Security Numbers (SSN) start with "000" or "666." ○ Patient or user names are formatted as follows: XWBPATIENT,[N] or XWBUSER,[N] respectively, where the N is a number written out and incremented with each new entry (e.g., XWBPATIENT, ONE, XWBPATIENT, TWO, etc.). ○ Other personal demographic-related data (e.g., addresses, phones, IP addresses, etc.) were also changed to be generic. • PDF 508 Compliance—The final PDF document was recreated and now supports the minimum requirements to be 508 compliant (i.e., accessibility tags, language selection, alternate text for all images/icons, fully functional Web links, successfully passed Adobe Acrobat Quick Check). 	<ul style="list-style-type: none"> • Project Manager: J. Sch. • Developer: J. I. • Technical Writer: T. B.
05/08/2002	3.0	Revised Version for RPC Broker Patch XWB*1.1*26.	<ul style="list-style-type: none"> • Developer: J. I. • Technical Writer: T. B.
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09/--/1997	1.0	Initial RPC Broker Version 1.1 software release.	<ul style="list-style-type: none"> • Developer: J. I. • Technical Writer: T. B.

Patch Revisions

For the current patch history related to this software, see the Patch Module on FORUM.

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Orientation

How to Use this Manual

Throughout this manual, advice and instructions are offered regarding the use of the Remote Procedure Call (RPC) Broker 1.1 Development Kit (BDK) and the functionality it provides for Veterans Health Information Systems and Technology Architecture (VistA).

Intended Audience

The intended audience of this manual is the following stakeholders:

- Product Development (PD)—VistA legacy development teams.
- Information Resource Management (IRM)—System administrators at Department of Veterans Affairs (VA) sites who are responsible for computer management and system security on the VistA M Servers.
- Information Security Officers (ISOs)—Personnel at VA sites responsible for system security.
- Product Support (PS).

Legal Requirements

There are no special legal requirements involved in the use of the RPC Broker.

Disclaimers

This manual provides an overall explanation of configuring RPC Broker and the functionality contained in RPC Broker 1.1; however, no attempt is made to explain how the overall VistA programming system is integrated and maintained. Such methods and procedures are documented elsewhere. We suggest you look at the various VA Internet and Intranet SharePoint sites and Websites for a general orientation to VistA. For example, visit the Office of Information and Technology (OIT) Product Development (PD) Intranet Website.





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Documentation Conventions

This manual uses several methods to highlight different aspects of the material:

- Various symbols are used throughout the documentation to alert the reader to special information. The following table gives a description of each of these symbols:

Table 2. Documentation Symbol Descriptions

Symbol	Description
	NOTE/REF: Used to inform the reader of general information including references to additional reading material.
	CAUTION / RECOMMENDATION / DISCLAIMER: Used to caution the reader to take special notice of critical information.

- Descriptive text is presented in a proportional font (as represented by this font).
- Conventions for displaying TEST data in this document are as follows:
 - The first three digits (prefix) of any Social Security Numbers (SSN) begin with either "000" or "666."
 - Patient and user names are formatted as follows: [Application Name]PATIENT,[N] and [Application Name]USER,[N] respectively, where "Application Name" is defined in the Approved Application Abbreviations document and "N" represents the first name as a number spelled out and incremented with each new entry. For example, in RPC Broker (XWB) test patient and user names would be documented as follows: XWBPATIENT,ONE; XWBPATIENT,TWO; XWBPATIENT,THREE; etc.
- "Snapshots" of computer online displays (i.e., screen captures/dialogues) and computer source code are shown in a *non*-proportional font and may be enclosed within a box.
- User's responses to online prompts are **bold** typeface and highlighted in yellow (e.g., **<Enter>**).
- Emphasis within a dialogue box is **bold** typeface and highlighted in blue (e.g., **STANDARD LISTENER: RUNNING**).
- Some software code reserved/key words are **bold** typeface with alternate color font.
- References to "**<Enter>**" within these snapshots indicate that the user should press the **<Enter>** key on the keyboard. Other special keys are represented within < > angle brackets. For example, pressing the **PF1** key can be represented as pressing **<PF1>**.
- Author's comments are displayed in italics or as "callout" boxes.



NOTE: Callout boxes refer to labels or descriptions usually enclosed within a box, which point to specific areas of a displayed image.

- This manual refers to the M programming language. Under the 1995 American National Standards Institute (ANSI) standard, M is the primary name of the MUMPS programming language, and MUMPS is considered an alternate name. This manual uses the name M.

- All uppercase is reserved for the representation of M code, variable names, or the formal name of options, field/file names, and security keys (e.g., the XUPROGMODE security key).



NOTE: Other software code (e.g., Delphi/Pascal and Java) variable names and file/folder names can be written in lower or mixed case.

Documentation Navigation

This document uses Microsoft® Word's built-in navigation for internal hyperlinks. To add **Back** and **Forward** navigation buttons to your toolbar, do the following:

1. Right-click anywhere on the customizable Toolbar in Word 2010 (not the Ribbon section).
2. Select **Customize Quick Access Toolbar** from the secondary menu.
3. Press the drop-down arrow in the "Choose commands from:" box.
4. Select **All Commands** from the displayed list.
5. Scroll through the command list in the left column until you see the **Back** command (green circle with arrow pointing left).
6. Click/Highlight the **Back** command and press **Add** to add it to your customized toolbar.
7. Scroll through the command list in the left column until you see the **Forward** command (green circle with arrow pointing right).
8. Click/Highlight the Forward command and press **Add** to add it to your customized toolbar.
9. Press **OK**.

You can now use these **Back** and **Forward** command buttons in your Toolbar to navigate back and forth in your Word document when clicking on hyperlinks within the document.




NOTE: This is a one-time setup and is automatically available in any other Word document once you install it on the Toolbar.

Commonly Used Terms

The following is a list of terms and their descriptions that you may find helpful while reading the RPC Broker documentation:

Table 3. Commonly used RPC Broker Terms

Term	Description
Client	A single term used interchangeably to refer to a user, the workstation (i.e., PC), and the portion of the program that runs on the workstation.
Component	A software object that contains data and code. A component may or may not be visible.  REF: For a more detailed description, see the <i>Embarcadero Delphi for Windows User Guide</i> .
GUI	The Graphical User Interface application that is developed for the client workstation.
Host	The term Host is used interchangeably with the term Server.
Server	The computer where the data and the RPC Broker remote procedure calls (RPCs) reside.



REF: See the "[Glossary](#)" for additional terms and definitions.

How to Obtain Technical Information Online

Exported VistA M Server-based software file, routine, and global documentation can be generated using Kernel, MailMan, and VA FileMan utilities.



NOTE: Methods of obtaining specific technical information online is indicated where applicable under the appropriate section.

REF: See the *RPC Broker Technical Manual* for further information.

Help at Prompts

VistA M Server-based software provides online help and commonly used system default prompts. Users are encouraged to enter question marks at any response prompt. At the end of the help display, you are immediately returned to the point from which you started. This is an easy way to learn about any aspect of VistA M Server-based software.

Obtaining Data Dictionary Listings

Technical information about VistA M Server-based files and the fields in files is stored in data dictionaries (DD). You can use the List File Attributes option on the Data Dictionary Utilities submenu in VA FileMan to print formatted data dictionaries.



REF: For details about obtaining data dictionaries and about the formats available, see the "List File Attributes" chapter in the "File Management" section of the *VA FileMan Advanced User Manual*.

Assumptions

This manual is written with the assumption that the reader is familiar with the following:

- VistA computing environment:
 - Kernel—VistA M Server software
 - Remote Procedure Call (RPC) Broker—VistA Client/Server software
 - VA FileMan data structures and terminology—VistA M Server software
- Microsoft Windows environment
- M programming language
- Object Pascal programming language
- Object Pascal programming language/Embarcadero Delphi Integrated Development Environment (IDE)—RPC Broker

Reference Materials

Readers who wish to learn more about RPC Broker should consult the following:

- *RPC Broker Release Notes*
- *RPC Broker Installation Guide*
- *RPC Broker Systems Management Guide*
- *RPC Broker Technical Manual* (this manual)
- *RPC Broker User Guide*

- *RPC Broker Developer's Guide*—BDK Online Help, which provides an overview of development with the RPC Broker. The help is distributed in two zip files:
 - Broker_1_1.zip (i.e., Broker_1_1.chm)—This zip file contains the standalone online HTML help file. Unzip the contents and double-click on the **Broker_1_1.chm** file to open the help.
 - Broker_1_1-HTML_Files.zip—This zip file contains the associated HTML help files. Unzip the contents in the same directory and double-click on the **index.htm** file to open the help.

You may want to make an entry for **Broker_1_1.chm** in Delphi's Tools Menu, to make it easily accessible from within Delphi. To do this, use Delphi's **Tools | Configure Tools** option and create a new menu entry.

- RPC Broker VA Intranet website.

This site provides announcements, additional information (e.g., Frequently Asked Questions [FAQs], advisories), documentation links, archives of older documentation and software downloads.

VistA documentation is made available online in Microsoft Word format and in Adobe Acrobat Portable Document Format (PDF). The PDF documents *must* be read using the Adobe Acrobat Reader, which is freely distributed by Adobe Systems Incorporated at the following Website: <http://www.adobe.com/>

VistA documentation can be downloaded from the VA Software Document Library (VDL) Website: <http://www.va.gov/vdl/>

VistA documentation and software can also be downloaded from the Product Support (PS) anonymous directories.

1 Introduction

The RPC Broker Technical Manual" provides descriptive information and instructions on the use of the Remote Procedure Call (RPC) Broker (also referred to as "Broker") software within the VA's Veterans Health Information Systems and Technology Architecture (VistA) environment. This document is intended for systems managers—Information Resource Management (IRM) personnel who are responsible for implementing and maintaining this software, application programmers, and developers. It acquaints system managers with the utilities, software structure, and functionality of the RPC Broker system modules, including information about the routines and files that comprise this software. It also has information about the software's structure and recommendations regarding its efficient use. Additional information on installation, security, management features, and other requirements is also included.

1.1 Product Overview

The RPC Broker is considered to be part of the infrastructure of VistA. It establishes a common and consistent foundation for communication between clients and VistA M Servers.

The RPC Broker is a bridge connecting the client application front-end on the workstation (e.g., Delphi GUI applications) to the M-based data and business rules on the server. It links one part of a program running on a workstation to its counterpart on the server. The client and the server can be, and most often are, written in different computer languages. Therefore, the RPC Broker bridges the gap between the traditionally proprietary VistA and COTS/HOST products.

1.1.1 RPC Broker Includes

- A common communications driver for the M server interface that handles the device-specific characteristics of the supported communications protocol.
- An interface component on the M server, separate from the communications driver, that interprets client messages, executes the required code, and eventually returns data to the communications driver.
- A common file on the M server that all applications use to store the information about the queries to which they respond (i.e., REMOTE PROCEDURE file [#8994]).
- The Client Agent application that runs on client workstations, supporting single signon.
- The TRPCBroker component for Delphi, enabling development of client applications that can communicate via the RPC Broker.
- A dynamic link library (DLL) that provides access to RPC Broker functionality for development environments other than Delphi.

2 Implementation and Maintenance

The "RPC Broker Installation Guide" provides detailed information regarding the installation of the RPC Broker. It also contains many requirements and recommendation regarding how the Broker should be configured. Be sure to read the Installation Guide before attempting to install the RPC Broker.

2.1 Site Parameters

The following two areas of the Broker require site parameter review and configuration:

Table 4. RPC Broker—Site parameter references

Functional Area	Documentation Reference
Broker Listeners	See the "RPC Broker Site Parameters File" section in the <i>RPC Broker Systems Management Guide</i> .
Single Signon	See the "Integrated Auto Signon For Multiple Users" section in the <i>RPC Broker Systems Management Guide</i> .

2.2 Performance and Scalability

Current performance statistics are limited. However, results indicate that the processing time and resources consumed by the Broker itself are minimal. The RPC Broker does not introduce any additional overhead to the messages sent between the client and the server.

The RPC Broker listener does not tend to get overloaded, because it jobs off incoming requests to another process and then keeps listening for another request. This action is only limited by the number of partitions the M configuration supports.



Performance should instead be measured at the application level to determine the amount of resources consumed by VistA client/server applications that use the Broker. Performance and scalability, from a site's point of view, have been impacted by the load introduced by application executing on the host system, as opposed to the load introduced by the RPC Broker itself.

3 Files


3.1 VistA M Server Files

The RPC Broker consists of a single global with three files. This chapter describes the RPC Broker files including the file number, file name, global location, and description of the files.

Table 5. RPC Broker—Files and Globals

File #	File Name	Global Location	Description	Data w/ File	Data Setting
8994	REMOTE PROCEDURE	^XWB(8994,	<p>This file is used as a repository of server-based procedures (i.e., remote procedure calls [RPCs]) in the context of the Client/Server architecture. All RPCs used by any site-specific client/server application software using the RPC Broker interface must be registered and stored in this file. Applications running on client workstations can invoke (call) the RPCs in this file to be executed by the server and the results are returned to the client application. Each RPC is associated with an entry point (i.e., ROUTINE with optional TAG).</p> <p> NOTE: The RPC subfield (#19.05) of the OPTION file (#19) points to the RPC field (#.01) of the REMOTE PROCEDURE file (#8994).</p>	NO  NOTE: RPCs are distributed and installed as separate components during the installation of the RPC Broker.	NA
8994.1	RPC BROKER SITE PARAMETERS	^XWB(8994.1,	Site managers can use this file to configure and adjust many characteristics of an RPC Broker installation/implementation at a site.	NO	NA
8994.5	REMOTE	^XWB(8994.5,	This file was introduced as	NO	NA

File #	File Name	Global Location	Description	Data w/ File	Data Setting
	APPLICATION		<p>part of the Broker Security Enhancement (BSE) Project. It was released with RPC Broker Patch XWB*1.1*45. This file helps better secure remote user/visitor access to Remote VistA M Servers initiated by RPC Broker-based GUI applications. Remote user/visitor access permits applications where users need to access a large number of sites and do so <i>without</i> requiring a separate Access and Verify code at each site. Once BSE is fully implemented, those RPC Broker-based applications that require remote/visitor access <i>must</i> have an entry in this file with a one-way hash of a secure phrase. Identification of an entry in the file is based on the application passing in the original phrase which is then hashed and used for a cross-reference lookup. The application must have at least one entry in the CALLBACKTYPE Multiple field (#1) indicating all of the following:</p> <ul style="list-style-type: none"> Connection type Valid address for the authenticating server Connection port number. <p>This information is necessary for the Remote VistA M Server to directly connect the Authenticating VistA M Server to obtain the demographic information necessary to create or match the user/visitor entry in the NEW PERSON file (#200). The application also</p>		

File #	File Name	Global Location	Description	Data w/ File	Data Setting
			<p>specifies the desired context option for the user/visitor. This is given to the remote user/visitor instead of forcing the application to determine how to set this value.</p> <p> NOTE: This is a very small file, containing only entries for those applications that use the Broker Security Enhancement (BSE) for remote visitor's access mechanism. The total number of entries should be significantly under 20.</p>		

3.2 Client Files

3.2.1 End-User Workstation



NOTE: RPC Broker 1.0 released the initial end-user client workstation files (XWB1_0.EXE; 1996). RPC Broker 1.1 released an updated version (XWB1_1WS.EXE; 1997). Thus, this installation has not been updated since 1997.

- ..\Program Files (x86)\Vista\Broker
 - CLAGENT.exe
 - CLAGENT.hlp
 - rpctest.exe
 - rpctest.hlp
- ..\Windows\System32
 - Bapi32.dll

3.2.2 Programmer Workstation



NOTE: RPC Broker 1.1 supports Delphi Versions: XE5, XE4, XE3, and XE2.

Files installed vary depending on BDK patch level, installation choices, and Delphi version. In general, files are placed in the following directories:

- ..\Program Files (x86)\Vista\BDK32\Help
- ..\Program Files (x86)\Vista\BDK32\Samples\BrokerEx
- ..\Program Files (x86)\Vista\BDK32\Samples\SilentSignOn
- ..\Program Files (x86)\Vista\Broker\rpctest.exe
- ..\Program Files (x86)\Vista\BDK32\Source

After installing the Broker Development Kit (BDK) in a developer workstation, Delphi stores .bpl and .dcp files in the default working paths for the Delphi Integrated Development Environment (IDE). The exact path and file name depends on the versions of Delphi and the version of Microsoft® Windows you are running. For example, with Delphi XE5 running on Microsoft® Windows 7, the default paths and file names are:

- C:\Users\Public\Public Documents\RAD Studio\12.0\Bpl\SharedRPCBroker_DXE5.bpl
- C:\Users\Public\Public Documents\RAD Studio\12.0\Bpl\ SharedRPCBroker _RXE5.bpl
- C:\Users\Public\Public Documents\RAD Studio\12.0\Bpl\XWB_DXE5.bpl
- C:\Users\Public\Public Documents\RAD Studio\12.0\Bpl\XWB_RXE5.bpl
- C:\Users\Public\Public Documents\RAD Studio\12.0\Dcp\ SharedRPCBroker _DXE5.dcp
- C:\Users\Public\Public Documents\RAD Studio\12.0\Dcp\ SharedRPCBroker _RXE5.dcp
- C:\Users\Public\Public Documents\RAD Studio\12.0\Dcp\XWB_DXE5.dcp
- C:\Users\Public\Public Documents\RAD Studio\12.0\Dcp\XWB_RXE5.dcp

4 Global Translation, Journaling, and Protection

4.1 *Translation*

Translation is recommended for the sole RPC Broker global (i.e., ^XWB global). The ^XWB global has the potential to be read-intensive as more and more remote procedures are added to it in the future.



REF: Consult the Cookbook recommendations for suggestions regarding journaling, translation, and replication; the information here may not apply.

4.2 *Journaling*

Journaling of this global is not required, since the ^XWB global, for the most part is static (except during the addition of new remote procedures).

4.3 *Protection*

The following global protection should be set:

Table 6. RPC Broker—Global Information


Global Name	Caché Protection
^XWB	Owner: RWD Group: N World: N Network: RWD

5 Routines

This section contains a list of the routines exported with the RPC Broker (and includes routines exported with the M2M Broker software, entries are shaded in [Table 7](#)). A brief description of the routines is provided.

Table 7. RPC Broker—Routines

Routine	Description
XWB2HL7	This routine contains various functions and procedures that are used by the Broker for Remote Data Views (RDV) via HL7.
XWB2HL7A	This routine contains various functions and procedures that are used by the Broker for Remote Data Views (RDV) via HL7.
XWB2HL7B	This routine contains various functions and procedures that are used by the Broker for Remote Data Views (RDV) via HL7.
XWB2HL7C	This routine contains various functions and procedures that are used by the Broker for Remote Data Views (RDV) via HL7.
XWB45PO	This post-install routine was released with RPC Broker Patch XWB*1.1*45. It contains REMOVE APPLICATION file (#8994.5) entries that are used for development and testing by the Broker Security Enhancement (BSE) Project.
XWBBRK	This routine contains calls that are designed to parse the various attributes of the Broker messages. All of this information is used internally. In the case of large arrays sent by the client, the function BREAD is used to read in the variable length subscripts and values.
XWBBRK2	This routine is a continuation of XWBBRK. The main entry point (i.e., CAPI actually calls the application RPC.
XWBCAGNT	Server code for RPC Broker client agent application.
XWBDLOG	Debug Logging for Broker
XWBDRPC	This routine contains various functions and procedures that are used for deferred RPCs by the Broker for Remote Data Views (RDV).
XWBEXMPL	This routine is used to support the Broker Example application. The Broker Example application is used to test the RPC Broker connectivity, actions, and RPCs. It is distributed with the Broker.
XWBFM	This routine contains entry points used to interface to the VA FileMan database server.
XWBLIB	This routine contains various functions and procedures used by the Broker. It is best described as a library or depository.
XWBM2MC	M2M Broker Client APIs.
XWBM2MEZ	This routine was released with RPC Broker Patch XWB*1.1*45. It contains various functions and procedures for M-to-M Broker server connections that are used by the Broker Security Enhancement (BSE) Project.
XWBM2MS	M2M Broker Server.

Routine	Description
XWBM2MT	M2M Broker Example.
XWBPRS	RPC Broker Message Parser.
XWBPRS2	RPC Broker Message Parser.
XWBRL	M2M Broker Link Methods.
XWBRM	M2M Broker Server Request Manager. This routine was enhanced with RPC Broker Patch XWB*1.1*45 for the Broker Security Enhancement (BSE) Project.
XWBRMX	M2M Broker Server Request Manager.
XWBRPC	M2M Broker Server Message Request Handler (MRH).
XWBRPCC	M2M Broker Client Utilities.
XWBRW	Read/Write for Broker TCP.
XWBSEC	This routine contains various functions and procedures used by the Broker. Calls in this routine are used for client/server security.
XWBTCP	This routine contains functions and procedures used to control the Broker TCP/IP Listener process. Systems personnel can use calls in this routine to start, stop, and debug the Broker process.
XWBTCPC	This job is started for each Broker request. The Listener process (i.e., XWBTCPL) receives a connection request from a client and then dispatch, using the M JOB command, XWBTCPC to manage the rest of the interaction.
XWBTCPL	This is the Broker Listener process. IRM starts this job. It remains running on a system listening for TCP/IP connection requests. Once a request is received, this routine starts a separate process to manage the rest of the connection, and then returns to "listening" for a new request.
XWBTCPM	TCP/IP Process Handler.
XWBTCPM1	Support for XWBTCPM.
XWBTCPM2	Test WEB Service. This routine was enhanced with RPC Broker Patch XWB*1.1*45 for the Broker Security Enhancement (BSE) Project.
XWBTCPMT	This routine was released with RPC Broker Patch XWB*1.1*43. Test a connection.
XWBUTL	M2M Programmer Utilities.
XWBVL	M2M Broker Server Link Utility.
XWBVLC	M2M Broker Client.
XWBVLL	M2M Broker Listener.
XWBZ1	<p>Archive: This routine supports the RPC Broker 1.0 Echo application, which was originally used to test RPC Broker connectivity, actions, and APIs.</p> <p> NOTE: The Echo client application is <i>not</i> distributed with RPC Broker 1.1; it was replaced by the RPC Test application (i.e., rpctest.exe). It is listed here for historical purposes only.</p>

6 Exported Options

The following options are exported with the RPC Broker:

Table 8. RPC Broker—Exported Options (listed alphabetically by option name)

Name	Menu Text	Type
XWB BROKER EXAMPLE	RPC BROKER PROGRAMMING EXAMPLE	Broker (Client/Server) (See Section 6.1.)
XWB DEBUG EDIT	Debug Parameter Edit	VistA M Server: Run Routine (See Section 6.3.5.)
XWB EGCHO	RPC BROKER DEMO/TEST	Broker (Client/Server) (See Section 6.4.)
XWB LISTENER EDIT	RPC Listener Edit	VistA M Server: Edit (See Section 6.3.1.)
XWB LISTENER STARTER	Start All RPC Broker Listeners	VistA M Server: Run Routine (See Section 6.3.2.)
XWB LISTENER STOP ALL	Stop All RPC Broker Listeners	VistA M Server: Run Routine (See Section 6.3.3.)
XWB LOG CLEAR	Clear XWB Log Files	VistA M Server: Run Routine (See Section 6.3.4.)
XWB LOG VIEW	View XWB Log	VistA M Server: Run Routine (See Section 6.3.6.)
XWB M2M CACHE LISTENER	Start M2M RPC Broker Cache Listener	VistA M Server: Run Routine (See Section 6.5.)
XWB MENU	RPC Broker Management Menu	VistA M Server: Menu (See Section 6.3.)
XWB RPC TEST	RPC	Broker (Client/Server) (See Section 6.2.)

Broker client/server applications are Type "B" options (i.e., Broker client/server options) in the OPTION file (#19):

- User *must* have the client/server application option assigned to them as with any other assigned option in VistA.
- Client/Server application only runs for those users who are allowed to activate it.



NOTE: The client/server application options are not displayed in the user's menu tree.

6.1 XWB BROKER EXAMPLE

The RPC BROKER PROGRAMMING EXAMPLE option [XWB BROKER EXAMPLE] is a Broker (Client/Server) option. It supports the Broker Example (BrokerEx) demonstration program provided in the Broker Development Kit (BDK). Developers should assign this option to themselves, if they want to try out the BrokerEx application. For programmers who have the XUPROGMODE security key, however, assigning this option to themselves is not necessary.

6.2 XWB RPC TEST

The RPC option [XWB RPC TEST] is a Broker (Client/Server) option. It is a tool that can be used to verify and test the Broker client/server connection and signon process. It displays information about the client and the server and can be a useful debugging tool for IRM. The rpctest.exe application on the client workstation runs the RPC Broker Diagnostic application.

It is recommended that the XWB RPC TEST option be given to users running Broker-based VistA client/server applications. To enable remote troubleshooting by IRM for all users, you can put this option on the Common menu (i.e., System Command Options menu [XUCOMMAND]). This enables any user to run the rpctest.exe application on their workstation at your request.

6.3 XWB MENU

The RPC Broker Management Menu [XWB MENU] is for system managers. It contains the following options:

Figure 1. RPC Broker Management Menu option [XWB MENU]

Select RPC Broker Management Menu Option:

```
RPC Listener Edit
Start All RPC Broker Listeners
Stop All RPC Broker Listeners
Clear XWB Log Files
Debug Parameter Edit
View XWB Log
```




NOTE: This menu was introduced with RPC Broker Patch XWB*1.1*9 and updated with subsequent RPC Broker patches.

6.3.1 XWB LISTENER EDIT

The RPC Listener Edit option [XWB LISTENER EDIT] creates or edits listener entries in the RPC BROKER SITE PARAMETERS file (#8994.1).



REF: For more information on this option, see the *RPC Broker Systems Management Guide*.

6.3.2 XWB LISTENER STARTER

The Start All RPC Broker Listeners option [XWB LISTENER STARTER] automatically starts all listeners configured in the RPC BROKER SITE PARAMETERS file (#8994.1). This option first **stops** any of these listeners that may be running, and then starts all of them up.



NOTE: TaskMan *must* be running to use this option.



NOTE: This option was introduced with patch XWB*1.1*9.



REF: For more information on this option, see the *RPC Broker Systems Management Guide*.

6.3.3 XWB LISTENER STOP ALL

The Stop All RPC Broker Listeners option [XWB LISTENER STOP ALL] stops all running listeners configured in the RPC BROKER SITE PARAMETERS file (#8994.1) set to automatically start.

6.3.4 XWB LOG CLEAR

The Clear XWB Log Files option [XWB LOG CLEAR] clears (KILLs) the XWB log files.

6.3.5 XWB DEBUG EDIT

The Debug Parameter Edit option [XWB DEBUG EDIT] edits the Broker debug parameter (XWBDEBUG).

6.3.6 XWB LOG VIEW

The View XWB Log option [XWB LOG VIEW] allows the user to view the debug log files that the Broker can set. The XWBDEBUG parameter *must* be set for log files to be recorded.

6.4 XWB EGCHO

The RPC BROKER DEMO/TEST option [XWB EGCHO] is a Broker Client/Server option. It supports development and testing of new versions of the RPC Broker using restricted Remote Procedure Calls (RPCs).

6.4.1 Historical Use

The RPC BROKER DEMO/TEST option [XWB EGCHO] was originally used to run the Echo client application, which was first released with RPC Broker 1.0. It was used to test RPC Broker connectivity, actions, and APIs. It was replaced by the RPC Test application (i.e., rpctest.exe).

It called the following RPCs:

- XWB EGCHO LIST
- XWB EGCHO BIG LIST
- XWB EGCHO STRING
- XWB EGCHO MEMO
- XWB EGCHO SORT LIST
- XWB GET VARIABLE VALUE



REF: For more information on the RPC Test application (i.e., rpctest.exe), see Section [6.2](#).

6.5 XWB M2M CACHE LISTENER



NOTE: This option is for Caché/NT only. It calls STRT^XWBVLL() and is jobbed off.

The Start M2M RPC Broker Cache Listener option [XWB M2M CACHE LISTENER] starts the RPC Broker M2M listener. It prompts the user for the port number, and it provides a default value used for M2M.

6.6 *Exported RPCs*

The RPC Broker distributes the following remote procedure calls (RPCs):

XWB ARE RPCS AVAILABLE	XWB EXAMPLE SORT NUMBERS
XWB CREATE CONTEXT	XWB EXAMPLE TRAP PARAMS
XWB DEFERRED CLEAR	XWB EXAMPLE WPTXT
XWB DEFERRED CLEAR ALL	XWB FILE LIST
XWB DEFERRED GETDATA	XWB FILENAME CHECK
XWB DEFERRED RPC	XWB GET BROKER INFO
XWB DEFERRED STATUS	XWB GET VARIABLE VALUE
XWB DIRECT RPC	XWB IM HERE
XWB EGCHO BIG LIST	XWB IS RPC AVAILABLE
XWB EGCHO LIST	XWB M2M EXAMPLE LARRY
XWB EGCHO MEMO	XWB M2M EXAMPLE REF
XWB EGCHO SORT LIST	XWB REMOTE CLEAR
XWB EGCHO STRING	XWB REMOTE GETDATA
XWB EXAMPLE BIG TEXT	XWB REMOTE RPC
XWB EXAMPLE ECHO STRING	XWB REMOTE STATUS CHECK
XWB EXAMPLE GET LIST	XWB RPC LIST
XWB EXAMPLE GLOBAL SORT	

7 Archiving and Purging

7.1 *Archiving*

There are no software-specific archiving procedures or recommendations for the following RPC Broker components:

- ^XWB global
- REMOTE PROCEDURE (#8994)
- RPC BROKER SITE PARAMETERS file (#8994.1)

7.2 *Purging*

There are no software-specific purging procedures or recommendations for the following RPC Broker components:

- ^XWB global
- REMOTE PROCEDURE file (#8994)
- RPC BROKER SITE PARAMETERS file (#8994.1)

8 Callable Routines

The RPC Broker does *not* provide any callable M routines. However, other programming interfaces are provided (e.g., Delphi components, DLL, Pascal functions, and RPCs).



REF: For information on these other programming interfaces, see the "[External Interfaces](#)" section.

9 External Interfaces

The following external interfaces to RPC Broker functionality are provided:

9.1 *RPC Broker Components*

RPC Broker 1.1 (fully patched) provides programmers with the capability to develop new VistA client/server software using the following RPC Broker Delphi components in the 32-bit environment (listed alphabetically):

- TCCOWRPCBroker
- TContextorControl
- TRPCBroker (original component)
- TSharedBroker
- TSharedRPCBroker
- TXWBRichEdit



NOTE: These RPC Broker components wrap the functionality of the Broker resulting in a more modularized and orderly interface. Those components derived from the original TRPCBroker component, inherit the TRPCBroker properties and methods.

These RPC Broker components (with the exception of TXWBRichEdit) provide all functionality needed for client applications to communicate with VistA M servers via the RPC Broker. All of these components are compatible with Embarcadero Delphi XE2 and greater.



NOTE: As of RPC Broker Patch XWB*1.1*50, this version of the Broker supports Delphi XE5, XE4, XE3, and XE2.



CAUTION: This statement defines the extent of support relative to use of Delphi. The Office of Information and Technology (OIT) only supports the Broker Development Kit (BDK) running in the currently offered version of Delphi and the immediately previous version of Delphi. This level of support became effective 06/12/2000.

Sites may continue to use outdated versions of the RPC Broker Development Kit but do so with the understanding that support is not be available and that continued use of outdated versions do not afford features that can be essential to effective client/server operations in the VistA environment. An archive of old (no longer supported) Broker Development Kits are maintained in the VA Intranet Broker Archive.



REF: For more information on the Broker components, see the *RPC Broker User Guide* and the *RPC Broker Developer's Guide* (i.e., BDK online help; Broker_1_1.chm).

9.2 *RPC Broker Dynamic Link Library (DLL)*

The RPC Broker DLL (BAPI32.DLL) provides access to RPC Broker functionality for development environments other than Delphi.



REF: For more information on the RPC Broker DLL, see the *RPC Broker User Guide* and the *RPC Broker Developer's Guide* (i.e., BDK online help; Broker_1_1.chm).

9.3 *Pascal Functions*

The following Pascal functions are provided by the TRPCBroker component:

- GetServerInfo function
- Splash Screen functions: SplashOpen and SplashClose
- Piece function
- Translate function
- Encryption functions: Decrypt and Encrypt



REF: For more information on these Pascal functions, see the *RPC Broker User Guide* and the *RPC Broker Developer's Guide* (i.e., BDK online help; Broker_1_1.chm).

9.4 *RPC Broker Remote Procedures*

The following RPC is provided for use by developers:

XWB GET VARIABLE VALUE



REF: For more information, see the *RPC Broker User Guide* and the *RPC Broker Developer's Guide* (i.e., BDK online help; Broker_1_1.chm).

10 External Relations

10.1 Relationship to Other Software

The RPC Broker software was developed to aid the VistA development community and Information Resources Management (IRM). It is considered to be part of the VistA infrastructure. Other infrastructure products include:

- Kernel
- Kernel Toolkit
- VA FileMan
- MailMan

The RPC Broker is used by all VistA client/server applications. The RPC Broker fully integrates with Kernel 8.0 and VA FileMan 22.0.

It is possible that the use of RPCs is also extended to *non*-client/server applications. In this case, the REMOTE PROCEDURE file (#8994) *must* be present for those applications to function correctly.

10.2 Relationship with Kernel and VA FileMan

Before installing the RPC Broker, the following software must be in place and fully patched:

- Kernel 8.0
- Kernel Toolkit 7.3
- VA FileMan 22.0

10.3 Relationships with Operating Systems

On the client side, it was decided that the 32-bit Microsoft® Windows environment would be the supported platform. Thus, the client portions of the RPC Broker are compatible with the following Microsoft® Windows operating systems:

- Windows 7
- Windows XP

On the server side, the RPC Broker supports the following ANSI M environments:

- InterSystems Caché for:
 - NT
 - Linux
 - OpenVMS
- Greystone Technology MUMPS (GT.M) on Linux

10.4 DBA Approvals and Integration Agreements (IAs)

The Database Administrator (DBA) maintains a list of Integration Agreements (IAs) or mutual agreements between software developers allowing the use of internal entry points or other software-specific features that are not available to the general programming public.

10.4.1 IAs—Current List for RPC Broker as Custodian

To obtain a current list of IA to which the RPC Broker (XWB) software is a custodian, perform the following procedure:

1. Sign on to the **FORUM** system.
2. Go to the **DBA** menu [DBA].
3. Select the **Integration Agreements Menu** option [DBA IA ISC].
4. Select the **Custodial Package Menu** option [DBA IA CUSTODIAL MENU].
5. Choose the **ACTIVE by Custodial Package** option [DBA IA CUSTODIAL].
6. When prompted for a package, enter **XWB** or **RPC BROKER**.
7. All current IAs to which the RPC Broker software is custodian are listed.

10.4.2 IAs—Detailed Information

To obtain detailed information on a specific integration agreement:

1. Sign on to the **FORUM** system.
2. Go to the **DBA** menu [DBA].
3. Select the **Integration Agreements Menu** option [DBA IA ISC].
4. Select the **Inquire** option [DBA IA INQUIRY].
5. When prompted for "INTEGRATION REFERENCES," enter the specific integration agreement number of the IA you would like to display.
6. The option then lists the full text of the IA you requested.

10.4.3 IAs—Current List for RPC Broker as Subscriber

To obtain the current list of IAs, if any, to which the RPC Broker software is a subscriber, perform the following procedure:

1. Sign on to the **FORUM** system.
2. Go to the **DBA** menu [DBA].
3. Select the **Integration Agreements Menu** option [DBA IA ISC].
4. Select the **Subscriber Package Menu** option [DBA IA SUBSCRIBER MENU].
5. Choose the **Print ACTIVE by Subscribing Package** option [DBA IA SUBSCRIBER].
6. When prompted with "START WITH SUBSCRIBING PACKAGE," enter **XWB** or **RPC BROKER** (uppercase).
7. When prompted with "GO TO SUBSCRIBING PACKAGE," enter **XWB** or **RPC BROKER** (uppercase).
8. All current IAs to which the RPC Broker (XWB) software is a subscriber are listed.

11 Internal Relations

No options in the RPC Broker product assume that the entry/exit logic of another option has already occurred.

12 Software-wide Variables

The RPC Broker does *not* create any software-wide variables that have received Programming Standards and Conventions Committee (SACC) exemptions.

13 Software Product Security

13.1 Security Management

There are no special legal requirements involved in the use of the RPC Broker software.

13.2 Mail Groups and Alerts

There are no mail groups exported or alerts associated with the RPC Broker software.

13.3 Remote Systems

13.3.1 Connections

The RPC Broker M server process:

- Allows connections from client applications.
- Authenticates client application connection as any normal logon requires.
- Allows client applications to use any remote procedure call (RPC) authorized to the application, if the application is authorized to the signed-on user.
- Exchanges data (typically) between clients and the RPC Broker server.
- Allows clients can be anywhere on VA's TCP/IP network.
- Uses encryption when a user's Access and Verify codes are sent from the client to the server.
- Provides an encryption API for developer to use in their own applications to encode and decode messages passed between client and server.

Security with the RPC Broker is a four-part process:

1. Client workstations *must* send a valid connection request to the M Server.
2. Users *must* have valid Access and Verify codes.
3. Users *must* be valid users of a VistA client/server application.
4. Any remote procedure call *must* be registered and valid for the application being executed.



REF: For more information regarding Broker security, see Chapter 2, "Security," in the *RPC Broker Systems Management Guide*.

13.3.2 Remote Data Views

The RPC Broker can be used to facilitate invocation of Remote Procedure Calls on a remote server. Applications can use either of the following RPCs to pass information between servers:

- XWB DIRECT RPC
- XWB REMOTE RPC

These RPC pass the following:

- Desired remote server.
- Desired remote RPC.
- Parameters for the remote RPC.

Communications between local and remote servers is as follows:

1. RPC Broker on the local server passes the remote RPC name and parameters to the remote server using VistA HL7.
2. VistA HL7 sends any results from the remote server back to the local server.
3. RPC Broker on the local server passes the results back to the client application.



NOTE: The XWB DIRECT RPC and XWB REMOTE RPC are available only on a controlled subscription basis.

13.4 Interfaces

No *non-VA* products are embedded in or required by the RPC Broker software, other than those provided by the underlying operating systems.

13.5 Electronic Signatures

There are no electronic signatures used within the RPC Broker software.

13.6 Security Keys

There are *no* specific security keys exported with the RPC Broker software. However, to bypass security for development purposes, we recommend client/server application developers be assigned the XUPROGMODE security key.

All users assigned the XUPROGMODE security key can do the following:

- Run any VistA client/server application, regardless of whether it is in their menu tree or not.
- Access any RPC without regard to the application context.

13.7 File Security

The RPC Broker establishes the following file security:

Table 9. RPC Broker—File Security

Number	Name	DD	RD	WR	DEL	LAYGO	AUDIT
8994	REMOTE PROCEDURE	@	@	@	@	@	@
8994.1	RPC BROKER SITE PARAMETERS	@	@	@	@	@	@
8994.5	REMOTE APPLICATION	@	@	@	@	@	@



REF: For more information on these files, see the "[VistA M Server Files](#)" topic in Chapter [3](#), "[Files](#)."

13.8 Official Policies

- Modification of any part of the RPC Broker software is *strongly* discouraged.
- Distribution of the RPC Broker software is unrestricted.
- The VHA IT Architecture Statement of Direction for FY98 prescribes "*Use of Kernel Broker for client-server communication...*"
- As per the Software Engineering Process Group/Software Quality Assurance (SEPG/SQA) Standard Operating Procedure (SOP) 192-039—Interface Control Registration and Approval (effective 01/29/01), application programmers *must* not alter any HealthVet VistA Class I software code.

Glossary

Term	Definition
CLIENT	A single term used interchangeably to refer to the user, the workstation, and the portion of the program that runs on the workstation. In an object-oriented environment, a client is a member of a group that uses the services of an unrelated group. If the client is on a local area network (LAN), it can share resources with another computer (server).
COMPONENT	An object-oriented term used to describe the building blocks of GUI applications. A software object that contains data and code. A component may or may not be visible. These components interact with other components on a form to create the GUI user application interface.
DHCP	D ynamic H ost C onfiguration P rotocol.
DLL	D ynamic L ink L ibrary. A DLL allows executable routines to be stored separately as files with a DLL extension. These routines are only loaded when a program calls for them. DLLs provide several advantages: <ol style="list-style-type: none">1. DLLs help save on computer memory, since memory is only consumed when a DLL is loaded. They also save disk space. With static libraries, your application absorbs all the library code into your application so the size of your application is greater. Other applications using the same library also carry this code around. With the DLL, you do <i>not</i> carry the code itself; you have a pointer to the common library. All applications using it then share one image.2. DLLs ease maintenance tasks. Because the DLL is a separate file, any modifications made to the DLL do <i>not</i> affect the operation of the calling program or any other DLL.3. DLLs help avoid redundant routines. They provide generic functions that can be used by a variety of programs.
GUI	G raphical U ser I nterface. A type of display format that enables users to choose commands, initiate programs, and other options by selecting pictorial representations (icons) via a mouse or a keyboard.
ICON	A picture or symbol that graphically represents an object or a concept.
REMOTE PROCEDURE CALL	A remote procedure call (RPC) is essentially M code that may take optional parameters to do some work and then return either a single value or an array back to the client application.
SERVER	The computer where the data and the Business Rules reside. It makes resources available to client workstations on the network. In VistA, it is an entry in the OPTION file (#19). An automated mail protocol that is activated by sending a message to a server at another location with the "S.server" syntax. A server's activity is specified in the OPTION file (#19) and can be the running of a routine or the placement of data into a file.

Term	Definition
USER ACCESS	<p>This term is used to refer to a limited level of access to a computer system that is sufficient for using/operating software, but does not allow programming, modification to data dictionaries, or other operations that require programmer access. Any of VistA's options can be locked with a security key (e.g., XUPROGMODE, which means that invoking that option requires programmer access).</p> <p>The user's access level determines the degree of computer use and the types of computer programs available. The Systems Manager assigns the user an access level.</p>
USER INTERFACE	<p>The way the software is presented to the user, such as Graphical User Interfaces that display option prompts, help messages, and menu choices. A standard user interface can be achieved by using Embarcadero's Delphi Graphical User Interface to display the various menu option choices, commands, etc.</p>
WINDOW	<p>An object on the screen (dialogue) that presents information such as a document or message.</p>



REF: For a list of commonly used terms and definitions, see the OIT Master Glossary VA Intranet Website.

For a list of commonly used acronyms, see the VA Acronym Lookup Intranet Website.

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