



## Red Hat AMQ 7.5

# Using the AMQ JavaScript Client

For Use with AMQ Clients 2.6



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## Abstract

This guide describes how to install and configure the client, run hands-on examples, and use your client with other AMQ components.

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# CHAPTER 1. OVERVIEW

AMQ JavaScript is a library for developing messaging applications. It enables you to write JavaScript applications that send and receive AMQP messages.

AMQ JavaScript is part of AMQ Clients, a suite of messaging libraries supporting multiple languages and platforms. For an overview of the clients, see [AMQ Clients Overview](#). For information about this release, see [AMQ Clients 2.6 Release Notes](#).

AMQ JavaScript is based on the [Rhea](#) messaging library. For detailed API documentation, see the [AMQ JavaScript API reference](#).

## 1.1. KEY FEATURES

- An event-driven API that simplifies integration with existing applications
- SSL/TLS for secure communication
- Flexible SASL authentication
- Automatic reconnect and failover
- Seamless conversion between AMQP and language-native data types
- Access to all the features and capabilities of AMQP 1.0

## 1.2. SUPPORTED STANDARDS AND PROTOCOLS

AMQ JavaScript supports the following industry-recognized standards and network protocols:

- Version 1.0 of the [Advanced Message Queueing Protocol](#) (AMQP)
- Versions 1.0, 1.1, 1.2, and 1.3 of the [Transport Layer Security](#) (TLS) protocol, the successor to SSL
- [Simple Authentication and Security Layer](#) (SASL) mechanisms ANONYMOUS, PLAIN, and EXTERNAL
- Modern [TCP](#) with [IPv6](#)

## 1.3. SUPPORTED CONFIGURATIONS

AMQ JavaScript supports the following OS and language versions:

- Red Hat Enterprise Linux 6 and 7 with Node.js 4, 6, and 8 from Software Collections
- Red Hat Enterprise Linux 8 with Node.js 10
- Microsoft Windows 10 Pro with Node.js 4, 6, and 8
- Microsoft Windows Server 2012 R2 and 2016 with Node.js 4, 6, and 8

AMQ JavaScript is supported in combination with the following AMQ components and versions:

- All versions of AMQ Broker



- All versions of AMQ Interconnect
- All versions of AMQ Online
- A-MQ 6 versions 6.2.1 and higher

For more information, see [Red Hat AMQ 7 Supported Configurations](#) .

## 1.4. TERMS AND CONCEPTS

This section introduces the core API entities and describes how they operate together.

**Table 1.1. API terms**

Entity	Description
<b>Container</b>	A top-level container of connections.
<b>Connection</b>	A channel for communication between two peers on a network. It contains sessions.
<b>Session</b>	A context for sending and receiving messages. It contains senders and receivers.
<b>Sender</b>	A channel for sending messages to a target. It has a target.
<b>Receiver</b>	A channel for receiving messages from a source. It has a source.
<b>Source</b>	A named point of origin for messages.
<b>Target</b>	A named destination for messages.
<b>Message</b>	An application-specific piece of information.
<b>Delivery</b>	A message transfer.

AMQ JavaScript sends and receives *messages*. Messages are transferred between connected peers over *senders* and *receivers*. Senders and receivers are established over *sessions*. Sessions are established over *connections*. Connections are established between two uniquely identified *containers*. Though a connection can have multiple sessions, often this is not needed. The API allows you to ignore sessions unless you require them.

A sending peer creates a sender to send messages. The sender has a *target* that identifies a queue or topic at the remote peer. A receiving peer creates a receiver to receive messages. The receiver has a *source* that identifies a queue or topic at the remote peer.

The sending of a message is called a *delivery*. The message is the content sent, including all metadata such as headers and annotations. The delivery is the protocol exchange associated with the transfer of that content.

To indicate that a delivery is complete, either the sender or the receiver settles it. When the other side learns that it has been settled, it will no longer communicate about that delivery. The receiver can also indicate whether it accepts or rejects the message.

## 1.5. DOCUMENT CONVENTIONS

In this document, **sudo** is used for any command that requires root privileges. You should always exercise caution when using **sudo**, as any changes can affect the entire system.

For more information about using **sudo**, see [The sudo Command](#).

## CHAPTER 2. INSTALLATION

This chapter guides you through the steps to install AMQ JavaScript in your environment.

### 2.1. PREREQUISITES

To begin installation, [use your subscription](#) to access AMQ distribution files and repositories.

To use AMQ JavaScript, you must also install and configure Node.js for your environment. See the [Node.js](#) website for more information.

AMQ JavaScript depends on the Node.js **debug** module. See the [npm page](#) for installation instructions.

### 2.2. INSTALLING ON RED HAT ENTERPRISE LINUX

AMQ JavaScript is distributed as a zip archive. Follow these steps to install it in your environment.

1. Open a browser and log in to the Red Hat Customer Portal **Product Downloads** page at [access.redhat.com/downloads](https://access.redhat.com/downloads).
2. Locate the **Red Hat AMQ Clients** entry in the **JBOSS INTEGRATION AND AUTOMATION** category.
3. Click **Red Hat AMQ Clients** The **Software Downloads** page opens.
4. Download the **AMQ JavaScript Client** zip file.
5. Use the **unzip** command to extract the file contents into a directory of your choosing. This creates a new subdirectory named **nodejs-rhea-<version>**.

```
$ unzip nodejs-rhea-<version>.zip
Archive: nodejs-rhea-<version>.zip
creating: nodejs-rhea-<version>/
creating: nodejs-rhea-<version>/node_modules/
creating: nodejs-rhea-<version>/node_modules/rhea/
[...]
```

6. Configure your environment to use the installed library. Add the **node\_modules** directory to the **NODE\_PATH** environment variable.

```
$ cd nodejs-rhea-<version>
$ export NODE_PATH=$PWD/node_modules:$NODE_PATH
```

To make this configuration take effect for all new console sessions, set **NODE\_PATH** in your **\$HOME/.bashrc** file.

7. Test your installation. The following command returns zero if it can successfully import the installed library.

```
$ node -e 'require("rhea"); echo $?'
0
```

### 2.3. INSTALLING ON MICROSOFT WINDOWS

1. Open a browser and log in to the Red Hat Customer Portal **Product Downloads** page at [access.redhat.com/downloads](https://access.redhat.com/downloads).
2. Locate the **Red Hat AMQ Clients** entry in the **JBOSS INTEGRATION AND AUTOMATION** category.
3. Click **Red Hat AMQ Clients** The **Software Downloads** page opens.
4. Download the **AMQ JavaScript Client** zip file.
5. Extract the file contents into a directory of your choosing by right-clicking on the zip file and selecting **Extract All**. This creates a new subdirectory named **nodejs-rhea-<version>**.
6. Configure your environment to use the installed library. Add the **node\_modules** directory to the **NODE\_PATH** environment variable.

```
$ cd nodejs-rhea-<version>  
$ set NODE_PATH=%cd%\node_modules;%NODE_PATH%
```

## 2.4. PREPARING THE LIBRARY FOR USE IN BROWSERS

AMQ JavaScript can run inside a web browser. To create a browser-compatible version of the library, use the **npm run browserify** command.

```
$ cd nodejs-rhea-<version>/node_modules/rhea  
$ npm install  
$ npm run browserify
```

This produces a file named **rhea.js** that can be used in browser-based applications.

## CHAPTER 3. GETTING STARTED

This chapter guides you through a simple exercise to help you get started using AMQ JavaScript.

### 3.1. PREPARING THE BROKER

The example programs require a running broker with a queue named **examples**. Follow these steps to define the queue and start the broker:

#### Procedure

1. [Install the broker](#).
2. [Create a broker instance](#). Enable anonymous access.
3. Start the broker instance and check the console for any critical errors logged during startup.

```
$ <broker-instance-dir>/bin/artemis run
...
14:43:20,158 INFO [org.apache.activemq.artemis.integration.bootstrap] AMQ101000:
Starting ActiveMQ Artemis Server
...
15:01:39,686 INFO [org.apache.activemq.artemis.core.server] AMQ221020: Started
Acceptor at 0.0.0.0:5672 for protocols [AMQP]
...
15:01:39,691 INFO [org.apache.activemq.artemis.core.server] AMQ221007: Server is now
live
```

4. Use the **artemis queue** command to create a queue called **examples**.

```
<broker-instance-dir>/bin/artemis queue create --name examples --auto-create-address --
anycast
```

You are prompted to answer a series of questions. For yes or no questions, type **N**. Otherwise, press Enter to accept the default value.

### 3.2. RUNNING HELLO WORLD

The Hello World example sends a message to the **examples** queue on the broker and then fetches it back. On success it prints **Hello World!** to the console.

Using your configured installation environment, run the **helloworld.js** example.

```
$ cd nodejs-rhea-<version>/node_modules/rhea/examples
$ node helloworld.js
Hello World!
```

## CHAPTER 4. EXAMPLES

This chapter demonstrates the use of AMQ JavaScript through example programs.

For more examples, see the [AMQ JavaScript example suite](#).

### 4.1. SENDING MESSAGES

This client program connects to a server using **<connection-url>**, creates a sender for target **<address>**, sends a message containing **<message-body>**, closes the connection, and exits.

#### Example: Sending messages

```
"use strict";

var rhea = require("rhea");
var url = require("url");

if (process.argv.length !== 5) {
  console.error("Usage: send.js <connection-url> <address> <message-body>");
  process.exit(1);
}

var conn_url = url.parse(process.argv[2]);
var address = process.argv[3];
var message_body = process.argv[4];

var container = rhea.create_container();

container.on("sender_open", function (event) {
  console.log("SEND: Opened sender for target address '" +
    event.sender.target.address + "'");
});

container.on("sendable", function (event) {
  var message = {
    body: message_body
  };

  event.sender.send(message);

  console.log("SEND: Sent message '" + message.body + "'");

  event.sender.close();
  event.connection.close();
});

var opts = {
  host: conn_url.hostname,
  port: conn_url.port || 5672,
  // To connect with a user and password:
  // username: "<username>",
  // password: "<password>",
};
```

```
var conn = container.connect(opts);
conn.open_sender(address);
```

### Running the example

To run the example program, copy it to a local file and invoke it using the **node** command.

```
$ node send.js amqp://localhost queue1 hello
```

## 4.2. RECEIVING MESSAGES

This client program connects to a server using **<connection-url>**, creates a receiver for source **<address>**, and receives messages until it is terminated or it reaches **<count>** messages.

### Example: Receiving messages

```
"use strict";

var rhea = require("rhea");
var url = require("url");

if (process.argv.length !== 4 && process.argv.length !== 5) {
  console.error("Usage: receive.js <connection-url> <address> [<message-count>]");
  process.exit(1);
}

var conn_url = url.parse(process.argv[2]);
var address = process.argv[3];
var desired = 0;
var received = 0;

if (process.argv.length === 5) {
  desired = parseInt(process.argv[4]);
}

var container = rhea.create_container();

container.on("receiver_open", function (event) {
  console.log("RECEIVE: Opened receiver for source address " +
    event.receiver.source.address + "");
});

container.on("message", function (event) {
  var message = event.message;

  console.log("RECEIVE: Received message " + message.body + "");

  received++;

  if (received == desired) {
    event.receiver.close();
    event.connection.close();
  }
});
```

```
var opts = {
  host: conn_url.hostname,
  port: conn_url.port || 5672,
  // To connect with a user and password:
  // username: "<username>",
  // password: "<password>",
};

var conn = container.connect(opts);
conn.open_receiver(address);
```

### Running the example

To run the example program, copy it to a local file and invoke it using the **python** command.

```
$ node receive.js amqp://localhost queue1
```



## CHAPTER 5. USING THE API

This chapter explains how to use the AMQ JavaScript API to perform common messaging tasks.

For more information, see the [AMQ JavaScript API reference](#) and [AMQ JavaScript example suite](#).

### 5.1. BASIC OPERATION

#### 5.1.1. Handling messaging events

AMQ JavaScript is an asynchronous event-driven API. To define how the application handles events, the user registers event-handling functions on the **container** object. These functions are then called as network activity or timers trigger new events.

##### Example: Handling messaging events

```
var rhea = require("rhea");
var container = rhea.create_container();

container.on("sendable", function (event) {
  console.log("A message can be sent");
});

container.on("message", function (event) {
  console.log("A message is received");
});
```

These are only a few common-case events. The full set is documented in the `{ClientAmqpJavaScriptApiLink}`.

#### 5.1.2. Creating a container

The container is the top-level API object. It is the entry point for creating connections, and it is responsible for running the main event loop. It is often constructed with a global event handler.

##### Example: Creating a container

```
var rhea = require("rhea");
var container = rhea.create_container();
```

##### Setting the container identity

Each container instance has a unique identity called the container ID. When AMQ JavaScript makes a network connection, it sends the container ID to the remote peer. To set the container ID, pass the **id** option to the **create\_container** method.

##### Example: Setting the container identity

```
var container = rhea.create_container({id: "job-processor-3"});
```

If the user does not set the ID, the library will generate a UUID when the container is constructed.

### 5.2. NETWORK CONNECTIONS

### 5.2.1. Creating outgoing connections

To connect to a remote server, pass connection options containing the host and port to the **container.connect()** method.

#### Example: Creating outgoing connections

```
container.on("connection_open", function (event) {
  console.log("Connection " + event.connection + " is open");
});

var opts = {
  host: "example.com",
  port: 5672
};

container.connect(opts);
```

The default host is **localhost**. The default port is 5672.

See the [Section 5.4, "Security"](#) section for information about creating secure connections.

### 5.2.2. Configuring reconnect

Reconnect allows a client to recover from lost connections. It is used to ensure that the components in a distributed system reestablish communication after temporary network or component failures.

AMQ JavaScript enables reconnect by default. If a connection attempt fails, the client will try again after a brief delay. The delay increases exponentially for each new attempt, up to a default maximum of 60 seconds.

To disable reconnect, set the **reconnect** connection option to **false**.

#### Example: Disabling reconnect

```
var opts = {
  host: "example.com",
  reconnect: false
};

container.connect(opts);
```

To control the delays between connection attempts, set the **initial\_reconnect\_delay** and **max\_reconnect\_delay** connection options. Delay options are specified in milliseconds.

To limit the number of reconnect attempts, set the **reconnect\_limit** option.

#### Example: Configuring reconnect

```
var opts = {
  host: "example.com",
  initial_reconnect_delay: 100,
  max_reconnect_delay: 60 * 1000,
  reconnect_limit: 10
};
```

```
};
container.connect(opts);
```

### 5.2.3. Configuring failover

AMQ JavaScript allows you to configure alternate connection endpoints programatically.

To specify multiple connection endpoints, define a function that returns new connection options and pass the function in the **connection\_details** option. The function is called once for each connection attempt.

#### Example: Configuring failover

```
var hosts = ["alpha.example.com", "beta.example.com"];
var index = -1;

function failover_fn() {
  index += 1;

  if (index == hosts.length) index = 0;

  return {host: hosts[index].hostname};
};

var opts = {
  host: "example.com",
  connection_details: failover_fn
}

container.connect(opts);
```

This example implements repeating round-robin failover for a list of hosts. You can use this interface to implement your own failover behavior.

## 5.3. SENDERS AND RECEIVERS

The client uses sender and receiver links to represent channels for delivering messages. Senders and receivers are unidirectional, with a source end for the message origin, and a target end for the message destination.

Source and targets often point to queues or topics on a message broker. Sources are also used to represent subscriptions.

### 5.3.1. Creating queues and topics on demand

Some message servers support on-demand creation of queues and topics. When a sender or receiver is attached, the server uses the sender target address or the receiver source address to create a queue or topic with a name matching the address.

The message server typically defaults to creating either a queue (for one-to-one message delivery) or a topic (for one-to-many message delivery). The client can indicate which it prefers by setting the **queue** or **topic** capability on the source or target.

To select queue or topic semantics, follow these steps:

1. Configure your message server for automatic creation of queues and topics. This is often the default configuration.
2. Set either the **queue** or **topic** capability on your sender target or receiver source, as in the examples below.

### Example: Sending to a queue created on demand

```
var conn = container.connect({host: "example.com"});

var sender_opts = {
  target: {
    address: "jobs",
    capabilities: ["queue"]
  }
}

conn.open_sender(sender_opts);
```

### Example: Receiving from a topic created on demand

```
var conn = container.connect({host: "example.com"});

var receiver_opts = {
  source: {
    address: "notifications",
    capabilities: ["topic"]
  }
}

conn.open_receiver(receiver_opts);
```

For more details, see the following examples:

- [queue-send.js](#)
- [queue-receive.js](#)
- [topic-send.js](#)
- [topic-receive.js](#)

## 5.3.2. Creating durable subscriptions

A durable subscription is a piece of state on the remote server representing a message receiver. Ordinarily, message receivers are discarded when a client closes. However, because durable subscriptions are persistent, clients can detach from them and then re-attach later. Any messages received while detached are available when the client re-attaches.

Durable subscriptions are uniquely identified by combining the client container ID and receiver name to form a subscription ID. These must have stable values so that the subscription can be recovered.

1. Set the connection container ID to a stable value, such as **client-1**:

```
var container = rhea.create_container({id: "client-1"});
```

2. Create a receiver with a stable name, such as **sub-1**, and configure the receiver source for durability by setting the **durable** and **expiry\_policy** properties:

```
var receiver_opts = {
  source: {
    address: "notifications",
    name: "sub-1",
    durable: 2,
    expiry_policy: "never"
  }
}

conn.open_receiver(receiver_opts);
```

To detach from a subscription, use the **receiver.detach()** method. To terminate the subscription, use the **receiver.close()** method.

For more information, see the [durable-subscribe.js example](#).

### 5.3.3. Creating shared subscriptions

A shared subscription is a piece of state on the remote server representing one or more message receivers. Because it is shared, multiple clients can consume from the same stream of messages.

The client configures a shared subscription by setting the **shared** capability on the receiver source.

Shared subscriptions are uniquely identified by combining the client container ID and receiver name to form a subscription ID. These must have stable values so that multiple client processes can locate the same subscription. If the **global** capability is set in addition to **shared**, the receiver name alone is used to identify the subscription.

To create a durable subscription, follow these steps:

1. Set the connection container ID to a stable value, such as **client-1**:

```
var container = rhea.create_container({id: "client-1"});
```

2. Create a receiver with a stable name, such as **sub-1**, and configure the receiver source for sharing by setting the **shared** capability:

```
var receiver_opts = {
  source: {
    address: "notifications",
    name: "sub-1",
    capabilities: ["shared"]
  }
}

conn.open_receiver(receiver_opts);
```

To detach from a subscription, use the **receiver.detach()** method. To terminate the subscription, use the **receiver.close()** method.

For more information, see the [shared-subscribe.js example](#).

## 5.4. SECURITY

### 5.4.1. Securing connections with SSL/TLS

AMQ JavaScript uses SSL/TLS to encrypt communication between clients and servers.

To connect to a remote server with SSL/TLS, set the **transport** connection option to **tls**.

#### Example: Enabling SSL/TLS

```
var opts = {
  host: "example.com",
  port: 5671,
  transport: "tls"
};

container.connect(opts);
```



#### NOTE

By default, the client will reject connections to servers with untrusted certificates. This is sometimes the case in test environments. To bypass certificate authorization, set the **rejectUnauthorized** connection option to **false**. Be aware that this compromises the security of your connection.

### 5.4.2. Connecting with a user and password

AMQ JavaScript can authenticate connections with a user and password.

To specify the credentials used for authentication, set the **username** and **password** connection options.

#### Example: Connecting with a user and password

```
var opts = {
  host: "example.com",
  username: "alice",
  password: "secret"
};

container.connect(opts);
```

### 5.4.3. Configuring SASL authentication

AMQ JavaScript uses the SASL protocol to perform authentication. SASL can use a number of different authentication *mechanisms*. When two network peers connect, they exchange their allowed mechanisms, and the strongest mechanism allowed by both is selected.

AMQ JavaScript enables SASL mechanisms based on the presence of user and password information. If the user and password are both specified, **PLAIN** is used. If only a user is specified, **ANONYMOUS** is used. If neither is specified, SASL is disabled.

## CHAPTER 6. FILE-BASED CONFIGURATION

AMQ JavaScript can read the configuration options used to establish connections from a local file named **connect.json**. This enables you to configure connections in your application at the time of deployment.

The library attempts to read the file when the application calls the container **connect** method without supplying any connection options.

### 6.1. FILE LOCATIONS

If set, AMQ JavaScript uses the value of the **MESSAGING\_CONNECT\_FILE** environment variable to locate the configuration file.

If **MESSAGING\_CONNECT\_FILE** is not set, AMQ JavaScript searches for a file named **connect.json** at the following locations and in the order shown. It stops at the first match it encounters.

On Linux:

1. **\$PWD/connect.json**, where **\$PWD** is the current working directory of the client process
2. **\$HOME/.config/messaging/connect.json**, where **\$HOME** is the current user home directory
3. **/etc/messaging/connect.json**

On Windows:

1. **%cd%/connect.json**, where **%cd%** is the current working directory of the client process

If no **connect.json** file is found, the library uses default values for all options.

### 6.2. FILE FORMAT

The **connect.json** file contains JSON data, with additional support for JavaScript comments.

All of the configuration attributes are optional or have default values, so a simple example need only provide a few details:

**Example: A simple connect.json file**

```
{
  "host": "example.com",
  "user": "alice",
  "password": "secret"
}
```

SASL and SSL/TLS options are nested under **"sasl"** and **"tls"** namespaces:

**Example: A connect.json file with SASL and SSL/TLS options**

```
{
  "host": "example.com",
  "user": "ortega",
  "password": "secret",
```

```

"ssl": {
  "mechanisms": ["SCRAM-SHA-1", "SCRAM-SHA-256"]
},
"tls": {
  "cert": "/home/ortega/cert.pem",
  "key": "/home/ortega/key.pem"
}
}

```

## 6.3. CONFIGURATION OPTIONS

The option keys containing a dot (.) represent attributes nested inside a namespace.

Table 6.1. Configuration options in `connect.json`

Key	Value type	Default value	Description
<b>scheme</b>	string	<b>"amqps"</b>	<b>"amqp"</b> for cleartext or <b>"amqps"</b> for SSL/TLS
<b>host</b>	string	<b>"localhost"</b>	The hostname or IP address of the remote host
<b>port</b>	string or number	<b>"amqps"</b>	A port number or port literal
<b>user</b>	string	<i>None</i>	The user name for authentication
<b>password</b>	string	<i>None</i>	The password for authentication
<b>sasl.mechanisms</b>	list or string	<i>None</i> ( <i>system defaults</i> )	A JSON list of enabled SASL mechanisms. A bare string represents one mechanism. If none are specified, the client uses the default mechanisms provided by the system.
<b>sasl.allow_insecure</b>	boolean	<b>false</b>	Enable mechanisms that send cleartext passwords
<b>tls.cert</b>	string	<i>None</i>	The filename or database ID of the client certificate
<b>tls.key</b>	string	<i>None</i>	The filename or database ID of the private key for the client certificate
<b>tls.ca</b>	string	<i>None</i>	The filename, directory, or database ID of the CA certificate
<b>tls.verify</b>	boolean	<b>true</b>	Require a valid server certificate with a matching hostname



## CHAPTER 7. INTEROPERABILITY

This chapter discusses how to use AMQ JavaScript in combination with other AMQ components. For an overview of the compatibility of AMQ components, see the [product introduction](#).

### 7.1. INTEROPERATING WITH OTHER AMQP CLIENTS

AMQP messages are composed using the [AMQP type system](#). This common format is one of the reasons AMQP clients in different languages are able to interoperate with each other.

When sending messages, AMQ JavaScript automatically converts language-native types to AMQP-encoded data. When receiving messages, the reverse conversion takes place.



#### NOTE

More information about AMQP types is available at the [interactive type reference](#) maintained by the Apache Qpid project.

Table 7.1. AMQP types

AMQP type	Description
<b>null</b>	An empty value
<b>boolean</b>	A true or false value
<b>char</b>	A single Unicode character
<b>string</b>	A sequence of Unicode characters
<b>binary</b>	A sequence of bytes
<b>byte</b>	A signed 8-bit integer
<b>short</b>	A signed 16-bit integer
<b>int</b>	A signed 32-bit integer
<b>long</b>	A signed 64-bit integer
<b>ubyte</b>	An unsigned 8-bit integer
<b>ushort</b>	An unsigned 16-bit integer
<b>uint</b>	An unsigned 32-bit integer
<b>ulong</b>	An unsigned 64-bit integer
<b>float</b>	A 32-bit floating point number

AMQP type	Description
<b>double</b>	A 64-bit floating point number
<b>array</b>	A sequence of values of a single type
<b>list</b>	A sequence of values of variable type
<b>map</b>	A mapping from distinct keys to values
<b>uuid</b>	A universally unique identifier
<b>symbol</b>	A 7-bit ASCII string from a constrained domain
<b>timestamp</b>	An absolute point in time

JavaScript has fewer native types than AMQP can encode. To send messages containing specific AMQP types, use the **wrap\_** functions from the **rhea/types.js** module.

Table 7.2. AMQ JavaScript types before encoding and after decoding

AMQP type	AMQ JavaScript type before encoding	AMQ JavaScript type after decoding
<b>null</b>	<b>null</b>	<b>null</b>
<b>boolean</b>	<b>boolean</b>	<b>boolean</b>
<b>char</b>	<b>wrap_char(number)</b>	<b>number</b>
<b>string</b>	<b>string</b>	<b>string</b>
<b>binary</b>	<b>wrap_binary(string)</b>	<b>string</b>
<b>byte</b>	<b>wrap_byte(number)</b>	<b>number</b>
<b>short</b>	<b>wrap_short(number)</b>	<b>number</b>
<b>int</b>	<b>wrap_int(number)</b>	<b>number</b>
<b>long</b>	<b>wrap_long(number)</b>	<b>number</b>
<b>ubyte</b>	<b>wrap_ubyte(number)</b>	<b>number</b>
<b>ushort</b>	<b>wrap_ushort(number)</b>	<b>number</b>
<b>uint</b>	<b>wrap_uint(number)</b>	<b>number</b>

AMQP type	AMQ JavaScript type before encoding	AMQ JavaScript type after decoding
<b>ulong</b>	<b>wrap_ulong(number)</b>	<b>number</b>
<b>float</b>	<b>wrap_float(number)</b>	<b>number</b>
<b>double</b>	<b>wrap_double(number)</b>	<b>number</b>
<b>array</b>	<b>wrap_array(Array, code)</b>	<b>Array</b>
<b>list</b>	<b>wrap_list(Array)</b>	<b>Array</b>
<b>map</b>	<b>wrap_map(object)</b>	<b>object</b>
<b>uuid</b>	<b>wrap_uuid(number)</b>	<b>number</b>
<b>symbol</b>	<b>wrap_symbol(string)</b>	<b>string</b>
<b>timestamp</b>	<b>wrap_timestamp(number)</b>	<b>number</b>

Table 7.3. AMQ JavaScript and other AMQ client types (1 of 2)

AMQ JavaScript type before encoding	AMQ C++ type	AMQ .NET type
<b>null</b>	<b>nullptr</b>	<b>null</b>
<b>boolean</b>	<b>bool</b>	<b>System.Boolean</b>
<b>wrap_char(number)</b>	<b>wchar_t</b>	<b>System.Char</b>
<b>string</b>	<b>std::string</b>	<b>System.String</b>
<b>wrap_binary(string)</b>	<b>proton::binary</b>	<b>System.Byte[]</b>
<b>wrap_byte(number)</b>	<b>int8_t</b>	<b>System.SByte</b>
<b>wrap_short(number)</b>	<b>int16_t</b>	<b>System.Int16</b>
<b>wrap_int(number)</b>	<b>int32_t</b>	<b>System.Int32</b>
<b>wrap_long(number)</b>	<b>int64_t</b>	<b>System.Int64</b>
<b>wrap_ubyte(number)</b>	<b>uint8_t</b>	<b>System.Byte</b>
<b>wrap_ushort(number)</b>	<b>uint16_t</b>	<b>System.UInt16</b>

AMQ JavaScript type before encoding	AMQ C++ type	AMQ .NET type
<code>wrap_uint(number)</code>	<code>uint32_t</code>	<code>System.UInt32</code>
<code>wrap_ulong(number)</code>	<code>uint64_t</code>	<code>System.UInt64</code>
<code>wrap_float(number)</code>	<code>float</code>	<code>System.Single</code>
<code>wrap_double(number)</code>	<code>double</code>	<code>System.Double</code>
<code>wrap_array(Array, code)</code>	-	-
<code>wrap_list(Array)</code>	<code>std::vector</code>	<code>Amqp.List</code>
<code>wrap_map(object)</code>	<code>std::map</code>	<code>Amqp.Map</code>
<code>wrap_uuid(number)</code>	<code>proton::uuid</code>	<code>System.Guid</code>
<code>wrap_symbol(string)</code>	<code>proton::symbol</code>	<code>Amqp.Symbol</code>
<code>wrap_timestamp(number)</code>	<code>proton::timestamp</code>	<code>System.DateTime</code>

Table 7.4. AMQ JavaScript and other AMQ client types (2 of 2)

AMQ JavaScript type before encoding	AMQ Python type	AMQ Ruby type
<code>null</code>	<code>None</code>	<code>nil</code>
<code>boolean</code>	<code>bool</code>	<code>true, false</code>
<code>wrap_char(number)</code>	<code>unicode</code>	<code>String</code>
<code>string</code>	<code>unicode</code>	<code>String</code>
<code>wrap_binary(string)</code>	<code>bytes</code>	<code>String</code>
<code>wrap_byte(number)</code>	<code>int</code>	<code>Integer</code>
<code>wrap_short(number)</code>	<code>int</code>	<code>Integer</code>
<code>wrap_int(number)</code>	<code>long</code>	<code>Integer</code>
<code>wrap_long(number)</code>	<code>long</code>	<code>Integer</code>
<code>wrap_ubyte(number)</code>	<code>long</code>	<code>Integer</code>

AMQ JavaScript type before encoding	AMQ Python type	AMQ Ruby type
<code>wrap_ushort(number)</code>	<code>long</code>	<code>Integer</code>
<code>wrap_uint(number)</code>	<code>long</code>	<code>Integer</code>
<code>wrap_ulong(number)</code>	<code>long</code>	<code>Integer</code>
<code>wrap_float(number)</code>	<code>float</code>	<code>Float</code>
<code>wrap_double(number)</code>	<code>float</code>	<code>Float</code>
<code>wrap_array(Array, code)</code>	<code>proton.Array</code>	<code>Array</code>
<code>wrap_list(Array)</code>	<code>list</code>	<code>Array</code>
<code>wrap_map(object)</code>	<code>dict</code>	<code>Hash</code>
<code>wrap_uuid(number)</code>	-	-
<code>wrap_symbol(string)</code>	<code>str</code>	<code>Symbol</code>
<code>wrap_timestamp(number)</code>	<code>long</code>	<code>Time</code>

## 7.2. INTEROPERATING WITH AMQ JMS

AMQP defines a standard mapping to the JMS messaging model. This section discusses the various aspects of that mapping. For more information, see the AMQ JMS [Interoperability](#) chapter.

### JMS message types

AMQ JavaScript provides a single message type whose body type can vary. By contrast, the JMS API uses different message types to represent different kinds of data. The table below indicates how particular body types map to JMS message types.

For more explicit control of the resulting JMS message type, you can set the **x-opt-jms-msg-type** message annotation. See the AMQ JMS [Interoperability](#) chapter for more information.

Table 7.5. AMQ JavaScript and JMS message types

AMQ JavaScript body type	JMS message type
<code>string</code>	<code>TextMessage</code>
<code>null</code>	<code>TextMessage</code>
<code>wrap_binary(string)</code>	<code>BytesMessage</code>

AMQ JavaScript body type	JMS message type
Any other type	<a href="#">ObjectMessage</a>

### 7.3. CONNECTING TO AMQ BROKER

AMQ Broker is designed to interoperate with AMQP 1.0 clients. Check the following to ensure the broker is configured for AMQP messaging:

- Port 5672 in the network firewall is open.
- The AMQ Broker AMQP acceptor is enabled. See [Default acceptor settings](#).
- The necessary addresses are configured on the broker. See [Addresses, Queues, and Topics](#).
- The broker is configured to permit access from your client, and the client is configured to send the required credentials. See [Broker Security](#).

### 7.4. CONNECTING TO AMQ INTERCONNECT

AMQ Interconnect works with any AMQP 1.0 client. Check the following to ensure the components are configured correctly:

- Port 5672 in the network firewall is open.
- The router is configured to permit access from your client, and the client is configured to send the required credentials. See [Securing network connections](#).

## APPENDIX A. USING YOUR SUBSCRIPTION

AMQ is provided through a software subscription. To manage your subscriptions, access your account at the Red Hat Customer Portal.

### Accessing your account

1. Go to [access.redhat.com](https://access.redhat.com).
2. If you do not already have an account, create one.
3. Log in to your account.

### Activating a subscription

1. Go to [access.redhat.com](https://access.redhat.com).
2. Navigate to **My Subscriptions**.
3. Navigate to **Activate a subscription** and enter your 16-digit activation number.

### Downloading ZIP and TAR files

To access ZIP or TAR files, use the customer portal to find the relevant files for download. If you are using RPM packages, this step is not required.

1. Open a browser and log in to the Red Hat Customer Portal **Product Downloads** page at [access.redhat.com/downloads](https://access.redhat.com/downloads).
2. Locate the **Red Hat AMQ** entries in the **JBOSS INTEGRATION AND AUTOMATION** category.
3. Select the desired AMQ product. The **Software Downloads** page opens.
4. Click the **Download** link for your component.

### Registering your system for packages

To install RPM packages on Red Hat Enterprise Linux, your system must be registered. If you are using ZIP or TAR files, this step is not required.

1. Go to [access.redhat.com](https://access.redhat.com).
2. Navigate to **Registration Assistant**.
3. Select your OS version and continue to the next page.
4. Use the listed command in your system terminal to complete the registration.

To learn more see [How to Register and Subscribe a System to the Red Hat Customer Portal](#) .

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