TIBCO Rendezvous®

Java Reference

Software Release 8.4
February 2012

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Important Information

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Preface

TIBCO Rendezvous® is a messaging infrastructure product.

TIBCO is proud to announce the latest release of TIBCO Rendezvous®. This release is the latest in a long history of TIBCO products that leverage the power of the Information Bus® to enable truly event-driven IT environments. To find out more about how TIBCO Rendezvous and other TIBCO products are powered by TIB® technology, please visit us at www.tibco.com.

This manual describes the TIBCO Rendezvous API for Java programmers. It is part of the documentation set for Rendezvous Software Release 8.4.0.

Topics

Manual Organization

The organization of this book mirrors the underlying object structure of the Rendezvous Java API. Each chapter describes a group of closely related objects and their methods.

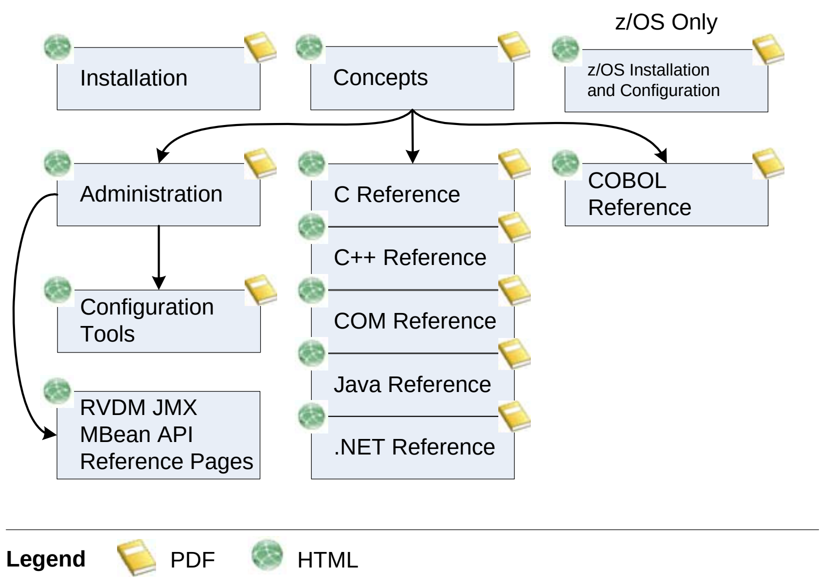
Within each chapter, methods are grouped with their objects.

Related Documentation

This section lists documentation resources you may find useful.

TIBCO Rendezvous Documentation

The documentation road map shows the relationships between the books and online references in this product's documentation set.



The following documents form the Rendezvous documentation set:

- *TIBCO Rendezvous Concepts*

  Read this book first. It contains basic information about Rendezvous components, principles of operation, programming constructs and techniques, advisory messages, and a glossary. All other books in the documentation set refer to concepts explained in this book.

- *TIBCO Rendezvous C Reference*

  Detailed descriptions of each datatype and function in the Rendezvous C API. Readers should already be familiar with the C programming language, as well as the material in *TIBCO Rendezvous Concepts*.

- *TIBCO Rendezvous C++ Reference*

  Detailed descriptions of each class and method in the Rendezvous C++ API. The C++ API uses some datatypes and functions from the C API, so we recommend the *TIBCO Rendezvous C Reference* as an additional resource. Readers should already be familiar with the C++ programming language, as well as the material in *TIBCO Rendezvous Concepts*.

- *TIBCO Rendezvous Java Reference*

  Detailed descriptions of each class and method in the Rendezvous Java language interface. Readers should already be familiar with the Java programming language, as well as the material in *TIBCO Rendezvous Concepts*.

- *TIBCO Rendezvous .NET Reference*

  Detailed descriptions of each class and method in the Rendezvous .NET interface. Readers should already be familiar with either C# or Visual Basic .NET, as well as the material in *TIBCO Rendezvous Concepts*.

- *TIBCO Rendezvous COM Reference*

  Detailed descriptions of each class and method in the Rendezvous COM component. Readers should already be familiar with the programming environment that uses COM and OLE automation interfaces, as well as the material in *TIBCO Rendezvous Concepts*.

- *TIBCO Rendezvous Administration*

  Begins with a checklist of action items for system and network administrators. This book describes the mechanics of Rendezvous licensing, network details, plus a chapter for each component of the Rendezvous software suite. Readers should have *TIBCO Rendezvous Concepts* at hand for reference.

- *TIBCO Rendezvous Configuration Tools*

  Detailed descriptions of each Java class and method in the Rendezvous configuration API, plus a command line tool that can generate and apply XML documents representing component configurations. Readers should already be familiar with the Java programming language, as well as the material in *TIBCO Rendezvous Administration*.

- *TIBCO Rendezvous Installation*

  Includes step-by-step instructions for installing Rendezvous software on various operating system platforms.

- *TIBCO Rendezvous Release Notes*

  Lists new features, changes in functionality, deprecated features, migration and compatibility information, closed issues and known issues.

Typographical Conventions

The following typographical conventions are used in this manual.

Table 1   General Typographical Conventions

Convention	Use
TIBCO_HOME *ENV_HOME* *TIBRV_HOME*	Many TIBCO products must be installed within the same home directory. This directory is referenced in documentation as *TIBCO_HOME*. The value of *TIBCO_HOME* depends on the operating system. For example, on Windows systems, the default value is `C:\tibco`. Other TIBCO products are installed into an *installation environment*. Incompatible products and multiple instances of the same product are installed into different installation environments. An environment home directory is referenced in documentation as *ENV_HOME*. The default value of *ENV_HOME* depends on the operating system. For example, on Windows systems the default value is `C:\tibco`. TIBCO Rendezvous installs into a version-specific directory inside *TIBCO_HOME*. This directory is referenced in documentation as *TIBRV_HOME*. The value of *TIBRV_HOME* depends on the operating system. For example on Windows systems, the default value is `C:\tibco\rv\8.4`.
`code font`	Code font identifies commands, code examples, filenames, pathnames, and output displayed in a command window. For example: Use `MyCommand` to start the foo process.
`bold code font`	Bold code font is used in the following ways: • In procedures, to indicate what a user types. For example: Type **`admin`**. • In large code samples, to indicate the parts of the sample that are of particular interest. • In command syntax, to indicate the default parameter for a command. For example, if no parameter is specified, `MyCommand` is enabled: `MyCommand [`**`enable`**` | disable]`

Table 1 General Typographical Conventions (Cont'd)

Convention	Use
italic font	Italic font is used in the following ways: • To indicate a document title. For example: See *TIBCO FTL Concepts*. • To introduce new terms For example: A portal page may contain several portlets. *Portlets* are mini-applications that run in a portal. • To indicate a variable in a command or code syntax that you must replace. For example: `MyCommand` *PathName*
Key combinations	Key name separated by a plus sign indicate keys pressed simultaneously. For example: Ctrl+C. Key names separated by a comma and space indicate keys pressed one after the other. For example: Esc, Ctrl+Q.
	The note icon indicates information that is of special interest or importance, for example, an additional action required only in certain circumstances.
	The tip icon indicates an idea that could be useful, for example, a way to apply the information provided in the current section to achieve a specific result.
	The warning icon indicates the potential for a damaging situation, for example, data loss or corruption if certain steps are taken or not taken.

Table 2 Syntax Typographical Conventions

Convention	Use
`[ ]`	An optional item in a command or code syntax. For example: `MyCommand [optional_parameter] required_parameter`
`|`	A logical OR that separates multiple items of which only one may be chosen. For example, you can select only one of the following parameters: `MyCommand para1 | param2 | param3`

Table 2 Syntax Typographical Conventions

Convention	Use

`{ }`	A logical group of items in a command. Other syntax notations may appear within each logical group.
	
	For example, the following command requires two parameters, which can be either the pair `param1` and `param2`, or the pair `param3` and `param4`.
	
	`MyCommand {param1 param2} | {param3 param4}`
	
	In the next example, the command requires two parameters. The first parameter can be either `param1` or `param2` and the second can be either `param3` or `param4`:
	
	`MyCommand {param1 | param2} {param3 | param4}`
	
	In the next example, the command can accept either two or three parameters. The first parameter must be `param1`. You can optionally include `param2` as the second parameter. And the last parameter is either `param3` or `param4`.
	
	`MyCommand param1 [param2] {param3 | param4}`

Connecting with TIBCO Resources

How to Join TIBCOmmunity

TIBCOmmunity is an online destination for TIBCO customers, partners, and resident experts. It is a place to share and access the collective experience of the TIBCO community. TIBCOmmunity offers forums, blogs, and access to a variety of resources. To register, go to http://www.tibcommunity.com.

How to Access All TIBCO Documentation

You can access TIBCO documentation here:

http://docs.tibco.com

How to Contact TIBCO Support

For comments or problems with this manual or the software it addresses, contact TIBCO Support as follows:

- For an overview of TIBCO Support, and information about getting started with TIBCO Support, visit this site:

  http://www.tibco.com/services/support

- If you already have a valid maintenance or support contract, visit this site:

  https://support.tibco.com

  Entry to this site requires a user name and password. If you do not have a user name, you can request one.

Chapter 1 Concepts

This chapter presents concepts specific to the TIBCO Rendezvous® Java language interface. For concepts that pertain to Rendezvous software in general, see the book *TIBCO Rendezvous Concepts*.

Topics

Implementations

Rendezvous Java language interface offers several implementations. Table 3 summarizes and compares them. To specify an implementation, see Archive Files on page 23, and Tibrv.open() on page 37.

Table 3 Implementations (Sheet 1 of 2)

Aspect	JNI (Native) Preferred	JNI (Native) Backward Compatibility	Java
Suggested Usage	Use in most situations.	Use only for backward compatibility, when it is impractical to migrate to the JNI preferred implementation.	Use only for situations that require `rva`.
Coding	A thin Java layer serves as a programming interface to an underlying C implementation.		Implemented in Java.
Primary Runtime Environment	Independent application	Independent application or browser applet	Downloadable browser applet
Scope of Functionality	Maximal coverage of C functionality. Exception: I/O events		Covers core functionality of Rendezvous. Excludes fault tolerance, certified delivery, and secure daemons.
Speed	Faster for all receiving applications—whether they access all fields or only a small subset of fields from inbound messages.	Slower for all receiving applications. Retained for backward compatibility only.	Generally not as fast as either native C implementation.
Transport Support	`rvd` and intra-process transports	`rvd`, `rva`, and intra-process transports	`rva` and intra-process transports
Message Storage	Messages exist both in Java (garbage-collected) storage and in native C (JNI) storage.		Messages exist only in Java (garbage-collected) storage.

Table 3 Implementations (Sheet 2 of 2)

Aspect	JNI (Native) Preferred	JNI (Native) Backward Compatibility	Java
Timer Granularity	Supports fine-resolution timers (within operating system limitations)		Timer granularity is limited by JVM to 10 milliseconds.
Forward Feature Support	In release 8.0 and later, only this implementation supports new features; for example, sending message arrays, vector listeners, dispose.	None	None
Library Requirements	Must load the Rendezvous JNI library		Does not require the Rendezvous JNI library

Strings and Character Encodings

Rendezvous software uses strings in several roles:

- String data inside message fields
- Field names
- Subject names (and other *associated* strings that are not strictly *inside* the message)
- Certified delivery (CM) correspondent names
- Group names (fault tolerance)

Encodings and Translation

Java programs represent all these strings in the Unicode 2-byte character set.

- Before sending an outbound message, Rendezvous software translates these strings into the character encoding appropriate to the ISO locale.
- Conversely, when extracting a string from an inbound message, Rendezvous software translates it to Unicode according to the encoding tag of the message.

  If a message has no tag, Rendezvous translates its strings *as if* the message used the default encoding (see Default Encoding, below). This assumption is not always correct (see Inbound Translation, below).

Default Encoding

The default encoding depends on the locale where Java is running. That is, the locale determines the value of the Java system property `file.encoding`, which in turn determines the translation scheme.

For example, the United States is locale `en_US`, and uses the Latin-1 character encoding (also called ISO 8859-1); Japan is locale `ja_JP`, and uses the Shift-JIS character encoding.

When the system property `file.encoding` is inaccessible, the default encoding is `8859-1` (Latin-1). Programs can override this system property; for details, see TibrvMsg.setStringEncoding() on page 89.

Some browsers (for example, Microsoft Internet Explorer) do not permit programs to access the system property `file.encoding`. When programs attempt to access it, the browser throws a `SecurityException`. Although this is normal, and the program continues to run, the browser may nonetheless print a stack trace, indicating that the program cannot access that system property.

Outbound Translation

Outbound translation from Unicode to a specified encoding usually occurs when adding a string to a message. However, in an `rva` environment (using `tibrvjweb.jar`) translation occurs later—when sending the message, or when explicitly converting the message to a byte array.

Exotic Characters

A wire-format string can contain only characters that are valid in the encoding of the surrounding message. The translation procedure detects exotic characters, and throws an exception with `TibrvStatus.INVALID_ENCODING`.

Inbound Translation

Inbound translation occurs before the program receives the data.

Automatic inbound translation is correct when two programs exchange messages within the same locale.

In contrast, the automatic translation might be incorrect when the sender and receiver use different character encodings.

In this situation, the receiver must *explicitly* retranslate to the local encoding.

See Also

TibrvMsg.getStringEncoding() on page 81
TibrvMsg.setStringEncoding() on page 89

Interrupting Event Dispatch Threads

The Java method `Thread.interrupt()` is *ineffective* when all of these conditions are simultaneously true:

- `Tibrv` is open using the native (JNI) implementation.
- The thread dispatches an event queue or queue group.
- The queue or queue group is empty of events.

To effectively interrupt such a thread, a program can destroy the queue or queue group. In this situation, the dispatch method throws an exception; the thread can use that exception as an occasion to exit.

Rendezvous Daemon and Agent

Rendezvous Java programs can connect to the network in either of two ways:

- An *rvd transport* connects to a Rendezvous daemon process (`rvd`).
- An *rva transport* connects to a Rendezvous agent process (`rva`), which in turn connects to a Rendezvous daemon process.

This section describes the two kinds of transports, the processes to which they connect, and the reasons for choosing each one.

Java Applications and Applets

A Java program runs either as an independent application or as an applet.

An *independent application* runs as an ordinary process. It can access the usual resources, such as file I/O and network connections.

An *applet* runs within a browser or an applet-viewer process. Since browsers download untrusted applets across the Internet, they enforce security restrictions on those applets. These restrictions protect the computer and its local network from tampering by unauthorized applets.

Security versus Efficiency

Rendezvous daemon (`rvd`) processes service all network communications for Rendezvous programs. Every Rendezvous program (in any supported language) uses a Rendezvous daemon. When a program sends a message, `rvd` transmits it across the network. When a program listens to a subject, `rvd` receives messages from the network, and presents messages with matching subject names to the listening program.

Within Rendezvous programs, each network transport object represents a connection to an `rvd` process. Because `rvd` is an essential link in Rendezvous communications, if the transport cannot connect to an `rvd` process that is already running, it automatically starts one.

However, Java applets present a security concern for `rvd`. The Rendezvous agent (`rva`) acts as a secure gateway between `rvd` on a network, and untrusted remote Java applets. Instead of connecting directly to `rvd`, applets must connect to an `rva` process, which in turn connects to `rvd`. As its name implies, `rva` acts as the applet's *agent* for all interactions with `rvd`.

Figure 2 on page 13 depicts `rva` (center) in this intermediary role between Java applets and `rvd`. On the left side of Figure 2, a user downloads a Java applet from a remote server; the applet connects back to that home server to gain access to the home network, so the applet can exchange data with programs on that network.

Remote Java applets cannot spawn processes on the home network. Instead of spawning `rvd` on the home network, they connect to `rva`—which must already be running before any applet attempts to connect. Network administrators retain complete control over `rva`, along with its use of LAN, file and computational resources on the home network.

The Rendezvous agent also protects `rvd` from inappropriate requests; `rva` checks and filters all requests from Java applets, so `rvd` receives only well-formed, legitimate requests.

Java applets using `rva` do not require Rendezvous shared libraries (JNI), so they can run in browsers on computers where Rendezvous software is not installed.

However, `rva` does not support certified message delivery, distributed queue or fault tolerance features. Java programs that use these features must connect directly to `rvd`; these features are not available to applets that connect from remote networks through `rva`.

For connections to the local network, a direct connection to `rvd` is more efficient than an indirect connection through `rva` to `rvd`. In all situations we recommend `rvd` transports in preference to `rva` transports—except for applets connecting to a remote home network, which must use `rva` transports.

For information about transport objects, see TibrvTransport on page 210.

For more information about `rvd`, see Rendezvous Daemon (rvd) on page 41 in *TIBCO Rendezvous Administration*.

For more information about `rva`, see Rendezvous Agent (rva) on page 267 in *TIBCO Rendezvous Administration*.

Starting rvd Automatically

`rvd` transports attempt to connect to an `rvd` process—if such a process is already running. If an appropriate process is *not* already running, the `rvd` transport starts one on its local host computer, and then connects to it.

However, transports cannot automatically start processes on remote computers. If the parameters of an `rvd` transport specify a remote daemon, then the daemon must already be running before the transport attempts to connect.

Starting rva

Java programs can never start `rva` automatically; they must connect to an existing `rva` process.

Start the Rendezvous agent using the `rva` command or icon. The `rva` command line accepts `rvd` command parameters, and uses them to start `rvd` (when appropriate).

When `rva` starts, it attempts to connect to an `rvd` process with identical parameters. If an appropriate `rvd` process is not already running, `rva` starts it automatically. If `rvd` terminates, `rva` restarts it automatically. (However, `rva` can start `rvd` only on the same computer; it cannot automatically start a remote `rvd`.)

Numerous Java applets can connect to one `rva` process, and each applet can create several `TibrvRvaTransport` objects (each representing a separate connection to `rva`). An `rva` process instance connects to `rvd` only once, with a single transport, regardless of the number of Java `TibrvRvaTransport` objects that connect to it.

For more information about starting `rva`, see Rendezvous Agent (rva) on page 267 in *TIBCO Rendezvous Administration*.

For more information about starting `rvd`, see Rendezvous Daemon (rvd) on page 41 in *TIBCO Rendezvous Administration*.

Browser Security

rva

Browsers download applets from web servers, using the hypertext transport protocol (HTTP). A web server host runs a process that services HTTP requests. Standard browser security arrangements permit an applet to connect back across the Internet to the web server host where it originated. Rendezvous applets that use `rva` transports connect in this way, and so require this permission (for details, see Internet Web Site Considerations on page 14).

rvd

Applets that use `rvd` transports connect to an `rvd` process. Most browsers permit TCP connections from locally installed classes, with appropriate configuration. For more information, see the documentation for the browser.

Network Overview—rvd Transports

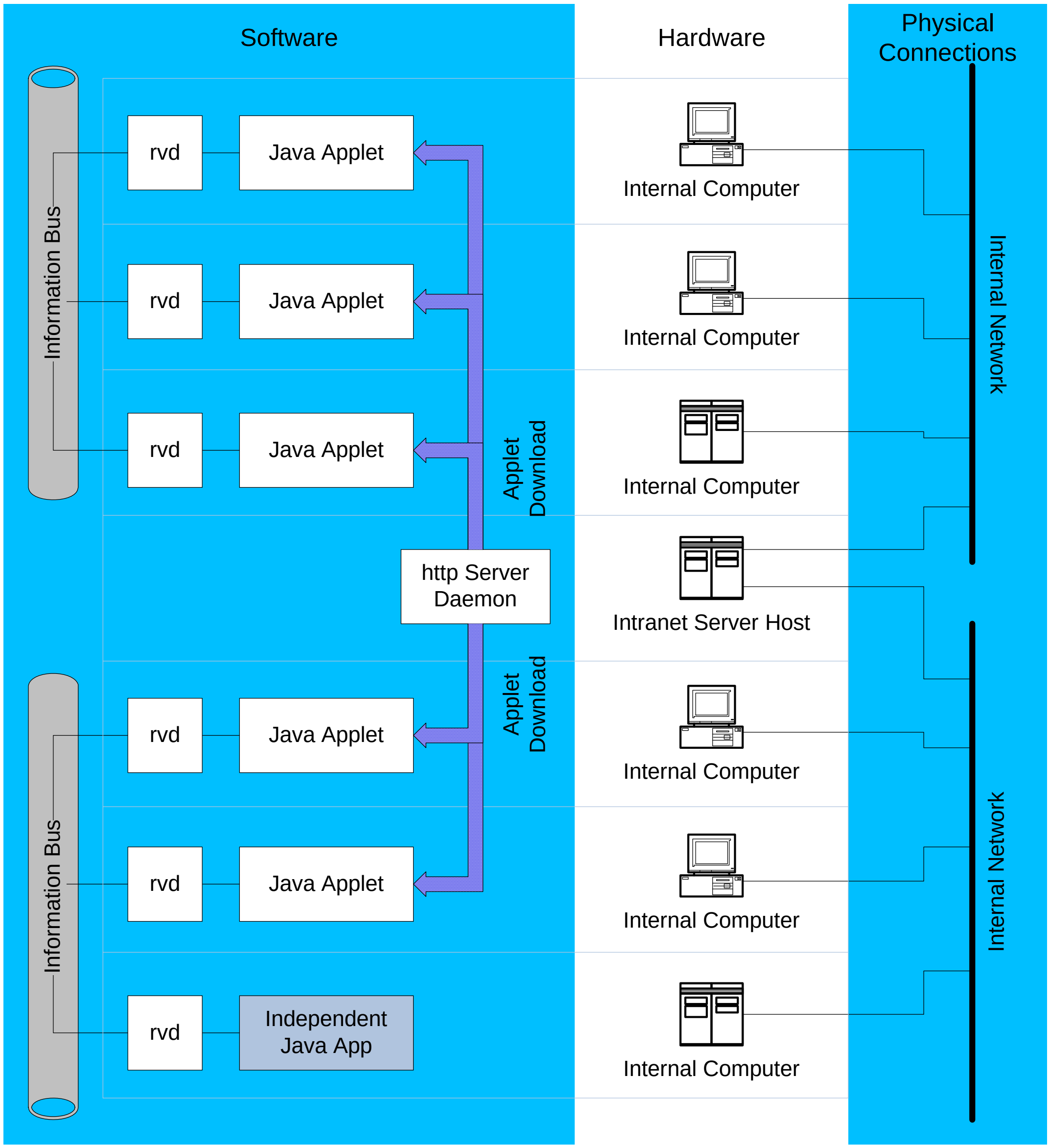
Figure 1 on page 11 shows programs that communicate using `rvd` transports.

In the top and bottom of Figure 1, Java applets run in two separate local networks. Browsers download the applets from an intranet web server (center), but the applets then communicate with other Rendezvous programs on their *local* networks (that is, they do not communicate with web server host).

This configuration is well-suited to intranets within an enterprise. The applets may run on a single network, or on several networks connected by Rendezvous routing daemons.

The independent Java application (bottom) also uses an `rvd` transport, and communicates with applets on its network.

Figure 1   Java Programs with rvd Transports



Network Overview—rva Transports

Figure 2 on page 13 illustrates a typical environment for Rendezvous Java programs that communicate using `rva` transports.

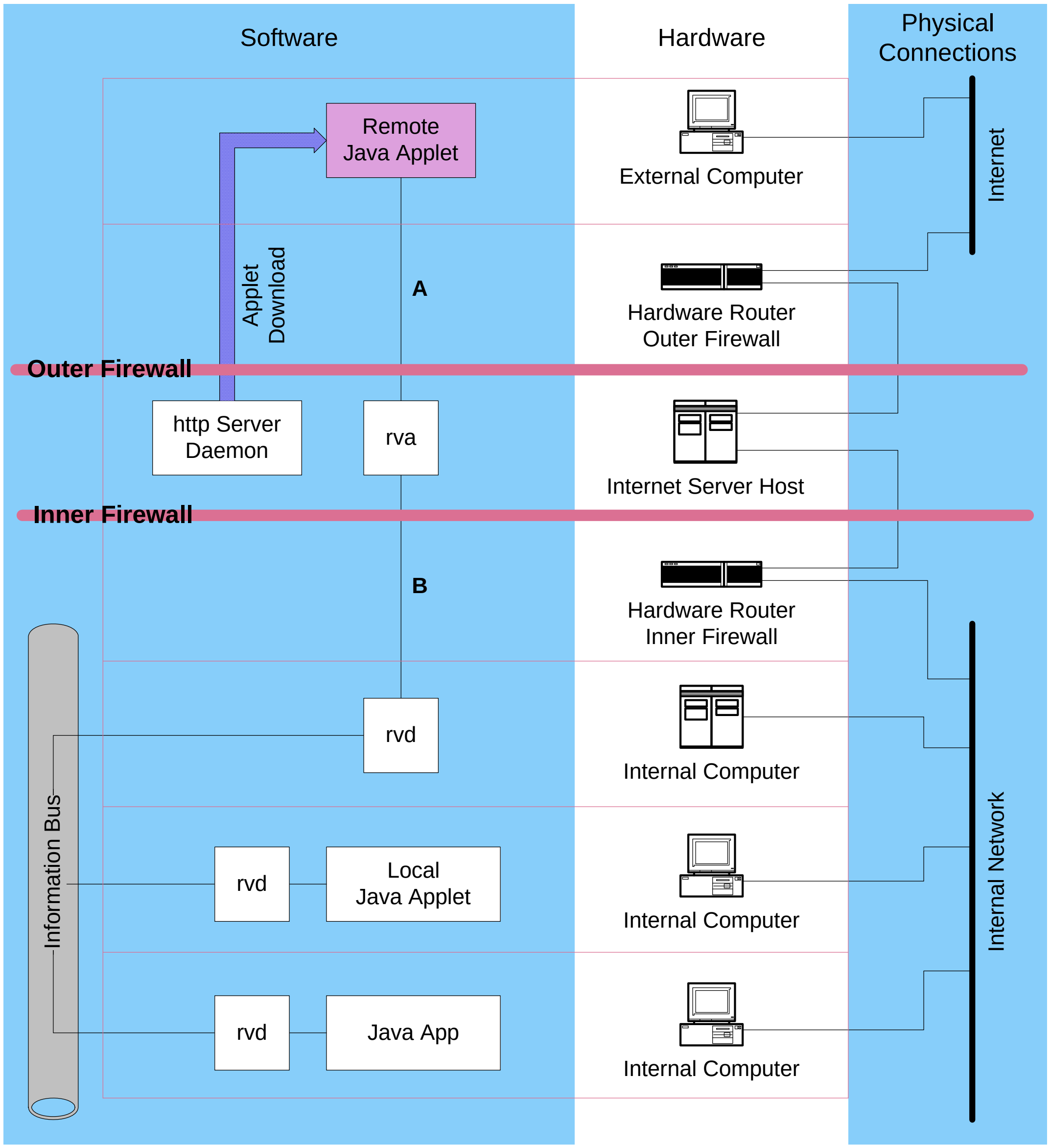
The top of Figure 2 depicts an Internet environment, and the bottom depicts a local network environment; at the center (between the two firewalls) is the internet web server host—the bridge between the internal network and the Internet.

The bottom of Figure 2 shows a local network with Rendezvous programs, which communicate with one another through Rendezvous daemon processes (`rvd`). These programs can be Java applets, independent Java applications, and Rendezvous programs written in other languages.

Remote browsers (like the one at the top of Figure 2) use the Internet to download Rendezvous applets from the web server. Those remote applets connect back to a Rendezvous agent process (`rva`) on the web server host. The `rva` process acts on behalf of the applets, as their intermediary for communications with the internal network (bottom).

This indirection (`rva`) adds a layer of security, protecting the web server host and the internal network from unauthorized applets.

Figure 2 Java Programs with rva Transports



Internet Web Site Considerations

When you design Java applets that connect to an Internet web site, pay special attention to these issues.

Rendezvous Files

For correct download and operation of your applet, Rendezvous files must be available in the applet's code base directory.

- Place the `jar` archive file in the code base directory. The `jar` file is named `tibrvjweb.jar`.
- Embed the applet in a web page. In the HTML source file, use the `<APPLET>` tag, and specify the `ARCHIVE` argument:

  `ARCHIVE=`*codebase_dir*`/tibrvjweb.jar`

  The `ARCHIVE` argument tells browsers where to find the supporting Rendezvous package, compressed as a `jar` file.

Home Computer and Port

Applets connect back to an `rva` process on the web server host computer by creating a `TibrvRvaTransport`. This code fragment illustrates a typical applet calling sequence:

```
TibrvRvaTransport myTransport = new TibrvRvaTransport(
                                  getCodeBase().getHost(),
                                  portNum,
                                  true);
```

An `rva` process on the home computer must be listening for client connections on the correct TCP port. Be sure that your calls to `RvTibrvRvaTransport()` use a TCP port that matches the `-listen` parameter of `rva`.

Open a Path through the Firewall

Request that the system administrator configure the server-side firewall so that TCP connection requests or HTTP GET and POST requests can propagate from the applet back to `rva`. Applets can only connect if this path is open.

See also, Rendezvous Agent (rva) on page 267 in *TIBCO Rendezvous Administration*.

HTTP Tunneling

Direct TCP connections to `rva` yield the best performance. However, intervening firewalls and proxy servers usually prevent applets from establishing direct TCP connections to `rva`.

To alleviate this restriction in some situations, `rva` can use a technique called HTTP tunneling, in which it communicates with its client applets through a TCP port using the (slower) HTTP protocol.

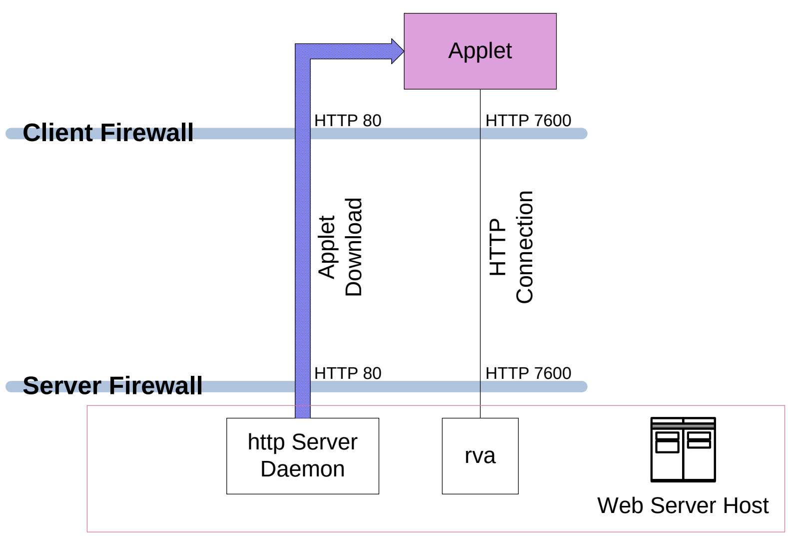
This solution works in two situations:

- Tunnel to the Web Server Host on page 15
- Signed Applets on page 16

Tunnel to the Web Server Host

Most web servers communicate using the default HTTP port, which is port 80. If the client-side firewall allows HTTP GET and POST requests on an HTTP port other than 80, then rva can listen for connections on that other port, and client applets can contact `rva` on that port. The server-side firewall must also allow HTTP GET and POST requests on the same port. Figure 3 on page 15 illustrates this situation.

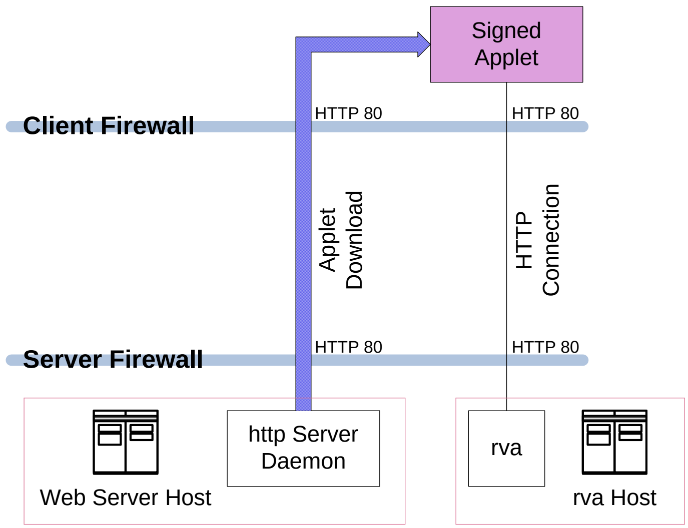
Figure 3   HTTP Tunneling to the Web Server Host



Signed Applets

Most browsers allow *signed* applets to connect to computers other than the web server host. If `rva` runs on a host computer other than the web server host, then `rva` can listen on HTTP port 80, and signed applet clients can contact it. Figure 4 on page 16 illustrates this situation. However, *unsigned* applets can connect only to the web server host; browsers prevent unsigned applets from connecting to any other computer.

Figure 4 HTTP Tunneling to a Separate rva Host



Isolate External from Internal

The book *TIBCO Rendezvous Administration* discusses strategies for isolating separate pathways for various application programs. These strategies are even more important in the context of Java applets, so you can protect your internal network and its Rendezvous programs from external applets.

Techniques include using separate UDP or PGM services and multicast addressing. For more information, see Network Details on page 17 in *TIBCO Rendezvous Administration*.

Intranet Web Site Considerations

When you design Java programs that run on an intranet—using `rvd` transports to connect to the local network—pay special attention to these issues.

Rendezvous Files

Correct operation of programs requires the Rendezvous classes. The program searches for the archive file that contains the Rendezvous classes; the `CLASSPATH` environment variable guides the search.

JNI Shared Libraries

Correct operation of `TibrvRvdTransport` requires prior installation of the JNI shared libraries.

rvd

`TibrvRvdTransport` objects must be able to connect to an `rvd` process. We recommend that you install the rvd executable on the client host computer.

Chapter 2 Programmer's Checklist

Consult this chapter for details of the application development cycle.

Topics

Checklist

Developers of Rendezvous programs can use this checklist during the four phases of the development cycle: installing Rendezvous software, coding your Java program, compiling your Java program, and running your program as either an independent application or as a browser applet.

Install

- Install the Rendezvous software release, which automatically includes the Java archive files in the `lib` subdirectory.
- The `CLASSPATH` variable must include an archive file that contains the Rendezvous classes.

  On UNIX platforms, include the appropriate archive file from Table 4, Archive Files, on page 23.

  On other supported platforms, this step is automatic.

Code

- Import the correct Rendezvous package.

  Import `com.tibco.tibrv.*`

Compile

- Java 1.6 (or later) is required.
- The `CLASSPATH` variable must include an archive file that contains the Rendezvous classes. Include the appropriate archive file from Table 4, Archive Files, on page 23.
- To use TIBCO Rendezvous® Server In-Process Module (IPM), the `CLASSPATH` variable must include the archive file `tibrvnative.jar`; it is the only archive file that supports IPM.

Run

- Java 1.6 (or later) is required.
- Both `rvd` and `rva` require valid licensing.

  See Licensing Information on page 11 in *TIBCO Rendezvous Administration*.

Run as Independent Application

- Rendezvous software must be properly installed, so that the application can access shared library files. For details, see Shared Library Files on page 25.
- The `CLASSPATH` variable must include the location of the Rendezvous classes. Include the appropriate archive file from Table 4, Archive Files, on page 23.
- The application must be able to connect to a Rendezvous daemon process (`rvd`).

Run as Applet Using rva Transport

- Applets running in a browser automatically download Rendezvous classes as needed. The Rendezvous classes must be located at the applet's code base (the URL from which the browser obtains the applet code).

  For example, if the compiled applet code is in `http://demo/myapp.class`, then that location must also contain `http://demo/com.tibco.tibrv/*.class` in a series of subdirectories. For details, see Internet Web Site Considerations on page 14.

  Some browsers can download classes from archive files. For details, consult the documentation for those browser products. Select the archive file for the Web implementation from Table 4, Archive Files, on page 23.
- The Rendezvous agent (`rva`) must be properly installed at the web server host computer (the code base specifies its host name).

  The Rendezvous agent process must already be running before the applet attempts to connect.

  If the applet overrides the default values, the `port` parameter of its `TibrvRvaTransport` must match the `Listen` parameter of `rva`. (See TibrvRvaTransport() on page 227.)
- The Rendezvous agent must be able to connect to a Rendezvous daemon process (`rvd`).

Run as Applet Using rvd Transports

- Rendezvous software must be properly installed on the computer on which the applet is running, so that the application can access shared library files.
- Applets running in a browser gain speed when the Rendezvous package is installed locally. To take advantage of this efficiency, the `CLASSPATH` variable (as read when the browser starts) must include an appropriate archive file from Table 4, Archive Files, on page 23.

- The applet must be able to connect to a Rendezvous daemon process (`rvd`). If the browser does not permit the applet to connect to `rvd`, adjust the browser's security settings to permit TCP connections to the `rvd` client connection socket (the `daemon` parameter of `TibrvRvaTransport()` specifies this socket).

Run as Independent Application with IPM

- Ensure that the IPM C library is in the path variable; see IPM Library, page 25.
- Be sure that the application process can access the Rendezvous license ticket file, `tibrv.tkt`. The user's path must contain this file. For more information, see Licensing Information on page 11 in *TIBCO Rendezvous Administration*.

Archive Files

Table 4 details the `jar` files for various implementations of Rendezvous for Java. Place the appropriate `jar` file in the `CLASSPATH` environment variable.

Table 4 Archive Files (Sheet 1 of 2)

Edition	Archive File	Contents
Web		
We recommend this pure Java implementation only for situations that require `rva`.		
Web	`tibrvjweb.jar`	Standard classes `TibrvRvaTransport` only Pure Java implementation
JNI Preferred		
We recommend the following two native (JNI) implementations for most situations. These implementations were formerly known as *thin-message* technology. As of release 8.2, this name no longer aptly describes the actual implementation differences.		
Native Local	`tibrvnative.jar`	Standard classes Certified message delivery Fault tolerance `TibrvRvdTransport` Vector sending Vector listening Dispose IPM
Native Secure Daemon	`tibrvnativesd.jar`	Standard classes Certified message delivery Fault tolerance Secure daemons (`TibrvSdContext`) `TibrvRvdTransport` Vector sending Vector listening Dispose

Table 4 Archive Files (Sheet 2 of 2)

Edition	Archive File	Contents
JNI Backward Compatibility The following two native (JNI) implementations are retained only for backward compatibility, when it is impractical to migrate to the native preferred implementation. These implementations were formerly known as *full-message* technology. As of release 8.2, this name no longer aptly describes the actual implementation differences.		
Backward Compatibility Local	`tibrvj.jar`	Standard classes Certified message delivery Fault tolerance `TibrvRvaTransport` and `TibrvRvdTransport`
Backward Compatibility Secure Daemon	`tibrvjsd.jar`	Standard classes Certified message delivery Fault tolerance Secure daemons (`TibrvSdContext`) `TibrvRvaTransport` and `TibrvRvdTransport`

Shared Library Files

Independent Java applications that use `rvd` transports must be able to access Rendezvous shared library files (C libraries). Table 5 details the environment variables that direct Java applications to the Rendezvous installation directory. The installation directory must contain the required shared library files.

Table 5 Environment Variables for Shared Library Files

Platform	Environment Variable
Windows	`PATH` must include `\`*install_dir*`\bin` The installation procedure sets this variable automatically.
UNIX (Except as below)	`LD_LIBRARY_PATH` must include *install_dir*`/lib` For 64-bit JVM, `LD_LIBRARY_PATH` must also include *install_dir*`/lib/64`
HP/UX	`SHLIB_PATH` must include *install_dir*`/lib`

IPM Library

A Java program can use standard Rendezvous communication library or the IPM library.

To select between the standard Rendezvous communication library or the IPM library, modify the path variable according to Table 6.

Table 6 Selecting the Communications Library (Sheet 1 of 2)

Library	Instructions
Standard Rendezvous Communications Library	**UNIX** Ensure that the subdirectory *TIBCO_HOME*`/lib` appears *before* *TIBCO_HOME*`/lib/ipm` in your `LD_LIBRARY_PATH` (or `SH_LIBRARY_PATH`) environment variable. **Windows** Ensure that the subdirectory *TIBCO_HOME*`/bin` appears *before* *TIBCO_HOME*`/bin/ipm` in your `PATH` environment variable.

Table 6 Selecting the Communications Library (Sheet 2 of 2)

Library	Instructions
IPM Communications Library	**UNIX** Ensure that the subdirectory *TIBCO_HOME*`/lib/ipm` appears *before* *TIBCO_HOME*`/lib` in your `LD_LIBRARY_PATH` (or `SH_LIBRARY_PATH`) environment variable. **Windows** Ensure that the subdirectory *TIBCO_HOME*`/bin/ipm` appears *before* *TIBCO_HOME*`/bin` in your `PATH` environment variable.

Existing Rendezvous applications that use the standard shared library do not require modifications in order to use the IPM library instead.

Chapter 3 Rendezvous Environment

This brief chapter describes the methods that open and close the internal machinery upon which Rendezvous software depends.

Topics

Tibrv

Class

Declaration
```
class com.tibco.tibrv.Tibrv.Tibrv
  extends java.lang.Object
```

Purpose The Rendezvous environment.

Remarks Programs do not create instances of `Tibrv`. Instead, programs use its static methods to open and close the Rendezvous environment. Private constants and variables contain references to Rendezvous resources.

For a list of constants that this class defines, see Implementations on page 38.

Method	Description	Page
Environment Life Cycle and Properties		
`Tibrv.open()`	Start Rendezvous internal machinery.	37
`Tibrv.close()`	Stop and destroy Rendezvous internal machinery.	30
`Tibrv.getVersion()`	Return the version string or one of its components.	33
`Tibrv.isValid()`	Determine whether the Rendezvous machinery is open.	36
`Tibrv.isNativeImpl()`	Discriminate between native (JNI) implementation and Java implementation.	35
Utility Objects		
`Tibrv.defaultQueue()`	Extract the default queue object.	31
`Tibrv.processTransport()`	Extract the intra-process transport object.	39
Asynchronous Errors		
`Tibrv.getErrorCallback()`	Extract the callback object that processes asynchronous errors.	32
`Tibrv.setErrorCallback()`	Set the callback for processing asynchronous errors.	40
IPM		
`Tibrv.isIPM()`	Test whether the IPM library is loaded.	34

Method	Description	Page
`Tibrv.setRVParameters()`	Set Rendezvous daemon command line parameters for IPM.	41

Inherited Methods

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString`
`java.lang.Object.wait`

Tibrv.close()

Method

Declaration `static void close() throws TibrvException`

Purpose Stop and destroy Rendezvous internal machinery.

Remarks After `Tibrv.close()` destroys the internal machinery, Rendezvous software becomes inoperative:

- Events no longer arrive in queues.
- All events, queues and queue groups are unusable, so programs can no longer dispatch events.
- All transports are unusable, so programs can no longer send outbound messages.

After closing a `Tibrv` object, all events, transports, queues and queue groups associated with that environment are invalid; it is illegal to call any methods of these objects.

After closing a `Tibrv` environment, you can reopen it either with the same implementation, or with a different implementation.

Reference Count A reference count protects against interactions between programs and third-party packages that call `Tibrv.open()` and `Tibrv.close()`. Each call to `Tibrv.open()` increments an internal counter; each call to `Tibrv.close()` decrements that counter. A call to `Tibrv.open()` actually creates internal machinery only when the reference counter is zero; subsequent calls merely increment the counter, but do not duplicate the machinery. A call to `Tibrv.close()` actually destroys the internal machinery only when the call decrements the counter to zero; other calls merely decrement the counter. In each program, the number of calls to `Tibrv.open()` and `Tibrv.close()` must match.

To ascertain the actual state of the internal machinery, use Tibrv.isValid() on page 36.

See Also Tibrv.isValid() on page 36
Tibrv.open() on page 37

Tibrv.defaultQueue()

Method

Declaration `static TibrvQueue defaultQueue()`

Purpose Extract the default queue object.

Remarks If Rendezvous is not open, this method returns `null`.

Each process has exactly one default queue; the call `Tibrv.open()` automatically creates it. Programs must not destroy the default queue.

See Also TibrvQueue on page 172.

Tibrv.getErrorCallback()

Method

Declaration `static TibrvErrorCallback getErrorCallback()`

Purpose Extract the callback object that processes asynchronous errors.

Remarks If the program has not set an error callback, this method returns `null`.

See Also Tibrv.setErrorCallback() on page 40
TibrvErrorCallback on page 365

Tibrv.getVersion()

Method

Declaration

```
static String getVersion()
static String getCmVersion()
static String getFtVersion()

static int    getMajorVersion()
static int    getMinorVersion()
static int    getUpdateVersion()

static String getVersionString()     // This method is deprecated
//
```

Purpose Return the version string or one of its components.

Remarks `getVersion()` returns the version number of the Java package (whether using machinery from `Tibrv.IMPL_JAVA` or `Tibrv.IMPL_NATIVE`).

`getCmVersion()` returns the version number of the underlying C implementation of the certified delivery library (`Tibrv.IMPL_NATIVE` only).

`getFtVersion()` returns the version number of the underlying C implementation of the fault tolerance library (`Tibrv.IMPL_NATIVE` only).

`getMajorVersion()`, `getMinorVersion()` and `getUpdateVersion()` return the three segments of the complete version number that `getVersion()` returns (it formats these three segments into a string).

The method `getVersionString()` is deprecated (though not yet obsolete), starting with release 6.2. We encourage programmers to migrate to `getVersion()` instead.

Tibrv.isIPM()

Method

Declaration `public static boolean isIPM();`

Purpose Test whether the IPM library is loaded.

Remarks You can use this call to determine whether an application program process has linked the IPM. You can test that your program dynamically links the correct library. You can program different behavior depending on which library is linked.

`true` indicates that the program links the IPM library (from the `lib/ipm/` subdirectory).

`false` indicates that the program links the standard Rendezvous library (from the `lib/` directory).

Tibrv.isNativeImpl()

Method

Declaration `static boolean isNativeImpl()`

Purpose Discriminate between native (JNI) implementation and Java implementation.

Remarks When a program opens the Rendezvous environment with `Tibrv.IMPL_SELECT`, it can later use this method to determine the effective implementation.

This method returns `true` when Rendezvous software uses the JNI library. Otherwise it returns `false`.

Tibrv.isValid()

Method

Declaration `static boolean` **`isValid`**`()`

Purpose Determine whether the Rendezvous machinery is open.

Remarks This method returns `true` after the method `Tibrv.open()` has returned successfully.

Otherwise this method returns `false`. The value `false` usually indicates one of these situations:

- The program has not opened the Rendezvous environment.
- Attempts to open the environment failed.
- The environment was open, but the program closed it with `Tibrv.close()`.

See Also Tibrv.open() on page 37
Tibrv.close() on page 30

Tibrv.open()

Method

Declaration

```
static void open() throws TibrvException

static void open(int implementation) throws TibrvException

static void open(String pathname) throws TibrvException
```

Purpose Start Rendezvous internal machinery.

Remarks This call creates the internal machinery that Rendezvous software requires for its operation:

- Internal data structures.
- Default event queue.
- Intra-process transport.
- Event driver.

Until the first call to `Tibrv.open()` creates the internal machinery, all events, transports, queues and queue groups are unusable. Messages and their methods do not depend on the internal machinery.

Parameter	Description
`implementation`	Open Rendezvous using this implementation. Choose a value from among the constants `Tibrv.IMPL_NATIVE`, `Tibrv.IMPL_JAVA`, and `Tibrv.IMPL_SELECT`. See Implementations on page 38.
`pathname`	Programs that use IPM can supply a filepath name, which explicitly specifies a configuration file. IPM reads parameter values from that file. For details, see Configuring IPM on page 248 in *TIBCO Rendezvous Concepts*. When IPM is not available, this version of the method throws an exception with error status.

Method Forms With no argument, open using `Tibrv.IMPL_SELECT`. To determine the actual implementation, use Tibrv.isNativeImpl() on page 35.

With an `implementation` argument, open using the specified implementation.

Implementations These constants denote the implementation choices.

Constant	Description
`Tibrv.IMPL_NATIVE`	Open Rendezvous machinery using the implementation in the JNI library, if possible; otherwise, throw a `TibrvException` with one of these status codes: `TibrvStatus.VERSION_MISMATCH`, `TibrvStatus.WRONG_JAVA_ARCHIVE`, `TibrvStatus.LIBRARY_NOT_FOUND`, `TibrvStatus.LIBRARY_NOT_LOADED`. An exception could indicate an incorrect value of the `CLASSPATH` environment variable.
`Tibrv.IMPL_JAVA`	Open Rendezvous machinery using the pure Java implementation.
`Tibrv.IMPL_SELECT`	Open Rendezvous machinery using JNI library if possible; otherwise, use the Java implementation.

Reference Count A reference count protects against interactions between programs and third-party packages that call `Tibrv.open()` and `Tibrv.close()`. Each call to `Tibrv.open()` increments an internal counter; each call to `Tibrv.close()` decrements that counter. A call to `Tibrv.open()` actually creates internal machinery only when the reference counter is zero; subsequent calls merely increment the counter, but do not duplicate the machinery. A call to `Tibrv.close()` actually destroys the internal machinery only when the call decrements the counter to zero; other calls merely decrement the counter. In each program, the number of calls to `Tibrv.open()` and `Tibrv.close()` must match.

See Also
Implementations, page 2
Tibrv.close() on page 30
Tibrv.isNativeImpl() on page 35

Tibrv.processTransport()

Method

Declaration `static TibrvProcessTransport processTransport()`

Purpose Extract the intra-process transport object.

Remarks If Rendezvous is not open, this method returns `null`.

Each process has exactly one intra-process transport; the call `Tibrv.open()` automatically creates it. Programs must not destroy the intra-process transport.

See Also TibrvProcessTransport on page 223

Tibrv.setErrorCallback()

Method

Declaration `static void setErrorCallback(TibrvErrorCallback errorCallback)`

Purpose Set the callback for processing asynchronous errors.

Parameter	Description
`errorCallback`	Use this `TibrvErrorCallback` object to process all asynchronous errors.

See Also Tibrv.getErrorCallback() on page 32
TibrvErrorCallback on page 365
TibrvErrorCallback.onError() on page 366

Tibrv.setRVParameters()

Method

Declaration

```
static void setRVParameters(String[] parameters)
 throws TibrvException
```

Purpose Set Rendezvous daemon command line parameters for IPM.

Remarks The `Rendezvous` daemon process (`rvd`) accepts several command line parameters. When IPM serves the role of the daemon, this call lets you supply those parameters from within the application program.

This call is optional. When this call is present, it has no effect unless it precedes the call to `Tibrv.open()`. For interaction semantics, see Parameter Configuration—Precedence and Interaction on page 249 in *TIBCO Rendezvous Concepts*.

This call is available only with IPM. When IPM is not available, this call throws an exception with error status.

Parameter	Description
`parameters`	Supply an array of strings. Each string is either a command line parameter name (for example, `-logfile`) or its value. For details about parameters, see rvd on page 42 in *TIBCO Rendezvous Administration*

Example 1   IPM: Configuring Parameters In Program Code

```
String rvParams[] = {"-reliability", "3",
                     "-reuse-port", "30000"};
Tibrv.setRVParameters(rvParams);
Tibrv.open();
```

See Also Configuring IPM on page 248 in *TIBCO Rendezvous Concepts*

TibrvSdContext

Class

Declaration

```
final class com.tibco.tibrv.TibrvSdContext

static final String TIBRV_SECURE_DAEMON_ANY_NAME  = null;
static final String TIBRV_SECURE_DAEMON_ANY_CERT  = null;
```

Purpose This class defines static methods for interacting with secure Rendezvous daemons.

Remarks Programs do not create instances of `TibrvSdContext`. Instead, programs use its static methods to configure user names, passwords and certificates, and to register trust in daemon certificates.

To use the methods of this class, Java programs must satisfy these two criteria:

- Programs must compile and run with the archive file `tibrvjsd.jar` (which defines this class); see Archive Files on page 23.
- Programs must open the Rendezvous environment using the native implementation; see Tibrv.open() on page 37—in particular, the constant `Tibrv.IMPL_NATIVE`, which specifies the Rendezvous JNI library implementation.

Method	Description	Page
`TibrvSdContext.setDaemonCert()`	Register trust in a secure daemon.	43
`TibrvSdContext.setUserCertWithKey()`	Register a (PEM) certificate with private key for identification to secure daemons.	45
`TibrvSdContext.setUserCertWithKeyBin()`	Register a (PKCS #12) certificate with private key for identification to secure daemons.	46
`TibrvSdContext.setUserNameWithPassword()`	Register a user name with password for identification to secure daemons.	47

TibrvSdContext.setDaemonCert()

Method

Declaration

```
static void setDaemonCert(
    java.lang.String    daemonName,
    java.lang.String    daemonCert)
  throws TibrvException
```

Purpose

Register trust in a secure daemon.

Remarks

When any program transport connects to a secure daemon, it verifies the daemon's identity using SSL protocols. Certificates registered using this method identify trustworthy daemons. Programs divulge user names and passwords to daemons that present registered certificates.

Parameter	Description
`daemonName`	Register a certificate for a secure daemon with this name. For the syntax and semantics of this parameter, see Daemon Name, below.
`daemonCert`	Register this public certificate. The text of this certificate must be in PEM encoding. See also Certificate on page 44.

Daemon Name

The daemon name is a three-part string of the form:

`ssl:`*host*`:`*port_number*

This string must be identical to the string you supply as the `daemon` argument to the transport creation call; see TibrvRvdTransport() on page 237.

Colon characters (`:`) separate the three parts.

`ssl` indicates the protocol to use when attempting to connect to the daemon.

host indicates the host computer of the secure daemon. You can specify this host either as a network IP address, or a hostname. Omitting this part specifies the local host.

port_number specifies the port number where the secure daemon listens for SSL connections.

(This syntax is similar to the syntax connecting to remote daemons, with the addition of the prefix `ssl`.)

In place of this three-part string, you can also supply the constant `TibrvSdContext.TIBRV_SECURE_DAEMON_ANY_NAME`. This form lets you register a catch-all certificate that applies to any secure daemon for which you have not explicitly registered another certificate. For example, you might use this form when several secure daemons share the same certificate.

Certificate For important details, see CA-Signed Certificates on page 177 in *TIBCO Rendezvous Administration*.

In place of an actual certificate, you can also supply the constant `TibrvSdContext.TIBRV_SECURE_DAEMON_ANY_CERT`. The program accepts any certificate from the named secure daemon. For example, you might use this form when testing a secure daemon configuration, before generating any actual certificates.

Any Name and Any Certificate Notice that the constants `TibrvSdContext.TIBRV_SECURE_DAEMON_ANY_NAME` and `TibrvSdContext.TIBRV_SECURE_DAEMON_ANY_CERT` each eliminate one of the two security checks before transmitting sensitive identification data to a secure daemon. We strongly discourage using both of these constants simultaneously, because that would eliminate all security checks, leaving the program vulnerable to unauthorized daemons.

TibrvSdContext.setUserCertWithKey()

Method

Declaration

```
static void setUserCertWithKey(
    java.lang.String    userCertWithKey,
    java.lang.String    password)
  throws TibrvException
```

Purpose Register a (PEM) certificate with private key for identification to secure daemons.

Remarks When any program transport connects to a secure daemon, the daemon verifies the program's identity using SSL protocols.

The Rendezvous API includes two methods that achieve similar effects:

- This call accepts a certificate in PEM text format.
- `TibrvSdContext.setUserCertWithKeyBin()` accepts a certificate in PKCS #12 binary format.

Parameter	Description
`userCertWithKey`	Register this user certificate with private key. The text of this certificate must be in PEM encoding.
`password`	Use this password to decrypt the private key.

For important information about password security, see Security Factors on page 177 in *TIBCO Rendezvous Administration*.

CA-Signed Certificate You can also supply a certificate signed by a certificate authority (CA). To use a CA-signed certificate, you must supply not only the certificate and private key, but also the CA's public certificate (or a chain of such certificates). Concatenate these items in one string. For important details, see CA-Signed Certificates on page 177 in *TIBCO Rendezvous Administration*.

Exceptions An exception that reports status `TibrvStatus.INVALID_FILE` can indicate either disk I/O failure, or invalid certificate data, or an incorrect password.

See Also TibrvSdContext.setUserCertWithKeyBin() on page 46

TibrvSdContext.setUserCertWithKeyBin()

Method

Declaration

```
void setUserCertWithKeyBin(
    byte[]              userCertWithKey,
    java.lang.String    password);
```

Purpose Register a (PKCS #12) certificate with private key for identification to secure daemons.

Remarks When any program transport connects to a secure daemon, the daemon verifies the program's identity using SSL protocols.

The Rendezvous API includes two methods that achieve similar effects:

- This call accepts a certificate in PKCS #12 binary format.
- `TibrvSdContext.setUserCertWithKey()` accepts a certificate in PEM text format.

Parameter	Description
`userCertWithKey`	Register this user certificate with private key. The binary data of this certificate must be in PKCS #12 format.
`password`	Use this password to decrypt the private key.

For important information about password security, see Security Factors on page 177 in *TIBCO Rendezvous Administration*.

CA-Signed Certificate You can also supply a certificate signed by a certificate authority (CA). To use a CA-signed certificate, you must supply not only the certificate and private key, but also the CA's public certificate (or a chain of such certificates). For important details, see CA-Signed Certificates on page 177 in *TIBCO Rendezvous Administration*.

Exceptions An exception that reports status `TibrvStatus.INVALID_FILE` can indicate either disk I/O failure, or invalid certificate data, or an incorrect password.

See Also TibrvSdContext.setUserCertWithKey() on page 45
www.rsasecurity.com/rsalabs/pkcs

TibrvSdContext.setUserNameWithPassword()

Method

Declaration

```
static TibrvStatus setUserNameWithPassword(
    java.lang.String    userName,
    java.lang.String    password)
  throws TibrvException
```

Purpose Register a user name with password for identification to secure daemons.

Remarks When any program transport connects to a secure daemon, the daemon verifies the program’s identity using SSL protocols.

Parameter	Description
`userName`	Register this user name for communicating with secure daemons.
`password`	Register this password for communicating with secure daemons.

For important information about password security, see Security Factors on page 177 in *TIBCO Rendezvous Administration*.

Chapter 4 Data

This chapter describes messages and the data they contain.

Topics

See Also Strings and Character Encodings, page 4
Appendix A, Custom Datatypes, on page 367

Field Names and Field Identifiers

In Rendezvous 5 and earlier releases, programs would specify fields within a message using a field name. In Rendezvous 6 and later releases, programs can specify fields in two ways:

- A *field name* is a character string. Each field can have at most one name. Several fields can have the same name.
- A *field identifier* is a 16-bit unsigned integer, which must be unique within the message. That is, two fields in the same message cannot have the same identifier. However, a nested submessage is considered a separate identifier space from its enclosing parent message and any sibling submessages.

  Java presents these identifiers as 32-bit integers, padding the high bytes with zero.

Message methods specify fields using a combination of a field name and a unique field identifier. When absent, the default field identifier is zero.

To compare the speed and space characteristics of these two options, see Search Characteristics on page 50.

Rules and Restrictions

`NULL` is a legal field name *only* when the identifier is zero. It is *illegal* for a field to have *both* a non-zero identifier *and* a `NULL` field name.

Note that in Java, `NULL` is *not* the same as `""` (the empty string). It is legal for a field to have a non-zero identifier and the empty string as its field name. However, we generally recommend *against* using the empty string as a field name.

Adding a New Field

When a program adds a new field to a message, it can attach a field name, a field identifier, or both. If the program supplies an identifier, Rendezvous software checks that it is unique within the message; if the identifier is already in use, the operation fails with the status code `TibrvStatus.ID_IN_USE`.

Search Characteristics

In general, an identifier search completes in constant time. In contrast, a name search completes in linear time proportional to the number of fields in the message. Name search is quite fast for messages with 16 fields or fewer; for messages with more than 16 fields, identifier search is faster.

Space Characteristics

The smallest field name is a one-character string, which occupies three bytes in Rendezvous wire format. That one ASCII character yields a name space of 127 possible field names; a larger range requires additional characters.

Field identifiers are 16 bits, which also occupy three bytes in Rendezvous wire format. However, those 16 bits yield a space of 65535 possible field identifiers; that range is fixed, and cannot be extended.

Finding a Field Instance

When a message contains several field instances with the same field name, these methods find a specific instance by name and number (they do not use field identifiers):

- TibrvMsg.removeFieldInstance() on page 85.
- TibrvMsg.getFieldInstance() on page 77.

TibrvMsg

Class

Declaration

```
class com.tibco.tibrv.TibrvMsg
  extends java.lang.Object
```

Purpose Represent Rendezvous messages.

Remarks This class has no `destroy()` method. Instead, the Java garbage collector reclaims storage automatically. Nonetheless it is possible to explicitly manage native message storage; see TibrvMsg.dispose() on page 65.

(Sheet 1 of 3)

(Sheet 2 of 3)

Method	Description	Page
`TibrvMsg.removeField()`	Remove a field from a message.	83
`TibrvMsg.removeFieldInstance()`	Remove a specified instance of a field from a message.	85
`TibrvMsg.update()`	Update a field within a message.	91
Update Scalar (convenience methods)	Update a field containing a scalar value.	94
`TibrvMsg.updateField()`	Update a field within a message.	96
Address Information		
`TibrvMsg.getReplySubject()`	Extract the reply subject from a message.	79
`TibrvMsg.getSendSubject()`	Extract the subject from a message.	80
`TibrvMsg.setReplySubject()`	Set the reply subject for a message.	87
`TibrvMsg.setSendSubject()`	Set the subject for a message.	88
Event Dispatched		
`TibrvMsg.getEvent()`	Extract the event associated with a (dispatched) message object.	74
String and Character Conversion		
`TibrvMsg.getTypeName()`	Convert a type designator to its corresponding string name.	82
`TibrvMsg.toString()`	Format a message as a string.	90
`TibrvMsg.getStringEncoding()`	Return the character encoding for converting between Java Strings and wire format strings.	81
`TibrvMsg.setStringEncoding()`	Set the character encoding for converting between Java Unicode strings and wire format strings.	89

(Sheet 3 of 3)

Method	Description	Page
Custom Datatypes See Appendix A, Custom Datatypes, on page 367.		
`TibrvMsg.getDecoder()`	Extract the decoder interface for a custom datatype.	368
`TibrvMsg.getEncoder()`	Extract the encoder interface for a custom datatype.	369
`TibrvMsg.setHandlers()`	Define a custom datatype by registering its encoder and decoder interfaces.	370

Inherited Methods

```
java.lang.Object.equals
java.lang.Object.getClass
java.lang.Object.hashCode
java.lang.Object.notify
java.lang.Object.notifyAll
java.lang.Object.wait
```

Datatype Constants

These constants are all defined with short values. To extract a human-readable name from a short value, see TibrvMsg.getTypeName() on page 82

Table 7 Datatype Constants (Sheet 1 of 2)

Constant	Comment
`TibrvMsg.DEFAULT`	Used only as a `type` argument to `TibrvMsg.add()`
`TibrvMsg.MSG`	
`TibrvMsg.DATETIME`	
`TibrvMsg.OPAQUE`	
`TibrvMsg.STRING`	
`TibrvMsg.XML`	Byte-array, compressed for network transmission.
`TibrvMsg.BOOL`	

Table 7 Datatype Constants (Sheet 2 of 2)

Constant	Comment
TibrvMsg.I8	
TibrvMsg.U8	
TibrvMsg.I16	
TibrvMsg.U16	
TibrvMsg.I32	
TibrvMsg.U32	
TibrvMsg.I64	
TibrvMsg.U64	
TibrvMsg.F32	
TibrvMsg.F64	
TibrvMsg.IPPORT16	
TibrvMsg.IPADDR32	
TibrvMsg.U8ARRAY	
TibrvMsg.I16ARRAY	
TibrvMsg.U16ARRAY	
TibrvMsg.I32ARRAY	
TibrvMsg.U32ARRAY	
TibrvMsg.I64ARRAY	
TibrvMsg.U64ARRAY	
TibrvMsg.F32ARRAY	
TibrvMsg.F64ARRAY	
TibrvMsg.USER_FIRST	Custom datatypes begin with this number.
TibrvMsg.USER_LAST	

See Also

Strings and Character Encodings, page 4
TibrvMsgField on page 97
Appendix A, Custom Datatypes, on page 367

TibrvMsg()

Constructor

Declaration

```
TibrvMsg()

TibrvMsg(TibrvMsg msg) throws TibrvException

TibrvMsg(byte[] bytes) throws TibrvException
```

Purpose Create a message object.

Remarks None of these constructors place address information on the new message object.

This class has no `destroy()` method. Instead, the Java garbage collector reclaims storage automatically. To actively manage message storage, see `TibrvMsg.dispose()`.

To use an inbound message outside of its callback, you can use the copy constructor to detach (that is, copy) a message—for example, to process a message in a different thread. (If your program detaches a message, then you must also ensure that no references to the copy remain; such references could interfere with garbage collection. Furthermore, when using the Rendezvous JNI preferred library, we recommend that programs call `TibrvMsg.dispose()` to explicitly release the copy's storage within the native C environment.)

Parameter	Description
`msg`	Create an independent copy of this message.
`bytes`	Create a message with fields populated from this byte array. For example, programs can create such byte arrays from messages using the method `TibrvMsg.getAsBytes()`, and store them in files; after reading them from such files, programs can reconstruct a message from its byte array.

Method Forms With no argument, create an empty message (with no fields).

With a `TibrvMsg` argument, create an independent copy of that message, copying all its fields (field values are also independent copies).

With a byte array argument, create a message with fields populated from the byte array.

See Also TibrvMsg.dispose() on page 65
TibrvMsg.getAsBytes() on page 72
TibrvMsgCallback.onMsg() on page 148

TibrvVectorCallback.onMsgs() on page 159

TibrvMsg.add()

Method

Declaration

```
void add(
    java.lang.String fieldName,
    java.lang.Object data)
   throws TibrvException

void add(
    java.lang.String fieldName,
    java.lang.Object data,
    short type)
  throws TibrvException

void add(
    java.lang.String fieldName,
    java.lang.Object data,
    short type,
    int fieldId)
  throws TibrvException
```

Purpose Add a field to a message.

Remarks This method copies the information into the new message field. All related convenience methods behave similarly.

(Sheet 1 of 2)

Parameter	Description
`fieldName`	Add a field with this name. `null` is a legal name. However, if `fieldId` is non-zero, then `fieldName` must be non-`null`.
`data`	Add a field with this data value. `null` is illegal.
`type`	Add a field with this explicit type. For a list of types, see Datatype Constants on page 54. When absent or `TibrvMsg.DEFAULT`, determine the field's type from the type of the data. In Figure 5 on page 61, filled dots indicate default encodings between homologous types.

(Sheet 2 of 2)

Parameter	Description
`fieldId`	Add a field with this identifier. All field identifiers must be unique within each message. When absent, add a field without an identifier. Integers in the range [`0`, `65535`] are valid identifiers. Zero is a special value, indicating no identifier. It is illegal to add a field that has both a `null` field name *and* a non-zero field identifier.

Encoding and Type Conversion This method automatically tags Java data with a corresponding Rendezvous wire format type; sending the message actually triggers the encoding into wire format. Figure 5 on page 61 specifies default encodings with filled circles; for some types you can override the default decoding by using convenience calls that force specific types (see Add Scalar on page 62).

Encoding XML We recommend converting the XML document string to a byte sequence, using the encoding that corresponds to your locale (file encoding system property). Then create a `TibrvXml` object containing the bytes, and add that object to the message. This practice ensures that all receivers can easily parse the resulting XML document. For more information, see Decoding XML on page 68.

Nested Message When the `data` argument is a message object, this method adds only the data portion of the nested message; it does not include any address information or certified delivery information.

Empty Array The behavior of `TibrvMsg.add` differs among the various implementations when the `data` argument is an empty array. The reason for the discrepancy is that Java supports empty arrays, while C does not.

The native (JNI) preferred implementation uses underlying C calls to manipulate messages stored outside of the Java environment, so it cannot support empty arrays; consequently, this method throws an exception when it receives an empty array.

The native (JNI) backward compatibility implementation and the pure Java implementation both manipulate messages stored within the Java environment, so they do support empty arrays; consequently, this method correctly adds an empty array to a message field.

Figure 5 Java to Wire Format Datatype Conversion Matrix

Add

tibrvMsg Destination Type \ Java Source Type	Bool	Float	Double	Byte	Short	Integer	Long	float[]	double[]	byte[]	short[]	int[]	long[]	InetAddress (4-byte only)	TibrvIPAddr	TibrvIPPort	Date	TibrvDate	TibrvMsg	String	TibrvXml	TibrvMsg[]	String[]
TibrvMsg.BOOL	●			N	N	N	N																
TibrvMsg.F32	S	●	N	S	S	N	N																
TibrvMsg.F64	S	S	●	S	S	N	N																
TibrvMsg.I8	S			●	N	N	N																
TibrvMsg.I16	S			S	●	N	N									N							
TibrvMsg.I32	S			S	S	●	N								N	S							
TibrvMsg.I64	S			S	S	S	●								S	S							
TibrvMsg.U8	S			N	N	N	N																
TibrvMsg.U16	S			S	N	N	N									S							
TibrvMsg.U32	S			S	S	N	N								S	S							
TibrvMsg.U64	S			S	S	S	N								S	S							
TibrvMsg.IPADDR32						S	S							●	●								
TibrvMsg.IPPORT16						S	S									●							
TibrvMsg.DATETIME																	●	●					
TibrvMsg.F32ARRAY								●	N	S	S	N	N										
TibrvMsg.F64ARRAY								S	●	S	S	N	N										
TibrvMsg.I8ARRAY										S	N	N	N										
TibrvMsg.I16ARRAY										S	●	N	N										
TibrvMsg.I32ARRAY										S	S	●	N										
TibrvMsg.I64ARRAY										S	S	S	●										
TibrvMsg.U8ARRAY										S	N	N	N										
TibrvMsg.U16ARRAY										S	N	N	N										
TibrvMsg.U32ARRAY										S	S	N	N										
TibrvMsg.U64ARRAY										S	S	S	N										
TibrvMsg.MSG																			●				
TibrvMsg.OPAQUE										●	N	N	N										
TibrvMsg.STRING																				●			
TibrvMsg.XML																					●		
TibrvMsg.MSGARRAY																						●	
TibrvMsg.STRINGARRAY																							●

Key	
●	Homologous types; conversion always supported; no loss of information
S	Supported conversion; always supported
N	Numeric conversion; loss of information is possible (without warning)
	Unsupported conversion

See Also TibrvMsg.addField() on page 64
Add Scalar, page 62

Add Scalar

Convenience Methods

Declaration

```
void add(
    java.lang.String fieldName,
    scalar_type data)
  throws TibrvException

void add(
    java.lang.String fieldName,
    scalar_type data,
    int fieldId)
  throws TibrvException

void addUbits(
    java.lang.String fieldName,
    scalar_type data)
  throws TibrvException

void addUbits(
    java.lang.String fieldName,
    scalar_type data,
    int fieldId)
  throws TibrvException
```

Purpose Add a field containing a scalar value.

Method Forms The convenience methods named **`add()`** determine the field type from the numeric type of the data.

The convenience methods named **`addU`***nn*`()` add *unsigned* integer fields, *discarding* the sign bit of a Java integer data value.

(Sheet 1 of 2)

Method Name	Java Data Type	Field Type	Type Description
`add`	`boolean`	`TibrvMsg.`**`BOOL`**	boolean
`add`	`float`	`TibrvMsg.`**`F32`**	32-bit floating point
`add`	`double`	`TibrvMsg.`**`F64`**	64-bit floating point
`add`	`byte`	`TibrvMsg.`**`I8`**	8-bit integer
`add`	`short`	`TibrvMsg.`**`I16`**	16-bit integer
`add`	`int`	`TibrvMsg.`**`I32`**	32-bit integer
`add`	`long`	`TibrvMsg.`**`I64`**	64-bit integer

(Sheet 2 of 2)

Method Name	Java Data Type	Field Type	Type Description
add**U8**	byte	TibrvMsg.**U8**	8-bit unsigned integer
add**U16**	short	TibrvMsg.**U16**	16-bit unsigned integer
add**U32**	int	TibrvMsg.**U32**	32-bit unsigned integer
add**U64**	long	TibrvMsg.**U64**	64-bit unsigned integer

Parameter	Description
fieldName	Add a field with this name. null is a legal name. However, if fieldId is non-zero, then fieldName must be non-null.
data	Add a field with this data value. null is illegal.
fieldId	Add a field with this identifier. All field identifiers must be unique within each message. When absent, add a field without an identifier. Zero is a special value, indicating no identifier. It is illegal to add a field that has both a null field name, and a non-zero field identifier.

TibrvMsg.addField()

Method

Declaration

```
void addField(TibrvMsgField field)
  throws TibrvException
```

Purpose Add a field object to a message.

Remarks This method copies the information into the new message field. All related methods behave similarly.

It is illegal to add a field that has *both* a `null` field name, and a non-zero field identifier.

Field Name Length The the longest possible field name is 127 bytes.

Parameter	Description
`field`	Add this field to the message.

See Also TibrvMsg.add() on page 59
Add Scalar, page 62

TibrvMsg.dispose()

Method

Declaration `void dispose()`

Purpose Release native storage associated with the message.

Remarks In the native (JNI) preferred implementations, messages occupy storage outside of the Java environment (that is, in the native C environment) and also within the Java environment. When the Java garbage collector recycles the Java message object, this action triggers release of the corresponding native storage as well.

However, the timing of garbage collection is unpredictable, delaying the release of native storage as well. In applications where efficient management of native storage is a critical performance factor, you can use this method to explicitly free the native storage.

Call this `dispose` method at the end of a message callback method to immediately free the native storage associated with the message. The Java message object is independent of the native storage (and independent of this method), and it remains intact until the Java garbage collector recycles it in the usual way.

Attempting to access the message after calling this method results in an exception. (However, `TibrvMsg.getSendSubject()` and `TibrvMsg.setReplySubject()` retrieve `null` rather than throwing an exception

Restrictions `dispose()` is available only in the JNI preferred implementation. It is *not* available in the JNI backward compatibility implementation, nor in the pure Java implementation.

TibrvMsg.get()

Method

Declaration

```
java.lang.Object get(
    java.lang.String  fieldName)
  throws TibrvException

java.lang.Object get(
    int               fieldId)
  throws TibrvException

java.lang.Object get(
    java.lang.String  fieldName,
    int               fieldId)
  throws TibrvException
```

Purpose Get the value of a specified field from a message.

Remarks Programs specify the field to retrieve using the `fieldName` and `fieldId` parameters.

The method returns a snapshot of the field value.

When a program gets fields with the datatypes listed here, this method (and convenience methods) return a reference to the actual value in the message—*not* a copy. Use caution when modifying values of these types: `TibrvMsg.MSG`, `TibrvMsg.DATETIME`, `TibrvMsg.IPPORT16`, `TibrvMsg.IPADDR32`, `TibrvMsg.OPAQUE` (extracted as a byte array), `TibrvMsg.XML` (extracted as a byte array), and *all* array types.

Programs can use a related method to loop through all the fields of a message; to retrieve each field by its integer index number, see TibrvMsg.getFieldByIndex() on page 76.

Parameter	Description
`fieldName`	Get a field with this name.
`fieldId`	Get the field with this identifier.

Field Search Algorithm

This method, and related methods that *get* message fields, all use this algorithm to find a field within a message, as specified by a field identifier and a field name.

1. If the program supplied zero as the identifier, or omitted any identifier, then begin at step 3.

If the program supplied a *non-zero* field identifier, then search for the field with that identifier.

If the search succeeds, return the field.

On failure, continue to step 2.

2. If the identifier search (in step 1) fails, and the program supplied a non-`null` field name, then search for a field with that name.

   If the name search succeeds, and the identifier in the field is `null`, return the field.

   If the name search succeeds, but the actual identifier in the field is non-`null` (so it does not match the identifier supplied) then throw an exception with the status code `TibrvStatus.ID_CONFLICT`.

   On failure, or if the program supplied `null` as the field name, return `null`.

3. When the program supplied zero as the identifier, or omitted any identifier, then begin here.

   Search for a field with the specified name—even if that name is `null`.

   If the search succeeds, return the field.

   On failure, return `null`.

If a message contains several fields with the same name, searching by name finds the first instance of the field with that name.

Extracting Fields from a Nested Message

Earlier releases of Rendezvous software allowed programs to get fields from a nested submessage by concatenating field names. Starting with release 6, Rendezvous software no longer supports this special case convenience. Instead, programs must separately extract the nested submessage using `TibrvMsg.get()` (or a related method), and then get the desired fields from the submessage.

Method Forms

With only a field name, find the field by name. If the field name is not present in the message, return `null`. If several fields with that name are present in the message, this method returns the first one that it finds.

With only a field identifier, find the field with that identifier (since identifiers are unique, the message can contain at most one such field). If the identifier is not present in the message, return `null`.

With both a field name and a field identifier, search first by identifier, and then by field name. If neither are present in the message, return `null`. If identifier search succeeds, return the field value. If the name search succeeds, but the actual identifier in the field is non-zero (so it does not match the identifier supplied) then throw a `TibrvException` with status code `TibrvStatus.ID_CONFLICT`.

Decoding and Type Conversion

This method automatically decodes the extracted field data from its Rendezvous wire format type to a corresponding Java type. In Figure 6 on page 69, filled circles (as well as + and - symbols) specify default decodings between homologous types; for some types you can override the default decoding by using convenience calls that force specific types (see Get Scalar on page 70).

Java does not admit unsigned integers. When extracting an unsigned integer from an inbound message field, this method automatically promotes the value to the corresponding Java type that is large enough to contain it (Figure 6 indicates this with +). When extracting an unsigned 64-bit integer, Java does not have a type that can contain a number that uses all 64 bits; this method decodes it to a Java `long`, interpreting the high bit as a sign bit (Figure 6 indicates this with -).

Decoding XML

After extracting the XML document into a byte array, explicitly convert it to a string using the encoding that corresponds to your locale (file encoding system property). For more information, see Encoding XML on page 60.

Figure 6   Wire Format to Java Datatype Conversion Matrix

Get

	Java Destination Type																				
tibrvMsg Source Type	Bool	Float	Double	Byte	Short	Integer	Long	float[]	double[]	byte[]	short[]	int[]	long[]	TibrvIPAddr	TibrvIPPort	TibrvDate	TibrvMsg	String	TibrvXml	TibrvMsg[]	String[]
TibrvMsg.BOOL	●	N	N	N	N	N	N														
TibrvMsg.F32	N	●	S	N	N	N	N														
TibrvMsg.F64	N	N	●	N	N	N	N														
TibrvMsg.I8	N	N	N	●	S	S	S														
TibrvMsg.I16	N	N	N	N	●	S	S														
TibrvMsg.I32	N	N	N	N	N	●	S														
TibrvMsg.I64	N	N	N	N	N	N	●														
TibrvMsg.U8	N	N	N	N	+	S	S														
TibrvMsg.U16	N	N	N	N	N	+	S														
TibrvMsg.U32	N	N	N	N	N	N	+														
TibrvMsg.U64	N	N	N	N	N	N	-														
TibrvMsg.IPADDR32														●							
TibrvMsg.IPPORT16															●						
TibrvMsg.DATETIME																●					
TibrvMsg.F32ARRAY								●													
TibrvMsg.F64ARRAY									●												
TibrvMsg.I8ARRAY										●											
TibrvMsg.I16ARRAY											●										
TibrvMsg.I32ARRAY												●									
TibrvMsg.I64ARRAY													●								
TibrvMsg.U8ARRAY																					
TibrvMsg.U16ARRAY																					
TibrvMsg.U32ARRAY																					
TibrvMsg.U64ARRAY																					
TibrvMsg.MSG																	●				
TibrvMsg.OPAQUE										●											
TibrvMsg.STRING																		●			
TibrvMsg.XML																			●		
TibrvMsg.MSGARRAY																				●	
TibrvMsg.STRINGARRAY																					●

Key	
●	Homologous types; conversion always supported; no loss of information
S	Supported conversion; always supported
N	Numeric conversion; loss of information is possible (without warning)
+	Unsigned converted to signed integer with double bit precision; no loss of information
-	Unsigned 64-bit integer interpreted as signed 64-bits; high bit interpreted as sign bit
	Unsupported conversion

Get Scalar

Convenience Methods

Declaration

```
scalar_type getScalar_type(
    java.lang.String fieldName,
    int fieldId)
  throws TibrvException

scalar_type getAsScalar_type(
    java.lang.String fieldName,
    int fieldId)
  throws TibrvException
```

Purpose Get the value of a field as a scalar value.

Remarks Each convenience method in this family retrieves a field and extracts its data. If the field's type (as it exists) does not match the type of the convenience method, then the **get***type* method throws an exception; in contrast, the **getAs***type* method attempts to convert the data (see Decoding and Type Conversion on page 68, and Wire Format to Java Datatype Conversion Matrix on page 69). If conversion is not possible, the method throws an exception with status code `TibrvStatus.CONVERSION_FAILED`.

Parameter	Description
`fieldName`	Get a field with this name.
`fieldId`	Get the field with this identifier.

(Sheet 1 of 2)

Method Name	Field Type	Java Type	Type Description
get**Boolean** getAs**Boolean**	TibrvMsg.**BOOL**	boolean	boolean
get**Float** getAs**Float**	TibrvMsg.**F32**	float	32-bit floating point
get**Double** getAs**Double**	TibrvMsg.**F64**	double	64-bit floating point
get**Byte** getAs**Byte**	TibrvMsg.**I8**	byte	8-bit integer

(Sheet 2 of 2)

Method Name	Field Type	Java Type	Type Description
get**Short** getAs**Short**	TibrvMsg.**I16**	short	16-bit integer
get**Int** getAs**Int**	TibrvMsg.**I32**	int	32-bit integer
get**Long** getAs**Long**	TibrvMsg.**I64**	long	64-bit integer

TibrvMsg.getAsBytes()

Method

Declaration `byte[] getAsBytes() throws TibrvException`

Purpose Extract the data from a message as a byte sequence.

Remarks Return a copy of the message data as a byte sequence, suitable for archiving in a file. To reconstruct the message from bytes, see TibrvMsg() on page 57.

The byte data includes the message header and all message fields in Rendezvous wire format. It does not include address information, such as the subject and reply subject, nor certified delivery information.

The byte sequence can contain interior `null` bytes.

See Also TibrvMsg() on page 57

TibrvMsg.getByteSize()

Method

Declaration

```
int getByteSize()
  throws TibrvException
```

Purpose Return the size of a message (in bytes).

Remarks This measurement accounts for the actual space that the message occupies (in wire format), including its header and its fields. It does not include address information, such as the subject or reply subject.

Programs can use this call as part of these tasks:

- Assess throughput rates.
- Limit output rates (also called *throttling*).

TibrvMsg.getEvent()

Method

Declaration

```
TibrvEvent getEvent();
```

Purpose Extract the event associated with a (dispatched) message object.

Remarks Dispatch associates the message with a listener event.

This call is valid only for an inbound message that has already been dispatched to a listener event. If the message is not associated with a listener event, then this method returns `null`.

Restrictions This method is available only in the JNI preferred implementation. It is *not* available in the JNI backward compatibility implementation, nor in the pure Java implementation.

See Also TibrvEvent.getClosure() on page 137
TibrvVectorCallback.onMsgs() on page 159

TibrvMsg.getField()

Method

Declaration

```
TibrvMsgField getField(
    java.lang.String  fieldName)
  throws TibrvException

TibrvMsgField getField(
    int               fieldId)
  throws TibrvException

TibrvMsgField getField(
    java.lang.String  fieldName,
    int               fieldId)
  throws TibrvException
```

Purpose

Get a specified field from a message.

Remarks

Programs specify the field to retrieve using the `fieldName` and `fieldId` parameters.

The method takes a snapshot of the field, and returns that information as a field object.

Programs can use a related method to loop through all the fields of a message; to retrieve each field by its integer index number, see TibrvMsg.getFieldByIndex() on page 76.

Parameter	Description
`fieldName`	Get a field with this name.
`fieldId`	Get the field with this identifier.

Method Forms

With only a field name, find the field by name. If the field name is not present in the message, return `null`. If several fields with that name are present in the message, this method returns the first one that it finds.

With only a field identifier, find the field with that identifier (since identifiers are unique, the message can contain at most one such field). If the identifier is not present in the message, return `null`.

With both a field name and a field identifier, search first by identifier, and then by field name. If neither are present in the message, return `null`.

See Also

TibrvMsg.get() on page 66

TibrvMsg.getFieldByIndex()

Method

Declaration

```
TibrvMsgField getFieldByIndex(int fieldIndex)
  throws ArrayIndexOutOfBoundsException TibrvException
```

Purpose Get a field from a message by an index.

Remarks Programs can loop through all the fields of a message, to retrieve each field in turn using an integer index.

The method takes a snapshot of the field, and returns that information as a field object.

Add, *remove* and *update* calls can perturb the order of fields (which, in turn, affects the results when a program gets a field by index).

Parameter	Description
`fieldIndex`	Get the field with this index. Zero specifies the first field.

TibrvMsg.getFieldInstance()

Method

Declaration

```
TibrvMsgField getFieldInstance(
    java.lang.String fieldName,
    int instance)
  throws TibrvException
```

Purpose Get a specific instance of a field from a message.

Remarks When a message contains several field instances with the same field name, retrieve a specific instance by number (for example, get the `i`*th* field named `foo`). Programs can use this method in a loop that examines every field with a specified name.

The argument `1` denotes the first instance of the named field.

The method takes a snapshot of the field, and returns that information as a field object.

The method copies scalar data into the field object. Non-scalar data extracted from the field remain valid until the message is destroyed; that is, even removing the field or updating the field's value does *not* invalidate non-scalar data (such as arrays, strings, submessages, XML data, or opaque byte sequences).

When the `instance` argument is greater than the actual number of instances of the field in the message, this method returns `null`.

Release 5 Interaction Rendezvous 5 (and earlier) did not support array datatypes. Some older programs circumvented this limitation by using several fields with the same name to simulate arrays. This work-around is no longer necessary, since release 6 (and later) supports array datatypes within message fields. The method `TibrvMsg.getFieldInstance()` ensures backward compatibility, so new programs can still receive and manipulate messages sent from older programs. Nonetheless, we encourage programmers to use array types as appropriate, and we discourage storing several fields with the same name in a message.

Parameter	Description
`fieldName`	Get an instance of the field with this name. `null` specifies the empty string as the field name.
`instance`	Get this instance of the specified field name. The argument `1` denotes the first instance of the named field.

See Also TibrvMsgField on page 97

TibrvMsg.getNumFields()

Method

Declaration `int getNumFields()`

Purpose Extract the number of fields in a message.

Remarks This method counts the immediate fields of the message; it does not descend into submessages to count their fields recursively.

TibrvMsg.getReplySubject()

Method

Declaration `java.lang.String` **`getReplySubject`**`()`

Purpose Extract the reply subject from a message.

Remarks The reply subject string is part of a message's address information—it is *not* part of the message itself.

If the reply subject is not set, this method returns `null`.

See Also TibrvMsg.setReplySubject() on page 87
Supplementary Information for Messages on page 41 in *TIBCO Rendezvous Concepts*

TibrvMsg.getSendSubject()

Method

Declaration `java.lang.String` **`getSendSubject`**`()`

Purpose Extract the subject from a message.

Remarks The subject string is part of a message's address information—it is *not* part of the message itself.

If the destination subject is not set, this method returns `null`.

See Also TibrvMsg.setSendSubject() on page 88
Supplementary Information for Messages on page 41 in *TIBCO Rendezvous Concepts*

TibrvMsg.getStringEncoding()

Method

Declaration `static java.lang.String getStringEncoding()`

Purpose Return the character encoding for converting between Java Strings and wire format strings.

See Also Strings and Character Encodings, page 4
TibrvMsg.setStringEncoding() on page 89

TibrvMsg.getTypeName()

Method

Declaration `static java.lang.String getTypeName(short type)`

Purpose Convert a type designator to its corresponding string name.

Remarks This static method returns string representations of the `TibrvMsg` datatype constants. For example, it converts the type constant `TibrvMsg.I8ARRAY` to the string `"I8ARRAY"`.

For custom datatypes, this method returns a string of the form `"USER_FIRST+3"` (for example).

If the type is invalid, this method returns the string `INVALID`.

Parameter	Description
`type`	Convert this type constant to a string name.

See Also Datatype Constants, page 54
TibrvMsg.setHandlers() on page 370

TibrvMsg.removeField()

Method

Declaration

```
boolean removeField(
    java.lang.String  fieldName)

boolean removeField(
    int               fieldId)

boolean removeField(
    java.lang.String  fieldName,
    int               fieldId)
  throws TibrvException
```

Purpose

Remove a field from a message.

Parameter	Description
`fieldName`	Remove the field with this name.
`fieldId`	Remove the field with this identifier.

Method Forms and the Field Search Algorithm

This method uses this algorithm to find and remove a field within a message, as specified by a field identifier and a field name.

1. If the program supplied zero as the identifier, or omitted any identifier, then begin at step 3.

   If the program supplied a *non-zero* field identifier, then search for the field with that identifier. If the search succeeds, remove the field and return `true`.

   On the search does not find a field, continue to step 2.

2. If the identifier search (in step 1) fails, and the program supplied a non-`null` field name, then search for a field with that name.

   On the search does not find a field, or if the program supplied `null` as the field name, return `false`.

   If the name search succeeds, but the actual identifier in the field is non-zero (so it does not match the identifier supplied) then throw an exception with the status code `TibrvStatus.ID_CONFLICT`.

   If the search succeeds, remove the field and return `true`.

3. When the program supplied zero as the identifier, or omitted any identifier, then begin here.

   Search for a field with the specified name—even if that name is `null`.

   If the search succeeds, remove the field and return `true`.

If the search does not find a field, return `false`.

If a message contains several fields with the same name, searching by name removes the first instance of the field with that name.

TibrvMsg.removeFieldInstance()

Method

Declaration

```
boolean removeFieldInstance(
    java.lang.String fieldName,
    int instance)
  throws TibrvException
```

Purpose Remove a specified instance of a field from a message.

Remarks When a message contains several field instances with the same field name, remove a specific instance by number (for example, remove the `i`*th* field named `foo`). Programs can use this method in a loop that examines every field with a specified name.

The argument `1` denotes the first instance of the named field.

If the specified instance does not exist, the method returns `false`.

Parameter	Description
`fieldName`	Remove the field with this name.
`instance`	Remove this instance of the field. The argument `1` specifies the first instance of the named field.

TibrvMsg.reset()

Method

Declaration

```
void reset()
  throws TibrvException
```

Purpose Clear a message, preparing it for re-use.

Remarks This method is the equivalent of creating a new message—except that the unmanaged storage is re-used.

When this method returns, the message has no fields; it is like a newly created message. The message's address information is also reset.

See Also TibrvMsg() on page 57

TibrvMsg.setReplySubject()

Method

Declaration

```
void setReplySubject(java.lang.String replySubject)
  throws TibrvException
```

Purpose Set the reply subject for a message.

Remarks A receiver can reply to an inbound message using its reply subject.

Rendezvous routing daemons modify subjects and reply subjects to enable transparent point-to-point communication across network boundaries. This modification does not apply to subject names stored in message data fields; we discourage storing point-to-point subject names in data fields.

Parameter	Description
`replySubject`	Use this string as the new reply subject, replacing any existing reply subject. The reply subject `null` removes the previous reply subject.

See Also TibrvMsg.getReplySubject() on page 79
Supplementary Information for Messages on page 41 in *TIBCO Rendezvous Concepts*

TibrvMsg.setSendSubject()

Method

Declaration

```
void setSendSubject(java.lang.String subject)
  throws TibrvException
```

Purpose Set the subject for a message.

Remarks The subject of a message can describe its content, as well as its destination set.

Rendezvous routing daemons modify subjects and reply subjects to enable transparent point-to-point communication across network boundaries. This modification does not apply to subject names stored in message data fields; we discourage storing point-to-point subject names in data fields.

Parameter	Description
`subject`	Use this string as the new subject, replacing any existing subject. The subject `null` removes the previous subject, leaving the message unsendable.

See Also TibrvMsg.getSendSubject() on page 80
Supplementary Information for Messages on page 41 in *TIBCO Rendezvous Concepts*

TibrvMsg.setStringEncoding()

Method

Declaration

```
static void setStringEncoding(
    java.lang.String    encoding)
  throws java.io.UnsupportedEncodingException
```

Purpose Set the character encoding for converting between Java Unicode strings and wire format strings.

Remarks This method overrides the default string encoding for all strings in all messages.

`null` indicates the ISO 8859-1 (Latin-1) encoding:

- To translate Unicode strings to Latin-1 strings, disregard the *null* high byte of each character. Unicode characters with non-null high bytes are out of the Latin-1 range.
- To translate Latin-1 strings to Unicode strings, pad each character with a `null` high byte.

Do *not* call this method while any listener events are valid. We recommend setting it at program start, before creating any listeners.

Encoding changes are not retroactive; that is, changing the encoding affects only future string translations. For further details, see Strings and Character Encodings on page 4.

Parameter	Description
`encoding`	Use this encoding.

See Also

Strings and Character Encodings, page 4
TibrvMsg.getStringEncoding() on page 81
www.unicode.org

TibrvMsg.toString()

Method

Declaration `java.lang.String toString()`

Purpose Format a message as a string.

Remarks Programs can use this method to obtain a string representation of the message for printing.

For most datatypes, this method formats the full value of the field to the output string; these types are exceptions:

`TibrvMsg.OPAQUE`	This method abbreviates the value of an opaque field; for example, `[472 opaque bytes]`.
`TibrvMsg.XML`	This method abbreviates the value of an XML field; for example, `[XML document: 472 bytes]`. The size measures *un*compressed data.

This method formats `TibrvMsg.IPADDR32` fields as four dot-separated decimal integers.

This method formats `TibrvMsg.IPPORT16` fields as one decimal integer.

TibrvMsg.update()

Method

Declaration

```
void update(
    java.lang.String fieldName,
    java.lang.Object data)
  throws TibrvException

void update(
    java.lang.String fieldName,
    java.lang.Object data,
    short            type)
  throws TibrvException

void update(
    java.lang.String fieldName,
    java.lang.Object data,
    short            type,
    int              fieldId)
  throws TibrvException
```

Purpose Update a field within a message.

Remarks This method copies the new data into the message field. All related convenience methods behave similarly.

This method locates a field within the message by matching the `fieldName` and `fieldId` arguments. Then it updates the message field using the `data` argument. (Notice that only the value and count of the message field can change.)

If no existing field matches the specifications in the `fieldName` and `fieldId` arguments, then this method adds a new field to the message. Update convenience methods also add a field if it is not present.

The type of the existing message field and the type of the updating `field` argument must be identical; otherwise, the method throws an exception with the error status code `TibrvStatus.INVALID_TYPE`. However, when updating array or vector fields, the count (number of elements) can change.

(Sheet 1 of 2)

Parameter	Description
`fieldName`	Update a field with this name. When absent, locate the field by identifier only.

(Sheet 2 of 2)

Parameter	Description
`data`	Update a field using this data value. It is illegal to add or update a field with `null` data. To remove a field, use TibrvMsg.removeField() on page 83.
`type`	Update a field with this type. When absent, determine the field's type from the type of the data. Default encodings and possible conversions are identical to methods that add fields; see Figure 5 on page 61.
`fieldId`	Update a field with this identifier. All field identifiers must be unique within each message. Zero is a special value, indicating no identifier. It is illegal to add a field that has both a `null` field name, and a non-zero field identifier.

Field Search Algorithm

This method, and related methods that *update* message fields, all use this algorithm to find and update a field within a message, as specified by a field identifier and a field name.

1. If the program supplied zero as the identifier, or omitted any identifier, then begin at step 3.

   If the program supplied a *non-zero* field identifier, then search for the field with that identifier.

   If the search succeeds, then update that field.

   On failure, continue to step 2.

2. If the identifier search (in step 1) fails, and the program supplied a non-`null` field name, then search for a field with that name.

   If the search succeeds, then update that field.

   If the name search succeeds, but the actual identifier in the field is non-`null` (so it does not match the identifier supplied) then throw an exception with the status code `TibrvStatus.ID_CONFLICT`.

   If the search fails, *add* the field as specified (with name and identifier).

However, if the program supplied `null` as the field name, then do not search for the field name; instead, throw an exception with the status code `TibrvStatus.NOT_FOUND`.

3. When the program supplied zero as the identifier, or omitted any identifier, then begin here.

   Search for a field with the specified name—even if that name is `null`.

   If the search fails, *add* the field as specified (with name and identifier).

If a message contains several fields with the same name, searching by name finds the first instance of the field with that name.

Nested Message

When the new value is a message object, this method uses only the data portion of the nested message (`data`); it does not include any address information or certified delivery information.

Update Scalar

Convenience Methods

Declaration

```
void update(
    java.lang.String fieldName,
    scalar_type      data)
  throws TibrvException

void update(
    java.lang.String fieldName,
    scalar_type      data,
    int              fieldId)
  throws TibrvException

void updateUbits(
    java.lang.String fieldName,
    scalar_type      data)
  throws TibrvException

void updateUbits(
    java.lang.String fieldName,
    scalar_type      data,
    int              fieldId)
  throws TibrvException
```

Purpose Update a field containing a scalar value.

Method Forms The convenience methods named **`update()`** determine the field type from the numeric type of the data.

The convenience methods named **`updateU`***nn*`()` update unsigned integer fields, discarding the sign bit of a Java integer data value.

Method Name	Java Data Type	Field Type	Type Description
`update`	`boolean`	`TibrvMsg.`**`BOOL`**	boolean
`update`	`float`	`TibrvMsg.`**`F32`**	32-bit floating point
`update`	`double`	`TibrvMsg.`**`F64`**	64-bit floating point
`update`	`byte`	`TibrvMsg.`**`I8`**	8-bit integer
`update`	`short`	`TibrvMsg.`**`I16`**	16-bit integer
`update`	`int`	`TibrvMsg.`**`I32`**	32-bit integer
`update`	`long`	`TibrvMsg.`**`I64`**	64-bit integer
`update`**`U8`**	`byte`	`TibrvMsg.`**`U8`**	8-bit unsigned integer

Method Name	Java Data Type	Field Type	Type Description
update**U16**	short	TibrvMsg.**U16**	16-bit unsigned integer
update**U32**	int	TibrvMsg.**U32**	32-bit unsigned integer
update**U64**	long	TibrvMsg.**U64**	64-bit unsigned integer

Parameter	Description
data	Update a field with this data value. It is illegal to add or update a field with null data.
fieldName	Update a field with this name. When absent, locate the field by identifier only.
fieldId	Update a field with this identifier. All field identifiers must be unique within each message. Zero is a special value, indicating no identifier. It is illegal to add a field that has both a null field name, and a non-zero field identifier.

TibrvMsg.updateField()

Method

Declaration

```
void updateField(TibrvMsgField field)
  throws TibrvException
```

Purpose Update a field within a message.

Remarks This method copies the new data into the existing message field. All related convenience methods behave similarly.

This method locates a field within the message by matching the name and identifier of `field`. Then it updates the message field using the `field` argument. (Notice that the program may not supply a field object with a different field name, field identifier, or datatype.)

If no existing field matches the specifications in the `field` argument, then this method adds the field to the message. Update convenience methods also add the field if it is not present. It is illegal to add a field that has both a `null` field name, and a non-zero field identifier.

The type of the existing message field and the type of the updating `field` argument must be identical; otherwise, the method returns the error status code `TibrvStatus.INVALID_TYPE`. However, when updating array or vector fields, the count (number of elements) can change.

Parameter	Description
`field`	Update the existing message field using this field. It is illegal to add or update a field with `null` data.

TibrvMsgField

Class

Declaration

```
class com.tibco.tibrv.TibrvMsgField
  extends java.lang.Object
```

Purpose Represent a message field.

Remarks This class has no `destroy()` method. Instead, the Java garbage collector reclaims storage automatically.

Field	Description
`name`	Field name, of type `java.lang.String`. Names must be strings; `null` is a special value that indicates no name. Field names use the character encoding appropriate to the ISO locale; see Strings and Character Encodings on page 4.
`id`	Field identifier, of type `int`. Identifiers must be in the range [0-65535]; zero is a special value that indicates no identifier.
`data`	Data content of the field, a `java.lang.Object`. When storing data in this field, Rendezvous software does not verify that the data and type of the field are consistent. Methods that add the field object into a message verify consistency (for example `TibrvMsg.addField()` and `TibrvMsg.updateField()`). It is illegal to add or update a field with `null` data.
`type`	Type designator for the data, a `short`. For a list of types, see Datatype Constants on page 54. To interpret a type designator as a string, see TibrvMsg.getTypeName() on page 82. When storing a type designator in this field, Rendezvous software does not verify that the data and type of the field are consistent. Methods that add the field object into a message verify consistency (for example `TibrvMsg.addField()` and `TibrvMsg.updateField()`). If absent, the default type is `TibrvMsg.DEFAULT`, which instructs `TibrvMsg.addField()` and `TibrvMsg.updateField()` to use the default type corresponding to the data value.

Method	Description	Page
`TibrvMsgField()`	Create a message field object.	99
`TibrvMsgField.toString()`	Format a field as a string.	101

Inherited Methods

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.wait`

See Also

TibrvMsg.addField() on page 64
TibrvMsg.getField() on page 75
TibrvMsg.updateField() on page 96

TibrvMsgField()

Constructor

Declaration

```
TibrvMsgField()

TibrvMsgField(TibrvMsgField field)

TibrvMsgField(
    java.lang.String name,
    java.lang.Object data,
    short type,
    int id)

TibrvMsgField(
    java.lang.String name,
    java.lang.Object data,
    short type)

TibrvMsgField(
    java.lang.String name,
    java.lang.Object data)
```

Purpose Create a message field object.

Method Forms With no arguments, create an empty field (no name, no identifier, no data, no type).

With a field argument, create an independent copy of the field.

Name, identifier, data and type arguments contribute to the contents of the field object.

Remarks This constructor does not verify that the data and type of the field are consistent. Methods that add the field object into a message verify consistency (for example `TibrvMsg.addField()` and `TibrvMsg.updateField()`).

(Sheet 1 of 2)

Parameter	Description
`field`	Create an independent copy of this field.
`name`	Create a field with this name. To create a field with no name, supply `null`.
`id`	Create a field with this identifier. Identifiers must be in the range [0-65535]; zero is a special value that indicates no identifier.

(Sheet 2 of 2)

Parameter	Description
`data`	Create a field with this data value. The data value must be non-`null`.
`type`	Create a field with this type. For a list of types, see Datatype Constants on page 54. If absent, the default type is `TibrvMsg.DEFAULT`, which instructs the methods `TibrvMsg.addField()` and `TibrvMsg.updateField()` to use the default type corresponding to the data value.

See Also

TibrvMsg.addField() on page 64
TibrvMsg.updateField() on page 96

TibrvMsgField.toString()

Method

Declaration `java.lang.String toString()`

Purpose Format a field as a string.

Remarks Programs can use this method to obtain a string representation of the field for printing.

TibrvMsgView

Class

Declaration

```
class com.tibco.tibrv.TibrvMsgView
  extends java.lang.Object
```

Purpose View the fields of Rendezvous messages.

Remarks A message view is a snapshot copy of a Rendezvous message. All the data resides within the Java environment (not in the C environment). A view provides read-only access to field data of an inbound message.

To create a new view, see TibrvMsgView.extract() on page 104.

Efficiency When a callback method gets 10 or more fields, then a message view is usually more efficient than accessing the fields of the C message. Extracting a message view accesses the native C message only once, instead of repeatedly (with every get call).

When a callback method gets fewer than 10 fields, then getting fields from the native C message is usually more efficient.

Restrictions `TibrvMsgView` and its methods are available only in the JNI preferred implementation. They are *not* available in the JNI backward compatibility implementation, nor in the pure Java implementation.

(Sheet 1 of 2)

Method	Description	Page
Message View Life Cycle and Properties		
`TibrvMsgView.extract()`	Extract a snapshot view of a Rendezvous message.	104
Fields		
`TibrvMsgView.get()`	Get the value of a specified field from a message view snapshot.	105
Get Scalar from TibrvMsgView	Get the value of a field from a message view snapshot as a scalar value.	107
`TibrvMsgView.getField()`	Get a specified field from a snapshot message view.	109

(Sheet 2 of 2)

Method	Description	Page
`TibrvMsgView.getFieldByIndex()`	Get a field from a snapshot message view by an index.	110
`TibrvMsgView.getFieldInstance()`	Get a specific instance of a field from a message.	111
`TibrvMsgView.getNumFields()`	Extract the number of fields in a snapshot message view.	112

Inherited Methods

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.wait`

Example 2 Using a Message View

```
try {
    TibrvMsgView view = TibrvMsgView.extract(message);
    for (int i = 1; i <= this.fieldCount; i++) {
         view.get(i);
         ...
    }
} catch (final TibrvException e) {
    e.printStackTrace();
    System.exit(0);
}
```

See Also

Strings and Character Encodings, page 4
TibrvMsg on page 52
TibrvMsgField on page 97
Appendix A, Custom Datatypes, on page 367

TibrvMsgView.extract()

Method

Declaration

```
static TibrvMsgView extract(TibrvMsg message)
  throws TibrvException
```

Purpose Extract a snapshot view of a Rendezvous message.

Remarks This static method parses a snapshot of the native C message into a view of the message data. Upon successful completion, all the message data are available as Java objects.

The message view contains snapshot data. That is, subsequently modifying the data in the message does not affect the data in the message view.

Parameter	Description
`message`	Extract the data from this message into a new view object.

SubMessages When a field contains a submessage, this method creates a copy of the submessage—that is, a Java message object corresponding to a an independent copy of the submessage in the C environment. You may access its fields as a message object, or you may explicitly extract the submessage into its own message view.

Decoding and Type Conversion The method `TibrvMsgView.extract()` automatically decodes the extracted field data from its Rendezvous wire format type to a corresponding Java type. In Figure 6 on page 69, filled circles (as well as + and – symbols) specify default decodings between homologous types; for some types you can override the default decoding by using convenience calls that force specific types (see Get Scalar from TibrvMsgView on page 107).

Java does not admit unsigned integers. When extracting an unsigned integer from an inbound message field, this method automatically promotes the value to the corresponding Java type that is large enough to contain it (Figure 6 indicates this with +). When extracting an unsigned 64-bit integer, Java does not have a type that can contain a number that uses all 64 bits; this method decodes it to a Java `long`, interpreting the high bit as a sign bit (Figure 6 indicates this with –).

See Also Figure 6, Wire Format to Java Datatype Conversion Matrix, on page 69
TibrvMsgView on page 102

TibrvMsgView.get()

Method

Declaration

```
java.lang.Object get(
    final java.lang.String fieldName)
  throws TibrvException

java.lang.Object get(
    final int fieldId)
  throws TibrvException

java.lang.Object get(
    final java.lang.String fieldName,
    final int fieldId)
  throws TibrvException
```

Purpose Get the value of a specified field from a message view snapshot.

Remarks Programs specify the field to retrieve using the `fieldName` and `fieldId` parameters.

When the field contains a submessage, this method returns a copy of the submessage—that is, a Java message object corresponding to a an independent copy of the submessage in the C environment. You may access its fields as a message object, or you may explicitly extract the submessage into its own message view.

Programs can use a related method to loop through all the fields of a message; to retrieve each field by its integer index number, see TibrvMsg.getFieldByIndex() on page 76.

Parameter	Description
`fieldName`	Get a field with this name.
`fieldId`	Get the field with this identifier.

Field Search Algorithm

This method, and related methods that *get* fields from message views, use the same algorithm as `TibrvMsg.get()`. For complete details, see Field Search Algorithm on page 66.

Method Forms With only a field name, find the field by name. If the field name is not present in the message, return `null`. If several fields with that name are present in the message, this method returns the first one that it finds.

With only a field identifier, find the field with that identifier (since identifiers are unique, the message can contain at most one such field). If the identifier is not present in the message, return `null`.

With both a field name and a field identifier, search first by identifier, and then by field name. If neither are present in the message, return `null`. If identifier search succeeds, return the field value. If the name search succeeds, but the actual identifier in the field is non-zero (so it does not match the identifier supplied) then throw a `TibrvException` with status code `TibrvStatus.ID_CONFLICT`.

See Also TibrvMsgView on page 102

Get Scalar from TibrvMsgView

Convenience Methods

Declaration

```
scalar_type getScalar_type(
    java.lang.String fieldName,
    int fieldId)
  throws TibrvException

scalar_type getAsScalar_type(
    java.lang.String fieldName,
    int fieldId)
  throws TibrvException
```

Purpose Get the value of a field from a message view snapshot as a scalar value.

Remarks Each convenience method in this family retrieves a field and extracts its data. If the field's type (as it exists) does not match the type of the convenience method, then the **get***type* method throws an exception; in contrast, the **getAs***type* method attempts to convert the data (see Decoding and Type Conversion on page 68, and Wire Format to Java Datatype Conversion Matrix on page 69). If conversion is not possible, the method throws an exception with status code `TibrvStatus.CONVERSION_FAILED`.

Parameter	Description
`fieldName`	Get a field with this name.
`fieldId`	Get the field with this identifier.

(Sheet 1 of 2)

Method Name	Field Type	Java Type	Type Description
get**Boolean** getAs**Boolean**	TibrvMsg.**BOOL**	boolean	boolean
get**Float** getAs**Float**	TibrvMsg.**F32**	float	32-bit floating point
get**Double** getAs**Double**	TibrvMsg.**F64**	double	64-bit floating point
get**Byte** getAs**Byte**	TibrvMsg.**I8**	byte	8-bit integer

(Sheet 2 of 2)

Method Name	Field Type	Java Type	Type Description
`getShort` `getAsShort`	`TibrvMsg.I16`	`short`	16-bit integer
`getInt` `getAsInt`	`TibrvMsg.I32`	`int`	32-bit integer
`getLong` `getAsLong`	`TibrvMsg.I64`	`long`	64-bit integer

TibrvMsgView.getField()

Method

Declaration

```
TibrvMsgField getField(
    java.lang.String  fieldName)
  throws TibrvException

TibrvMsgField getField(
    int               fieldId)
  throws TibrvException

TibrvMsgField getField(
    java.lang.String  fieldName,
    int               fieldId)
  throws TibrvException
```

Purpose Get a specified field from a snapshot message view.

Remarks Programs specify the field to retrieve using the `fieldName` and `fieldId` parameters.

The method `TibrvMsgView.extract()` creates field objects for each field of the message snapshot. This returns one of those field objects.

Programs can use a related method to loop through all the fields of a message view; to retrieve each field by its integer index number, see TibrvMsgView.getFieldByIndex() on page 110.

Parameter	Description
`fieldName`	Get a field with this name.
`fieldId`	Get the field with this identifier.

Method Forms With only a field name, find the field by name. If the field name is not present in the message, return `null`. If several fields with that name are present in the message, this method returns the first one that it finds.

With only a field identifier, find the field with that identifier (since identifiers are unique, the message can contain at most one such field). If the identifier is not present in the message, return `null`.

With both a field name and a field identifier, search first by identifier, and then by field name. If neither are present in the message, return `null`.

See Also TibrvMsgView on page 102
TibrvMsgView.get() on page 105

TibrvMsgView.getFieldByIndex()

Method

Declaration

```
TibrvMsgField getFieldByIndex(int fieldIndex)
  throws ArrayIndexOutOfBoundsException TibrvException
```

Purpose Get a field from a snapshot message view by an index.

Remarks Programs can loop through all the fields of a message, to retrieve each field in turn using an integer index.

The method `TibrvMsgView.extract()` creates field objects for each field of the message snapshot. This returns one of those field objects.

Parameter	Description
`fieldIndex`	Get the field with this index. Zero specifies the first field.

See Also TibrvMsgView on page 102
TibrvMsgView.get() on page 105

TibrvMsgView.getFieldInstance()

Method

Declaration

```
TibrvMsgField getFieldInstance(
    java.lang.String fieldName,
    int instance)
  throws TibrvException
```

Purpose Get a specific instance of a field from a message.

Remarks When a message contains several field instances with the same field name, retrieve a specific instance by number (for example, get the `i`*th* field named `foo`). Programs can use this method in a loop that examines every field with a specified name.

The argument `1` denotes the first instance of the named field.

The method `TibrvMsgView.extract()` creates field objects for each field of the message snapshot. This returns one of those field objects.

When the `instance` argument is greater than the actual number of instances of the field in the message, this method returns `null`.

Release 5 Interaction Rendezvous 5 (and earlier) did not support array datatypes. Some older programs circumvented this limitation by using several fields with the same name to simulate arrays. This work-around is no longer necessary, since release 6 (and later) supports array datatypes within message fields. The method `TibrvMsgView.getFieldInstance()` ensures backward compatibility, so new programs can still receive and manipulate messages sent from older programs. Nonetheless, we encourage programmers to use array types as appropriate, and we discourage storing several fields with the same name in a message.

Parameter	Description
`fieldName`	Get an instance of the field with this name. `null` specifies the empty string as the field name.
`instance`	Get this instance of the specified field name. The argument `1` denotes the first instance of the named field.

See Also TibrvMsgField on page 97
TibrvMsgView on page 102
TibrvMsgView.get() on page 105

TibrvMsgView.getNumFields()

Method

Declaration `int getNumFields()`

Purpose Extract the number of fields in a snapshot message view.

Remarks This method counts the immediate fields of the message; it does not descend into submessages to count their fields recursively.

TibrvDate

Class

Declaration

```
class com.tibco.tibrv.TibrvDate
  extends java.util.Date
```

Purpose Represent date and time.

This object relies on the method `java.util.Date.toString()` to convert a value to a string.

Remarks This class has no `destroy()` method. Instead, the Java garbage collector reclaims storage automatically.

Constant	Description
`TibrvDate.MAX_SECONDS`	Maximum date (in seconds) that this class can represent. The value is 549,755,813,887 (the maximum value of a 40-bit signed integer), which is approximately 17,432 years after the year 1970.
`TibrvDate.MIN_SECONDS`	Minimum date (in seconds) that this class can represent. The value is -549,755,813,888 (the minimum value of a 40-bit signed integer), which is approximately 17,432 years before the year 1970.

Method	Description	Page
`TibrvDate()`	Create a Rendezvous date object.	116
`TibrvDate.getTimeNanoseconds()`	Extract the modifying value (in nanoseconds) of a date object.	117
`TibrvDate.getTimeSeconds()`	Extract the partial value (in whole seconds) of a date object.	118
`TibrvDate.setTime()`	Change the value of a date object.	119

Inherited Methods
java.util.Date.after java.util.Date.before java.util.Date.clone java.util.Date.compareTo java.util.Date.getDate java.util.Date.getDay java.util.Date.getHours java.util.Date.getMinutes java.util.Date.getMonth java.util.Date.getSeconds java.util.Date.getTime java.util.Date.getTimezoneOffset java.util.Date.getYear java.util.Date.hashCode java.util.Date.parse java.util.Date.setDate java.util.Date.setHours java.util.Date.setMinutes java.util.Date.setMonth java.util.Date.setSeconds java.util.Date.setYear java.util.Date.toGMTString java.util.Date.toLocaleString java.util.Date.toString java.util.Date.UTC
java.lang.Object.equals java.lang.Object.getClass java.lang.Object.hashCode java.lang.Object.notify java.lang.Object.notifyAll java.lang.Object.wait

Representations In all three representations, zero denotes the epoch, 12:00 midnight, January 1st, 1970. Range limits in this table denote the extreme value on either side of that center. Bold type indicates the primary unit of measurement for each representation.

Table 8 Date and Time Representations (Sheet 1 of 2)

Representation	Details	
`java.util.Date`	Milliseconds as a 64-bit signed integer.	
	range in years	`292,471,208`
	range in seconds	`9,223,372,036,854,775`
	range in milliseconds	**`9,223,372,036,854,775,807`**

Table 8 Date and Time Representations (Sheet 2 of 2)

Representation	Details	
`TibrvDate`	Seconds as a 64-bit signed integer, plus nanoseconds as a 32-bit unsigned integer. However, values are restricted to the range and granularity supported by Rendezvous wire format. Forcing larger or finer values into this representation causes an exception.	
	range in years	`292,471,208,677`
	range in seconds	**`9,223,372,036,854,775,807`**
	restricted range in seconds	`549,755,813,887`
	restricted range in milliseconds	`549,755,813,887,000`
Rendezvous wire format	Seconds as a 40-bit signed integer, plus microseconds as a 24-bit unsigned integer.	
	range in years	`17,432`
	range in seconds	**`549,755,813,887`**
	range in milliseconds	`549,755,813,887,000`

See Also TibrvMsg.get() on page 66

TibrvDate()

Constructor

Declaration

```
TibrvDate()

TibrvDate(java.util.Date date)

TibrvDate(long milliseconds)

TibrvDate(
    long  seconds,
    int   nanoseconds)
```

Purpose Create a Rendezvous date object.

Remarks If the time value specified is out of range, this constructor throws an `IllegalArgumentException`.

Parameter	Description
`date`	Copy the value of this Java date or Rendezvous date object into an independent copy object.
`milliseconds`	Create a date from this value (in milliseconds, centered on 12:00am, January 1, 1970).
`seconds`	Create a date from this value (in seconds, centered on 12:00am, January 1, 1970).
`nanoseconds`	Add this value (in nanoseconds) to the time specified by the `seconds` parameter. This argument must be non-negative.

Method Forms With no arguments, create a date object representing the current time.

With an argument of class `java.util.Date` (or a subclass), create a `TibrvDate` object representing the same date value.

With one argument, interpret that `long` as the date in milliseconds. For example, specify the time 1/2 second before midnight of December 31, 1969 as -500 milliseconds.

With two arguments, interpret them as seconds and (non-negative) nanoseconds. For example, specify the time 1/2 second before midnight of December 31, 1969 as -1 seconds plus 500,000,000 nanoseconds.

See Also TibrvDate on page 113
Representations, page 114

TibrvDate.getTimeNanoseconds()

Method

Declaration

```
int getTimeSeconds()
```

Purpose Extract the modifying value (in nanoseconds) of a date object.

Remarks This value is always non-negative, between zero and 999999999.

It modifies the date in whole seconds (as returned by TibrvDate.getTimeSeconds() on page 118), by specifying the number of nanoseconds *after* that date. For example, the time 1/2 second before midnight of December 31, 1969 is -1 seconds plus 500,000,000 nanoseconds.

See Also TibrvDate.getTimeSeconds() on page 118

TibrvDate.getTimeSeconds()

Method

Declaration `long getTimeSeconds()`

Purpose Extract the partial value (in whole seconds) of a date object.

Remarks The value is the date in seconds, centered on 12:00am, January 1, 1970.

To get the modifying nanosecond value, use TibrvDate.getTimeNanoseconds() on page 117.

See Also TibrvDate.getTimeNanoseconds() on page 117

TibrvDate.setTime()

Method

Declaration

```
void setTime(long milliseconds)

void setTime(
    long   seconds,
    int    nanoseconds)
```

Purpose Change the value of a date object.

Remarks If the time value specified is out of range, this constructor throws an `IllegalArgumentException`.

Parameter	Description
`milliseconds`	Set the date from this value (in milliseconds, centered on 12:00am, January 1, 1970).
`seconds`	Set the a date from this value (in seconds, centered on 12:00am, January 1, 1970). This argument must be in the range [`TibrvDate.MIN_SECONDS`;`TibrvDate.MAX_SECONDS`].
`nanoseconds`	Add this value (in nanoseconds) to the time specified by the `seconds` parameter. This argument must be non-negative, in the range [`0;999999999`].

Method Forms With one argument, interpret it as the date in milliseconds. For example, specify the time 1/2 second before midnight of December 31, 1969 as -500 milliseconds.

With two arguments, interpret them as seconds and (non-negative) nanoseconds. For example, specify the time 1/2 second before midnight of December 31, 1969 as -1 seconds plus 500,000,000 nanoseconds.

See Also Representations, page 114

TibrvIPAddr

Class

Declaration

```
class com.tibco.tibrv.TibrvIPAddr
  extends java.lang.Object
```

Purpose Represent an IP address.

Remarks In general, an IP address consists of four 8-bit unsigned integers, in network byte order.

This class has no `destroy()` method. Instead, the Java garbage collector reclaims storage automatically.

Method	Description	Page
`TibrvIPAddr()`	Create an IP address object.	121
`TibrvIPAddr.getAddr()`	Get an IP address as a 32-bit integer.	122
`TibrvIPAddr.getAsBytes()`	Get an IP address as a 4-byte array.	123
`TibrvIPAddr.getAsString()`	Get an IP address as a String.	124

Inherited Methods
`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString` (override)
`java.lang.Object.wait`

See Also TibrvMsg.get() on page 66

TibrvIPAddr()

Constructor

Declaration

```
TibrvIPAddr(byte[] bytes)

TibrvIPAddr(
    java.net.InetAddress inetAddr)

TibrvIPAddr(
    byte b1,
    byte b2,
    byte b3,
    byte b4)

TibrvIPAddr(
    java.lang.String ipString)
  throws java.lang.NumberFormatException

TibrvIPAddr(int address)

TibrvIPAddr(TibrvIPAddr ipAddr)
```

Purpose Create an IP address object.

Parameter	Description
`bytes`	Create an IP address from an array of 4 bytes. For `aaa.bbb.ccc.ddd`, let `bytes[0]` be the high byte `aaa`, and `bytes[3]` be the low byte `ddd`.
`b1, b2, b3, b4`	Create an IP address from these 4 bytes. For `aaa.bbb.ccc.ddd`, let `b1` be the high byte `aaa`, and `b4` be the low byte `ddd`.
`address`	Create an IP address from a 32-bit integer, interpreted as 4 bytes in network byte order.
`ipString`	Create an IP address from a string representation (for example, `"aaa.bbb.ccc.ddd"`).
`inetAddr`	Copy this Java 4-byte internet address into a `TibrvIPAddr` object with an equivalent value. (`TibrvIPAddr` supports only 4-byte IP addresses.)
`ipAddr`	Make an independent copy of this `TibrvIPAddr` object.

Remarks If the `ipString` argument does not represent a valid IP address, this constructor throws a `java.lang.NumberFormatException`.

TibrvIPAddr.getAddr()

Method

Declaration `final int getAddr()`

Purpose Get an IP address as a 32-bit integer.

TibrvIPAddr.getAsBytes()

Method

Declaration `final byte[] getAsBytes()`

Purpose Get an IP address as a 4-byte array.

Remarks The zeroth element is the high byte.

TibrvIPAddr.getAsString()

Method

Declaration `final java.lang.String getAsString()`

Purpose Get an IP address as a String.

Remarks This method returns a string composed of four decimal integers (in the form `"aaa.bbb.ccc.ddd"`).

TibrvIPPort

Class

Declaration

```
class com.tibco.tibrv.TibrvIPPort
  extends java.lang.Object
```

Purpose Represent an IP port number.

Remarks In general, an IP Port number is an unsigned 16-bit integer [0;65535], in network byte order. This class represents a port number as a 32-bit integer, because Java does not support unsigned numbers.

This class has no `destroy()` method. Instead, the Java garbage collector reclaims storage automatically.

Constant	Description
`TibrvIPPort.MAX_PORT`	Maximum port number that this class can represent (65535).
`TibrvIPPort.MIN_PORT`	Minimum port number that this class can represent (zero).

Method	Description	Page
`TibrvIPPort()`	Create an IP port object.	126
`TibrvIPPort.getPort()`	Get an IP port as a 32-bit integer.	127
`TibrvIPPort.getAsBytes()`	Get an IP port as a 2-byte array.	128

Inherited Methods

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString` (override)
`java.lang.Object.wait`

See Also TibrvMsg.get() on page 66

TibrvIPPort()

Constructor

Declaration

```
TibrvIPPort(
    byte highByte,
    byte lowByte)

TibrvIPPort(int port)

TibrvIPPort(TibrvIPPort ipPort)
```

Purpose Create an IP port object.

Parameter	Description
`highByte`, `lowByte`	Create an IP port from these 2 bytes.
`port`	Create an IP port from the 2 low bytes of this 32-bit integer, which must be in the range [0;65535].
`ipPort`	Make an independent copy of this `TibrvIPPort` object.

TibrvIPPort.getPort()

Method

Declaration `int getPort()`

Purpose Get an IP port as a 32-bit integer.

Remarks The value is always in the range [0;65535].

TibrvIPPort.getAsBytes()

Method

Declaration `byte[] getAsBytes()`

Purpose Get an IP port as a 2-byte array.

Remarks The high byte is the zeroth element.

TibrvXml

Class

Declaration

```
class com.tibco.tibrv.TibrvXml
  extends java.lang.Object
```

Purpose Represent an XML byte array.

Remarks Within programs, XML data is represented as a byte array. Within message fields, Rendezvous software compresses the bytes for efficient network transmission.

This class has no `destroy()` method. Instead, the Java garbage collector reclaims storage automatically.

Method	Description	Page
`TibrvXml()`	Create an XML data object.	130
`TibrvXml.getBytes()`	Get the data bytes from an XML data object.	131

Inherited Methods

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString` (override)
`java.lang.Object.wait`

See Also TibrvMsg.get() on page 66

TibrvXml()

Constructor

Declaration `TibrvXml (byte[] xmlBytes)`

Purpose Create an XML data object.

Parameter	Description
`xmlBytes`	Create an XML data object from this byte array.

TibrvXml.getBytes()

Method

Declaration `byte[] getBytes()`

Purpose Get the data bytes from an XML data object.

Chapter 5 Events and Queues

Programs can express interest in events of two kinds—inbound messages and timers. When an event occurs, it triggers a program callback method to process the event. Events wait in queues until programs dispatch them. Dispatching an event runs its callback method to process the event.

Event queues organize events awaiting dispatch. Programs dispatch events to run callback methods.

Queue groups add flexibility and fine-grained control to the event queue dispatch mechanism. Programs can create groups of queues and dispatch them according to their queue priorities.

This chapter presents classes, methods, interfaces and types associated with event interest and event processing.

Topics

TibrvEvent

Class

Declaration

```
class com.tibco.tibrv.TibrvEvent
  extends java.lang.Object
```

Purpose Event objects represent program interest in events, and event occurrences.

Remarks Programs create instances of event subclasses of `TibrvEvent`, but not of this superclass.

Each call to a Rendezvous event constructor results in a new event object, which represents your program's interest in a set of events. Rendezvous software uses the same event object to signal each occurrence of such an event.

Destroying an event object cancels the program's interest in that event. Destroying the queue or transport of an event automatically destroys the event as well.

Although the fault tolerance classes are technically events, they are sufficiently different from listeners and timers that they require separate description. See Chapter 8, Fault Tolerance, on page 255.

Method	Description	Page
`TibrvEvent.destroy()`	Destroy an event, canceling interest.	136
`TibrvEvent.getClosure()`	Extract the closure data of an event object.	137
`TibrvEvent.getQueue()`	Extract the queue of an event object.	138
`TibrvEvent.isValid()`	Test whether an event has been destroyed.	139
`TibrvEvent.isVectorListener()`	Test whether this event object is a vector listener.	140

Inherited Methods

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString` (override)
`java.lang.Object.wait`

Descendants TibrvListener on page 141

TibrvCmListener on page 288
TibrvTimer on page 160
TibrvFtMember on page 257
TibrvFtMonitor on page 277

TibrvEvent.destroy()

Method

Declaration `void destroy()`

Purpose Destroy an event, canceling interest.

Remarks Destroying an event object cancels interest in it. Upon return from `TibrvEvent.destroy()`, the destroyed event is no longer dispatched. However, all active callback methods of this event continue to run and return normally, even though the event is invalid.

It is legal for an event callback method to destroy its own event argument.

Destroying event interest invalidates the event object; subsequent API calls involving the invalid event throw exceptions, unless explicitly documented to the contrary.

See Also TibrvEvent.isValid() on page 139

TibrvEvent.getClosure()

Method

Declaration `java.lang.Object getClosure()`

Purpose Extract the closure data of an event object.

Remarks This method can extract the closure data even from invalid events.

TibrvEvent.getQueue()

Method

Declaration `TibrvQueue getQueue()`

Purpose Extract the queue of an event object.

Remarks If the event is invalid, this method returns `null`.

TibrvEvent.isValid()

Method

Declaration `boolean` **`isValid`**`()`

Purpose Test whether an event has been destroyed.

Remarks This method returns `false` if the event has been destroyed (using the `destroy` method); `true` otherwise.

Notice that `TibrvEvent.destroy()` invalidates the event immediately, even though active callback methods may continue to run.

See Also TibrvEvent.destroy() on page 136

TibrvEvent.isVectorListener()

Method

Declaration `java.lang.boolean **isVectorListener**();`

Purpose Test whether this event object is a vector listener.

Remarks This method returns `true` when the event is a vector listener. Otherwise, it returns `false`.

Restrictions This method is available only in the JNI preferred implementation. It is *not* available in the JNI backward compatibility implementation, nor in the pure Java implementation.

See Also TibrvVectorListener on page 149

TibrvListener

Class

Declaration

```
class com.tibco.tibrv.TibrvListener
  extends TibrvEvent
```

Purpose Listen for inbound messages.

Remarks A listener object continues listening for messages until the program destroys it.

Programs must destroy instances of this class. Rendezvous software keeps internal references to these objects, so the Java garbage collector does not delete them automatically.

Destroying the queue or transport of an event automatically destroys the listener as well.

Method	Description	Page
`TibrvListener()`	Create a listener object to listen for inbound messages.	144
`TibrvListener.getSubject()`	Extract the subject from a listener event object.	145
`TibrvListener.getTransport()`	Extract the transport from a listener event object.	146

Inherited Methods

`TibrvEvent.destroy()`
`TibrvEvent.getClosure()`
`TibrvEvent.getQueue()`
`TibrvEvent.isValid()`

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString` (override)
`java.lang.Object.wait`

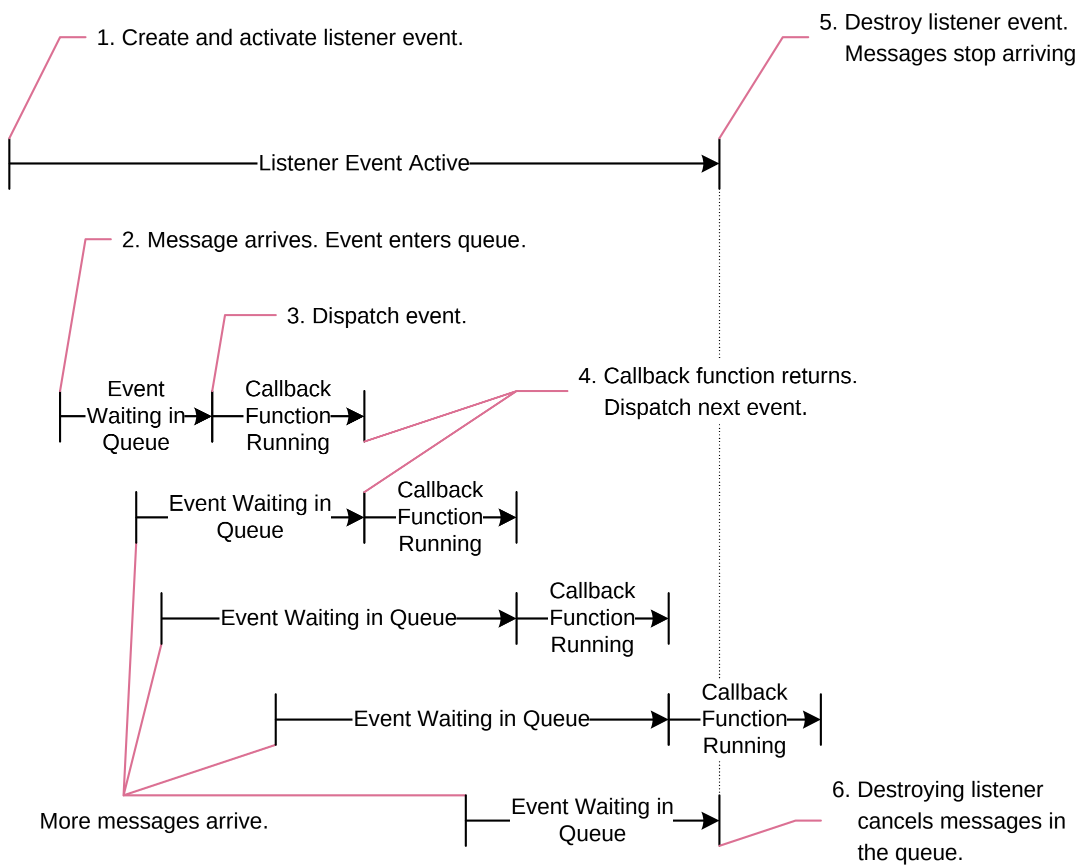
Activation and Dispatch

Inbound messages on the transport that match the subject trigger the event.

This constructor creates a listener event object, and *activates* the event—that is, it begins listening for all inbound messages with matching subjects. When a message arrives, Rendezvous software places the event object and message on its event queue. Dispatch removes the event object from the queue, and runs the callback method to process the message. (To stop receiving inbound messages on the subject, destroy the event object; this action cancels all messages already queued for the listener event; see also TibrvEvent.destroy() on page 136.)

Figure 7 illustrates that messages can continue to accumulate in the queue, even while the callback method is processing.

Figure 7 Listener Activation and Dispatch



When the callback method is I/O-bound, messages can arrive faster than the callback method can process them, and the queue can grow unacceptably long. In programs where a delay in processing messages is unacceptable, consider dispatching from several threads to process messages concurrently.

Descendants

TibrvVectorListener on page 149
TibrvCmListener on page 288

TibrvListener()

Constructor

Declaration

```
TibrvListener(
    TibrvQueue          queue,
    TibrvMsgCallback    callback,
    TibrvTransport      transport,
    java.lang.String    subject,
    java.lang.Object    closure)
  throws TibrvException
```

Purpose Create a listener object to listen for inbound messages.

Remarks For each inbound message, place this event on the event queue.

Parameter	Description
`queue`	For each inbound message, place the event on this event queue.
`callback`	On dispatch, process the event with this interface implementation.
`transport`	Listen for inbound messages on this transport.
`subject`	Listen for inbound messages with subjects that match this specification. Wildcard subjects are permitted. The empty string is not a legal subject name.
`closure`	Store this closure data in the event object.

Inbox Listener To receive unicast (point-to-point) messages, listen to a unique inbox subject name. First call `TibrvTransport.createInbox()` to create the unique inbox name; then call `TibrvListener()` to begin listening. Remember that other programs have no information about an inbox until the listening program uses it as a reply subject in an outbound message.

See Also TibrvEvent.destroy() on page 136
TibrvMsgCallback on page 147
TibrvMsgCallback.onMsg() on page 148

TibrvListener.getSubject()

Method

Declaration `java.lang.String getSubject()`

Purpose Extract the subject from a listener event object.

TibrvListener.getTransport()

Method

Declaration `TibrvTransport getTransport()`

Purpose Extract the transport from a listener event object.

TibrvMsgCallback

Interface

Declaration `interface com.tibco.tibrv.`**`TibrvMsgCallback`**

Purpose Process inbound messages (listener events).

Remarks Implement this interface to process inbound messages.

Method	Description	Page
`TibrvMsgCallback.onMsg()`	Process inbound messages (listener events).	148

See Also TibrvListener() on page 144

TibrvMsgCallback.onMsg()

Method

Declaration

```
void onMsg(
    TibrvListener listener,
    TibrvMsg msg)
```

Purpose Process inbound messages (listener events).

Parameter	Description
`listener`	This parameter receives the listener event.
`msg`	This parameter receives the inbound message.

Remarks Implement this method to process inbound messages.

If your application requires a more complex processing arrangement, it can detach individual messages, and pass them to other threads for processing. To detach a message, use the copy constructor to make an independent copy of it. In the JNI implementation, you must detach a copy in order to use the message outside the scope of the callback. (If your program detaches a message, then you must also ensure that no references to the copy remain; such references could interfere with garbage collection. Furthermore, when using the Rendezvous JNI preferred library, we recommend that programs call `TibrvMsg.dispose()` to explicitly release the copy's storage within the native C environment.)

CM Label Information The callback method for certified delivery messages can use certified delivery (CM) label information to discriminate these situations:

- If `TibrvCmMsg.getSender()` returns `null`, then the message uses the reliable protocol (that is, it was sent from an ordinary transport).
- If `TibrvCmMsg.getSender()` returns a valid sender name, then the message uses the certified delivery protocol (that is, it is a labeled message, sent from a CM transport).

See Also

TibrvCmListener() on page 290
TibrvCmMsg.getSender() on page 333
TibrvCmMsg.getSequence() on page 334
TibrvCmMsg.getTimeLimit() on page 336

TibrvVectorListener

Class

Declaration

```
class com.tibco.tibrv.TibrvVectorListener
  extends TibrvEvent
```

Purpose Listen for inbound messages, and receive them in a vector.

Remarks A vector listener object continues listening for messages until the program destroys it.

Programs must destroy instances of this class. Rendezvous software keeps internal references to these objects, so the Java garbage collector does not delete them automatically.

Destroying the queue or transport of a vector listener event automatically invalidates the vector listener as well.

Method	Description	Page
`TibrvVectorListener()`	Listen for inbound messages, and receive them in a vector.	151
`TibrvVectorListener.getSubject()`	Extract the subject from a vector listener event object.	156
`TibrvVectorListener.getTransport()`	Extract the transport from a vector listener event object.	157

Inherited Methods

`TibrvEvent.destroy()`
`TibrvEvent.getClosure()`
`TibrvEvent.getQueue()`
`TibrvEvent.isValid()`
`TibrvEvent.isVectorListener()`

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString` (override)
`java.lang.Object.wait`

Restrictions

This class is available only in the JNI preferred implementation. It is *not* available in the JNI backward compatibility implementation, nor in the pure Java implementation.

Related Classes

TibrvEvent on page 134
TibrvListener on page 141
TibrvVectorCallback on page 158

TibrvVectorListener()

Method

Declaration

```
TibrvVectorListener (
    TibrvQueue queue,
    TibrvVectorCallback callback,
    TibrvTransport transport,
    java.lang.String subject,
    java.lang.Object closure)
  throws TibrvException
```

Purpose Create a vector listener object to listen for inbound messages, and receive them in a vector.

Parameter	Description
`queue`	Place each inbound message on this event queue.
`callback`	On dispatch, process the message vector with this callback interface implementation.
`transport`	Listen for inbound messages on this transport.
`subject`	Listen for inbound messages with subjects that match this specification. Wildcard subjects are permitted. The empty string is *not* a legal subject name.
`closure`	Store this closure data in the event object.

Motivation The standard way of receiving messages—one at a time—has the advantage of simplicity. However, if your application requires high throughput and low latency, consider receiving data messages in a vector instead. Vector listeners can boost performance for programs that receive a large number of messages by reducing the overhead associated with message dispatch. Applications that require high throughput (that is, many messages arriving rapidly) could benefit from vector listeners.

We do *not* recommend vector listeners for command messages, administrative messages, advisory messages, nor any other out-of-band purpose.

Activation and Dispatch

This method creates a vector listener event object, and *activates* the event—that is, it begins listening for all inbound messages with matching subjects. Dispatch removes a group of matching messages from the queue, and runs the callback method to process the message vector.

To stop receiving inbound messages on the subject, destroy the event object; this action cancels all messages already queued for the vector listener event.

Interoperability

Vector listeners and ordinary listeners can listen on the same queue.

Grouping Messages into Vectors

When several vector listeners use the same queue, the dispatcher groups messages into vectors with the following properties:

- The sequence of messages in a vector reflect consecutive arrival in the queue.
- All messages in a vector share the same callback object (though they need not match the same listener).

From these properties we can derive further inferences:

- If two vector listeners use the same callback object, then the dispatcher can group messages on their subjects into the same vector.
- If two messages are adjacent in the queue, but require different callback objects, then the dispatcher cannot group them into the same vector.

Example 3 Vector Listeners: Same Callback

Two vector listeners, F and P, listen on subjects `FOO` and `PHU`, respectively. Both F and P designate the same queue, Q1, and the same callback object, C1, to process their messages. In this situation, the dispatcher for Q1 can group messages on subjects `FOO` and `PHU` into the same vector (as long as the messages constitute a contiguous sequence within Q1).

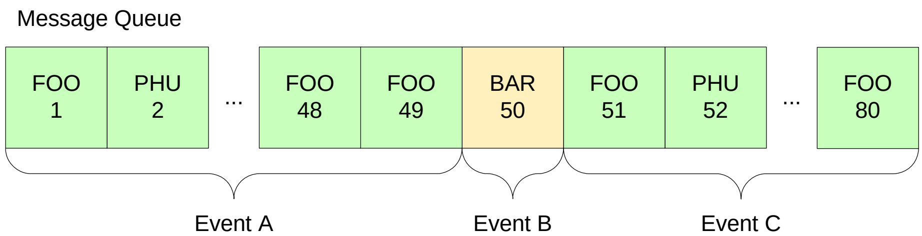
Example 4 Vector Listeners: Different Callbacks

Extend the previous example by adding a third vector listener, B, which listens on subject `BAR`. B designates the same queue, Q1, but uses a new callback object, C2 to process its messages. In this situation, the dispatcher for Q1 must group messages on subject `BAR` separately from messages on subjects `FOO` and `PHU`.

Suppose the Q1 contains 49 messages with subjects `FOO` or `PHU`, then 1 message with subject `BAR`, then 30 more messages with subjects `FOO` and `PHU`. Figure 8 shows this message queue. The dispatcher produces at least three separate events.

Because messages 49 and 50 require different callbacks, the dispatcher must close the vector of FOO and PHU messages at message 49, and start a new vector for message 50 with subject BAR. When the dispatcher encounters message 51 with subject FOO again, it closes the BAR vector after only one message, and starts a third vector for FOO.

Figure 8 Grouping Messages into Vectors



Example 5 Vector Listeners: Mixing Vector and Ordinary Listeners

Altering the previous example, suppose that B is an ordinary listener, instead of a vector listener. B necessarily specifies a different callback object than F and P (because ordinary listeners and vector listeners require different callback types with different signatures).

The behavior of the dispatcher remains the same as in Example 4.

Dispatch Order vs. Processing Order

Messages dispatch in the order that they arrive in the queue. However, the order in which callbacks process messages can differ from dispatch order. The following examples illustrate this possibility by contrasting three scenarios.

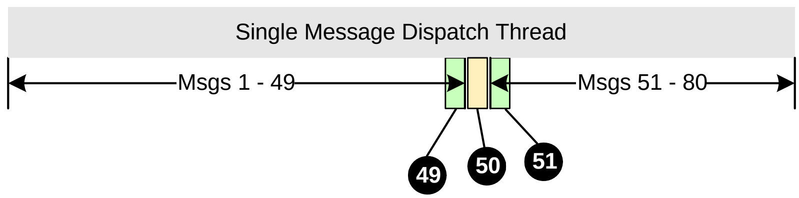
Example 6 Vector Listeners: Deliberately Processing Out of Order

The simplest callback (from the programmer's perspective) processes the messages within a vector in order (that is, the order that dispatcher moves them from the queue into the vector, which mirrors the order in which the messages arrive in the queue). Nonetheless you could program a callback that processes messages in reverse order, or any other order (though one would need a convincing reason to do so).

Example 7 Vector Listeners: Processing Message Vectors in a Single Dispatcher Thread

Figure 9 shows a closer look at the situation of Example 4, in which several vector listeners all designate Q1 for their events. If a single thread dispatches Q1, then the callbacks are guaranteed to run in sequence. If the callbacks process messages in the order that they appear within the vectors, then message processing order is identical to dispatch order, which is also identical to arrival order. Figure 9 shows this effect.

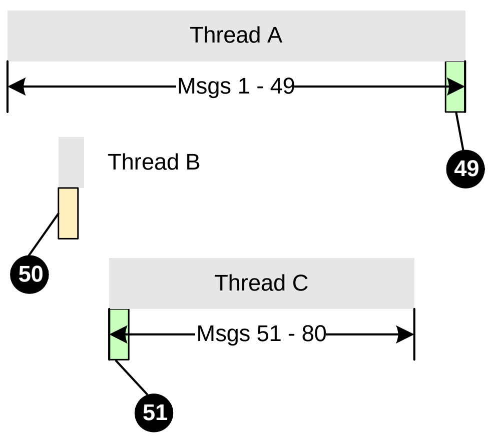
Figure 9 Vector Listener Callbacks in a Single Dispatch Thread



Example 8 Vector Listeners: Processing Message Vectors in Separate Threads

However, if several threads dispatch Q1 in parallel, then the callbacks can run concurrently. In this situation, message processing order could differ dramatically from arrival order. Figure 10 shows this possibility.

Figure 10 Vector Listener Callbacks in Multiple Dispatch Threads



Although message number 49 dispatches (in event A) before message 50 (in event B), it is possible for the BAR callback (in thread B) to process message 50 before the FOO callback (in thread A) processes message 49. Furthermore, it is even possible for the FOO callback (in thread C) to process message 51 before the FOO callback (in thread A) processes message 49.

Before developing a program that processes inbound message vectors in several threads, consider carefully whether it is important (in the context of your application's semantics) to process messages in order of arrival.

Restrictions

This method is available only in the JNI preferred implementation. It is *not* available in the JNI backward compatibility implementation, nor in the pure Java implementation.

See Also

TibrvEvent.destroy() on page 136
TibrvVectorCallback on page 158
TibrvVectorCallback.onMsgs() on page 159
TibrvVectorListener.getSubject() on page 156

TibrvVectorListener.getSubject()

Method

Declaration `java.lang.String getSubject();`

Purpose Extract the subject from a vector listener event object.

Restrictions This method is available only in the JNI preferred implementation. It is *not* available in the JNI backward compatibility implementation, nor in the pure Java implementation.

TibrvVectorListener.getTransport()

Method

Declaration `TibrvTransport getTransport();`

Purpose Extract the transport from a vector listener event object.

Restrictions This method is available only in the JNI preferred implementation. It is *not* available in the JNI backward compatibility implementation, nor in the pure Java implementation.

TibrvVectorCallback

Class

Declaration `abstract class com.tibco.tibrv.`**`TibrvVectorCallback`**

Purpose Process inbound message vectors (vector listener events).

Remarks Implement a subclass to process inbound message vectors.

Method	Description	Page
`TibrvVectorCallback.onMsgs()`	Process inbound message vectors (vector listener events).	159

Related Classes TibrvVectorListener on page 149

Restrictions This abstract class is available only in the JNI preferred implementation. It is *not* available in the JNI backward compatibility implementation, nor in the pure Java implementation.

See Also TibrvVectorListener() on page 151

TibrvVectorCallback.onMsgs()

Method

Declaration

```
void onMsgs(
    TibrvMsg messages[])
```

Purpose Process inbound message vectors (vector listener events).

Parameter	Description
`messages`	This parameter receives an array of inbound messages.

Remarks Implement this method to process inbound message vectors.

In the simplest arrangement, your callback method processes the messages in the array. When the callback method returns, the Rendezvous library deallocates the array.

If your application requires a more complex processing arrangement, it can detach individual messages, and pass them to other threads for processing. To detach a message, use the copy constructor to make an independent copy of it. In the JNI implementation, you must detach a copy in order to use the message outside the scope of the callback. (If your program detaches a message, then you must also ensure that no references to the copy remain; such references could interfere with garbage collection. Furthermore, when using the Rendezvous JNI preferred library, we recommend that programs call `TibrvMsg.dispose()` to explicitly release the copy's storage within the native C environment.)

It is illegal to pass the message array to a different thread for processing, or to use it as dynamically-allocated storage.

Notice that in contrast to `TibrvMsgCallback.onMsg()`, this vector callback does not receive the listener event as an argument. You can use `TibrvMsg.getEvent()` to get it from the individual message objects.

Restrictions This interface method is available only in the JNI preferred implementation. It is *not* available in the JNI backward compatibility implementation, nor in the pure Java implementation.

See Also

TibrvMsg() on page 57
TibrvMsg.dispose() on page 65
TibrvMsg.getEvent() on page 74
TibrvVectorListener() on page 151

TibrvTimer

Class

Declaration

```
class com.tibco.tibrv.TibrvTimer
  extends TibrvEvent
```

Purpose Timer event.

Remarks All timers are repeating timers. To simulate a once-only timer, code the callback method to destroy the timer.

Programs must destroy instances of this class. Rendezvous software keeps internal references to these objects, so the Java garbage collector does not delete them automatically.

Destroying the queue of a timer automatically destroys the timer as well.

Activation and Dispatch The constructor creates a timer event object, and *activates* the timer event—that is, it requests notification from the operating system when the timer's interval elapses. When the interval elapses, Rendezvous software places the event object on its event queue. Dispatch removes the event object from the queue, and runs the callback method to process the timer event. When the callback method begins, Rendezvous software automatically reactivates the event, using the same interval. On dispatch Rendezvous software also determines whether the next interval has already elapsed, and requeues the timer event if appropriate. (To stop the cycle, destroy the event object; see TibrvEvent.destroy() on page 136.)

Notice that time waiting in the event queue until dispatch can increase the effective interval of the timer. It is the programmer's responsibility to ensure timely dispatch of events.

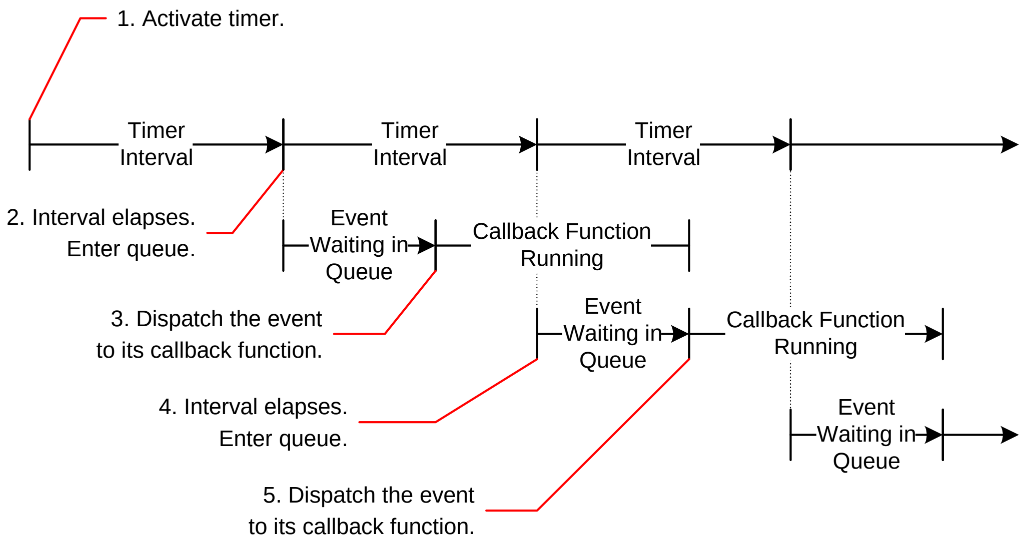
Figure 11 illustrates a sequence of timer intervals. The number of elapsed timer intervals directly determines the number of event callbacks.

At any moment the timer object appears on the event queue at most once—not several times as multiple copies. Nonetheless, Rendezvous software arranges for the appropriate number of timer event callbacks based the number of intervals that have elapsed since the timer became active or reset its interval.

Destroying or invalidating the timer object *immediately* halts the sequence of timer events. The timer object ceases to queue new events, and an event already in the queue does not result in a callback. (However, callback methods that are already running in other threads continue to completion.)

Resetting the timer interval *immediately* interrupts the sequence of timer events and begins a new sequence, counting the new interval from that moment. The reset operation is equivalent to destroying the timer and creating a new object in its place.

Figure 11 Timer Activation and Dispatch



Timer Granularity

Express the timer interval (in seconds) as a 64-bit floating point number. This representation allows microsecond granularity for intervals for over 100 years. The actual granularity of intervals depends on hardware, Java and operating system constraints. Most releases of the JVM limit timer granularity to 10 milliseconds.

Zero as Interval

Many programmers traditionally implement user events as timers with interval zero. Instead, we recommend implementing user events as messages on the intra-process transport. For more information, see Intra-Process Transport and User Events on page 114 in *TIBCO Rendezvous Concepts*.

Method	Description	Page
`TibrvTimer()`	Start a timer.	163
`TibrvTimer.getInterval()`	Extract the interval from a timer event object.	164
`TibrvTimer.resetInterval()`	Reset the interval of a timer event object.	165

Inherited Methods

`TibrvEvent.destroy()`
`TibrvEvent.getClosure()`
`TibrvEvent.getQueue()`
`TibrvEvent.isValid()`

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString` (override)
`java.lang.Object.wait`

Descendants TibrvEvent on page 134

TibrvTimer()

Constructor

Declaration

```
TibrvTimer(
    TibrvQueue           queue,
    TibrvTimerCallback   callback,
    double               interval,
    java.lang.Object     closure)
  throws TibrvException
```

Purpose Start a timer.

Remarks All timers are repeating timers. To simulate a once-only timer, code the callback method to destroy the timer.

Parameter	Description
`queue`	At each time interval, place the event on this event queue.
`callback`	On dispatch, process the event with this interface implementation.
`interval`	The timer triggers its callback method at this repeating interval (in seconds).
`closure`	Store this closure data in the event object.

Timer Granularity Express the timer interval (in seconds) as a double (64-bit floating point number). This representation allows microsecond granularity for intervals for over 100 years. The actual granularity of intervals depends on Java implementation constraints, as well as hardware and operating system constraints.

The JNI implementation supports fine-resolution timers through the underlying C layer. Most releases of the JVM limit the Java implementation to 10 millisecond resolution.

See Also TibrvEvent.destroy() on page 136
TibrvTimerCallback on page 166
TibrvTimerCallback.onTimer() on page 167

TibrvTimer.getInterval()

Method

Declaration `double getInterval()`

Purpose Extract the interval from a timer event object.

TibrvTimer.resetInterval()

Method

Declaration

```
void resetInterval(double newInterval)
  throws TibrvException
```

Purpose Reset the interval of a timer event object.

Remarks The timer begins counting the new interval immediately.

Parameter	Description
`newInterval`	The timer triggers its callback method at this new repeating interval (in seconds).

Timer Granularity Express the timer interval (in seconds) as a 64-bit floating point number. This representation allows microsecond granularity for intervals up to approximately 146 years. The actual granularity of intervals depends on hardware and operating system constraints.

Limit of Effectiveness This method can affect a timer only before or during its interval—but not after its interval has elapsed.

This method neither examines, changes nor removes an event that is already waiting in a queue for dispatch. If the next event for the timer object is already in the queue, then that event remains in the queue, representing the old interval. The change takes effect with the subsequent interval. (To circumvent this limitation, a program can destroy the old timer object and replace it with a new one.)

TibrvTimerCallback

Interface

Declaration `interface com.tibco.tibrv.`**`TibrvTimerCallback`**

Purpose Process timer events.

Remarks Implement this interface to process timer events.

Method	Description	Page
`TibrvTimerCallback.onTimer()`	Process timer events.	167

See Also TibrvTimer() on page 163

TibrvTimerCallback.onTimer()

Method

Declaration

```
void onTimer(TibrvTimer timer)
```

Purpose Process timer events.

Remarks Implement this method to process timer events.

Parameter	Description
`timer`	This parameter receives the timer event.

TibrvDispatchable

Interface

Declaration `interface com.tibco.tibrv.`**`TibrvDispatchable`**

Purpose Common interface for queues and queue groups.

Remarks Both `TibrvQueue` and `TibrvQueueGroup` implement this interface, so programs can call the common methods on objects of either class. For example, consider a dispatcher routine that receives an object of type `TibrvDispatchable`; it can call the `dispatch()` method, without needing to determine whether the object is queue or a queue group.

Method	Description	Page
`TibrvDispatchable.dispatch()`	Dispatch an event; if no event is ready, block.	169
`TibrvDispatchable.poll()`	Dispatch an event, if possible.	170
`TibrvDispatchable.timedDispatch()`	Dispatch an event, but if no event is ready to dispatch, limit the time that this call blocks while waiting for an event.	171

See Also Interrupting Event Dispatch Threads, page 6
TibrvQueue on page 172
TibrvQueueGroup on page 191

TibrvDispatchable.dispatch()

Method

Declaration

```
void dispatch()
  throws TibrvException, java.lang.InterruptedException
```

Purpose Dispatch an event; if no event is ready, block.

Remarks If an event is ready to dispatch, then this call dispatches it, and then returns. If no events are waiting, then this call blocks indefinitely while waiting for the object to receive an event.

Both `TibrvQueue` and `TibrvQueueGroup` implement this method.

See Also

Interrupting Event Dispatch Threads, page 6
TibrvDispatchable on page 168
TibrvQueue.dispatch() on page 177
Interrupting a Dispatch Call, page 177
TibrvQueueGroup.dispatch() on page 197

TibrvDispatchable.poll()

Method

Declaration

```
boolean poll()
  throws TibrvException, java.lang.InterruptedException
```

Purpose Dispatch an event, if possible.

Remarks If an event is ready to dispatch, then this call dispatches it, and then returns. If no events are waiting, then this call returns immediately.

When the call dispatches an event, it returns `true`. When the call does not dispatch an event, it returns `false`.

This call is equivalent to `timedDispatch(0)`.

Both `TibrvQueue` and `TibrvQueueGroup` implement this method.

See Also Interrupting Event Dispatch Threads, page 6
TibrvDispatchable on page 168
TibrvQueue.poll() on page 186
TibrvQueueGroup.poll() on page 201

TibrvDispatchable.timedDispatch()

Method

Declaration

```
boolean timedDispatch(double timeout)
  throws TibrvException, java.lang.InterruptedException
```

Purpose Dispatch an event, but if no event is ready to dispatch, limit the time that this call blocks while waiting for an event.

Remarks If an event is ready to dispatch, then this call dispatches it, and then returns. If no events are waiting, this call waits for an event to arrive. If an event arrives before the waiting time elapses, then it dispatches the event and returns. If the waiting time elapses first, then the call returns without dispatching an event.

When the call dispatches an event, it returns `true`. When the call does not dispatch an event, it returns `false`.

Both `TibrvQueue` and `TibrvQueueGroup` implement this method.

Parameter	Description
`timeout`	Maximum time (in seconds) that this call can block while waiting for an event to arrive. Zero indicates no blocking (immediate timeout). -1 indicates no timeout.

See Also

Interrupting Event Dispatch Threads, page 6
TibrvDispatchable on page 168
TibrvQueue.timedDispatch() on page 190
TibrvQueueGroup.timedDispatch() on page 203

TibrvQueue

Class

Declaration

```
class com.tibco.tibrv.TibrvQueue
  extends java.lang.Object
  implements TibrvDispatchable
```

Purpose Event queue.

Remarks Each event is associated with a `TibrvQueue` object; when the event occurs, Rendezvous software places the event object in its queue. Programs dispatch queues to process events.

Programs must explicitly destroy instances of this class. Rendezvous software keeps internal references to these objects, so the Java garbage collector does not delete them automatically.

Default Queue The method `Tibrv.defaultQueue()` returns a pre-defined queue. Programs that need only one event queue can use this default queue (instead of using `TibrvQueue()` to create one). The default queue has priority 1, can hold an unlimited number of events, and never discards an event (since it never exceeds an event limit).

Rendezvous software places all advisories pertaining to queue overflow on the default queue.

Programs cannot destroy the default queue, except as a side effect of `Tibrv.close()`. Programs cannot change the parameters of the default queue.

Limit Policy These constants specify the possible strategies for resolving overflow of queue limit.

Constant	Description
`TibrvQueue.DISCARD_NONE`	Never discard events; use this policy when a queue has no limit on then number of events it can contain.
`TibrvQueue.DISCARD_FIRST`	Discard the first event in the queue (that is, the oldest event in the queue, which would otherwise be the next event to dispatch).
`TibrvQueue.DISCARD_LAST`	Discard the last event in the queue (that is, the youngest event in the queue).
`TibrvQueue.DISCARD_NEW`	Discard the new event (which would otherwise cause the queue to overflow its maximum events limit).

Method	Description	Page
Life Cycle		
`TibrvQueue()`	Create an event queue.	175
`TibrvQueue.destroy()`	Destroy an event queue.	176
`TibrvQueue.isDefault()`	Test whether a queue is the default queue.	184
`TibrvQueue.isValid()`	Test validity of a queue.	185
Dispatch		
`TibrvQueue.dispatch()`	Dispatch an event; if no event is ready, block.	177
`TibrvQueue.poll()`	Dispatch an event, if possible.	186
`TibrvQueue.timedDispatch()`	Dispatch an event, but if no event is ready to dispatch, limit the time that this call blocks while waiting for an event.	190
Properties		
`TibrvQueue.getCount()`	Extract the number of events in a queue.	178
`TibrvQueue.getDiscardAmount()`	Extract the discard amount of a queue.	179
`TibrvQueue.getLimitPolicy()`	Extract the limit policy of a queue.	180
`TibrvQueue.getMaxEvents()`	Extract the maximum event limit of a queue.	181
`TibrvQueue.getName()`	Extract the name of a queue.	182
`TibrvQueue.getPriority()`	Extract the priority of a queue.	183
`TibrvQueue.setName()`	Set the name of a queue.	187
`TibrvQueue.setLimitPolicy()`	Set the limit properties of a queue.	188
`TibrvQueue.setPriority()`	Set the priority of a queue.	189

Inherited Methods

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString` (override)
`java.lang.Object.wait`

TibrvQueue()

Constructor

Declaration `TibrvQueue()`

Purpose Create an event queue.

Remarks Upon creation, new queues use these default values.

Property	Default Value	Set Method
`limitPolicy`	`TibrvQueue.DISCARD_NONE`	TibrvQueue.setLimitPolicy() on page 188
`maxEvents`	zero (unlimited)	
`discardAmount`	zero	
`name`	`tibrvQueue`	TibrvQueue.setName() on page 187
`priority`	1	TibrvQueue.setPriority() on page 189

TibrvQueue.destroy()

Method

Declaration `void destroy()`

Purpose Destroy an event queue.

Remarks When a queue is destroyed, events that remain in the queue are discarded.

Destroying a queue invalidates all events associated with the queue.

A program must not call `TibrvQueue.destroy()` on the default queue. Closing `Tibrv` destroys the default queue; see Tibrv.close() on page 30.

TibrvQueue.dispatch()

Method

Declaration

```
void dispatch()
  throws TibrvException, java.lang.InterruptedException
```

Purpose Dispatch an event; if no event is ready, block.

Remarks If the queue is not empty, then this call dispatches the event at the head of the queue, and then returns. If the queue is empty, then this call blocks indefinitely while waiting for the queue to receive an event.

Interrupting a Dispatch Call To interrupt an event dispatch thread in the Java implementation (see Tibrv.open() on page 37), use the Java method `Thread.interrupt()`.

In the JNI (native) implementation, this call does not throw `InterruptedException`; instead, programs must explicitly check for interruptions by calling `Thread.interrupted()` before or after `TibrvQueue.dispatch()`.

The more reliable way to interrupt a JNI event dispatch thread is to destroy the `TibrvDispatchable` object that the thread dispatches. When the dispatch call encounters the invalid queue or queue group, it throws a `TibrvException` in the event dispatch thread.

See Also
Interrupting Event Dispatch Threads, page 6
TibrvDispatchable on page 168
TibrvDispatchable.dispatch() on page 169
TibrvQueue.poll() on page 186
TibrvQueue.timedDispatch() on page 190
TibrvDispatcher on page 204

TibrvQueue.getCount()

Method

Declaration

```
int getCount()
  throws TibrvException
```

Purpose Extract the number of events in a queue.

TibrvQueue.getDiscardAmount()

Method

Declaration

```
int getDiscardAmount()
  throws TibrvException
```

Purpose Extract the discard amount of a queue.

Remarks When the queue exceeds its maximum event limit, discard a block of events. This property specifies the number of events to discard.

See Also TibrvQueue.setLimitPolicy() on page 188

TibrvQueue.getLimitPolicy()

Method

Declaration

```
int getLimitPolicy()
  throws TibrvException
```

Purpose Extract the limit policy of a queue.

Remarks Each queue has a policy for discarding events when a new event would cause the queue to exceed its `maxEvents` limit. For an explanation of the policy values, see Limit Policy on page 172.

See Also TibrvQueue.setLimitPolicy() on page 188

TibrvQueue.getMaxEvents()

Method

Declaration

```
int getMaxEvents()
  throws TibrvException
```

Purpose Extract the maximum event limit of a queue.

Remarks Programs can limit the number of events that a queue can hold—either to curb queue growth, or implement a specialized dispatch semantics.

Zero specifies an unlimited number of events.

See Also TibrvQueue.setLimitPolicy() on page 188

TibrvQueue.getName()

Method

Declaration `java.lang.String getName()`

Purpose Extract the name of a queue.

Remarks Queue names assist programmers and administrators in troubleshooting queues. When Rendezvous software delivers an advisory message pertaining to a queue, it includes the queue's name; administrators can use queue names to identify specific queues within a program.

The default name of every queue is `tibrvQueue`. We strongly recommend that you relabel each queue with a distinct and informative name, for use in debugging.

This method returns the queue's name, even when the queue is invalid.

See Also TibrvQueue.setName() on page 187

TibrvQueue.getPriority()

Method

Declaration

```
int getPriority()
    throws TibrvException
```

Purpose Extract the priority of a queue.

Remarks Each queue has a single priority value, which controls its dispatch precedence within queue groups. Higher values dispatch before lower values; queues with equal priority values dispatch in round-robin fashion.

When the queue is invalid, this method throws an exception.

See Also TibrvQueue.setPriority() on page 189

TibrvQueue.isDefault()

Method

Declaration `final boolean isDefault()`

Purpose Test whether a queue is the default queue.

Remarks Returns `true` if the queue is the default queue; `false` otherwise.

See Also Tibrv.defaultQueue() on page 31

TibrvQueue.isValid()

Method

Declaration `final boolean isValid()`

Purpose Test validity of a queue.

Remarks Returns `true` if the queue is valid; `false` if the queue has been destroyed.

See Also Tibrv.close() on page 30
TibrvQueue.destroy() on page 176

TibrvQueue.poll()

Method

Declaration

```
boolean poll()
  throws TibrvException, java.lang.InterruptedException
```

Purpose Dispatch an event, if possible.

Remarks If the queue is not empty, then this call dispatches the event at the head of the queue, and then returns. If the queue is empty, then this call returns immediately.

When the call dispatches an event, it returns `true`. When the call does not dispatch an event, it returns `false`.

This call is equivalent to `timedDispatch(0)`.

See Also Interrupting Event Dispatch Threads, page 6
TibrvDispatchable on page 168
TibrvDispatchable.poll() on page 170
TibrvQueue.dispatch() on page 177
TibrvQueue.timedDispatch() on page 190

TibrvQueue.setName()

Method

Declaration

```
void setName(java.lang.String queueName)
  throws TibrvException
```

Purpose Set the name of a queue.

Remarks Queue names assist programmers and administrators in troubleshooting queues. When Rendezvous software delivers an advisory message pertaining to a queue, it includes the queue's name; administrators can use queue names to identify specific queues within a program.

The default name of every queue is `tibrvQueue`. We strongly recommend that you relabel each queue with a distinct and informative name, for use in debugging.

Parameter	Description
`queueName`	Replace the name of the queue with this new name. It is illegal to supply `null` as the new queue name.

See Also TibrvQueue.getName() on page 182

TibrvQueue.setLimitPolicy()

Method

Declaration

```
void setLimitPolicy(
    int limitPolicy,
    int maxEvents,
    int discardAmount)
  throws TibrvException
```

Purpose Set the limit properties of a queue.

Remarks This method simultaneously sets three related properties, which together describe the behavior of a queue in overflow situations. Each call must explicitly specify all three properties.

Parameter	Description
`limitPolicy`	Each queue has a policy for discarding events when a new event would cause the queue to exceed its `maxEvents` limit. Choose from the values of Limit Policy on page 172. When `maxEvents` is zero (unlimited), the `policy` must be `TibrvQueue.DISCARD_NONE`.
`maxEvents`	Programs can limit the number of events that a queue can hold—either to curb queue growth, or implement a specialized dispatch semantics. Zero specifies an unlimited number of events; in this case, the `policy` must be `TibrvQueue.DISCARD_NONE`.
`discardAmount`	When the queue exceeds its maximum event limit, discard a block of events. This property specifies the number of events to discard. When `discardAmount` is zero, the `policy` must be `TibrvQueue.DISCARD_NONE`.

See Also

TibrvQueue.getDiscardAmount() on page 179
TibrvQueue.getLimitPolicy() on page 180
TibrvQueue.getMaxEvents() on page 181

TibrvQueue.setPriority()

Method

Declaration

```
void setPriority(int priority)
  throws TibrvException
```

Purpose Set the priority of a queue.

Remarks Each queue has a single priority value, which controls its dispatch precedence within queue groups. Higher values dispatch before lower values; queues with equal priority values dispatch in round-robin fashion.

Changing the priority of a queue affects its position in all the queue groups that contain it.

Parameter	Description
`priority`	Replace the priority of the queue with this new value. The priority must be a non-negative integer. Priority zero signifies the last queue to dispatch.

See Also TibrvQueue.getPriority() on page 183

TibrvQueue.timedDispatch()

Method

Declaration

```
boolean timedDispatch(double timeout)
  throws TibrvException, java.lang.InterruptedException
```

Purpose Dispatch an event, but if no event is ready to dispatch, limit the time that this call blocks while waiting for an event.

Remarks If an event is already in the queue, this call dispatches it, and returns immediately. If the queue is empty, this call waits for an event to arrive. If an event arrives before the waiting time elapses, then it dispatches the event and returns. If the waiting time elapses first, then the call returns without dispatching an event.

When the call dispatches an event, it returns `true`. When the call does not dispatch an event, it returns `false`.

Parameter	Description
`timeout`	Maximum time (in seconds) that this call can block while waiting for an event to arrive in the queue. Zero indicates no blocking (immediate timeout). -1 indicates no timeout.

See Also Interrupting Event Dispatch Threads, page 6
TibrvDispatchable on page 168
TibrvDispatchable.timedDispatch() on page 171
TibrvQueue.dispatch() on page 177
TibrvQueue.poll() on page 186

TibrvQueueGroup

Class

Declaration

```
class com.tibco.tibrv.TibrvQueueGroup
  extends java.lang.Object
  implements TibrvDispatchable
```

Purpose Prioritized dispatch of several queues with one call.

Remarks Queue groups add flexibility and fine-grained control to the event queue dispatch mechanism. Programs can create groups of queues and dispatch them according to their queue priorities.

Programs must explicitly destroy instances of this class. Rendezvous software keeps internal references to these objects, so the Java garbage collector does not delete them automatically.

(Sheet 1 of 2)

Method	Description	Page
Life Cycle		
`TibrvQueueGroup()`	Create an event queue group.	193
`TibrvQueueGroup.destroy()`	Destroy an event queue group.	196
`TibrvQueueGroup.isValid()`	Test validity of a queue group.	200
Dispatch		
`TibrvQueueGroup.dispatch()`	Dispatch an event from a queue group; if no event is ready, block.	197
`TibrvQueueGroup.poll()`	Dispatch an event, but if no event is ready to dispatch, return immediately (without blocking).	201
`TibrvQueueGroup.timedDispatch()`	Dispatch an event, but if no event is ready to dispatch, limit the time that this call blocks while waiting for an event.	203
Queues		
`TibrvQueueGroup.add()`	Add an event queue to a queue group.	194
`TibrvQueueGroup.contains()`	Test whether a queue is in a queue group.	195

(Sheet 2 of 2)

Method	Description	Page
`TibrvQueueGroup.elements()`	Extract an enumeration of the queues in a queue group.	198
`TibrvQueueGroup.getCount()`	Extract the number of queues in a queue group.	199
`TibrvQueueGroup.remove()`	Remove an event queue from a queue group.	202

Inherited Methods

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString` (override)
`java.lang.Object.wait`

TibrvQueueGroup()

Constructor

Declaration

```
TibrvQueueGroup()
  throws TibrvException
```

Purpose Create an event queue group.

Remarks The new queue group is empty.

The queue group remains valid until the program explicitly destroys it.

See Also TibrvQueueGroup.add() on page 194
TibrvQueueGroup.destroy() on page 196

TibrvQueueGroup.add()

Method

Declaration

```
void add(TibrvQueue eventQueue)
  throws TibrvException
```

Purpose Add an event queue to a queue group.

Remarks If the queue is already in the group, adding it again has no effect.

If either the queue or the group is invalid, this method throws a `TibrvException`.

Parameter	Description
`eventQueue`	Add this event queue to a queue group.

See Also TibrvQueue on page 172

TibrvQueueGroup.contains()

Method

Declaration

```
boolean contains(TibrvQueue eventQueue)
  throws TibrvException
```

Purpose Test whether a queue is in a queue group.

Remarks If the queue is in the group, return `true`; otherwise `false`.

If the group is invalid, return `false`.

Parameter	Description
`eventQueue`	Test the membership of this event queue in the queue group.

See Also TibrvQueue on page 172

TibrvQueueGroup.destroy()

Method

Declaration `void destroy()`

Purpose Destroy an event queue group.

Remarks The individual queues in the group continue to exist, even though the group has been destroyed.

See Also TibrvQueueGroup() on page 193

TibrvQueueGroup.dispatch()

Method

Declaration

```
void dispatch()
  throws TibrvException, java.lang.InterruptedException
```

Purpose Dispatch an event from a queue group; if no event is ready, block.

Remarks If any queue in the group contains an event, then this call searches the queues in priority order, dispatches an event from the first non-empty queue that it finds, and then returns. If all the queues are empty, then this call blocks indefinitely while waiting for any queue in the group to receive an event.

When searching the group for a non-empty queue, this call searches according to the priority values of the queues. If two or more queues have identical priorities, subsequent dispatch and poll calls rotate through them in round-robin fashion.

See Also Interrupting Event Dispatch Threads, page 6
TibrvDispatchable on page 168
TibrvDispatchable.dispatch() on page 169
Interrupting a Dispatch Call, page 177
TibrvQueueGroup.timedDispatch() on page 203
TibrvQueueGroup.poll() on page 201

TibrvQueueGroup.elements()

Method

Declaration `java.util.Enumeration` **`elements`**`()`

Purpose Extract an enumeration of the queues in a queue group.

Remarks If the group is invalid, return `null`.

TibrvQueueGroup.getCount()

Method

Declaration `int getCount()`

Purpose Extract the number of queues in a queue group.

Remarks If the group is invalid, return zero.

TibrvQueueGroup.isValid()

Method

Declaration `boolean isValid()`

Purpose Test validity of a queue group.

Remarks Returns `true` if the queue group is valid; `false` if the queue group has been destroyed.

See Also Tibrv.close() on page 30
TibrvQueueGroup.destroy() on page 196

TibrvQueueGroup.poll()

Method

Declaration

```
boolean poll()
  throws TibrvException, java.lang.InterruptedException
```

Purpose

Dispatch an event, but if no event is ready to dispatch, return immediately (without blocking).

Remarks

If any queue in the group contains an event, then this call searches the queues in priority order, dispatches an event from the first non-empty queue that it finds, and then returns. If all the queues are empty, then this call returns immediately.

When searching the group for a non-empty queue, this call searches according to the priority values of the queues. If two or more queues have identical priorities, subsequent dispatch and poll calls rotate through them in round-robin fashion.

When the call dispatches an event, it returns `true`. When the call does not dispatch an event, it returns `false`.

This call is equivalent to `timedDispatch(0)`.

See Also

Interrupting Event Dispatch Threads, page 6
TibrvDispatchable on page 168
TibrvDispatchable.poll() on page 170
TibrvQueueGroup.dispatch() on page 197
TibrvQueueGroup.timedDispatch() on page 203

TibrvQueueGroup.remove()

Method

Declaration

```
void remove(TibrvQueue eventQueue)
  throws TibrvException
```

Purpose Remove an event queue from a queue group.

Remarks If the queue is not in the group, or if the group is invalid, this call throws an exception with the status code `TibrvStatus.INVALID_QUEUE`.

Parameter	Description
`eventQueue`	Remove this event queue from a queue group.

See Also TibrvQueue on page 172

TibrvQueueGroup.timedDispatch()

Method

Declaration

```
boolean timedDispatch(double timeout)
  throws TibrvException, java.lang.InterruptedException
```

Purpose Dispatch an event, but if no event is ready to dispatch, limit the time that this call blocks while waiting for an event.

Remarks If any queue in the group contains an event, then this call searches the queues in priority order, dispatches an event from the first non-empty queue that it finds, and then returns. If the queue is empty, this call waits for an event to arrive in any queue. If an event arrives before the waiting time elapses, then the call searches the queues, dispatches the event, and returns. If the waiting time elapses first, then the call returns without dispatching an event.

When searching the group for a non-empty queue, this call searches according to the priority values of the queues. If two or more queues have identical priorities, subsequent dispatch calls rotate through them in round-robin fashion.

When the call dispatches an event, it returns `true`. When the call does not dispatch an event, it returns `false`.

Parameter	Description
`timeout`	Maximum time (in seconds) that this call can block while waiting for an event to arrive in the queue group. Zero indicates no blocking (immediate timeout). -1 indicates no timeout.

See Also
Interrupting Event Dispatch Threads, page 6
TibrvDispatchable on page 168
TibrvDispatchable.timedDispatch() on page 171
TibrvQueueGroup.dispatch() on page 197
TibrvQueueGroup.poll() on page 201

TibrvDispatcher

Class

Declaration

```
class com.tibco.tibrv.TibrvDispatcher
  extends java.lang.Thread
```

Purpose Dispatch events from a queue or queue group.

Remarks Upon creation, this thread class loops indefinitely, repeatedly dispatching a queue or queue group.

This class is a programming convenience. Programs can implement specialized dispatcher threads, and use them instead of this class.

Exceptions If the thread catches a `TibrvException`, it presents the `DISPATCHER.THREAD_EXITED` advisory on the process transport, and exits. (The program destroyed the queue or queue group object, so this thread can no longer dispatch it.)

If the thread catches an interruption (`java.lang.InterruptedException`), it presents the `DISPATCHER.THREAD_EXITED` advisory on the process transport, and exits.

Interrupting a Dispatcher Thread To interrupt a dispatcher thread in the Java implementation (see Tibrv.open() on page 37), use either the Java method `Thread.interrupt()` or `TibrvDispatcher.destroy()`.

In either the JNI (native) implementation or the Java implementation, you can interrupt a dispatcher thread by calling its `TibrvDispatcher.destroy()` method. Destroying the thread insures prompt thread exit—at the latest, after the return of a program callback method (if one is in progress).

Method	Description	Page
`TibrvDispatcher()`	Create a dispatcher thread.	206

Constant	Description
`TibrvDispatcher.DEFAULT_NAME`	When the constructor does not receive a thread name, it gives the new dispatcher thread this default name.

Inherited Methods

`java.lang.Thread.activeCount`
`java.lang.Thread.checkAccess`
`java.lang.Thread.countStackFrames`
`java.lang.Thread.currentThread`
`java.lang.Thread.destroy` (override)
`java.lang.Thread.dumpStack`
`java.lang.Thread.enumerate`
`java.lang.Thread.getContextClassLoader`
`java.lang.Thread.getName`
`java.lang.Thread.getPriority`
`java.lang.Thread.getThreadGroup`
`java.lang.Thread.interrupt`
`java.lang.Thread.interrupted`
`java.lang.Thread.isAlive`
`java.lang.Thread.isDaemon`
`java.lang.Thread.isInterrupted`
`java.lang.Thread.join`
`java.lang.Thread.resume`
`java.lang.Thread.run` (override)
`java.lang.Thread.setContextClassLoader`
`java.lang.Thread.setDaemon`
`java.lang.Thread.setName`
`java.lang.Thread.setPriority`
`java.lang.Thread.sleep`
`java.lang.Thread.start`
`java.lang.Thread.stop`
`java.lang.Thread.suspend`
`java.lang.Thread.toString`
`java.lang.Thread.yield`

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.wait`

See Also

Tibrv.isNativeImpl() on page 35
Tibrv.open() on page 37
TibrvQueue.dispatch() on page 177

TibrvDispatcher()

Constructor

Declaration

```
TibrvDispatcher(
    java.lang.ThreadGroup    group,
    java.lang.String         name,
    TibrvDispatchable        dispatchable)

TibrvDispatcher(
    java.lang.String         name,
    TibrvDispatchable        dispatchable)

TibrvDispatcher(
    TibrvDispatchable        dispatchable)

TibrvDispatcher(
    java.lang.ThreadGroup    group,
    java.lang.String         name,
    TibrvDispatchable        dispatchable,
    double                   timeout)

TibrvDispatcher(
    java.lang.String         name,
    TibrvDispatchable        dispatchable,
    double                   timeout)

TibrvDispatcher(
    TibrvDispatchable        dispatchable,
    double                   timeout)
```

Purpose Create a dispatcher thread.

Remarks This constructor immediately starts the thread.

(Sheet 1 of 2)

Parameter	Description
`group`	Create a dispatcher thread in this Java thread group. When absent, use the main thread group.
`name`	Create a dispatcher thread with this name. When absent, use the default thread name.
`dispatchable`	Create a thread that dispatches this `TibrvQueue` or `TibrvQueueGroup`.

(Sheet 2 of 2)

Parameter	Description
`timeout`	When this time period (in seconds) elapses without dispatching an event, the thread exits. When absent, the default is to run indefinitely (with no timeout).

See Also

TibrvDispatcher on page 204
DISPATCHER.THREAD_EXITED on page 274 in *TIBCO Rendezvous Concepts*

Chapter 6 Transports

Transports manage network connections and send outbound messages.

This chapter presents the various transport classes and their methods.

Topics

See Also

TibrvCmTransport on page 295
TibrvCmQueueTransport on page 340

TibrvTransport

Class

Declaration

```
abstract class com.tibco.tibrv.TibrvTransport
  extends java.lang.Object
```

Purpose A transport object represents a delivery mechanism for messages.

Remarks A transport describes a carrier for messages—whether across a network, among processes on a single computer, or within a process. Transports manage network connections, and send outbound messages.

A transport also defines the delivery scope of a message—that is, the set of *possible* destinations for the messages it sends.

Destroying a transport object invalidates subsequent send calls on that transport, and invalidates any listeners using that transport.

Programs must explicitly destroy instances of these classes. Rendezvous software keeps internal references to these objects, so the Java garbage collector does not delete them automatically.

This abstract class is the superclass of all other transport classes. Methods defined by this class are implemented by all transport subclasses (except `TibrvCmQueueTransport`, for which some methods do not apply).

Intra-Process Transport Each process has exactly one intra-process transport; the call `Tibrv.open()` automatically creates it, and the call `Tibrv.processTransport()` extracts it. Programs must not destroy the intra-process transport.

(Sheet 1 of 2)

Method	Description	Page
`TibrvTransport.createInbox()`	Create a unique inbox subject name.	212
`TibrvTransport.destroy()`	Destroy a transport.	213
`TibrvTransport.isValid()`	Test validity of a transport.	214
`TibrvTransport.getDescription()`	Extract the program description parameter from a transport.	215
`TibrvTransport.requestReliability()`	Request reliability interval (message retention time) for a service.	216
`TibrvTransport.send()`	Send a message.	218

(Sheet 2 of 2)

Method	Description	Page
`TibrvTransport.sendReply()`	Send a reply message.	219
`TibrvTransport.sendRequest()`	Send a request message and wait for a reply.	220
`TibrvTransport.setBatchSize()`	Enable outbound batching of data from IPM, and set the batch size (in bytes).	221
`TibrvTransport.setDescription()`	Set the program description parameter of a transport.	222

Inherited Methods

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString`
`java.lang.Object.wait`

Descendants

TibrvProcessTransport on page 223
TibrvNetTransport on page 224
TibrvRvaTransport on page 225
TibrvRvdTransport on page 235
TibrvCmTransport on page 295
TibrvCmQueueTransport on page 340

See Also

Transport on page 99 in *TIBCO Rendezvous Concepts*

TibrvTransport.createInbox()

Method

Declaration

```
java.lang.String createInbox()
  throws TibrvException
```

Purpose Create a unique inbox subject name.

Remarks This method creates inbox names that are unique throughout the transport scope.

- For network transports, inbox subject names are unique across all processes within the local router domain—that is, anywhere that direct multicast contact is possible. The inbox name is not necessarily unique outside of the local router domain.
- For the intra-process transport, inbox names are unique across all threads of the process.

This method creates only the unique name for an inbox; it does not begin listening for messages on that subject name. To begin listening, pass the inbox name as the `subject` argument to `TibrvListener()`. The inbox name is only valid for use with the same transport that created it. When calling `TibrvListener()`, you *must* pass the same transport object that created the inbox subject name.

Remember that other programs have no information about an inbox subject name until the listening program uses it as a reply subject in an outbound message.

Use inbox subject names for delivery to a specific destination. In the context of a network transport, an inbox destination specifies unicast (point-to-point) delivery.

Rendezvous routing daemons (`rvrd`) translate inbox subject names that appear as the send subject or reply subject of a message. They do not translate inbox subject names within the data fields of a message.

This inherited method is disabled for `TibrvCmQueueTransport` objects.

⚠ This method is the only legal way for programs to create inbox subject names.

See Also TibrvMsg.setReplySubject() on page 87

TibrvTransport.destroy()

Method

Declaration `void destroy()`

Purpose Destroy a transport.

Remarks Programs must explicitly destroy each transport object.

Destroying a transport achieves these effects:

- The transport flushes all outbound data to the Rendezvous daemon.

  This effect is especially important, and neither exiting the program nor calling `Tibrv.close()` is sufficient to flush outbound data.

- The transport invalidates (but does not destroy) all associated events.
- Subsequent calls that use the destroyed transport throw the exception `TibrvStatus.INVALID_TRANSPORT`.

It is illegal to destroy the intra-process transport (see Tibrv.processTransport() on page 39).

See Also TibrvTransport.isValid() on page 214

TibrvTransport.isValid()

Method

Declaration `boolean isValid()`

Purpose Test validity of a transport.

Remarks Returns `true` if the transport is valid; `false` if the transport has been destroyed.

See Also Tibrv.close() on page 30
TibrvTransport.destroy() on page 213
TibrvCmTransport.destroy() on page 307
TibrvCmQueueTransport.destroy() on page 347

TibrvTransport.getDescription()

Method

Declaration `String getDescription()`

Purpose Extract the program description parameter from a transport.

Remarks The description identifies your program to Rendezvous components. Browser administration interfaces display the description string.

See Also TibrvTransport on page 210
TibrvTransport.setDescription() on page 222

TibrvTransport.requestReliability()

Method

Declaration

```
void requestReliability(double reliability)
  throws TibrvException
```

Purpose Request reliability interval (message retention time) for a service.

Parameter	Description
`reliability`	Request this reliability interval (in seconds). This value must be greater than zero.

Remarks This call lets application programs shorten the reliability interval of the specific service associated with a transport object. Successful calls change the daemon's reliability interval for all transports within the application process that use the same service.

Programs can request reliability only from daemons of release 8.2 or later.

An application can request a shorter retention time than the value that governs the daemon as a whole (either the factory default or the daemons `-reliability` parameter). The daemon's governing value silently overrides calls that request a longer retention time.

Maximum Value Rule Client transport objects that connect to the same daemon could specify different reliability intervals on the same service—whether by requesting a reliability value, or by using the daemon's effective value. In this situation, the daemon selects the *largest* potential value from among all the transports on that service, and uses that maximum value as the effective reliability interval for the service (that is, for all the transports on the service). This method of resolution favors the more stringent reliability requirements. (Contrast this rule with the Lower Value Rule that applies between two daemons.)

Recomputing the Reliability Whenever a transport connects, requests reliability, or disconnects from the daemon, the daemon recalculates the reliability interval for the corresponding service, by selecting the largest value of all transports communicating on that service.

When recomputing the reliability interval would result in a shorter retention time, the daemon delays using the new value until after an interval equivalent to the older (longer) retention time. This delay ensures that the daemon retains message data at least as long as the effective reliability interval at the time the message is sent.

See Also

TibrvTransport on page 210
Reliability and Message Retention Time on page 35 in *TIBCO Rendezvous Administration*
Lower Value Rule on page 36 in *TIBCO Rendezvous Administration*
Changing the Reliability Interval within an Application Program on page 37 in *TIBCO Rendezvous Administration*
Reliable Message Delivery on page 58 in *TIBCO Rendezvous Concepts*

TibrvTransport.send()

Method

Declaration

```
void send(TibrvMsg message)
  throws TibrvException

void send(TibrvMsg[] messages)
  throws TibrvException
```

Purpose Send a message.

Remarks The message must have a valid destination subject; see TibrvMsg.setSendSubject() on page 88.

Parameter	Description
`message`	Send this message.
`messages`	Send this array of messages with one call. In most applications this call is more efficient than a series of send calls on individual messages.

Restrictions Sending an array of messages is available only in the JNI preferred implementation. It is *not* available in the JNI backward compatibility implementation, nor in the pure Java implementation.

See Also TibrvMsg.setSendSubject() on page 88

TibrvTransport.sendReply()

Method

Declaration

```
void sendReply(
    TibrvMsg replyMsg,
    TibrvMsg requestMsg)
  throws TibrvException
```

Purpose Send a reply message.

Remarks This convenience call extracts the reply subject of an inbound request message, and sends an outbound reply message to that subject. In addition to the convenience, this call is marginally faster than using separate calls to extract the subject and send the reply.

This method overwrites any existing send subject of the reply message with the reply subject of the request message.

Parameter	Description
`replyMessage`	Send this *outbound* reply message.
`requestMessage`	Send a reply to this *inbound* request message; extract its reply subject to use as the subject of the outbound reply message.

Give special attention to the order of the arguments to this method. Reversing the inbound and outbound messages can cause an infinite loop, in which the program repeatedly resends the inbound message to itself (and all other recipients).

See Also TibrvMsg.getReplySubject() on page 79

TibrvTransport.sendRequest()

Method

Declaration

```
TibrvMsg sendRequest(
    TibrvMsg message,
    double timeout)
  throws TibrvException
```

Purpose Send a request message and wait for a reply.

Blocking can Stall Event Dispatch

⚠ This call blocks all other activity on its program thread. If appropriate, programmers must ensure that other threads continue dispatching events on its queues.

Parameter	Description
`message`	Send this message.
`timeout`	Maximum time (in seconds) that this call can block while waiting for a reply. -1 indicates no timeout (wait without limit for a reply).

Remarks When the method receives a reply, it returns the reply. When the call does not receive a reply, it returns `null`, indicating timeout.

Programs that receive and process the request message cannot determine that the sender has blocked until a reply arrives.

The request message must have a valid destination subject; see TibrvMsg.setSendSubject() on page 88.

Operation This method operates in several synchronous steps:

1. Create an inbox name, and an event that listens to it. Overwrite any existing reply subject of `message` with the inbox name.
2. Send the outbound `message`.
3. Block until the listener receives a reply; if the time limit expires before a reply arrives, then return `null`. (The reply circumvents the event queue mechanism, so it is not necessary to explicitly call dispatch methods in the program.)
4. Return the reply as the value of this method.

TibrvTransport.setBatchSize()

Declaration

```
void setBatchSize(int numBytes)
  throws TibrvException
```

Purpose Enable outbound batching of data from IPM, and set the batch size (in bytes).

Remarks This type of batching is available only with the IPM library. It is not available with the standard (daemon-based) Rendezvous library.

When the batch size is greater than zero, IPM transfers data to the network in batches. This option can increase throughput, at the cost of higher latency.

When the batch size is zero, IPM transfers data to the network immediately, for lowest latency.

If you do not explicitly set the batch size using this call, then the default behavior disables outbound batching.

Contraindications

These conditions characterize situations in which we do not recommend batching:

- Data latency is *not* acceptable.
- Batch behavior does *not* produce measurable improvements in the performance of your application.

Parameter	Description
`numBytes`	Set the batch size (in bytes). Zero is a special value, which disables batching for the transport.

TibrvTransport.setDescription()

Method

Declaration

```
void setDescription(
    String description)
  throws TibrvException
```

Purpose Set the program description parameter of a transport.

Remarks The description identifies your program to Rendezvous components. Browser administration interfaces display the description string of ordinary transport objects (however they do not display the description string of `TibrvCmTransport` or `TibrvCmQueueTransport` objects.

As a debugging aid, we recommend setting a unique description string for each transport. Use a string that distinguishes both the application and the role of the transport within it.

Parameter	Description
`description`	Use this string as the new program description.

See Also TibrvTransport on page 210
TibrvTransport.getDescription() on page 215

TibrvProcessTransport

Class

Declaration

```
final class com.tibco.tibrv.TibrvProcessTransport
  extends TibrvTransport
```

Purpose The intra-process transport delivers messages among the threads of a program.

Remarks The intra-process transport does not access the network.

The call `Tibrv.open()` automatically creates the intra-process transport; `Tibrv.close()` automatically destroys it; `Tibrv.processTransport()` extracts it from the Rendezvous environment. Programs cannot create additional instances of this class, and cannot destroy the intra-process transport.

Inherited Methods

`TibrvTransport.createInbox()`
`TibrvTransport.isValid()`
`TibrvTransport.send()`
`TibrvTransport.sendReply()`
`TibrvTransport.sendRequest()`

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString` (override)
`java.lang.Object.wait`

Related Classes TibrvTransport on page 210
TibrvNetTransport on page 224

See Also Tibrv.processTransport() on page 39

TibrvNetTransport

Class

Declaration

```
abstract class com.tibco.tibrv.TibrvNetTransport
  extends TibrvTransport
```

Purpose Deliver messages across a network.

Remarks This abstract class is the superclass of all network transport classes.

Inherited Methods

`TibrvTransport.createInbox()`
`TibrvTransport.destroy()`
`TibrvTransport.isValid()`
`TibrvTransport.send()`
`TibrvTransport.sendReply()`
`TibrvTransport.sendRequest()`

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString` (override)
`java.lang.Object.wait`

Related Classes

TibrvTransport on page 210
TibrvProcessTransport on page 223
TibrvRvaTransport on page 225
TibrvRvdTransport on page 235
TibrvCmTransport on page 295
TibrvCmQueueTransport on page 340

TibrvRvaTransport

Class

Declaration

```
class com.tibco.tibrv.TibrvRvaTransport
  extends TibrvNetTransport
```

Purpose Deliver network messages through a Rendezvous agent (`rva`).

Remarks For most Java applets running in a secure browser environment, `TibrvRvaTransport` is the only way to connect to a network. `TibrvRvaTransport` in turn connects to an `rva` process running on the web server where the applet originates.

`TibrvRvaTransport` can operate through a firewall using the HTTP protocol.

`TibrvRvaTransport` can operate in either an `Tibrv.IMPL_NATIVE` environment, or an `Tibrv.IMPL_JAVA` environment (that is, it does not require the JNI library).

A `TibrvRvaTransport` can connect to the Rendezvous agent through either of two ports:

- The `rva` TCP port. Use this technique for programs running on intranets.
- The HTTP port, using *HTTP tunneling*. Use this technique for remote access, when it is not possible to open the `rva` port through a firewall. For more information, see HTTP Tunneling on page 15.

Programs must explicitly destroy instances of this class using `TibrvTransport.destroy()`. Rendezvous software keeps internal references to these objects, so the Java garbage collector does not delete them automatically.

(Sheet 1 of 2)

Method	Description	Page
`TibrvRvaTransport()`	Create a transport that connects through the Rendezvous agent.	227
`TibrvRvaTransport.getHostName()`	Return the host name of the computer where this transport connects to the Rendezvous agent.	230
`TibrvRvaTransport.getHttpReconnectDelay()`	Return the delay time (in seconds) before the transport reopens a connection to the Rendezvous agent.	231

(Sheet 2 of 2)

Method	Description	Page
`TibrvRvaTransport.getPort()`	Return the port number through which this transport connects to the Rendezvous agent.	232
`TibrvRvaTransport.isHttpTunneling()`	Determine whether this transport connects to the Rendezvous agent using HTTP protocol.	233
`TibrvRvaTransport.setHttpReconnectDelay()`	Set the delay time (in seconds) before the transport reopens a connection to the Rendezvous agent.	234

Inherited Methods

`TibrvTransport.createInbox()`
`TibrvTransport.destroy()`
`TibrvTransport.isValid()`
`TibrvTransport.send()`
`TibrvTransport.sendReply()`
`TibrvTransport.sendRequest()`

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString` (override)
`java.lang.Object.wait`

Related Classes

TibrvTransport on page 210
TibrvNetTransport on page 224
TibrvRvdTransport on page 235

See Also

Rendezvous Agent (rva), page 267 in *TIBCO Rendezvous Administration*

TibrvRvaTransport()

Constructor

Declaration

```
TibrvRvaTransport()
  throws TibrvException

TibrvRvaTransport(
    java.lang.String hostName)
  throws TibrvException

TibrvRvaTransport()
    java.lang.String hostName,
    int port)
  throws TibrvException

TibrvRvaTransport(
    java.lang.String hostName,
    int port,
    int tunnelMode)
  throws TibrvException

TibrvRvaTransport(     // This method is deprecated //
    java.lang.String hostName,
    int port,
    boolean enableHttp)
  throws TibrvException
```

Purpose Create a transport that connects through the Rendezvous agent.

Parameter	Description
`hostName`	Connect to `rva` on this computer. To connect to `rva` on the local computer, supply `null`.
`port`	Connect to `rva` through this port. To use the default `rva` port, supply zero. (`TibrvRvaTransport` defines the constant `DEFAULT_RVA_PORT` as `7600`.)
`tunnelMode`	The method interprets this parameter as a bit vector. For a list of bit constants, see Constant on page 228.
`enableHttp`	The method that uses this parameter is deprecated, starting in release 6.2. Instead, use the parameter `tunnelMode`. When `true`, first try to connect to `rva` through the specified `port`; if that attempt fails, then try tunneling through the HTTP port. When `false` (the default if absent), do not try HTTP tunneling.

Constant	Description
`TibrvRvaTransport.HTTP_TUNNEL_ENABLE`	When the flag `HTTP_TUNNEL_ENABLE` is set, first try to connect directly to `rva` through the specified `port`; if that attempt fails, then try tunneling through the HTTP port.
`TibrvRvaTransport.HTTP_TUNNEL_ENFORCE`	When the flag `HTTP_TUNNEL_ENFORCE` is set, only try tunneling through the HTTP port; do not attempt to connect directly to `rva`.
`TibrvRvaTransport.HTTP_TUNNEL_DISABLE`	When the flag `HTTP_TUNNEL_DISABLE` is set (the default if the parameter is entirely absent), do not try HTTP tunneling.
`TibrvRvaTransport.USE_NETSCAPE_SECURITY`	The flag `USE_NETSCAPE_SECURITY` affects the behavior of the `TibrvRvaTransport` when it attempts to connect to `rva` using HTTP tunneling. When this flag is set, the `TibrvRvaTransport` requests the `UniversalConnect` privilege from the object `netscape.security.PrivilegeManager`. An applet that obtains this privilege, *and* uses a signed Rendezvous `jar` file, can connect to `rva` on any computer. Programs can set this bit in conjunction with either `TibrvRvaTransport.HTTP_TUNNEL_ENABLE` or `TibrvRvaTransport.HTTP_TUNNEL_ENFORCE` (using *addition* or the *bitwise or* operator).

Method Forms With no arguments, connect to `rva` on the local computer (where the program is running).

All arguments specify options for connecting to `rva`.

Description String As a debugging aid, we recommend setting a unique description string for each transport. Use a string that distinguishes both the application and the role of the transport within it. See TibrvTransport.setDescription() on page 222.

See Also Signed Applets, page 16

Archive Files, page 23

Netscape Java Security Introduction, and Java Capabilities API, http://developer.netscape.com/docs/manuals/signedobj/capsapi.html (URLs can change without notice)

TibrvRvaTransport.getHostName()

Method

Declaration

```
java.lang.String getHostName()
```

Purpose

Return the host name of the computer where this transport connects to the Rendezvous agent.

TibrvRvaTransport.getHttpReconnectDelay()

Method

Declaration `double getHttpReconnectDelay()`

Purpose Return the delay time (in seconds) before the transport reopens a connection to the Rendezvous agent.

Remarks The default value is 0.2 seconds.

TibrvRvaTransport.getPort()

Method

Declaration `int getPort()`

Purpose Return the port number through which this transport connects to the Rendezvous agent.

Remarks This method returns the actual port (for example, if the program specified the default by supplying zero, this method returns the default TCP port number, which is `7600`).

TibrvRvaTransport.isHttpTunneling()

Method

Declaration `boolean` **`isHttpTunneling`**`()`

Purpose Determine whether this transport connects to the Rendezvous agent using HTTP protocol.

Remarks This method indicates whether the transport actually connects using HTTP protocol (for example, the program might specify HTTP, but reality might differ).

TibrvRvaTransport.setHttpReconnectDelay()

Method

Declaration

```
void setHttpReconnectDelay(double seconds)
```

Purpose Set the delay time (in seconds) before the transport reopens a connection to the Rendezvous agent.

Parameter	Description
`seconds`	Set this delay time.

Remarks This value is relevant only when the transport uses HTTP tunneling.

Unless a program has changed the value using this method, the default value is 0.2 seconds.

TibrvRvdTransport

Class

Declaration

```
class com.tibco.tibrv.TibrvRvdTransport
  extends TibrvNetTransport
```

Purpose Deliver network messages through a Rendezvous daemon.

Remarks TibrvRvdTransport is the most direct way to connect to a network. For most independent applications and servers, use TibrvRvdTransport (rather than TibrvRvaTransport).

TibrvRvdTransport must operate in an Tibrv.IMPL_NATIVE environment (that is, it requires the JNI library). To determine the implementation, see Tibrv.isNativeImpl() on page 35.

Programs must explicitly destroy instances of this class. Rendezvous software keeps internal references to these objects, so the Java garbage collector does not delete them automatically.

Constant	Description
TibrvRvdTransport.DEFAULT_RVD_PORT	Unless you specify another port when creating the transport, TibrvRvdTransport connects to the Rendezvous daemon through this default TCP port (7500).
TibrvRvdTransport.DEFAULT_BATCH	Default batch behavior. The transport transmits outbound messages to rvd as soon as possible. This value is the initial default for all transports.
TibrvRvdTransport.TIMER_BATCH	Timer batch behavior. The transport accumulates outbound messages, and transmits them to rvd in batches—either when its buffer is full, or when a timer interval expires. (Programs cannot adjust the timer interval.)

Method	Description	Page
`TibrvRvdTransport.getNetwork()`	Return the network interface that this transport uses for communication.	241
`TibrvRvdTransport.getService()`	Return the effective service that this transport uses for communication.	242
`TibrvRvdTransport.setBatchMode()`	Set the batch mode parameter of a transport.	243

Inherited Methods

`TibrvTransport.createInbox()`
`TibrvTransport.destroy()`
`TibrvTransport.isValid()`
`TibrvTransport.send()`
`TibrvTransport.sendReply()`
`TibrvTransport.sendRequest()`

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString` (override)
`java.lang.Object.wait`

Related Classes

TibrvTransport on page 210
TibrvProcessTransport on page 223
TibrvNetTransport on page 224
TibrvCmTransport on page 295
TibrvCmQueueTransport on page 340

TibrvRvdTransport()

Constructor

Declaration

```
TibrvRvdTransport()
  throws TibrvException

TibrvRvdTransport(
    java.lang.String service,
    java.lang.String network,
    java.lang.String daemon)
  throws TibrvException

TibrvRvdTransport(
    java.lang.String service,
    java.lang.String network,
    java.lang.String daemon,
    java.lang.String licenseTicket)
  throws TibrvException
```

Purpose

Create a transport that connects to a Rendezvous daemon.

Method Forms

With no arguments, connect to `rvd` on the local computer using default values the `service`, `network`, and `daemon` parameters.

All arguments specify options for connecting to `rvd`.

Connecting to the Rendezvous Daemon

Rendezvous daemon processes do the work of moving messages across a network. Every `TibrvRvdTransport` must connect to a Rendezvous daemon.

If a Rendezvous daemon process with a corresponding `daemon` parameter is already running, the transport connects to it.

If an appropriate Rendezvous local daemon is *not* running, the transport tries to start it. However, the transport does not attempt to start a *remote* daemon when none is running.

If the transport cannot connect to the Rendezvous daemon, the constructor throws an exception with the status code `TibrvStatus.DAEMON_NOT_FOUND`.

The first time a program successfully connects to the Rendezvous daemon process, `rvd` starts the clock ticking for temporary license tickets. (See Licensing Information, page 11 in *TIBCO Rendezvous Administration*.)

Description String

As a debugging aid, we recommend setting a unique description string for each transport. Use a string that distinguishes both the application and the role of the transport within it. See TibrvTransport.setDescription() on page 222.

Parameter	Description
`service`	The Rendezvous daemon divides the network into logical partitions. Each `TibrvRvdTransport` communicates on a single service; a transport can communicate only with other transports on the same service. To communicate on more than one service, a program must create more than one transport—one transport for each service. You can specify the service in several ways. For details, see Service Parameter on page 103 in *TIBCO Rendezvous Concepts*. `null` specifies the default `rendezvous` service.
`network`	Every network transport communicates with other transports over a single network interface. On computers with more than one network interface, the `network` parameter instructs the Rendezvous daemon to use a particular network for all outbound messages from this transport. To communicate over more than one network, programs must create more than one transport. You can specify the network in several ways. For details, see Network Parameter on page 107 in *TIBCO Rendezvous Concepts*. `null` specifies the primary network interface for the host computer.
`daemon`	The daemon parameter instructs the transport object about how and where to find the Rendezvous daemon and establish communication. For details, see Daemon Parameter on page 110 in *TIBCO Rendezvous Concepts*. You can specify a daemon on a remote computer. For details, see Remote Daemon on page 111 in *TIBCO Rendezvous Concepts*. If you specify a secure daemon, this string must be identical to as the `daemonName` argument of TibrvSdContext.setDaemonCert() on page 43. See also, Secure Daemon on page 111 in *TIBCO Rendezvous Concepts*. `null` specifies the default—find the local daemon on TCP socket `7500`. (This default is not valid when the local daemon is a secure daemon.)
`licenseTicket`	Embed this special license ticket in the transport object. When a licensed transport connects to `rvd`, it presents this special ticket to validate its connection (`rvd` uses the longest-running ticket available, which can be either this special ticket, or a ticket from the ticket file, `tibrv.tkt`). Ordinary license tickets are *not* valid for this parameter; see also, Embedded License on page 239.

Embedded License

Specially-licensed third-party developers can use the third form of this method. To use this alternate form, a developer must first purchase a special license ticket. This call embeds the special ticket in the program, so that end-users do not need to purchase Rendezvous to use the program.

To purchase an embedded license, contact TIBCO Software Inc.

See Also

TibrvRvdTransport.getDaemon() on page 240
TibrvRvdTransport.getNetwork() on page 241
TibrvRvdTransport.getService() on page 242

TibrvRvdTransport.getDaemon()

Method

Declaration `java.lang.String getDaemon()`

Purpose Return the socket where this transport connects to the Rendezvous daemon.

See Also TibrvRvaTransport() on page 227

TibrvRvdTransport.getNetwork()

Method

Declaration `java.lang.String` **`getNetwork`**`()`

Purpose Return the network interface that this transport uses for communication.

See Also TibrvRvaTransport() on page 227

TibrvRvdTransport.getService()

Method

Declaration `java.lang.String getService()`

Purpose Return the effective service that this transport uses for communication.

See Also TibrvRvaTransport() on page 227

TibrvRvdTransport.setBatchMode()

Method

Declaration

```
void setBatchMode(
    int mode)
  throws TibrvException

static final int DEFAULT_BATCH = 0;
static final int TIMER_BATCH = 1;
```

Purpose Set the batch mode parameter of a transport.

Remarks This type of batching is available only with the standard (daemon-based) Rendezvous library. It is not available with the IPM library.

The batch mode determines when the transport transmits outbound message data to `rvd`:

- As soon as possible (the initial default for all transports)
- Either when its buffer is full, or when a timer interval expires—either event triggers transmission to the daemon

Parameter	Description
`mode`	Use this value as the new batch mode.

Constant	Description
`DEFAULT_BATCH`	Default batch behavior. The transport transmits outbound messages to `rvd` as soon as possible. This value is the initial default for all transports.
`TIMER_BATCH`	Timer batch behavior. The transport accumulates outbound messages, and transmits them to `rvd` in batches—either when its buffer is full, or when a timer interval expires. (Programs cannot adjust the timer interval.)

See Also Batch Modes for Transports on page 118 in *TIBCO Rendezvous Concepts*

Chapter 7 Virtual Circuits

Virtual circuits feature Rendezvous communication between two terminals over an exclusive, continuous, monitored connection.

See Also Virtual Circuits on page 119 in *TIBCO Rendezvous Concepts*

Topics

TibrvVcTransport

Class

Declaration

```
class com.tibco.tibrv.TibrvVcTransport
  extends TibrvTransport
```

Purpose A virtual circuit transport object represents a terminal in a potential circuit.

Remarks A virtual circuit transport can fill the same roles as an ordinary transport. Programs can use them to create inbox names, send messages, create listeners and other events.

Instead of a constructor, this class has two create methods. These two methods also determine the protocol role of the transport object—one method creates a terminal that *accepts* connections, and another method creates a terminal that attempts to *connect*.

The two terminals play complementary roles as they attempt to establish a connection. However, this difference soon evaporates. After the connection is complete, the two terminals behave identically.

Method	Description	Page
`TibrvVcTransport.createAcceptVc()`	Create a virtual circuit accept object.	248
`TibrvVcTransport.createConnectVc()`	Create a virtual circuit connect object	249
`TibrvVcTransport.getConnectSubject()`	Return the connect subject of an accept terminal.	251
`TibrvVcTransport.waitForVcConnection()`	Test the connection status of a virtual circuit.	252

Broken Connection The following conditions can close a virtual circuit connection:

- Contact is broken between the object and its terminal.
- The virtual circuit loses data in either direction (see DATALOSS on page 272 in *TIBCO Rendezvous Concepts*).
- The partner program destroys its terminal object (or that terminal becomes invalid).
- The program destroys the object.

- The program destroys the object's ordinary transport.

Direct Communication

Because virtual circuits rely on point-to-point messages between the two terminals, they can use direct communication to good advantage. To do so, both terminals must use network transports that enable direct communication.

For an overview, see Direct Communication on page 116 in *TIBCO Rendezvous Concepts*.

For programming details, see Specifying Direct Communication on page 105 in *TIBCO Rendezvous Concepts*.

Inherited Methods

`TibrvTransport.createInbox()`
`TibrvTransport.destroy()`
`TibrvTransport.isValid()`
`TibrvTransport.send()`
`TibrvTransport.sendReply()`
`TibrvTransport.sendRequest()`

Disabled Methods inherited from `TibrvTransport`
`TibrvTransport.getDescription()`
`TibrvTransport.setDescription()`

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString` (override)
`java.lang.Object.wait`

Related Classes

TibrvTransport on page 210
TibrvProcessTransport on page 223
TibrvNetTransport on page 224

See Also

Virtual Circuits on page 119 in *TIBCO Rendezvous Concepts*

TibrvVcTransport.createAcceptVc()

Method

Declaration

```
TibrvVcTransport CreateAcceptVc(
    TibrvTransport    transport)
  throws TibrvException
```

Purpose Create a virtual circuit accept object.

Remarks After this call returns, the program must extract the object's connect subject, and send it in a message to another program, inviting it to establish a virtual circuit. Furthermore, the *reply subject* of that invitation message must be this connect subject. To complete the virtual circuit, the second program must extract this subject from the invitation, and supply it to `TibrvVcTransport.createConnectVc()`.

Parameter	Description
`transport`	The virtual circuit terminal uses this ordinary transport for communications. Programs may use this transport for other purposes. It is illegal to supply a virtual circuit transport object for this parameter (that is, you cannot nest a virtual circuit within another virtual circuit).

Test Before Using Either of two conditions indicate that the connection is ready to use:

- The transport presents the `VC.CONNECTED` advisory.
- `TibrvVcTransport.waitForVcConnection()` returns without error.

Immediately after this call, test *both* conditions with these two steps (in this order):

1. Listen on the virtual circuit transport object for the `VC.CONNECTED` advisory.
2. Call `TibrvVcTransport.waitForVcConnection()` with zero as the timeout parameter.

For an explanation, see Testing the New Connection on page 123 in *TIBCO Rendezvous Concepts*.

See Also TibrvVcTransport.createConnectVc() on page 249
TibrvVcTransport.getConnectSubject() on page 251
TibrvVcTransport.waitForVcConnection() on page 252
VC.CONNECTED on page 288 in *TIBCO Rendezvous Concepts*
VC.DISCONNECTED on page 289 in *TIBCO Rendezvous Concepts*

TibrvVcTransport.createConnectVc()

Method

Declaration

```
TibrvVcTransport CreateConnectVc(
    java.lang.String    connectSubject,
    TibrvTransport      transport)
  throws TibrvException
```

Purpose Create a virtual circuit connect object

Parameter	Description
`connectSubject`	The terminal uses this connect subject to establish a virtual circuit with an *accept* transport in another program. The program must receive this connect subject from the accepting program. The call to `TibrvVcTransport.createAcceptVc()` creates and returns this subject.
`transport`	The virtual circuit terminal uses this ordinary transport for communications. Programs may use this transport for other purposes. It is illegal to supply a virtual circuit transport object for this parameter (that is, you cannot nest a virtual circuit within another virtual circuit).

Test Before Using Either of two conditions indicate that the connection is ready to use:

- The transport presents the `VC.CONNECTED` advisory.
- `TibrvVcTransport.waitForVcConnection()` returns without error.

Immediately after this call, test *both* conditions with these two steps (in this order):

1. Listen on the virtual circuit transport object for the `VC.CONNECTED` advisory.
2. Call `TibrvVcTransport.waitForVcConnection()` with zero as the timeout parameter.

For an explanation, see Testing the New Connection on page 123 in *TIBCO Rendezvous Concepts*.

See Also

TibrvVcTransport.createAcceptVc() on page 248
TibrvVcTransport.getConnectSubject() on page 251
TibrvVcTransport.waitForVcConnection() on page 252
VC.CONNECTED on page 288 in *TIBCO Rendezvous Concepts*

VC.DISCONNECTED on page 289 in *TIBCO Rendezvous Concepts*

TibrvVcTransport.getConnectSubject()

Method

Declaration

```
java.lang.String getConnectSubject()
  throws TibrvException
```

Purpose

Return the connect subject of an accept terminal.

Remarks

After creating an accept terminal, the program must use this method to extract its connect subject, and send it in a message to another program, inviting it to establish a virtual circuit. Furthermore, the *reply subject* of that invitation message must be this connect subject. To complete the virtual circuit, the second program must extract this subject from the invitation, and supply it to `TibrvVcTransport.createConnectVc()`.

See Also

TibrvVcTransport.createAcceptVc() on page 248
TibrvVcTransport.createConnectVc() on page 249

TibrvVcTransport.waitForVcConnection()

Method

Declaration

```
void waitForVcConnection(
    java.lang.double    timeout)
  throws TibrvException
```

Purpose Test the connection status of a virtual circuit.

Remarks This method tests (and can block) until this virtual circuit transport object has established a connection with its opposite terminal. You may call this method for either an accept terminal or a connect terminal.

This method produces the same information as the virtual circuit advisory messages—but it produces it synchronously (while advisories are asynchronous). Programs can use this method not only to test the connection, but also to block until the connection is ready to use.

For example, a program can create a terminal object, then call this method to wait until the connection completes.

Parameter	Description
`timeout`	This parameter determines the behavior of the call: • For a quick test of current connection status, supply zero. The call returns immediately, without blocking. • To wait for a new terminal to establish a connection, supply a reasonable positive value. The call returns either when the connection is complete, or when this time limit elapses. • To wait indefinitely for a usable connection, supply -1. The call returns when the connection is complete. If the connection was already complete and is now broken, the call returns immediately.

Results When the connection is complete (ready to use), this method returns normally. Otherwise it throws an exception; the status value in the exception yields additional information about the unusable connection.

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Status	Description
`TibrvStatus.TIMEOUT`	The connection is not yet complete, but the non-negative time limit for waiting has expired.

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Status	Description
`TibrvStatus.TIBRV_VC_NOT_CONNECTED`	The connection was formerly complete, but is now irreparably broken.

See Also

TibrvVcTransport.createAcceptVc() on page 248
TibrvVcTransport.createConnectVc() on page 249
Testing the New Connection on page 123 in *TIBCO Rendezvous Concepts*
VC.CONNECTED on page 288 in *TIBCO Rendezvous Concepts*
VC.DISCONNECTED on page 289 in *TIBCO Rendezvous Concepts*

Chapter 8 Fault Tolerance

Rendezvous fault tolerance software coordinates a group of redundant processes into a fault-tolerant distributed program. Some processes actively fulfill the tasks of the program, while other processes wait in readiness. When one of the active processes fails, another process rapidly assumes active duty.

Topics

Fault Tolerance Road Map

For a complete discussion of concepts and operating principles, see Fault Tolerance Concepts on page 197 in *TIBCO Rendezvous Concepts*.

For suggestions to help you design programs using fault tolerance features, see Fault Tolerance Programming on page 215 in *TIBCO Rendezvous Concepts*.

For step-by-step hints for implementing fault-tolerant systems, see Developing Fault-Tolerant Programs on page 229 in *TIBCO Rendezvous Concepts*.

Fault tolerance software uses advisory messages to inform programs of status changes. For details, see Fault Tolerance (RVFT) Advisory Messages on page 315 in *TIBCO Rendezvous Concepts*.

If your application distributes fault-tolerant processes across network boundaries, you must configure the Rendezvous routing daemons to exchange `_RVFT` administrative messages. For details, see Fault Tolerance on page 407 in *TIBCO Rendezvous Administration*, and discuss with your network administrator.

TibrvFtMember

Class

Declaration

```
class com.tibco.tibrv.TibrvFtMember
  extends TibrvEvent
```

Purpose Represent membership in a fault tolerance group.

Remarks Upon creating this object, the program joins a fault tolerance group.

By destroying a member object, the program withdraws its membership in the fault tolerance group.

Programs must destroy instances of this class. Rendezvous software keeps internal references to these objects, so the Java garbage collector does not delete them automatically.

Destroying the queue or transport of a member object automatically destroys the member object as well.

Constants Each of these constant fields is a token designating a command to a fault tolerance callback method. The program's callback method receives one of these tokens in a parameter, and interprets it as an instruction from the Rendezvous fault tolerance software as described in this table (see also, Fault Tolerance Callback Actions on page 216 in *TIBCO Rendezvous Concepts*).

(Sheet 1 of 2)

Constant	Description
`TibrvFtMember.PREPARE_TO_ACTIVATE`	Prepare to activate (hint). Rendezvous fault tolerance software passes this token to the callback method to instruct the program to make itself ready to activate on short notice—so that if the callback method subsequently receives the instruction to activate, it can do so without delay. This token is a hint, indicating that the program might soon receive an instruction to activate. It does not guarantee that an activate instruction will follow, nor that any minimum time will elapse before an activate instruction follows.

(Sheet 2 of 2)

Constant	Description
`TibrvFtMember.ACTIVATE`	Activate immediately. Rendezvous fault tolerance software passes this token to the callback method to instruct the program to activate.
`TibrvFtMember.DEACTIVATE`	Deactivate immediately. Rendezvous fault tolerance software passes this token to the callback method to instruct the program to deactivate.

Method	Description	Page
`TibrvFtMember()`	Create a member of a fault tolerance group.	260
`TibrvFtMember.destroy()`	Destroy a member of a fault tolerance group.	263
`TibrvFtMember.getActivationInterval()`	Extract the activation interval of a fault tolerance member.	264
`TibrvFtMember.getActiveGoal()`	Extract the active goal of a fault tolerance member.	265
`TibrvFtMember.getGroupName()`	Extract the group name of a fault tolerance member.	266
`TibrvFtMember.getHeartbeatInterval()`	Extract the heartbeat interval of a fault tolerance member.	267
`TibrvFtMember.getPreparationInterval()`	Extract the preparation interval of a fault tolerance member.	268
`TibrvFtMember.getQueue()`	Extract the event queue of a fault tolerance member.	269
`TibrvFtMember.getTransport()`	Extract the transport of a fault tolerance member.	270

Method	Description	Page
`TibrvFtMember.getWeight()`	Extract the weight of a fault tolerance member.	271
`TibrvFtMember.setWeight()`	Change the weight of a fault tolerance member within its group.	273

Inherited Methods
`TibrvEvent.getClosure()` `TibrvEvent.isValid()`

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString` (override)
`java.lang.Object.wait`

Related Classes TibrvEvent on page 134
TibrvFtMonitor on page 277

See Also TibrvFtMemberCallback on page 274

TibrvFtMember()

Constructor

Declaration

```
TibrvFtMember(
    TibrvQueue queue,
    TibrvFtMemberCallback callback,
    TibrvTransport transport,
    java.lang.String groupName,
    int weight,
    int activeGoal,
    double heartbeatInterval,
    double preparationInterval,
    double activationInterval,
    java.lang.Object closure)
  throws TibrvException
```

Purpose Create a member of a fault tolerance group.

Remarks Upon creating a member object, the program becomes a member of the group.

A program may hold simultaneous memberships in several distinct fault tolerance groups. For examples, see Multiple Groups on page 219 in *TIBCO Rendezvous Concepts*.

Avoid joining the same group twice. It is illegal for a program to maintain more than one membership in any one fault tolerance group. The constructor does not guard against this illegal situation, and results are unpredictable.

All arguments are required except for `preparationInterval` (which may be zero) and `closure` (which may be `null`).

Intervals The heartbeat interval must be less than the activation interval. If the preparation interval is non-zero, it must be greater than the heartbeat interval and less than the activation interval. It is an error to violate these rules.

In addition, intervals must be reasonable for the hardware and network conditions. For information and examples, see Step 4: Choose the Intervals on page 237 in *TIBCO Rendezvous Concepts*.

Group Name The group name must be a legal Rendezvous subject name (see Subject Names on page 61 in *TIBCO Rendezvous Concepts*). You may use names with several elements; for examples, see Multiple Groups on page 219 in *TIBCO Rendezvous Concepts*.

(Sheet 1 of 2)

Parameter	Description
`queue`	Place fault tolerance events for this member on this event queue.
`callback`	On dispatch, process the event with this callback object.
`transport`	Use this transport for fault tolerance internal protocol messages (such as heartbeat messages).
`groupName`	Join the fault tolerant group with this name. The group name must conform to the syntax required for Rendezvous subject names. For details, see Subject Names on page 61 in *TIBCO Rendezvous Concepts*.
`weight`	Weight represents the ability of this member to fulfill its purpose, relative to other members of the same fault tolerance group. Rendezvous fault tolerance software uses relative weight values to select which members to activate; members with higher weight take precedence over members with lower weight. Acceptable values range from 1 to 65535. Zero is a special, reserved value; Rendezvous fault tolerance software assigns zero weight to processes with resource errors, so they only activate when no other members are available. For more information, see Rank and Weight on page 206 in *TIBCO Rendezvous Concepts*.
`activeGoal`	Rendezvous fault tolerance software sends callback instructions to maintain this number of active members. Acceptable values range from 1 to 65535.
`heartbeatInterval`	When this member is active, it sends heartbeat messages at this interval (in seconds). The interval must be positive. To determine the correct value, see Step 4: Choose the Intervals on page 237 in *TIBCO Rendezvous Concepts*.

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Parameter	Description
`preparationInterval`	When the heartbeat signal from one or more active members has been silent for this interval (in seconds), Rendezvous fault tolerance software issues an early warning hint (`TibrvFtMember.PREPARE_TO_ACTIVATE`) to the ranking inactive member. This warning lets the inactive member prepare to activate, for example, by connecting to a database server, or allocating memory. The interval must be non-negative. Zero is a special value, indicating that the member does not need advance warning to activate; Rendezvous fault tolerance software never issues a `TibrvFtMember.PREPARE_TO_ACTIVATE` hint when this value is zero. To determine the correct value, see Step 4: Choose the Intervals on page 237 in *TIBCO Rendezvous Concepts*.
`activationInterval`	When the heartbeat signal from one or more active members has been silent for this interval (in seconds), Rendezvous fault tolerance software considers the silent member to be lost, and issues the instruction to activate (`TibrvFtMember.ACTIVATE`) to the ranking inactive member. When a new member joins a group, Rendezvous fault tolerance software identifies the new member to existing members (if any), and then waits for this interval to receive identification from them in return. If, at the end of this interval, it determines that too few members are active, it issues the activate instruction (`TibrvFtMember.ACTIVATE`) to the new member. Then interval must be positive. To determine the correct value, see Step 4: Choose the Intervals on page 237 in *TIBCO Rendezvous Concepts*.
`closure`	Store this closure data in the member object.

See Also

TibrvFtMember on page 257.
TibrvFtMemberCallback on page 274.
TibrvFtMember.destroy() on page 263.
Step 1: Choose a Group Name, page 230 in *TIBCO Rendezvous Concepts*
Step 2: Choose the Active Goal, page 232 in *TIBCO Rendezvous Concepts*
Step 4: Choose the Intervals, page 237 in *TIBCO Rendezvous Concepts*
Step 5: Program Start Sequence, page 241 in *TIBCO Rendezvous Concepts*

TibrvFtMember.destroy()

Method

Declaration `void destroy()`

Purpose Destroy a member of a fault tolerance group.

Remarks By destroying a member object, the program cancels or withdraws its membership in the group.

This method has two effects:

- If this member is active, stop sending the heartbeat signal.
- Reclaim the program storage associated with this member.

Once a program withdraws from a group, it no longer receives fault tolerance events. One direct consequence is that an active program that withdraws can never receive an instruction to deactivate.

See Also TibrvFtMember() on page 260
TibrvFtMember.isValid() on page 272

TibrvFtMember.getActivationInterval()

Method

Declaration `double getActivationInterval()`

Purpose Extract the activation interval of a fault tolerance member.

See Also TibrvFtMember() on page 260

TibrvFtMember.getActiveGoal()

Method

Declaration `int getActiveGoal()`

Purpose Extract the active goal of a fault tolerance member.

See Also TibrvFtMember() on page 260

TibrvFtMember.getGroupName()

Method

Declaration `java.lang.String` **`getGroupName`**`()`

Purpose Extract the group name of a fault tolerance member.

See Also TibrvFtMember() on page 260

TibrvFtMember.getHeartbeatInterval()

Method

Declaration `double getHeartbeatInterval()`

Purpose Extract the heartbeat interval of a fault tolerance member.

Remarks If the member is invalid, this method returns `null`.

See Also TibrvFtMember() on page 260

TibrvFtMember.getPreparationInterval()

Method

Declaration `double getPreparationInterval()`

Purpose Extract the preparation interval of a fault tolerance member.

Remarks If the member is invalid, this method returns `null`.

See Also TibrvFtMember() on page 260

TibrvFtMember.getQueue()

Method

Declaration `TibrvQueue getQueue()`

Purpose Extract the event queue of a fault tolerance member.

Remarks If the member is invalid, this method returns `null`.

See Also TibrvQueue on page 172
TibrvFtMember() on page 260

TibrvFtMember.getTransport()

Method

Declaration `TibrvTransport getTransport()`

Purpose Extract the transport of a fault tolerance member.

See Also TibrvTransport on page 210
TibrvFtMember() on page 260

TibrvFtMember.getWeight()

Method

Declaration `int getWeight()`

Purpose Extract the weight of a fault tolerance member.

Remarks If the member is invalid, this method returns `null`.

See Also TibrvFtMember() on page 260

TibrvFtMember.isValid()

Method

Declaration `boolean isValid()`

Purpose Test validity of a fault tolerance member object.

Remarks Returns `true` if the member is valid; `false` if the member has been destroyed or is otherwise invalid.

See Also TibrvFtMember.destroy() on page 263

TibrvFtMember.setWeight()

Method

Declaration

```
void setWeight(int weight)
  throws TibrvException
```

Purpose Change the weight of a fault tolerance member within its group.

Remarks Weight summarizes the relative suitability of a member for its task, relative to other members of the same fault tolerance group. That suitability is a combination of computer speed and load factors, network bandwidth, computer and network reliability, and other factors. Programs may reset their weight when any of these factors change, overriding the previous assigned weight.

You can use relative weights to indicate priority among group members.

Zero is a special value; Rendezvous fault tolerance software assigns zero weight to processes with resource errors, so they only activate when no other members are available. Programs must always assign weights greater than zero.

When Rendezvous fault tolerance software requests a resource but receives an error (for example, the member process cannot allocate memory, or start a timer), it attempts to send the member process a `DISABLING_MEMBER` advisory message, and sets the member's weight to zero, effectively disabling the member. Weight zero implies that this member is active only as a last resort—when no other members outrank it. (However, if the disabled member process does become active, it might not operate correctly.)

Parameter	Description
`weight`	The new weight value. See weight on page 261.

See Also Adjusting Member Weights on page 227 in *TIBCO Rendezvous Concepts*.

TibrvFtMemberCallback

Interface

Declaration `interface com.tibco.tibrv.`**`TibrvFtMemberCallback`**

Purpose Process fault tolerance events for a group member.

Remarks Implement this interface to process fault tolerance events.

Method	Description	Page
`TibrvFtMemberCallback.onFtAction()`	Process fault tolerance events for a group member.	275

See Also TibrvFtMember() on page 260

TibrvFtMemberCallback.onFtAction()

Method

Declaration

```
void onFtAction(
    TibrvFtMember          member,
    java.lang.String       groupName,
    int                    action)
```

Purpose Process fault tolerance events for a group member.

Remarks Each member program of a fault tolerance group must implement this method. Programs register a member callback object (and this method) with each call to `TibrvFtMember()`.

Rendezvous fault tolerance software queues a member action event in three situations. In each case, it passes a different `action` argument, instructing the callback method to activate, deactivate, or prepare to activate the program.

- When the number of active members drops below the active goal, the fault tolerance callback method (in the ranking inactive member process) receives the token `TibrvFtMember.ACTIVATE`; the callback method must respond by assuming the duties of an active member.
- When the number of active members exceeds the active goal, the fault tolerance callback method (in any active member that is outranked by another active member) receives the action token `TibrvFtMember.DEACTIVATE`; the callback method must respond by switching the program to its inactive state.
- When the number of active members equals the active goal, and Rendezvous fault tolerance software detects that it might soon decrease below the active goal, the fault tolerance callback method (in the ranking inactive member) receives the action token `TibrvFtMember.PREPARE_TO_ACTIVATE`; the callback method must respond by making the program ready to activate immediately. For example, preparatory steps might include time-consuming tasks such as connecting to a database. If the callback method subsequently receives the `TibrvFtMember.ACTIVATE` token, it will be ready to activate without delay.

For additional information see Fault Tolerance Callback Actions on page 216 in *TIBCO Rendezvous Concepts*.

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Parameter	Description
`member`	This parameter receives the member object.

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Parameter	Description
`groupName`	This parameter receives a string denoting the name of the fault tolerance group.
`action`	This parameter receives a token that instructs the callback method to activate, deactivate or prepare to activate. See Constants on page 257.

See Also TibrvFtMember() on page 260.

TibrvFtMonitor

Class

Declaration

```
class com.tibco.tibrv.TibrvFtMonitor
  extends TibrvEvent
```

Purpose Monitor a fault tolerance group.

Remarks Upon creating this object, the program monitors a fault tolerance group.

Monitors are passive—they do not affect the group members in any way.

Rendezvous fault tolerance software queues a monitor event whenever the number of active members in the group changes—either it detects a new heartbeat, or it detects that the heartbeat from a previously active member is now silent, or it receives a message from the fault tolerance component of an active member indicating deactivation or termination.

The monitor callback method receives the number of active members as an argument.

By destroying a monitor object, the program stops monitoring the fault tolerance group.

Programs must destroy instances of this class. Rendezvous software keeps internal references to these objects, so the Java garbage collector does not delete them automatically.

Destroying the queue or transport of a monitor automatically destroys the monitor as well.

Inherited Methods

`TibrvEvent.getClosure()`
`TibrvEvent.getQueue()`
`TibrvEvent.isValid()`

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString` (override)
`java.lang.Object.wait`

Related Classes

TibrvEvent on page 134
TibrvFtMember on page 257

See Also

TibrvFtMonitorCallback on page 284

TibrvFtMonitor()

Constructor

Declaration

```
TibrvFtMonitor(
    TibrvQueue                queue,
    TibrvFtMonitorCallback    callback,
    TibrvTransport            transport,
    java.lang.String          groupName,
    double                    lostInterval,
    java.lang.Object          closure)
  throws TibrvException
```

Purpose Monitor a fault tolerance group.

Remarks The monitor callback method receives the number of active members as an argument.

The group need not have any members at the time of this constructor call.

Parameter	Description
`queue`	Place events for this monitor on this event queue.
`callback`	On dispatch, process the event with this callback method.
`transport`	Listen on this transport for fault tolerance internal protocol messages (such as heartbeat messages).
`groupName`	Monitor the fault tolerant group with this name. The group name must conform to the syntax required for Rendezvous subject names. For details, see Subject Names on page 61 in *TIBCO Rendezvous Concepts*. See also, Group Name on page 280.
`lostInterval`	When the heartbeat signal from an active member has been silent for this interval (in seconds), Rendezvous fault tolerance software considers that member lost, and queues a monitor event. The interval must be positive. To determine the correct value, see Step 4: Choose the Intervals on page 237 in *TIBCO Rendezvous Concepts*. See also, Lost Interval on page 280.
`closure`	Store this closure data in the monitor object.

Lost Interval

The monitor uses the `lostInterval` to determine whether a member is still active. When the heartbeat signal from an active member has been silent for this interval (in seconds), the monitor considers that member lost, and queues a monitor event.

We recommend setting the `lostInterval` identical to the group's `activationInterval`, so the monitor accurately reflects the behavior of the group members.

Group Name

The group name must be a legal Rendezvous subject name (see Subject Names on page 61 in *TIBCO Rendezvous Concepts*). You may use names with several elements; for examples, see Multiple Groups on page 219 in *TIBCO Rendezvous Concepts*.

See Also

TibrvFtMonitorCallback on page 284.
TibrvFtMonitor.destroy() on page 281.

TibrvFtMonitor.destroy()

Method

Declaration `void destroy()`

Purpose Stop monitoring a fault tolerance group, and free associated resources.

Remarks This method throws an exception when the monitor object is already invalid, or when its queue or transport are invalid.

See Also TibrvFtMonitor() on page 279

TibrvFtMonitor.getGroupName()

Method

Declaration `java.lang.String getGroupName()`

Purpose Extract the group name of a fault tolerance monitor.

Remarks If the monitor is invalid, this method returns `null`.

See Also TibrvFtMonitor() on page 279

TibrvFtMonitor.getTransport()

Method

Declaration

```
TibrvTransport getTransport()
```

Purpose

Extract the transport of a fault tolerance monitor.

See Also

TibrvTransport on page 210
TibrvFtMonitor() on page 279

TibrvFtMonitorCallback

Interface

Declaration `interface com.tibco.tibrv.`**`TibrvFtMonitorCallback`**

Purpose Process fault tolerance events for a monitor.

Remarks Implement this interface to process fault tolerance monitor events.

Method	Description	Page
`TibrvFtMonitorCallback.onFtMonitor()`	Process fault tolerance events for a monitor.	285

See Also TibrvFtMonitor() on page 279

TibrvFtMonitorCallback.onFtMonitor()

Declaration

```
void onFtMonitor(
    TibrvFtMonitor       Monitor,
    java.lang.String     groupName,
    int                  numActiveMembers)
```

Purpose Process fault tolerance events for a monitor.

Remarks A program must define a method of this type as a prerequisite to monitor a fault tolerance group. Programs register a monitor callback method with each call to `TibrvFtMonitor()` on page 279.

Rendezvous fault tolerance software queues a monitor event whenever the number of active members in the group changes.

A program need not be a member of a group in order to monitor that group. Programs that do not monitor need not define a monitor callback method.

Parameter	Description
`monitor`	This parameter receives the monitor object.
`groupName`	This parameter receives a string denoting the name of the fault tolerance group.
`numActiveMembers`	This parameter receives the number of group members now active.

See Also TibrvFtMonitor() on page 279.

Chapter 9 Certified Message Delivery

Although Rendezvous communications are highly reliable, some applications require even stronger assurances of delivery. Certified delivery features offers greater certainty of delivery—even in situations where processes and their network connections are unstable.

See Also

This API implements Rendezvous certified delivery features. For a complete discussion, see Certified Message Delivery on page 139 in *TIBCO Rendezvous Concepts*.

Certified delivery software uses advisory messages extensively. For example, advisories inform sending and receiving programs of the delivery status of each message. For complete details, see Certified Message Delivery (RVCM) Advisory Messages on page 291 in *TIBCO Rendezvous Concepts*.

If your application sends or receives certified messages across network boundaries, you must configure the Rendezvous routing daemons to exchange `_RVCM` administrative messages. For details, see Certified Message Delivery on page 403 in *TIBCO Rendezvous Administration*.

Some programs require certified delivery to *one of n* worker processes. See Distributed Queue on page 183 in *TIBCO Rendezvous Concepts*.

Topics

TibrvCmListener

Class

Declaration

```
class com.tibco.tibrv.TibrvCmListener
  extends TibrvListener
```

Purpose A certified delivery listener object listens for labeled messages and certified messages.

Remarks Each call to the constructor `TibrvCmListener()` results in a new certified delivery listener, which represents your program's listening interest in a stream of labeled messages and certified messages. Rendezvous software uses the same listener object to signal each occurrence of such an event.

We recommend that programs explicitly destroy each certified delivery listener object using `TibrvCmListener.destroy()`. Destroying a certified listener object cancels the program's immediate interest in that event, and frees its storage; nonetheless, a parameter to the destroy call determines whether certified delivery agreements continue to persist beyond the destroy call.

Programs must destroy instances of this class. Rendezvous software keeps internal references to these objects, so the Java garbage collector does not delete them automatically.

Destroying the queue or the certified delivery transport of a listener object automatically destroys the listener as well (but certified delivery agreements continue to persist).

Method	Description	Page
`TibrvCmListener()`	Listen for messages that match the subject, and request certified delivery when available.	290
`TibrvCmListener.destroy()`	Destroy a certified delivery listener.	291
`TibrvCmListener.confirmMsg()`	Explicitly confirm delivery of a certified message.	292
`TibrvCmListener.isExplicitConfirm()`	Test whether this listener expects explicit confirmation of delivery.	293
`TibrvCmListener.setExplicitConfirm()`	Override automatic confirmation of delivery for this listener.	294

Inherited Methods
TibrvListener.getSubject() TibrvListener.getTransport()
TibrvEvent.getClosure() TibrvEvent.getQueue() TibrvEvent.isValid()
java.lang.Object.equals java.lang.Object.getClass java.lang.Object.hashCode java.lang.Object.notify java.lang.Object.notifyAll java.lang.Object.toString (override) java.lang.Object.wait

Related Classes

TibrvEvent on page 134
TibrvListener on page 141

TibrvCmListener()

Constructor

Declaration

```
TibrvCmListener(
    TibrvQueue        queue,
    TibrvMsgCallback  callback,
    TibrvCmTransport  cmTransport,
    java.lang.String  subject,
    java.lang.Object  closure)
  throws TibrvException
```

Purpose Listen for messages that match the subject, and request certified delivery when available.

Parameter	Description
`queue`	For each inbound message, place the listener event on this event queue.
`callback`	On dispatch, process the event with this callback object.
`cmTransport`	Listen for inbound messages on this certified delivery transport.
`subject`	Listen for inbound messages with subjects that match this specification. Wildcard subjects are permitted. The empty string is not a legal subject name.
`closure`	Store this closure data in the event object.

Activation and Dispatch Details of listener event semantics are identical to those for ordinary listeners; see Activation and Dispatch on page 141.

Inbox Listener To receive unicast (point-to-point) messages, listen to a unique inbox subject name. First call `TibrvTransport.createInbox()` to create the unique inbox name; then call `TibrvCmListener()` to begin listening. Remember that other programs have no information about an inbox until the listening program uses it as a reply subject in an outbound message.

See Also

TibrvCmListener on page 288
TibrvCmTransport.destroy() on page 307
TibrvListener.getSubject() on page 145
TibrvTransport.createInbox() on page 212

TibrvCmListener.destroy()

Method

Declaration

```
void destroy()

void destroy(
    boolean    cancelAgreements)
```

Purpose Destroy a certified delivery listener.

Parameter	Description
cancelAgreements	`true` cancels all certified delivery agreements of this listener; certified senders delete from their ledgers all messages sent to this listener. `false` leaves all certified delivery agreements in effect, so certified senders continue to store messages.

Canceling Agreements

When destroying a certified delivery listener, a program can either cancel its certified delivery agreements with senders, or let those agreements persist (so a successor listener can receive the messages covered by those agreements).

When canceling agreements, each (previously) certified sender transport receives a `REGISTRATION.CLOSED` advisory. Successor listeners cannot receive old messages.

See Also TibrvCmListener on page 288

TibrvCmListener.confirmMsg()

Method

Declaration

```
void confirmMsg(
    TibrvMsg    message)
  throws TibrvException
```

Purpose Explicitly confirm delivery of a certified message.

Remarks Use this method only in programs that override automatic confirmation (see TibrvCmListener.setExplicitConfirm() on page 294). The default behavior of certified listeners is to automatically confirm delivery when the callback method returns.

Parameter	Description
`message`	Confirm receipt of this message.

Unregistered Message When a CM listener receives a labeled message, its behavior depends on context:

- If a CM listener is registered for certified delivery, it presents the supplementary information to the callback method. If the sequence number is present, then the receiving program can confirm delivery.
- If a CM listener is *not* registered for certified delivery with the sender, it presents the sender's name to the callback method, but omits the sequence number. In this case, the receiving program cannot confirm delivery; `TibrvCmListener.confirmMsg()` throws an exception with the status code `TibrvStatus.NOT_PERMITTED`.

  Notice that the first labeled message that a program receives on a subject might not be certified; that is, the sender has not registered a certified delivery agreement with the listener. If appropriate, the certified delivery library automatically requests that the sender register the listener for certified delivery. (See Discovery and Registration for Certified Delivery on page 154 in *TIBCO Rendezvous Concepts*.)

  A labeled but uncertified message can also result when the sender explicitly disallows or removes the listener.

See Also TibrvCmListener on page 288
TibrvCmListener.setExplicitConfirm() on page 294

TibrvCmListener.isExplicitConfirm()

Method

Declaration `boolean isExplicitConfirm()`

Purpose Test whether this listener expects explicit confirmation of delivery.

Remarks The default behavior of certified listeners is to automatically confirm delivery when the callback method returns (see TibrvMsgCallback.onMsg() on page 148). TibrvCmListener.setExplicitConfirm() on page 294 selectively overrides this behavior for this specific listener (without affecting other listeners).

See Also
TibrvCmListener on page 288
TibrvMsgCallback.onMsg() on page 148
TibrvCmListener.confirmMsg() on page 292
TibrvCmListener.setExplicitConfirm() on page 294

TibrvCmListener.setExplicitConfirm()

Method

Declaration

```
void setExplicitConfirm()
  throws TibrvException
```

Purpose Override automatic confirmation of delivery for this listener.

Remarks The default behavior of certified listeners is to automatically confirm delivery when the callback method returns (see TibrvMsgCallback.onMsg() on page 148). This call selectively overrides this behavior for this specific listener (without affecting other listeners).

By overriding automatic confirmation, the listener assumes responsibility to explicitly confirm each inbound certified message by calling `TibrvCmListener.confirmMsg()`.

Consider overriding automatic confirmation when the processing of inbound messages involves activity that is asynchronous with respect to the message callback method; for example, computations in other threads or additional network communications.

No method exists to restore the default behavior—that is, to reverse the effect of this method.

See Also
TibrvCmListener on page 288
TibrvMsgCallback.onMsg() on page 148
TibrvCmListener.confirmMsg() on page 292
TibrvCmListener.isExplicitConfirm() on page 293

TibrvCmTransport

Class

Declaration

```
class com.tibco.tibrv.TibrvCmTransport
  extends TibrvTransport
```

Purpose A certified delivery transport object implements the CM delivery protocol for messages.

Remarks Each certified delivery transport employs a `TibrvTransport` for network communications. The `TibrvCmTransport` adds the accounting mechanisms needed for delivery tracking and certified delivery.

Several `TibrvCmTransport` objects can employ a `TibrvTransport`, which also remains available for its own ordinary listeners and for sending ordinary messages. Destroying this `TibrvTransport` causes the `TibrvCmTransport` to destroy itself as well (along with all its listeners, while preserving their certified delivery agreements).

Destroying a certified delivery transport object invalidates subsequent certified send calls on that object, invalidates any certified listeners using that transport (while preserving the certified delivery agreements of those listeners).

Programs must explicitly destroy each certified delivery transport object. Rendezvous software keeps internal references to these objects, so the Java garbage collector does not delete them automatically.

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Method	Description	Page
`TibrvCmTransport()`	Create a transport for certified delivery.	299
`TibrvCmTransport.addListener()`	Pre-register an anticipated listener.	303
`TibrvCmTransport.allowListener()`	Invite the named receiver to reinstate certified delivery for its listeners, superseding the effect of any previous disallow calls.	304
`TibrvCmTransport.connectToRelayAgent()`	Connect a certified delivery transport to its designated relay agent.	305
`TibrvCmTransport.destroy()` `TibrvCmTransport.destroyEx()`	Destroy a certified delivery transport.	307

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Method	Description	Page
`TibrvCmTransport.disallowListener()`	Cancel certified delivery to all listeners at a specific correspondent. Deny subsequent certified delivery registration requests from those listeners.	308
`TibrvCmTransport.disconnectFromRelayAgent()`	Disconnect a certified delivery transport from its relay agent.	309
`TibrvCmTransport.expireMessages()`	Mark specified outbound CM messages as expired.	310
`TibrvCmTransport.getDefaultTimeLimit()`	Get the default message time limit for all outbound certified messages from a transport.	311
`TibrvCmTransport.getLedgerName()`	Extract the ledger name of a certified delivery transport.	312
`TibrvCmTransport.getName()`	Extract the correspondent name of a certified delivery transport or distributed queue member.	313
`TibrvCmTransport.getRelayAgent()`	Extract the name of the relay agent used by a certified delivery transport.	314
`TibrvCmTransport.getRequestOld()`	Extract the request old messages flag of a certified delivery transport.	315
`TibrvCmTransport.getSyncLedger()`	Extract the sync ledger flag of a certified delivery transport.	316
`TibrvCmTransport.getTransport()`	Extract the transport employed by a certified delivery transport or a distributed queue member.	317
`TibrvCmTransport.removeListener()`	Unregister a specific listener at a specific correspondent, and free associated storage in the sender’s ledger.	318

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Method	Description	Page
`TibrvCmTransport.removeSendState()`	Reclaim ledger space from obsolete subjects.	320
`TibrvCmTransport.reviewLedger()`	Query the ledger for stored items related to a subject name.	321
`TibrvCmTransport.send()`	Send a labeled message.	322
`TibrvCmTransport.sendReply()`	Send a labeled reply message.	323
`TibrvCmTransport.sendRequest()`	Send a labeled request message and wait for a reply.	324
`TibrvCmTransport.setDefaultTimeLimit()`	Set the default message time limit for all outbound certified messages from a transport.	326
`TibrvCmTransport.setPublisherInactivityDiscardInterval()`	Set a time limit after which a listening CM transport can discard state for inactive CM senders.	327
`TibrvCmTransport.syncLedger()`	Synchronize the ledger to its storage medium.	328

Inherited Methods

`TibrvTransport.createInbox()`
`TibrvTransport.destroy()`
`TibrvTransport.isValid()`
`TibrvTransport.send()`
`TibrvTransport.sendReply()`
`TibrvTransport.sendRequest()`

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString`
`java.lang.Object.wait`

Field	Description
`DEFAULT_TIME_LIMIT`	The default time limit (in seconds) for certified messages sent on this transport. The initial value is zero, a special value indicating that messages do not expire. Programs can change this value using `TibrvCmTransport.setDefaultTimeLimit()`.

Related Classes

TibrvTransport on page 210
TibrvRvdTransport on page 235
TibrvCmTransport on page 295
TibrvCmQueueTransport on page 340

TibrvCmTransport()

Method

Declaration

```
TibrvCmTransport(
    TibrvRvdTransport  transport)
  throws TibrvException

TibrvCmTransport(
    TibrvRvdTransport  transport,
    java.lang.String   cmName,
    boolean            requestOld)
  throws TibrvException

TibrvCmTransport(
    TibrvRvdTransport  transport,
    java.lang.String   cmName,
    boolean            requestOld,
    java.lang.String   ledgerName,
    boolean            syncLedger)
  throws TibrvException

TibrvCmTransport(
    TibrvRvdTransport  transport,
    java.lang.String   cmName,
    boolean            requestOld,
    java.lang.String   ledgerName,
    boolean            syncLedger,
    java.lang.String   relayAgent)
  throws TibrvException
```

Purpose Create a transport for certified delivery.

Remarks The new certified delivery transport must employ a valid transport for network communications.

The certified delivery transport remains valid until the program explicitly destroys it.

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Parameter	Description
`transport`	The new `TibrvCmTransport` employs this transport object for network communications. This object must be a `TibrvRvdTransport`. Destroying the `TibrvCmTransport` does not affect this `TibrvRvdTransport` object.

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Parameter	Description
`cmName`	Bind this reusable name to the new `TibrvCmTransport`, so the `TibrvCmTransport` represents a persistent correspondent with this name. If non-`null`, the name must conform to the syntax rules for Rendezvous subject names. It cannot begin with reserved tokens. It cannot be a non-reusable name generated by another call to `TibrvCmTransport()`. It cannot be the empty string. If omitted or `null`, then `TibrvCmTransport()` generates a unique, non-reusable name for the duration of the transport. For more information, see Name on page 301.
`requestOld`	This parameter indicates whether a persistent correspondent requires delivery of messages sent to a previous certified delivery transport with the same name, for which delivery was not confirmed. Its value affects the behavior of other CM sending transports. If this parameter is `true` *and* `cmName` is non-`null`, then the new `TibrvCmTransport` requires certified senders to retain unacknowledged messages sent to this persistent correspondent. When the new `TibrvCmTransport` begins listening to the appropriate subjects, the senders can complete delivery. (It is an error to supply `true` when `cmName` is `null`.) If this parameter is `false` (or omitted), then the new `TibrvCmTransport` does not require certified senders to retain unacknowledged messages. Certified senders may delete those messages from their ledgers.
`ledgerName`	If this argument is non-`null`, then the new `TibrvCmTransport` uses a file-based ledger. The argument must represent a valid file name. Actual locations corresponding to relative file names conform to operating system conventions. We strongly discourage using the empty string as a ledger file name. If omitted or `null`, then the new `TibrvCmTransport` uses a process-based ledger. For more information, see Ledger File on page 301.
`syncLedger`	If this argument is `true`, then operations that update the ledger file do not return until the changes are written to the storage medium. If this argument is `false` (or omitted), the operating system writes changes to the storage medium asynchronously.

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Parameter	Description
`relayAgent`	Designate the `rvrad` process with this name as the new transport's relay agent. If `null` or omitted, the new `TibrvCmTransport` does not use a relay agent. If non-`null`, the relay agent name must conform to the syntax rules for reusable names. For details, see Reusable Names on page 167 in *TIBCO Rendezvous Concepts*. It is illegal for a relay agent to have the same name as a CM correspondent. We strongly discourage using the empty string as a relay agent name. For more information, see Relay Agent on page 301.

Method Forms With only a transport, create a transient correspondent, with a unique, non-reusable name. (Supplying `null` as the `cmName` has the same effect.)

All other parameters are optional, with default values when omitted.

Name If `cmName` is `null`, then `TibrvCmTransport()` generates a unique, non-reusable name for the new certified delivery transport.

If `cmName` is non-`null`, then the new transport binds that name. A correspondent can persist beyond transport destruction only when it has *both* a reusable name *and* a file-based ledger.

For more information about the use of reusable names, see CM Correspondent Name on page 150 in *TIBCO Rendezvous Concepts*, and Persistent Correspondents on page 159 in *TIBCO Rendezvous Concepts*. For details of reusable name syntax, see Reusable Names on page 167 in *TIBCO Rendezvous Concepts*.

Relay Agent `TibrvCmTransport()` automatically connects a transport to its designated relay agent upon creation; see TibrvCmTransport.connectToRelayAgent() on page 305.

Ledger File Every certified delivery transport stores the state of its certified communications in a ledger.

If `ledgerFile` is `null`, then the new transport stores its ledger exclusively in process-based storage. When you destroy the transport or the process terminates, all information in the ledger is lost.

If `ledgerFile` specifies a valid file name, then the new transport uses that file for ledger storage. If the transport is destroyed or the process terminates with incomplete certified communications, the ledger file records that state. When a new transport binds the same reusable name, it reads the ledger file and continues certified communications from the state stored in the file.

Even though a transport uses a ledger file, it may sometimes replicate parts of the ledger in process-based storage for efficiency; however, programmers cannot rely on this replication.

The `syncLedger` parameter determines whether writing to the ledger file is a synchronous operation:

- To specify synchronous writing, supply `true`. Each time Rendezvous software writes a ledger item, the call does not return until the data is safely stored in the storage medium.
- To specify asynchronous writing (the default), supply `false`. Certified delivery calls may return before the data is safely stored in the storage medium, which results in greater speed at the cost of certainty. The ledger file might not accurately reflect program state in cases of hardware or operating system kernel failure (but it is accurate in cases of sudden program failure). Despite this small risk, we strongly recommend this option for maximum performance.

  A program that uses an asynchronous ledger file can explicitly synchronize it by calling TibrvCmTransport.syncLedger() on page 328.

Destroying a transport with a file-based ledger always leaves the ledger file intact; it neither erases nor removes a ledger file.

The ledger file must reside on the same host computer as the program that uses it.

See Also

TibrvCmTransport.destroy() on page 307
TibrvCmTransport.connectToRelayAgent() on page 305

TibrvCmTransport.addListener()

Method

Declaration

```
void addListener(
    java.lang.String    cmName,
    java.lang.String    subject)
  throws TibrvException
```

Purpose Pre-register an anticipated listener.

Remarks Some sending programs can anticipate requests for certified delivery—even before the listening programs actually register. In such situations, the sending transport can pre-register listeners, so Rendezvous software begins storing outbound messages in the sender's ledger; when the listener requests certified delivery, it receives the backlogged messages.

If the correspondent with this `cmName` already receives certified delivery of this `subject` from this sender transport, then `TibrvCmTransport.addListener()` has no effect.

If the correspondent with this `cmName` is disallowed, `TibrvCmTransport.addListener()` returns an exception with status code `TibrvStatus.NOT_PERMITTED`. You can call `TibrvCmTransport.allowListener()` to supersede the effect of a prior call to `TibrvCmTransport.disallowListener()`; then call `TibrvCmTransport.addListener()` again.

It is not sufficient for a sender to use this method to anticipate listeners; the anticipated listening programs must also require old messages when creating certified delivery transports.

Parameter	Description
`cmName`	Anticipate a listener from a correspondent with this reusable name.
`subject`	Anticipate a listener for this subject. Wildcard subjects are illegal.

See Also Name, page 301
TibrvCmTransport.allowListener() on page 304
TibrvCmTransport.disallowListener() on page 308
TibrvCmTransport.removeListener() on page 318
Anticipating a Listener, page 161 in *TIBCO Rendezvous Concepts*

TibrvCmTransport.allowListener()

Method

Declaration

```
void allowListener(
    java.lang.String    cmName)
  throws TibrvException
```

Purpose Invite the named receiver to reinstate certified delivery for its listeners, superseding the effect of any previous *disallow* calls.

Remarks Upon receiving the invitation to reinstate certified delivery, Rendezvous software at the listening program automatically sends new registration requests. The sending program accepts these requests, restoring certified delivery.

Parameter	Description
`cmName`	Accept requests for certified delivery to listeners at the transport with this correspondent name.

See Also Name, page 301
TibrvCmTransport.disallowListener() on page 308
Disallowing Certified Delivery, page 164 in *TIBCO Rendezvous Concepts*

TibrvCmTransport.connectToRelayAgent()

Method

Declaration

```
void connectToRelayAgent()
  throws TibrvException
```

Purpose Connect a certified delivery transport to its designated relay agent.

Remarks Programs may specify a relay agent when creating a CM transport object.

Connect calls are non-blocking; they immediately return control to the program, and asynchronously attempt to connect to the relay agent (continuing until they succeed, or until the program makes a disconnect call).

When a transport attempts to connect to a relay agent, Rendezvous software automatically locates the relay agent process (if it exists). When the program successfully connects to the relay agent, they synchronize:

- The transport receives a `RELAY.CONNECTED` advisory, informing it of successful contact with the relay agent. (Listen for all advisory messages on the ordinary `TibrvTransport` that the `TibrvCmTransport` employs.)

  (When a program cannot locate its relay agent, certified delivery software produces `DELIVERY.NO_RESPONSE` advisories; however, we recommend against designing programs to rely on this side effect.)
- If the client transport is a CM *listener*, the relay agent listens to the same set of subjects on behalf of the client. The relay agent also updates its confirmation state to reflect the state of the transport.
- If the client transport is a CM *sender*, the relay agent updates its acceptance state to reflect the state of the transport. The sending client updates its confirmation state to reflect the state of the relay agent.
- The transport and relay agent exchange the CM data messages that they have been storing during the time they were disconnected.

We recommend that programs remain connected for a minimum of two minutes, to allow time for this synchronization to complete. (Two minutes is a generous estimate, which is sufficient for most situations. Actual time synchronization time can be much shorter, and varies with the number of stored messages and the degree to which protocol state has changed.)

If the transport is already connected to its relay agent, then this method returns normally, and does not trigger a `RELAY.CONNECTED` advisory.

`TibrvCmTransport()` automatically connects a transport to its designated relay agent upon creation.

Errors The error code `TibrvStatus.INVALID_ARG` can indicate that the transport does not have a relay agent.

See Also TibrvCmTransport() on page 299
TibrvCmTransport.disconnectFromRelayAgent() on page 309
Relay Agent, page 170 in *TIBCO Rendezvous Concepts*

TibrvCmTransport.destroy()

Method

Declaration

```
void destroy()

void destroyEx()
```

Purpose Destroy a certified delivery transport.

Remarks Destroying a certified delivery transport with a file-based ledger always leaves the ledger file intact; it neither erases nor removes a ledger file.

These methods automatically disconnect the transport from its relay agent before destroying the object; see `TibrvCmTransport.disconnectFromRelayAgent()`.

Distributed Queue To destroy a distributed queue transport, call `destroyEx()`. With the ordinary destroy call, the distributed queue can lose reliable (non-certified) task messages before they are processed. In contrast, `destroyEx()` blocks until previously assigned tasks are complete; then it destroys the transport and returns. The distributed queue needs the listeners, queues and dispatchers (associated with the transport) to remain operational—programs must wait until after the transport has been completely destroyed before destroying these associated objects.

Restrictions `destroyEx()` is available in both the JNI preferred implementation and the JNI backward compatibility implementation. It is *not* available in the pure Java implementation.

See Also TibrvCmTransport() on page 299
TibrvCmTransport.disconnectFromRelayAgent() on page 309

TibrvCmTransport.disallowListener()

Method

Declaration

```
void disallowListener(
    java.lang.String    cmName)
  throws TibrvException
```

Purpose Cancel certified delivery to all listeners at a specific correspondent. Deny subsequent certified delivery registration requests from those listeners.

Remarks Disallowed listeners still receive subsequent messages from this sender, but delivery is not certified. In other words:

- The first labeled message causes the listener to initiate registration. Registration fails, and the listener discards that labeled message.
- The listener receives a `REGISTRATION.NOT_CERTIFIED` advisory, informing it that the sender has canceled certified delivery of all subjects.
- If the sender's ledger contains messages sent to the disallowed listener (for which this listener has not confirmed delivery), then Rendezvous software removes those ledger items, and does not attempt to redeliver those messages.
- Rendezvous software presents subsequent messages (from the canceling sender) to the listener without a sequence number, to indicate that delivery is not certified.

Senders can promptly revoke the acceptance of certified delivery by calling `TibrvCmTransport.disallowListener()` within the callback method that processes the `REGISTRATION.REQUEST` advisory.

This method disallows a correspondent by name. If the correspondent terminates, and another process instance (with the same reusable name) takes its place, the new process is still disallowed by this sender.

To supersede the effect of `TibrvCmTransport.disallowListener()`, call TibrvCmTransport.allowListener() on page 304.

Parameter	Description
`cmName`	Cancel certified delivery to listeners of the transport with this name.

See Also Name, page 301
TibrvCmTransport.allowListener() on page 304
Disallowing Certified Delivery, page 164 in *TIBCO Rendezvous Concepts*

TibrvCmTransport.disconnectFromRelayAgent()

Method

Declaration

```
void disconnectFromRelayAgent()
  throws TibrvException
```

Purpose Disconnect a certified delivery transport from its relay agent.

Remarks Disconnect calls are non-blocking; they immediately return control to the program, and asynchronously proceed with these clean-up tasks:

- If the client transport is a CM *listener*, the relay agent attempts to synchronize its listening state with the transport (to assure that the relay agent adequately represents the listening interest of the client).
- The transport stops communicating with the relay agent.
- The transport stores subsequent outbound events—including data messages and protocol state changes. If the transport is a certified *sender*, it cancels its request for delivery confirmation of outstanding unconfirmed messages. (See also, Requesting Confirmation on page 157 in *TIBCO Rendezvous Concepts*.)
- The relay agent stores subsequent inbound events for the transport—including data messages and protocol state changes.
- A transport that explicitly disconnects without terminating receives a `RELAY.DISCONNECTED` advisory, informing it that is safe to sever the physical network connection. (Terminating transports never receive this advisory; instead, it is safe to sever the connection when the destroy call returns.)

`TibrvCmTransport.destroy()` automatically disconnects a CM transport from its relay agent before termination.

Errors The error code `TibrvStatus.INVALID_ARG` can indicate that the transport does not have a relay agent.

See Also
TibrvCmTransport.connectToRelayAgent() on page 305
TibrvCmTransport.destroy() on page 307
Relay Agent, page 170 in *TIBCO Rendezvous Concepts*

TibrvCmTransport.expireMessages()

Method

Declaration

```
void expireMessages(
    String    subject,
    long      sequenceNumber)
  throws TibrvException;
```

Purpose Mark specified outbound CM messages as expired.

Remarks This call checks the ledger for messages that match *both* the subject and sequence number criteria, and *immediately* marks them as expired.

Once a message has expired, the CM transport no longer attempts to redeliver it to registered listeners.

Rendezvous software presents each expired message to the sender in a `DELIVERY.FAILED` advisory. Each advisory includes all the fields of an expired message. (This call can cause many messages to expire simultaneously.)

Use with extreme caution. This call exempts the expired messages from certified delivery semantics. It is appropriate only in very few situations.

For example, consider an application program in which an improperly formed CM message causes registered listeners to exit unexpectedly. When the listeners restart, the sender attempts to redeliver the offending message, which again causes the listeners to exit. To break this cycle, the sender can expire the offending message (along with all prior messages bearing the same subject).

Parameter	Description
`subject`	Mark messages with this subject. Wildcards subjects are permitted, but must exactly reflect the send subject of the message. For example, if the program sends to `A.*` then you may expire messages with subject `A.*` (however, `A.>` does not resolve to match `A.*`).
`sequenceNumber`	Mark messages with sequence numbers *less than or equal* to this value.

See Also DELIVERY.FAILED on page 298 in *TIBCO Rendezvous Concepts*

TibrvCmTransport.getDefaultTimeLimit()

Method

Declaration `double getDefaultTimeLimit()`

Purpose Get the default message time limit for all outbound certified messages from a transport.

Remarks Every labeled message has a time limit, after which the sender no longer certifies delivery.

Sending programs can explicitly set the time limit on a message (see TibrvCmMsg.setTimeLimit() on page 337). If a time limit is not already set for the outbound message, the transport sets it to the transport's default time limit (extractable with this method); if this default is not set for the transport (nor for the message), the default time limit is zero (no time limit).

Time limits represent the minimum time that certified delivery is in effect.

See Also TibrvCmTransport.setDefaultTimeLimit() on page 326
TibrvCmMsg.setTimeLimit() on page 337

TibrvCmTransport.getLedgerName()

Method

Declaration `java.lang.String getLedgerName()`

Purpose Extract the ledger name of a certified delivery transport.

Errors The error code `TibrvStatus.ARG_CONFLICT` can indicate that the transport does not have a ledger file.

See Also Ledger File, page 301
TibrvCmTransport() on page 299

TibrvCmTransport.getName()

Method

Declaration

```
java.lang.String getName()
```

Purpose

Extract the correspondent name of a certified delivery transport or distributed queue member.

See Also

Name, page 301
TibrvCmTransport() on page 299
TibrvCmQueueTransport() on page 344

TibrvCmTransport.getRelayAgent()

Method

Declaration `java.lang.String getRelayAgent()`

Purpose Extract the name of the relay agent used by a certified delivery transport.

Errors The error code `TibrvStatus.ARG_CONFLICT` can indicate that the transport does not have a relay agent.

See Also Relay Agent, page 301
TibrvCmTransport() on page 299

TibrvCmTransport.getRequestOld()

Method

Declaration

```
boolean getRequestOld()
```

Purpose

Extract the request old messages flag of a certified delivery transport.

See Also

requestOld on page 300
TibrvCmTransport() on page 299

TibrvCmTransport.getSyncLedger()

Method

Declaration `boolean getSyncLedger()`

Purpose Extract the sync ledger flag of a certified delivery transport.

Errors The error code `TibrvStatus.ARG_CONFLICT` can indicate that the transport does not have a ledger file.

See Also Ledger File, page 301
TibrvCmTransport() on page 299

TibrvCmTransport.getTransport()

Method

Declaration `TibrvRvdTransport getTransport()`

Purpose Extract the transport employed by a certified delivery transport or a distributed queue member.

See Also TibrvTransport on page 210
TibrvRvdTransport on page 235
TibrvCmTransport() on page 299
TibrvCmQueueTransport() on page 344

TibrvCmTransport.removeListener()

Method

Declaration

```
void removeListener(
    java.lang.String    cmName,
    java.lang.String    subject)
  throws TibrvException
```

Purpose Unregister a specific listener at a specific correspondent, and free associated storage in the sender's ledger.

Remarks This method cancels certified delivery of the specific `subject` to the correspondent with this `name`. The listening correspondent may subsequently re-register for certified delivery of the subject. (In contrast, `TibrvCmTransport.disallowListener()` cancels certified delivery of *all* subjects to the correspondent, *and* prohibits re-registration.)

Senders can call this method when the ledger item for a listening correspondent has grown very large. Such growth indicates that the listener is not confirming delivery, and may have terminated. Removing the listener reduces the ledger size by deleting messages stored for the listener.

When a sending program calls this method, certified delivery software in the sender behaves as if the listener had closed the endpoint for the `subject`. The sending program deletes from its ledger all information about delivery of the `subject` to the correspondent with this `cmName`. The sending program receives a `REGISTRATION.CLOSED` advisory, to trigger any operations in the callback method for the advisory.

If the listening correspondent is available (running and reachable), it receives a `REGISTRATION.NOT_CERTIFIED` advisory, informing it that the sender no longer certifies delivery of the subject.

If the correspondent with this `name` does not receive certified delivery of the `subject` from this sender `TibrvCmTransport`, then `TibrvCmTransport.removeListener()` throws an exception with the status code `TibrvStatus.INVALID_ARG`.

Parameter	Description
`cmName`	Cancel certified delivery of the subject to listeners of this correspondent.
`subject`	Cancel certified delivery of this subject to the named listener. Wildcard subjects are illegal.

See Also Name, page 301

TibrvCmTransport.addListener() on page 303
TibrvCmTransport.disallowListener() on page 308
Canceling Certified Delivery, page 162 in *TIBCO Rendezvous Concepts*

TibrvCmTransport.removeSendState()

Method

Declaration

```
void removeSendState(
    java.lang.String    subject)
  throws TibrvException
```

Purpose Reclaim ledger space from obsolete subjects.

Background In some programs subject names are useful only for a limited time; after that time, they are never used again. For example, consider a server program that sends certified reply messages to client inbox names; it only sends one reply message to each inbox, and after delivery is confirmed and complete, that inbox name is obsolete. Nonetheless, a record for that inbox name remains in the server's ledger.

As such obsolete records accumulate, the ledger size grows. To counteract this growth, programs can use this method to discard obsolete subject records from the ledger.

The `DELIVERY.COMPLETE` advisory is a good opportunity to clear the send state of an obsolete subject. Another strategy is to review the ledger periodically, sweeping to detect and remove all obsolete subjects.

⚠ Do not use this method to clear subjects that are still in use.

Parameter	Description
`subject`	Remove send state for this obsolete subject.

Remarks As a side-effect, this method resets the sequence numbering for the subject, so the next message sent on the subject would be number 1. In proper usage, this side-effect is never detected, since obsolete subjects are truly obsolete.

See Also TibrvCmTransport.reviewLedger() on page 321
TibrvCmTransport.send() on page 322
DELIVERY.COMPLETE on page 296 in *TIBCO Rendezvous Concepts*

TibrvCmTransport.reviewLedger()

Method

Declaration

```
void reviewLedger(
    TibrvCmReviewCallback    callback,
    java.lang.String         subject,
    java.lang.Object         closure)
  throws TibrvException
```

Purpose Query the ledger for stored items related to a subject name.

Remarks The callback method receives one message for each matching subject of outbound messages stored in the ledger. For example, when `FOO.*` is the `subject`, `TibrvCmTransport.reviewLedger()` calls its callback method separately for each matching subject—once for `FOO.BAR`, once for `FOO.BAZ`, and once for `FOO.BOX`.

However, if the callback method returns non-`null`, then `TibrvCmTransport.reviewLedger()` returns immediately.

If the ledger does not contain any matching items, `TibrvCmTransport.reviewLedger()` returns normally without calling the callback method.

For information about the content and format of the callback messages, see TibrvCmReviewCallback.onLedgerMsg() on page 330.

Parameter	Description
`callback`	This object receives the review messages.
`subject`	Query for items related to this subject name. If this subject contains wildcard characters (`*` or `>`), then review all items with matching subject names. The callback method receives a separate message for each matching subject in the ledger.
`closure`	Pass this closure data to the review callback method.

See Also TibrvCmReviewCallback.onLedgerMsg() on page 330

TibrvCmTransport.send()

Method

Declaration

```
void send(
    TibrvMsg    msg)
  throws TibrvException
```

Purpose Send a labeled message.

Remarks This method sends the message, along with its certified delivery protocol information: the correspondent name of the `TibrvCmTransport`, a sequence number, and a time limit. The protocol information remains on the message within the sending program, and also travels with the message to all receiving programs.

Programs can explicitly set the message time limit; see TibrvCmMsg.setTimeLimit() on page 337. If a time limit is not already set for the outbound message, this method sets it to the transport's default time limit (see TibrvCmTransport.setDefaultTimeLimit() on page 326); if that default is not set for the transport, the default time limit is zero (no time limit).

Parameter	Description
`msg`	Send this message. Wildcard subjects are illegal.

See Also

TibrvCmTransport.sendReply() on page 323
TibrvCmTransport.sendRequest() on page 324
TibrvCmTransport.setDefaultTimeLimit() on page 326
TibrvCmMsg.setTimeLimit() on page 337

TibrvCmTransport.sendReply()

Method

Declaration

```
void sendReply(
    TibrvMsg    replyMsg,
    TibrvMsg    requestMsg)
  throws TibrvException
```

Purpose Send a labeled reply message.

Remarks This convenience call extracts the reply subject of an inbound request message, and sends a labeled outbound reply message to that subject. In addition to the convenience, this call is marginally faster than using separate calls to extract the subject and send the reply.

This method can send a labeled reply to an ordinary message.

This method automatically registers the requesting CM transport, so the reply message is certified.

Parameter	Description
`replyMsg`	Send this *outbound* reply message.
`requestMsg`	Send a reply to this *inbound* request message; extract its reply subject to use as the subject of the outbound reply message. If this message has a wildcard reply subject, the method produces an error.

Give special attention to the order of the arguments to this method. Reversing the inbound and outbound messages can cause an infinite loop, in which the program repeatedly resends the inbound message to itself (and all other recipients).

See Also TibrvCmTransport.send() on page 322
TibrvCmTransport.sendRequest() on page 324

TibrvCmTransport.sendRequest()

Method

Declaration

```
TibrvMsg sendRequest(
    TibrvMsg  msg,
    double    timeout)
  throws TibrvException
```

Purpose Send a labeled request message and wait for a reply.

Blocking can Stall Event Dispatch

This call blocks all other activity on its program thread. If appropriate, programmers must ensure that other threads continue dispatching events on its queues.

Parameter	Description
`msg`	Send this request message. Wildcard subjects are illegal.
`timeout`	Maximum time (in seconds) that this call can block while waiting for a reply.

Remarks Programs that receive and process the request message cannot determine that the sender has blocked until a reply arrives.

The sender and receiver must already have a certified delivery agreement, otherwise the request is not certified.

The request message must have a valid destination subject; see TibrvMsg.setSendSubject() on page 88.

A certified request does not necessarily imply a certified reply; the replying program determines the type of reply message that it sends.

Operation This method operates in several synchronous steps:

1. Create a `TibrvCmListener` that listens for messages on the reply subject of `msg`.
2. Label and send the outbound `message`.

3. Block until the listener receives a reply; if the time limit expires before a reply arrives, then return `null`. (The reply event uses a private queue that is not accessible to the program.)

4. Return the reply message as the value of the method call.

See Also

TibrvCmTransport.send() on page 322
TibrvCmTransport.sendReply() on page 323

TibrvCmTransport.setDefaultTimeLimit()

Method

Declaration

```
void setDefaultTimeLimit(
    double    timeLimit)
  throws TibrvException
```

Purpose Set the default message time limit for all outbound certified messages from a transport.

Remarks Every labeled message has a time limit, after which the sender no longer certifies delivery.

Sending programs can explicitly set the time limit on a message (see TibrvCmMsg.setTimeLimit() on page 337). If a time limit is not already set for the outbound message, the transport sets it to the transport's default time limit (set with this method); if this default is not set for the transport, the default time limit is zero (no time limit).

Time limits represent the minimum time that certified delivery is in effect.

Parameter	Description
`timeLimit`	Use this time limit (in whole seconds). The time limit must be non-negative.

See Also

TibrvCmTransport.getDefaultTimeLimit() on page 311
TibrvCmMsg.setTimeLimit() on page 337

TibrvCmTransport.setPublisherInactivityDiscardInterval()

Method

Declaration

```
void setPublisherInactivityDiscardInterval(
    int    timeout);
  throws TibrvException
```

Purpose Set a time limit after which a listening CM transport can discard state for inactive CM senders.

Remarks The timeout value limits the time that can elapse during which such a sender does not send a message. When the elapsed time exceeds this limit, the listening transport declares the sender inactive, and discards internal state corresponding to the sender.

We discourage programmers from using this call except to solve a very specific problem, in which a long-running CM listener program accumulates state for a large number of obsolete CM senders with non-reusable names.

Before using this call, review every subject for which the CM transport has a listener; ensure that only CM senders with non-reusable names send to those subjects. (If senders with reusable names send messages to such subjects, the listening transport can discard their state, and incorrect behavior can result.)

Parameter	Description
`timeout`	Use this time limit (in whole seconds). The time limit must be non-negative.

TibrvCmTransport.syncLedger()

Method

Declaration

```
void syncLedger()
  throws TibrvException
```

Purpose Synchronize the ledger to its storage medium.

Remarks When this method returns, the transport's current state is safely stored in the ledger file.

Transports that use synchronous ledger files need not call this method, since the current state is automatically written to the storage medium before returning. Transports that use process-based ledger storage need not call this method, since they have no ledger file.

Errors The error code `TibrvStatus.INVALID_ARG` can indicate that the transport does not have a ledger file.

See Also Ledger File, page 301
TibrvCmTransport() on page 299
TibrvCmTransport.getSyncLedger() on page 316

TibrvCmReviewCallback

Interface

Declaration `interface com.tibco.tibrv.`**`TibrvCmReviewCallback`**

Purpose Process ledger review messages.

Remarks Implement this interface to process ledger review messages.

Method	Description	Page
`TibrvCmReviewCallback.onLedgerMsg()`	Programs define this method to process ledger review messages.	285

See Also TibrvCmTransport.reviewLedger() on page 321

TibrvCmReviewCallback.onLedgerMsg()

Method

Declaration

```
boolean onLedgerMsg(
    TibrvCmTransport     cmTransport,
    java.lang.String     subject,
    TibrvMsg             msg,
    java.lang.Object     closure)
```

Purpose Programs define this method to process ledger review messages.

Remarks `TibrvCmTransport.reviewLedger()` calls this callback method once for each matching subject stored in the ledger.

To continue reviewing the ledger, return `false` from this callback method. To stop reviewing the ledger, return `true` from this callback method; `TibrvCmTransport.reviewLedger()` cancels the review and returns immediately.

Parameter	Description
`cmTransport`	This parameter receives the transport.
`subject`	This parameter receives the subject for this ledger item.
`msg`	This parameter receives a summary message describing the delivery status of messages in the ledger. The table on page 330 describes the fields of the summary message.
`closure`	This parameter receives closure data that the program supplied to `TibrvCmTransport.reviewLedger()`.

(Sheet 1 of 2)

Field Name	Description
`subject`	The subject that this message summarizes. This field has datatype `TibrvMsg.STRING`.
`seqno_last_sent`	The sequence number of the most recent message sent with this subject name. This field has datatype `TibrvMsg.U64`.

(Sheet 2 of 2)

Field Name	Description
`total_msgs`	The total number of messages stored at this subject name. This field has datatype `TibrvMsg.U32`.
`total_size`	The total storage (in bytes) occupied by all messages with this subject name. If the ledger contains several messages with this subject name, then this field sums the storage space over all of them. This field has datatype `TibrvMsg.I64`.
`listener`	Each summary message can contain one or more fields named `listener`. Each `listener` field contains a nested submessage with details about a single registered listener. This field has datatype `TibrvMsg.MSG`.
`listener.`**`name`**	Within each `listener` submessage, the `name` field contains the name of the listener transport. This field has datatype `TibrvMsg.STRING`.
`listener.`**`last_confirmed`**	Within each `listener` submessage, the `last_confirmed` field contains the sequence number of the last message for which the listener confirmed delivery. This field has datatype `TibrvMsg.U64`.

See Also TibrvCmTransport.reviewLedger() on page 321

TibrvCmMsg

Class

Declaration

```
class com.tibco.tibrv.TibrvCmMsg
  extends java.lang.Object
```

Purpose Define methods to manipulate labeled messages.

Remarks Programs do not create instances of `TibrvCmMsg`. Instead, programs use its static methods to get and set certified delivery information of `TibrvMsg` objects.

Method	Description	Page
`TibrvCmMsg.getSender()`	Extract the correspondent name of the sender from a certified message.	333
`TibrvCmMsg.getSequence()`	Extract the sequence number from a certified message.	334
`TibrvCmMsg.getTimeLimit()`	Extract the message time limit from a certified message.	336
`TibrvCmMsg.setTimeLimit()`	Set the message time limit of a certified message.	337

Inherited Methods
`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.toString`
`java.lang.Object.wait`

See Also TibrvMsg on page 52

TibrvCmMsg.getSender()

Method

Declaration

```
static final java.lang.String getSender(
    TibrvMsg    msg)
  throws TibrvException
```

Purpose Extract the correspondent name of the sender from a certified message.

Remarks If the message is from a CM sender, then `TibrvCmMsg.getSender()` yields a valid CM correspondent name. If the message is *not* from a CM sender, then `TibrvCmMsg.getSender()` returns `null`.

Parameter	Description
`msg`	Extract the sender name from this message.

See Also TibrvCmTransport() on page 299
TibrvCmTransport.getName() on page 313

TibrvCmMsg.getSequence()

Method

Declaration

```
static final long getSequence(
    TibrvMsg    msg)
  throws TibrvException
```

Purpose Extract the sequence number from a certified message.

Remarks Rendezvous certified delivery sending methods automatically generate positive sequence numbers for outbound labeled messages.

In receiving programs, zero is a special value, indicating that an inbound message is not certified.

Parameter	Description
`msg`	Extract the sequence number from this message.

Exception This method throws an exception to discriminate between certified messages (included in a certified delivery agreement) and other messages.

- If the message is from a CM sender, *and* the CM listener is registered for certified delivery with that sender, then `TibrvCmMsg.getSequence()` yields a valid sequence number.
- If the message is from a CM sender, but the listener is *not* registered for certified delivery, then `TibrvCmMsg.getSequence()` *in the context of a* `TibrvCmListener`*'s callback method* throws an exception with the status code `TibrvStatus.NOT_FOUND`. (In any other context, it returns the actual sequence number stored on the message.)

  Notice that the first labeled message that a program receives on a subject might not be certified; that is, the sender has not registered a certified delivery agreement with the listener. If appropriate, the certified delivery library automatically requests that the sender register the listener for certified delivery. (See Discovery and Registration for Certified Delivery on page 154 in *TIBCO Rendezvous Concepts*.)

  A labeled but uncertified message can also result when the sender explicitly disallows or removes the listener.
- If the message is *not* from a CM sender, then `TibrvCmMsg.getSequence()` (in any context) returns zero.

Release 5 Interaction In release 6 (and later) the sequence number is a 64-bit unsigned integer, while in older releases (5 and earlier) it is a 32-bit unsigned integer.

When 32-bit senders overflow the sequence number, behavior is undefined.

When 64-bit senders send sequence numbers greater than 32 bits, 32-bit receivers detect malformed label information, and process the message as an ordinary reliable message (uncertified and unlabeled).

See Also TibrvCmTransport.send() on page 322

TibrvCmMsg.getTimeLimit()

Method

Declaration

```
static final double getTimeLimit(
    TibrvMsg    msg)
  throws TibrvException
```

Purpose Extract the message time limit from a certified message.

Remarks Programs can explicitly set the message time limit (see TibrvCmMsg.setTimeLimit() on page 337).

Zero is a special value, indicating no time limit.

If a time limit is not set for a message, this method returns zero. This situation can occur only for unsent outbound messages, and for inbound unlabeled messages.

Time limits represent the minimum time that certified delivery is in effect.

This value represents the total time limit of the message, *not* the time remaining.

Parameter	Description
`msg`	Extract the time limit from this message.

See Also

TibrvCmTransport.send() on page 322
TibrvCmMsg.setTimeLimit() on page 337

TibrvCmMsg.setTimeLimit()

Method

Declaration

```
static final void setTimeLimit(
    TibrvMsg    msg,
    double      timeLimit)
  throws TibrvException
```

Purpose Set the message time limit of a certified message.

Remarks Every labeled message has a time limit, after which the sender no longer certifies delivery.

Sending programs can explicitly set the message time limit using this method. If a time limit is not already set for the outbound message, `TibrvCmTransport.send()` sets it to the transport's default time limit (see TibrvCmTransport.setDefaultTimeLimit() on page 326); if that default is not set for the transport, the default time limit is zero (no time limit).

Time limits represent the minimum time that certified delivery is in effect.

It is meaningless for receiving programs to call this method.

Parameter	Description
`msg`	Set the time limit of this message.
`timeLimit`	Use this time limit (in whole seconds) for the message. The time limit must be non-negative.

See Also TibrvCmTransport.getDefaultTimeLimit() on page 311
TibrvCmTransport.setDefaultTimeLimit() on page 326
TibrvCmMsg.getTimeLimit() on page 336

Chapter 10 **Distributed Queue**

Programs can use distributed queues for *one of n* certified delivery to a group of worker processes.

A distributed queue is a group of `TibrvCmQueueTransport` objects, each in a separate process. From the outside, a distributed queue appears as though a single transport object; inside, the group members act in concert to process inbound task messages. Ordinary senders and CM senders can send task messages to the group. Notice that the senders are not group members, and do not do anything special to send messages to a group; rather, they send messages to ordinary subject names. Inside the group, the member acting as scheduler assigns each task message to exactly one of the other members (which act as workers); only that worker processes the task message. Each member uses CM listener objects to receive task messages.

Distributed queues depend upon the certified delivery methods and the fault tolerance methods.

We do not recommend sending messages across network boundaries to a distributed queue, nor distributing queue members across network boundaries. However, when crossing network boundaries in either of these ways, you must configure the Rendezvous routing daemons to exchange `_RVCM` and `_RVCMQ` administrative messages. For details, see Distributed Queues on page 411 in *TIBCO Rendezvous Administration*.

See Also Distributed Queue, page 183 in *TIBCO Rendezvous Concepts*

Topics

TibrvCmQueueTransport

Class

Declaration

```
class com.tibco.tibrv.TibrvCmQueueTransport
  extends TibrvCmTransport
```

Purpose Coordinate a distributed queue for *one-of-n* delivery.

Remarks Each `TibrvCmQueueTransport` object employs a `TibrvTransport` for network communications. The `TibrvCmQueueTransport` adds the accounting and coordination mechanisms needed for one-of-n delivery.

Several `TibrvCmQueueTransport` objects can employ one `TibrvTransport`, which also remains available for its own ordinary listeners and for sending ordinary messages.

Programs must explicitly destroy each `TibrvCmQueueTransport` object. Destroying a `TibrvCmQueueTransport` invalidates any certified listeners using that transport (while preserving their certified delivery agreements).

Whether explicitly or implicitly, programs must destroy instances of this class. Rendezvous software keeps internal references to these objects, so the Java garbage collector does not delete them automatically.

All members of a distributed queue must listen to exactly the same set of subjects. See Enforcing Identical Subscriptions on page 186 in *TIBCO Rendezvous Concepts*.

Scheduler recovery and task rescheduling are available only when the task message is a certified message (that is, a certified delivery agreement is in effect between the task sender and the distributed queue transport scheduler).

Disabled Methods Although `TibrvCmQueueTransport` is a subclass of `TibrvCmTransport`, all methods related to sending messages are disabled in `TibrvCmQueueTransport`. These disabled methods throw an `IllegalStateException`; for a list, see Disabled Methods on page 342. See also Certified Delivery Behavior in Queue Members on page 185 in *TIBCO Rendezvous Concepts*.

(Sheet 1 of 2)

Method	Description	Page
`TibrvCmQueueTransport()`	Create a transport as a distributed queue member.	344
`TibrvCmQueueTransport.destroy()`	Destroy a distributed queue member object.	347

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Method	Description	Page
`TibrvCmQueueTransport.getCompleteTime()`	Extract the worker complete time limit of a distributed queue member.	348
`TibrvCmQueueTransport.getUnassignedMessageCount()`	Extract the number of unassigned task messages from a distributed queue transport.	349
`TibrvCmQueueTransport.getWorkerWeight()`	Extract the worker weight of a distributed queue member.	350
`TibrvCmQueueTransport.getWorkerTasks()`	Extract the worker task capacity of a distributed queue member.	351
`TibrvCmQueueTransport.setCompleteTime()`	Set the worker complete time limit of a distributed queue member.	352
`TibrvCmQueueTransport.setTaskBacklogLimit...()`	Set the scheduler task queue limits of a distributed queue transport.	353
`TibrvCmQueueTransport.setWorkerWeight()`	Set the worker weight of a distributed queue member.	354
`TibrvCmQueueTransport.setWorkerTasks()`	Set the worker task capacity of a distributed queue member.	355

Inherited Methods	
Legal Methods	TibrvCmTransport.getName() TibrvCmTransport.getTransport() TibrvTransport.isValid() (override) java.lang.Object.equals java.lang.Object.getClass java.lang.Object.hashCode java.lang.Object.notify java.lang.Object.notifyAll java.lang.Object.toString java.lang.Object.wait
Disabled Methods	TibrvCmTransport.addListener() TibrvCmTransport.allowListener() TibrvCmTransport.connectToRelayAgent() TibrvCmTransport.disallowListener() TibrvCmTransport.disconnectFromRelayAgent() TibrvCmTransport.getDefaultTimeLimit() TibrvCmTransport.getLedgerName() TibrvCmTransport.getRelayAgent() TibrvCmTransport.getRequestOld() TibrvCmTransport.getSyncLedger() TibrvCmTransport.removeListener() TibrvCmTransport.removeSendState() TibrvCmTransport.reviewLedger() TibrvCmTransport.send() TibrvCmTransport.sendReply() TibrvCmTransport.sendRequest() TibrvCmTransport.setDefaultTimeLimit() TibrvCmTransport.syncLedger() TibrvTransport.createInbox() TibrvTransport.send() TibrvTransport.sendReply() TibrvTransport.sendRequest()

Constant	Description
TibrvCmQueueTransport.DEFAULT_COMPLETE_TIME	`static final double 0`
TibrvCmQueueTransport.DEFAULT_WORKER_WEIGHT	`static final int 1`

Constant	Description
TibrvCmQueueTransport.DEFAULT_WORKER_TASKS	static final int 1
TibrvCmQueueTransport.DEFAULT_SCHEDULER_WEIGHT	static final int 1
TibrvCmQueueTransport.DEFAULT_SCHEDULER_HEARTBEAT	static final double 1.0
TibrvCmQueueTransport.DEFAULT_SCHEDULER_ACTIVATION	static final double 3.5

Related Classes

TibrvTransport on page 210
TibrvRvdTransport on page 235
TibrvCmTransport on page 295

TibrvCmQueueTransport()

Constructor

Declaration

```
TibrvCmQueueTransport(
    TibrvRvdTransport    transport,
    java.lang.String     cmName)
  throws TibrvException

TibrvCmQueueTransport(
   TibrvRvdTransport    transport,
   java.lang.String     cmName,
   int          workerWeight,
   int          workerTasks,
   int          schedulerWeight,
   double       schedulerHeartbeat,
   double       schedulerActivation)
 throws TibrvException
```

Purpose Create a transport as a distributed queue member.

Remarks The new `TibrvCmQueueTransport` must employ a valid `TibrvRvdTransport` for network communications.

(Sheet 1 of 3)

Parameter	Description
`transport`	The new `TibrvCmQueueTransport` employs this `TibrvRvdTransport` object for network communications. Destroying the `TibrvCmQueueTransport` does not affect this transport.
`cmName`	Bind this reusable name to the new transport object, which becomes a member of the distributed queue with this name. The name must be non-`null`, and conform to the syntax rules for Rendezvous subject names. It cannot begin with reserved tokens. It cannot be a non-reusable name generated by a call to `TibrvCmTransport()`. It cannot be the empty string. For more information, see Reusable Names on page 167 in *TIBCO Rendezvous Concepts*.

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Parameter	Description
`workerWeight`	When the scheduler receives a task, it assigns the task to the available worker with the greatest worker weight. A worker is considered available unless either of these conditions are true: • The pending tasks assigned to the worker member exceed its task capacity. • The worker is also the scheduler. (The scheduler assigns tasks to its own worker role only when no other workers are available.) When omitted, the default value is `1`.
`workerTasks`	Task capacity is the maximum number of tasks that a worker can accept. When the number of accepted tasks reaches this maximum, the worker cannot accept additional tasks until it completes one or more of them. When the scheduler receives a task, it assigns the task to the worker with the greatest worker weight—unless the pending tasks assigned to that worker exceed its task capacity. When the preferred worker has too many tasks, the scheduler assigns the new inbound task to the worker with the next greatest worker weight. The value must be a non-negative integer. When omitted, the default value is `1`. Zero is a special value, indicating that this distributed queue member is a dedicated scheduler (that is, it never accepts tasks). Tuning task capacity to compensate for communication time lag is more complicated than it might seem. Before setting this value to anything other than 1, see Task Capacity on page 188 in *TIBCO Rendezvous Concepts*.

(Sheet 3 of 3)

Parameter	Description
`schedulerWeight`	Weight represents the ability of this member to fulfill the role of scheduler, relative to other members with the same name. Cooperating members use relative scheduler weight values to elect one member as the scheduler; members with higher scheduler weight take precedence. When omitted, the default value is `1`. Acceptable values range from 0 to 65535. Zero is a special value, indicating that the member can never be the scheduler. For more information, see Rank and Weight on page 206 in *TIBCO Rendezvous Concepts*.
`schedulerHeartbeat`	The scheduler sends heartbeat messages at this interval (in seconds). All `TibrvCmQueueTransport` objects with the same name must specify the same value for this parameter. The value must be strictly positive. To determine the correct value, see Step 4: Choose the Intervals on page 237 in *TIBCO Rendezvous Concepts*. When omitted, the default value is `1.0`.
`schedulerActivation`	When the heartbeat signal from the scheduler has been silent for this interval (in seconds), the cooperating member with the greatest scheduler weight takes its place as the new scheduler. All `TibrvCmQueueTransport` objects with the same name must specify the same value for this parameter. The value must be strictly positive. To determine the correct value, see Step 4: Choose the Intervals on page 237 in *TIBCO Rendezvous Concepts*. When omitted, the default value is `3.5`.

See Also TibrvCmQueueTransport.destroy() on page 347
Distributed Queue, page 183, in *TIBCO Rendezvous Concepts*

TibrvCmQueueTransport.destroy()

Method

Declaration `void destroy()`

Purpose Destroy a distributed queue member object.

Remarks Destroying a `TibrvCmQueueTransport` object removes the program from the distributed queue group.

See Also TibrvCmQueueTransport() on page 344

TibrvCmQueueTransport.getCompleteTime()

Method

Declaration `double getCompleteTime()`

Purpose Extract the worker complete time limit of a distributed queue member.

See Also Distributed Queue, page 183, in *TIBCO Rendezvous Concepts*
TibrvCmQueueTransport.setCompleteTime() on page 352

TibrvCmQueueTransport.getUnassignedMessageCount()

Method

Declaration

```
int getUnassignedMessageCount()
  throws TibrvException
```

Purpose

Extract the number of unassigned task messages from a distributed queue transport.

Remarks

An unassigned task message is a message received by the scheduler, but not yet assigned to any worker in the distributed queue.

This call produces a valid count only within a scheduler process. Within a worker process, this call always produces zero.

TibrvCmQueueTransport.getWorkerWeight()

Method

Declaration `int getWorkerWeight()`

Purpose Extract the worker weight of a distributed queue member.

See Also Distributed Queue, page 183, in *TIBCO Rendezvous Concepts*
TibrvCmQueueTransport() on page 344
TibrvCmQueueTransport.setWorkerWeight() on page 354

TibrvCmQueueTransport.getWorkerTasks()

Method

Declaration `int getWorkerTasks()`

Purpose Extract the worker task capacity of a distributed queue member.

See Also Distributed Queue, page 183, in *TIBCO Rendezvous Concepts*
TibrvCmQueueTransport() on page 344
TibrvCmQueueTransport.setWorkerTasks() on page 355

TibrvCmQueueTransport.setCompleteTime()

Method

Declaration

```
void setCompleteTime(
    double   completeTime)
  throws TibrvException
```

Purpose Set the worker complete time limit of a distributed queue member.

Remarks If the complete time is non-zero, the scheduler waits for a worker member to complete an assigned task. If the complete time elapses before the scheduler receives completion from the worker member, the scheduler reassigns the task to another worker member.

Zero is a special value, which specifies no limit on the completion time—that is, the scheduler does not set a timer, and does not reassign tasks when task completion is lacking. All members implicitly begin with a default complete time value of zero; programs can change this parameter using this method.

Parameter	Description
`completeTime`	Use this complete time (in seconds). The time must be non-negative.

See Also Distributed Queue, page 183, in *TIBCO Rendezvous Concepts*
TibrvCmQueueTransport.getCompleteTime() on page 348

TibrvCmQueueTransport.setTaskBacklogLimit...()

Method

Declaration

```
void setTaskBacklogLimitInBytes(
    int   byteLimit)
  throws TibrvException

void setTaskBacklogLimitInMessages(
    int   msgLimit)
  throws TibrvException
```

Purpose Set the scheduler task queue limits of a distributed queue transport.

Remarks The scheduler stores tasks in a queue. These properties limit the maximum size of that queue—by number of bytes or number of messages (or both). When no value is set for these properties, the default is no limit.

When the task messages in the queue exceed either of these limits, Rendezvous software deletes new inbound task messages.

Programs may call each of these methods at most once. The calls must occur before the transport assumes the scheduler role; after a transport acts as a scheduler, these values are fixed, and subsequent attempts to change them throw an exception with status code `TibrvStatus.NOT_PERMITTED`.

Parameter	Description
`byteLimit`	Use this size limit (in bytes). Zero is a special value, indicating no size limit.
`msgLimit`	Use this message limit (number of messages). Zero is a special value, indicating no limit on the number of messages.

See Also Distributed Queue, page 183, in *TIBCO Rendezvous Concepts*

TibrvCmQueueTransport.setWorkerWeight()

Method

Declaration

```
void setWorkerWeight(
    int   workerWeight)
  throws TibrvException
```

Purpose Set the worker weight of a distributed queue member.

Remarks Relative worker weights assist the scheduler in assigning tasks. When the scheduler receives a task, it assigns the task to the available worker with the greatest worker weight.

The default worker weight is 1; programs can set this parameter at creation using `TibrvCmQueueTransport()`, or change it dynamically using this method.

Parameter	Description
`workerWeight`	Use this worker weight.

See Also Distributed Queue, page 183, in *TIBCO Rendezvous Concepts*
TibrvCmQueueTransport() on page 344
TibrvCmQueueTransport.getWorkerWeight() on page 350

TibrvCmQueueTransport.setWorkerTasks()

Method

Declaration

```
void setWorkerTasks(
    int   workerTasks)
  throws TibrvException
```

Purpose Set the worker task capacity of a distributed queue member.

Remarks Task capacity is the maximum number of tasks that a worker can accept. When the number of accepted tasks reaches this maximum, the worker cannot accept additional tasks until it completes one or more of them.

When the scheduler receives a task, it assigns the task to the worker with the greatest worker weight—unless the pending tasks assigned to that worker exceed its task capacity. When the preferred worker has too many tasks, the scheduler assigns the new inbound task to the worker with the next greatest worker weight.

The default worker task capacity is 1.

Zero is a special value, indicating that this distributed queue member is a dedicated scheduler (that is, it never accepts tasks).

Tuning task capacity to compensate for communication time lag is more complicated than it might seem. Before setting this value to anything other than 1, see Task Capacity on page 188 in *TIBCO Rendezvous Concepts*.

Parameter	Description
`workerTasks`	Use this task capacity. The value must be a non-negative integer.

See Also

Distributed Queue, page 183, in *TIBCO Rendezvous Concepts*
TibrvCmQueueTransport() on page 344
TibrvCmQueueTransport.getWorkerTasks() on page 351

Chapter 11 Exceptions and Errors

Topics

TibrvException

Class

Declaration

```
class com.tibco.tibrv.TibrvException
  extends java.lang.Exception
```

Purpose Rendezvous software throws exceptions of this class.

Remarks Rendezvous software also throws exceptions defined as part of the Java language.

Field	Description
`error`	An error or status code, indicating the reason for the exception; see TibrvStatus on page 360.
`internal`	In some cases this field contains a Java exception, which can yield additional information. When no further information is available, this field is `null`.

Method	Description	Page
`TibrvException.printStackTrace()`	Print stack trace of this exception, and of the internal exception (if it is set).	359

Inherited Methods

`java.lang.Throwable.fillInStackTrace`
`java.lang.Throwable.getLocalizedMessage`
`java.lang.Throwable.getMessage`
`java.lang.Throwable.printStackTrace` (override)
`java.lang.Throwable.toString` (override)

`java.lang.Object.equals`
`java.lang.Object.getClass`
`java.lang.Object.hashCode`
`java.lang.Object.notify`
`java.lang.Object.notifyAll`
`java.lang.Object.wait`

See Also TibrvStatus on page 360

TibrvException.printStackTrace()

Method

Declaration

```
void printStackTrace()

void printStackTrace(java.io.PrintWriter s)

void printStackTrace(java.io.PrintStream s)
```

Purpose Print stack trace of this exception, and of the internal exception (if it is set).

Overrides `java.lang.Throwable.printStackTrace`

Parameter	Description
`s`	Print the stack trace to this object. When absent, print to the standard error stream.

TibrvStatus

Class

Declaration `class com.tibco.tibrv.TibrvStatus`

Purpose Define status codes.

(Sheet 1 of 5)

Status	Description
`TibrvStatus.INIT_FAILURE`	Cannot create the network transport.
`TibrvStatus.INVALID_TRANSPORT`	The transport has been destroyed, or is otherwise unusable.
`TibrvStatus.INVALID_ARG`	An argument is invalid. Check arguments other than messages, subject names, transports, events, queues and queue groups (which have separate status codes).
`TibrvStatus.NOT_INITIALIZED`	The method cannot run because the Rendezvous environment is not initialized (open).
`TibrvStatus.ARG_CONFLICT`	Two arguments that require a specific relation are in conflict. For example, the upper end of a numeric range is less than the lower end.
`TibrvStatus.SERVICE_NOT_FOUND`	Transport creation failed; cannot match the service name using `getservbyname()`.
`TibrvStatus.NETWORK_NOT_FOUND`	Transport creation failed; cannot match the network name using `getnetbyname()`.
`TibrvStatus.DAEMON_NOT_FOUND`	Transport creation failed; cannot match the daemon port number.
`TibrvStatus.NO_MEMORY`	The method could not allocate dynamic storage.
`TibrvStatus.INVALID_SUBJECT`	The method received a subject name with incorrect syntax.
`TibrvStatus.DAEMON_NOT_CONNECTED`	The Rendezvous daemon process (`rvd`) exited, or was never started. This status indicates that the program cannot start the daemon and connect to it.

(Sheet 2 of 5)

Status	Description
`TibrvStatus.VERSION_MISMATCH`	The library, header files and Rendezvous daemon are incompatible.
`TibrvStatus.SUBJECT_COLLISION`	It is illegal to create two certified worker events on the same CM transport with overlapping subjects.
`TibrvStatus.TIBRV_VC_NOT_CONNECTED`	A virtual circuit terminal was once complete, but is now irreparably broken.
`TibrvStatus.NOT_PERMITTED`	1. The program attempted an illegal operation. 2. Cannot create ledger file.
`TibrvStatus.INVALID_NAME`	The field name is too long; see Field Name Length on page 64.
`TibrvStatus.INVALID_TYPE`	1. The field type is not registered. 2. Cannot update field to a type that differs from the existing field's type.
`TibrvStatus.INVALID_SIZE`	The explicit size in the field does not match its explicit type.
`TibrvStatus.INVALID_COUNT`	The explicit field count does not match its explicit type.
`TibrvStatus.INVALID_DATA`	The program attempted to add data to a message field, but the datatype is not supported.
`TibrvStatus.NOT_FOUND`	Could not find the specified field in the message.
`TibrvStatus.ID_IN_USE`	Cannot add this field because its identifier is already present in the message; identifiers must be unique.
`TibrvStatus.ID_CONFLICT`	After field search by identifier fails, search by name succeeds, but the actual identifier in the field is non-`null` (so it does not match the identifier supplied).
`TibrvStatus.CONVERSION_FAILED`	Found the specified field, but could not convert it to the desired datatype.

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Status	Description
`TibrvStatus.RESERVED_HANDLER`	The datatype handler number is reserved for Rendezvous internal datatype handlers.
`TibrvStatus.ENCODER_FAILED`	The program's datatype encoder failed.
`TibrvStatus.DECODER_FAILED`	The program's datatype decoder failed.
`TibrvStatus.INVALID_MSG`	The method received a message argument that is not a well-formed message.
`TibrvStatus.INVALID_FIELD`	The program supplied an invalid field as an argument.
`TibrvStatus.INVALID_INSTANCE`	The program supplied zero as the field instance number (the first instance is number 1).
`TibrvStatus.CORRUPT_MSG`	The method detected a corrupt message argument.
`TibrvStatus.TIMEOUT`	A timed dispatch call returned without dispatching an event. A send request call returned without receiving a reply message. A virtual circuit terminal is not yet ready for use.
`TibrvStatus.INTR`	Interrupted operation.
`TibrvStatus.INVALID_DISPATCHABLE`	The method received an event queue or queue group that has been destroyed, or is otherwise unusable.
`TibrvStatus.INVALID_DISPATCHER`	The dispatcher thread is invalid or has been destroyed.
`TibrvStatus.INVALID_EVENT`	The method received an event that has been destroyed, or is otherwise unusable.
`TibrvStatus.INVALID_CALLBACK`	The method received `NULL` instead of a callback method.
`TibrvStatus.INVALID_QUEUE`	The method received a queue that has been destroyed, or is otherwise unusable.
`TibrvStatus.INVALID_QUEUE_GROUP`	The method received a queue group that has been destroyed, or is otherwise unusable.

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Status	Description
`TibrvStatus.INVALID_TIME_INTERVAL`	The method received a negative timer interval.
`TibrvStatus.SOCKET_LIMIT`	The operation failed because of an operating system socket limitation.
`TibrvStatus.OS_ERROR`	`Tibrv.open()` encountered an operating system error.
`TibrvStatus.EOF`	End of file.
`TibrvStatus.INVALID_FILE`	1. A certificate file or a ledger file is not recognizable as such. 2. `TibrvSdContext.setUserCertWithKey()` or `TibrvSdContext.setUserCertWithKeyBin()` could not complete a certificate file operation; this status code can indicate either disk I/O failure, or invalid certificate data, or an incorrect password.
`TibrvStatus.FILE_NOT_FOUND`	Rendezvous software could not find the specified file.
`TibrvStatus.IO_FAILED`	Cannot write to ledger file.
`TibrvStatus.NOT_FILE_OWNER`	The program cannot open the specified file because another program owns it. For example, ledger files are associated with correspondent names.
`TibrvStatus.TIBRV_IPM_ONLY`	The call is not available because the IPM library is not linked (that is, the call is available only when the IPM library is linked).
Java-Specific Status Codes	
`TibrvStatus.ERROR`	Default error when the error cannot be specified more precisely.
`TibrvStatus.LIBRARY_NOT_FOUND`	The JNI library is not present.
`TibrvStatus.LIBRARY_NOT_LOADED`	`SecurityException` while opening Rendezvous machinery; the JNI library is required, but not properly loaded.

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Status	Description
`TibrvStatus.WRONG_JAVA_ARCHIVE`	Attempted to open the native (JNI) implementation, but failed; opened the Java implementation instead.
`TibrvStatus.AGENT_NOT_FOUND`	The transport cannot find the specified `rva`.
`TibrvStatus.AGENT_ERROR`	Invalid response from `rva`.
`TibrvStatus.AGENT_DISCONNECTED`	The transport has lost its connection to `rva`. Check the physical network connection. Check that `rva` is still running.
`TibrvStatus.REQUEST_FAILED`	`rva` could not fulfill a request from the program.
`TibrvStatus.INVALID_ENCODING`	`TibrvMsg.setStringEncoding()` received an invalid encoding name.

See Also TibrvException on page 358

TibrvErrorCallback

Interface

Declaration `interface com.tibco.tibrv.`**`TibrvErrorCallback`**

Purpose Process asynchronous errors.

Remarks Programs can implement this interface (optional) to process asynchronous errors.

Method	Description	Page
`TibrvErrorCallback.onError()`	Process asynchronous errors.	366

See Also Tibrv.getErrorCallback() on page 32
Tibrv.setErrorCallback() on page 40

TibrvErrorCallback.onError()

Method

Declaration

```
void onError(
    java.lang.Object tibrvObject,
    int errorCode,
    java.lang.String message,
    java.lang.Throwable internal)
```

Purpose Process asynchronous errors.

Remarks Rendezvous software calls this method in two asynchronous error situations:

- The connection to the Rendezvous agent has broken.

  In this situation, the `tibrvObject` parameter receives the broken `TibrvRvaTransport` object. All listener objects associated with the broken transport are invalid.

- A subscription (listener) request failed.

  In this situation, the `tibrvObject` parameter receives the `TibrvListener` object representing the failed subscription. This situation is rare.

Programs need not respond the these errors. Programs that *do* respond to these errors usually inform the user of the problem.

Parameter	Description
`tibrvObject`	This parameter receives the object that is the locus of the error—either a `TibrvRvaTransport`, or a `TibrvListener`.
`errorCode`	This parameter receives a status code indicating the error. See TibrvStatus on page 360.
`message`	This parameter receives a printable string describing the error. In some cases, this message yields more information than the error code alone.
`internal`	In some cases this parameter receives a Java exception, which can yield additional information about the cause of the error. When no further information is available, this parameter receives `null`.

Appendix A Custom Datatypes

Programs can define custom datatypes by implementing interfaces that encode and decode the data. Decoder methods of `TibrvMsg` decode data from Rendezvous wire format representation into Java objects (for example, while extracting data from a message field). Encoder methods of `TibrvMsg` encode data into Rendezvous wire format representation from Java objects (for example, when sending a message).

This chapter describes these interfaces, and the methods that bind them to `TibrvMsg`.

Topics

TibrvMsg.getDecoder()

Method

Declaration

```
static TibrvMsgDecoder getDecoder(
    short    userType)
```

Purpose Extract the decoder interface for a custom datatype.

Remarks If no decoder is registered for the datatype, return `null`.

Parameter	Description
`userType`	This type designator must be in the inclusive range `[TibrvMsg.USER_FIRST,TibrvMsg.USER_LAST]`.

See Also TibrvMsg.setHandlers() on page 370
TibrvMsgDecoder on page 371

TibrvMsg.getEncoder()

Method

Declaration

```
static TibrvMsgEncoder getEncoder(
    short    userType)
```

Purpose Extract the encoder interface for a custom datatype.

Remarks If no encoder is registered for the datatype, return `null`.

Parameter	Description
`userType`	This type designator must be in the inclusive range `[TibrvMsg.USER_FIRST, TibrvMsg.USER_LAST]`.

See Also TibrvMsg.setHandlers() on page 370
TibrvMsgEncoder on page 373

TibrvMsg.setHandlers()

Method

Declaration

```
static void setHandlers(
    short                userType,
    TibrvMsgEncoder      encoder,
    TibrvMsgDecoder      decoder)
```

Purpose Define a custom datatype by registering its encoder and decoder interfaces.

Remarks The encoder and decoder must implement inverse operators. That is, when the encoder encodes a Java object as a byte array, and the decoder must decode the byte array to an identical Java object. Conversely, when the decoder decodes the byte array to a Java object, the encoder must encode the Java object as an identical byte array.

This method sets (or replaces) both interfaces. Supplying `null` for either the encoder or the decoder, removes that interface. Supplying `null` for both interfaces disables the custom type (by removing both interfaces).

Parameter	Description
`userType`	Define a custom datatype with this numeric designator. This type designator must be in the inclusive range `[TibrvMsg.USER_FIRST,TibrvMsg.USER_LAST]`.
`encoder`	Register this encoder for the type.
`decoder`	Register this decoder for the type.

See Also TibrvMsgDecoder on page 371
TibrvMsgEncoder on page 373

TibrvMsgDecoder

Interface

Declaration `interface com.tibco.tibrv.`**`TibrvMsgDecoder`**

Purpose Decode custom datatypes from wire format into Java objects.

Remarks To define this interface, programs must implement its method.

Method	Description	Page
`TibrvMsgDecoder.decode()`	Decode data (of a custom datatype) from wire format into a Java object.	372

See Also TibrvMsg.setHandlers() on page 370.
TibrvMsgEncoder on page 373

TibrvMsgDecoder.decode()

Method

Declaration

```
java.lang.Object decode(
    short type,
    byte[] bytes)
```

Purpose Decode data (of a custom datatype) from wire format into a Java object.

Remarks When this method successfully decodes the data, it must return the decoding as a Java object. When this method cannot decode the data, it must return `null`.

Parameter	Description
`type`	Decode this custom datatype.
`bytes`	Decode the data contained in this byte array. This argument cannot be `null`. However, it can be a byte array with length zero.

See Also TibrvMsgEncoder.encode() on page 375

TibrvMsgEncoder

Interface

Declaration `interface com.tibco.tibrv.`**`TibrvMsgEncoder`**

Purpose Encode Java objects as wire format custom datatypes.

Remarks To define this interface, programs must implement both of its methods.

Method	Description	Page
`TibrvMsgEncoder.canEncode()`	Test whether this encoder can encode the data as a particular wire format custom datatype.	374
`TibrvMsgEncoder.encode()`	Encode a Java object as a wire format custom datatype.	375

See Also TibrvMsg.setHandlers() on page 370.
TibrvMsgDecoder on page 371

TibrvMsgEncoder.canEncode()

Method

Declaration

```
boolean canEncode(
    short type,
    java.lang.Object data)
```

Purpose Test whether this encoder can encode the data as a particular wire format custom datatype.

Remarks Before calling `TibrvMsgEncoder.encode()`, `TibrvMsg` first checks its applicability by calling this method. Whenever this method indicates that encoding is viable, `TibrvMsgEncoder.encode()` must correctly encode the object.

This method must return `true` if the encoder can encode the data into the specified custom datatype; otherwise it must return `false`.

Parameter	Description
`type`	Test viability of encoding the data as an instance of this custom datatype.
`data`	Test viability of encoding this data.

See Also TibrvMsgEncoder.encode() on page 375

TibrvMsgEncoder.encode()

Method

Declaration

```
byte[] encode(
    short type,
    java.lang.Object data)
```

Purpose Encode a Java object as a wire format custom datatype.

Remarks Before calling this method, `TibrvMsg` first checks its applicability by calling `TibrvMsgEncoder.canEncode()`. Whenever `TibrvMsgEncoder.canEncode()` indicates that encoding is viable, this method must correctly encode the object.

When this method successfully encodes the data, it must return the encoding as a byte array; the byte array value can have length zero. When this method fails, it must return `null`.

Methods that call `TibrvMsgEncoder.encode()` incorporate its byte array value directly into a `TibrvMsg` object.

Parameter	Description
`type`	Encode the data as an instance of this custom datatype.
`data`	Encode this data.

See Also TibrvMsgDecoder.decode() on page 372
TibrvMsgEncoder.canEncode() on page 374

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